CIGNA MEDICAL COVERAGE POLICIES- RADIOLOGY

Cardiac Imaging Guidelines

Effective Date: February 02, 2027

Instructions for use

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2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

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Cardiac Imaging Guidelines

General Guidelines (CD-1.0)

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General Information

Abbreviations used in the Cardiac Imaging Guidelines

Abbreviation	Description
ACC	American College of Cardiology
ACS	Acute coronary syndrome
AHA	American Heart Association
AMI	Acute myocardial infarction
ANOCA	Angina with no obstructive coronary artery disease
ASCOT	Anglo-Scandinavian Cardiac Outcomes Trial
ASD	Atrial septal defect
AVR	Aortic valve replacement
BMI	Body mass index
BiVAD	Biventricular assist device
CABG	Coronary artery bypass grafting
CAC	Coronary artery calcium
CAD	Coronary artery disease
CAD-RADS 2	The Coronary Artery Disease Reporting and Data System
CHF	Congestive heart failure
CIED	Cardiac implantable electronic device

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Abbreviation	Description
CMD	Coronary microvascular dysfunction
CMR	Cardiovascular magnetic resonance
COPD	Chronic obstructive pulmonary disease
CT	Computed tomography
CCTA	Coronary computed tomography angiography
CCT	Cardiac computed tomography
CTA	Computed tomography angiography
CTEPH	Chronic thromboembolic pulmonary hypertension
CTRCD	Cardiotoxic Agent/Cancer Therapeutics-Related Cardiac Dysfunction
CTV	Computed tomography venography
CV	Cardiovascular
EBCT	Electron beam computed tomography
ECP	External counterpulsation (also known as EECP)
ECG	Electrocardiogram
ECP	External counterpulsation
ETT	Exercise treadmill stress test
FDG	Fluorodeoxyglucose, a radiopharmaceutical used to measure myocardial metabolism
FFR	Fractional flow reserve
HCM	Hypertrophic cardiomyopathy
HF	Heart failure
INOCA	Ischemia with no obstructive coronary artery disease

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Abbreviation	Description
IV	Intravenous
LAD	Left anterior descending coronary artery
LCx	Left circumflex artery
LDL-C	Low density lipoprotein cholesterol
LHC	Left heart catheterization
LM	Left main coronary artery
LV	Left ventricle
LVAD	Left ventricular assist device
LVEF	Left ventricular ejection fraction
LVOT	Left ventricular outflow tract
MI	Myocardial infarction
MINOCA	Myocardial infarction with no obstructive coronary artery disease
MPI	Myocardial perfusion imaging (SPECT study, nuclear cardiac study)
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
mSv	millisievert (a unit of radiation exposure) equal to an effective dose of a joule of energy per kilogram of recipient mass
MUGA	Multi gated acquisition scan of the cardiac blood pool
PCI	Percutaneous coronary intervention (includes percutaneous coronary angioplasty (PTCA) and coronary artery stenting)
PET	Positron emission tomography
PET MPI	PET myocardial perfusion imaging

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Abbreviation	Description
PTCA	Percutaneous coronary angioplasty
RCA	Right coronary artery
RHC	Right heart catheterization
RVAD	Right ventricular assist device
SCAD	Spontaneous coronary artery dissection
SPECT	Single photon emission computed tomography
SPECT MPI	SPECT myocardial perfusion imaging
Stress-perfusion CMR	Stress-perfusion cardiovascular magnetic resonance (CMR)
Stress Echo	Stress echocardiography
TEE	Transesophageal echocardiogram
TAVI	Transcatheter aortic valve implantation
TAVR	Transcatheter aortic valve replacement
TIA	Transient Ischemic Attack
TTE	Transthoracic echocardiogram
VSD	Ventricular septal defect

Glossary

Acute Chest pain — Chest pain is new onset (<2 mo) or involves a change in pattern, intensity, or duration compared with previous episodes in an individual with recurrent symptoms

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Acute Coronary Syndrome (ACS)	ACS (unstable angina, STEMI and NSTEMI) - sudden imbalance between myocardial oxygen consumption and demand, usually related to coronary artery obstruction, but includes other non-coronary artery origins such as acute coronary insufficiency (e.g., coronary embolism), hypotension, non-ischemic myocardial injury (e.g., myocarditis) and multifactorial causes that are not mutually exclusive (e.g., stress cardiomyopathy)
Adverse Pregnancy Outcomes (APO)	Adverse pregnancy outcomes (APOs) include myriad maternal or fetal complications, including hypertensive disorders of pregnancy (gestational hypertension, preeclampsia, eclampsia, and HELLP [hemolysis, elevated liver enzymes, low platelets] syndrome), placental abruption, spontaneous preterm birth, fetal growth restriction, and small-for-gestational-age infant
Agatston Score	A nationally recognized calcium score for the coronary arteries based on Hounsfield units and size (area) of the coronary calcium
Angina pectoris	Retrosternal chest discomfort that builds gradually in intensity (over several minutes), is usually precipitated by stress (physical or emotional) or occurring at rest (as in the case of an ACS) with characteristic radiation (e.g., left arm, neck, jaw) and its associated symptoms (e.g., dyspnea, nausea, lightheadedness). When actively treated (e.g., nitroglycerin) or spontaneously resolving (e.g., with rest), it dissipates over a few minutes
Anginal variants or equivalents	Symptoms or pain at a site other than the chest occurring in an individual at high cardiac risk (i.e., known CAD, diabetes). Anginal equivalents have the same importance as angina pectoris and can present as dyspnea, diaphoresis, nausea, extreme fatigue, pain, pressure, tightness, or discomfort in shoulders, arms, neck, back, upper abdomen, or jaw not otherwise explained by another process.
ARVD/ARVC – Arrhythmogenic Right	A potentially lethal inherited disease with syncope and rhythm disturbances, including sudden death, as presenting manifestations

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Ventricular Dysplasia/ Cardiomyopathy	
BNP	B-type natriuretic peptide, blood test used to diagnose and track heart failure (n-T-pro-BNP is a variant of this test)
Brugada Syndrome	An electrocardiographic pattern that is unique and might be a marker for significant life-threatening dysrhythmias
Chronic Coronary Syndrome	CAD that is chronic, often progressive, and is treatable with lifestyle adjustments, medications, and invasive interventions instituted to achieve disease stabilization or regression
Double Product (Rate Pressure Product)	An index of cardiac oxygen consumption, is the systolic blood pressure times heart rate, generally calculated at peak exercise; over 25000 means an adequate stress load was performed
Fabry Disease	An infiltrative cardiomyopathy, can cause heart failure and arrhythmias
Fatigue	A subjective feeling of weakness, tiredness or exhaustion. Exertional fatigue is acute in nature, with rapid onset, short duration, and short recovery period.
First-degree relative	A biological parent, sibling, or child of an individual
Hibernating myocardium	Viable but poorly functioning or non-functioning myocardium which likely could benefit from intervention to improve myocardial blood supply
Major epicardial coronary arteries	The large, angiographically visible coronary arteries supplying the myocardium, including the left main, LAD, LCx, RCA, and clinically significant branch vessels >1.5 mm in diameter
NSTEMI (Non-ST Segment Myocardial Infarction)	Troponin rise/fall with ≥1 value >99th percentile without STEMI ECG criteria,

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Optimized Medical Therapy	Should include (where tolerated) antiplatelet agents, calcium channel antagonists, partial fatty acid oxidase inhibitors (e.g., ranolazine), statins, short-acting nitrates as needed, long-acting nitrates up to 6 months after an acute coronary syndrome episode, beta blocker drugs (optional), angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blocking (ARB) agents (optional)
Platypnea	Shortness of breath when upright or seated (the opposite of orthopnea) and can indicate cardiac malformations, shunt or tumor
Risk factors for Cardiac Chest pain	Comorbidities that increase the risk of developing coronary artery disease such as age ≥65 y, diabetes, hypertension (i.e., stage 1 hypertension (130–139mm Hg systolic or 80–89mm Hg diastolic), or stage 2 hypertension (≥140mm Hg systolic or ≥90mm Hg diastolic), adverse pregnancy outcomes, family history of premature CAD (history of any direct blood relatives [parents, siblings, children]) who have had any of the following conditions at age 55 or younger for male relatives or age 65 or younger for female relatives: AMI, sudden cardiac death without obvious cause, CABG surgery, PCI, familial/genetic factors (includes genetic abnormalities leading to vasculopathies, aneurysmal disorders, cardiomyopathies, coagulopathies, and inherited dysrhythmia syndromes)
Silent ischemia	Absence of ischemic symptoms or signs prior to objective demonstration of ischemia by stress testing and/or demonstration of obstructive CAD
Stable Chest Pain	Chest pain symptoms are chronic (≥2 mo) and associated with consistent precipitants such as exertion or emotional stress
STEMI (ST Segment Myocardial Infarction)	STEMI (ST Segment Myocardial Infarction): ECG: persistent ST-elevation meeting J-point criteria + troponin rise/fall above 99th percentile
Syncope	Loss of consciousness; near-syncope is not syncope

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Takotsubo cardiomyopathy	Apical dyskinesis oftentimes associated with extreme stress and usually thought to be reversible
Troponin	A marker for ischemic injury, primarily cardiac
TAVR (TAVI)	A minimally invasive procedure to treat aortic valve disease
Unstable Angina	Ischemic symptoms at rest or with decreasing threshold, present <2 weeks, without STEMI ECG criteria and without troponin elevation.

Practice Estimate of Effective Radiation Dose Chart for Selected Imaging Studies

Imaging Study	Estimate of Effective Radiation Dose
PET myocardial perfusion study: Rubidium-82 Nitrogen-13 ammonia	4mSv 2mSv
Thallium myocardial perfusion study (MPI) Dual isotope: 3.5 mCi 201Tl rest/ 30 mCi 99mTc sestamibi stress	23mSv
Diagnostic conventional coronary angiogram (catheterization)	2mSv to 22mSv
Coronary computed tomography angiography (CCTA)	8.7mSv
Cardiac CT for calcium scoring	1mSv to 5mSv
CT Abdomen and Pelvis	7.7mSv
Chest x-ray	0.1mSv

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General Criteria

Information Needed to Support Medical Necessity

- A pertinent clinical evaluation since the onset or change in symptoms is required prior to considering advanced imaging, which includes:
  - Relevant clinical history
  - Physical examination and pertinent diagnostic testing results such as recent ECG, chest x-ray or ECHO/ultrasound, cardiovascular lab studies performed after symptoms started or worsened
    - Effort should be made to obtain copies of reported abnormal ECG studies in order to determine whether the ECG is uninterpretable for ischemia on ETT
  - Report from most recent previous stress testing or other diagnostic cardiac imaging if performed
  - A relevant clinical evaluation documenting any subjective findings (complaints, changes in behavior) or objective findings (clinical exam findings)
    - Other meaningful contact (telephone call, electronic mail or messaging) by an established individual can substitute for a face-to-face clinical evaluation such as requests based on new increased or worsening symptoms.
    - Some conditions may require a face-to-face evaluation as discussed in the applicable condition-specific guideline sections (such as requests based on new physical exam findings).
    - A clinical evaluation may be medically unnecessary if the individual is undergoing a guideline-supported, scheduled follow-up imaging or other designated procedural evaluation.
    - Exceptions due to routine surveillance indications are addressed in the applicable condition-specific guideline sections.
  - Vital signs, height and weight, BMI, or description of general habitus
  - Clinical question to be answered by advanced imaging that will affect management of the clinical condition
- Cardiac imaging is not medically necessary if the results will not affect clinical management decisions. If a decision to perform cardiac catheterization or other angiography has already been made, there is often no need for imaging stress testing.
- Assessment of ischemic symptoms (if present) based on the descriptions below following this section

Cardiac evaluation

Cardiac Chest Pain (likely angina)

For the purpose of this guideline, when diagnostic testing is requested to evaluate cardiac symptoms for suspected ischemic origin, chest pain is defined as follows:

- Cardiac chest pain (stable angina pectoris, typical angina, likely angina) is defined as **one** of the following:
  - Retrosternal chest discomfort described as pain, pressure, squeezing, heaviness, tightness, or burning, and may radiate to the left arm, neck, jaw, or back that is precipitated by exercise or stress and resolved with rest or nitroglycerin
  - In an individual with known CAD (history of myocardial infarction, prior coronary revascularization with PCI or CABG, imaging or testing showing obstructive CAD) or SCAD (spontaneous coronary artery dissection) with any of the following symptoms:
    - chest discomfort
    - unexplained exertional fatigue
    - unexplained dyspnea on exertion
    - an individual's known anginal equivalent (symptoms with prior known cardiac event)
  - Retrosternal chest discomfort described as pain, pressure, squeezing, heaviness, tightness, or burning, and may radiate to the left arm, neck, jaw, or back that is precipitated by exercise or stress is considered cardiac chest pain in the setting of any of the following:
    - age ≥65
    - diabetes mellitus
    - hypertension
    - history of adverse pregnancy outcomes
    - chest pain associated with syncope
    - family history of premature CAD (occurring before age 56 in males or before age 66 in females)
- Possible Cardiac Chest Pain (less likely angina, possible angina. atypical chest pain):
  - Symptoms suggestive of a cardiac origin but lacking definitive features or occurring in a time course not suggestive of angina (such as atypical pain location or quality, pain resolves spontaneously within seconds or lasts for an extended period and is unrelated to exertion)
  - May occur in the presence of mild associated symptoms, or in the presence of some risk factors without diagnostic confirmation
- Non-cardiac explanation:
  - Pain likely due to non-cardiac causes, especially when persistent or recurring despite negative cardiac evaluations
  - Pain qualities include sharp, stabbing, fleeting, or positional. Associated symptoms may include heartburn unrelated to meals or abdominal discomfort.
- Anginal equivalents (individuals with previously documented CAD only):

- Symptoms consistent with individual's known angina pattern in an individual with a history of CABG or PCI
- Dyspnea on exertion
- Fatigue (overwhelming sense of unexplained exhaustion causing a decreased capacity for physical activity or mental work)

Other signs and symptoms suggestive of potential cardiac etiology:
- dyspnea
- orthopnea
- paroxysmal nocturnal dyspnea
- heartburn unrelated to meals/nausea and vomiting
- palpitations
- syncope
- heart failure

Note: Chest pain remains the predominant symptom reported by females among those diagnosed with an acute coronary syndrome.

For the purpose of this guideline, evidence documenting the presence of obstructive CAD includes any of the following:
- Prior heart catheterization or CCTA revealing any of the following:
  - ≥40% stenosis of the left main coronary artery
  - ≥50% stenosis for other major epicardial vessels
  - Significant stenosis defined by an FFR of ≤0.80
  - History of a prior PCI or CABG

For the purpose of this guideline, evidence documenting the presence of non-obstructive CAD includes prior heart catheterization or CCTA revealing any of the following:
- <40% stenosis of the left main coronary artery
- <50% stenosis for other major epicardial vessels
- FFR >0.8

The Coronary Artery Disease Reporting and Data System (CAD-RADS 2) classification of percentage luminal diameter coronary artery stenosis on coronary CT angiography (CCTA) is as follows:
- CAD-RADS 0: 0%
- CAD-RADS 1: 1% to 24%
- CAD-RADS 2: 25% to 49%
- CAD-RADS 3: 50% to 69%
- CAD-RADS 4:
  - ≥50% left main coronary artery stenosis
  - ≥70% in at least one major epicardial coronary artery

- CAD-RADS 5: 100% (total occlusion)

For the purposes of this guideline, evidence documenting a prior MI includes any of the following:

- presence of diagnostic Q waves on an ECG
- a fixed perfusion defect on MPI
- akinetic or dyskinetic wall motion on echocardiogram
- area of Late Gadolinium Enhancement (LGE) on cardiac MRI suggesting scar

Findings that may alter the ECG changes during exercise or are uninterpretable for ischemia on a stress test:

- Complete Left Bundle Branch Block (bifasicular block involving right bundle branch and left anterior hemiblock does not render ECG uninterpretable for ischemia)
- Ventricular paced rhythm
- Pre-excitation pattern such as Wolff-Parkinson-White
- ≥1.0mm ST segment depression (NOT nonspecific ST/T wave changes)
- LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria)
- T wave inversion in at least two contiguous inferior and/or lateral leads. This includes leads I, II, AVF, AVL, V5 or V6. (T wave inversion isolated in lead III or T wave inversion in lead V1 and V2 are not included).
- Individual on digitalis preparation

The Exercise Treadmill Test (ETT)

- Requirements for a diagnostic ETT include:
  - ECG that can be interpreted for ischemia
  - Individual capable of exercise to achieve target heart rate on a treadmill or similar device (5 METs or greater; see functional capacity below). Target heart rate is calculated as 85% of the maximum age predicted heart rate (MPHR). MPHR is estimated as 220 minus the individual's age.
- An abnormal ETT (exercise treadmill test) includes at least one of the following:
  - ST segment depression (horizontal or downsloping ≥1.0 mm below baseline)
  - Development of chest pain
  - Drop in systolic blood pressure >10 mmHg during exercise
  - Non-sustained ventricular tachycardia ≥3 consecutive ventricular beats at a rate of >100 beats per minute
  - Sustained ventricular tachycardia (ventricular rhythm at rate >100 beats/minute lasting >30 seconds or requiring termination due to hemodynamic compromise in <30 seconds)
- Functional capacity ≥5 METs equates to the following:
  - Can walk four blocks without stopping

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- Can walk up a hill
- Can climb one flight of stairs without stopping
- Can perform heavy work around the house
- Can walk 4 mph at a brisk pace

Evidence Discussion

Chest pain

Many factors are taken into consideration when an individual presents chest pain or symptoms suspect for an underlying cardiac etiology, such as coronary artery disease or heart failure. Details such as precipitating and alleviating factors, duration of the symptoms, chronicity, progression, and prior medical history or risk factors that may escalate the concern for ischemia. Symptoms associated with cardiac etiology can include chest pain, pressure, heaviness, tightness, dyspnea, diaphoresis, nausea/vomiting, lightheadedness, syncope, and palpitations. Cardiac pain related to ischemia is characterized by pressure, squeezing, heaviness, tightness, or burning in the chest, often retrosternal, and radiating to the left arm, neck, jaw, or back. In general, ischemic chest pain has a gradual onset over minutes, is relieved by rest or nitroglycerin, and is precipitated by exertion or emotional stress (Gulati et al., 2021). Risk factors increasing the likelihood of an ischemic etiology of chest pain include age ≥65, diabetes, hypertension, history of adverse pregnancy outcomes, chest pain associated with syncope, family history of premature CAD, and genetic predispositions (Dehmer et al., 2020) (Bays et al., 2021).

CAD RADS 2

Coronary Artery Disease – Reporting and Data System (CAD-RADS 2) is a standardized reporting framework for coronary CT angiography (CCTA) results designed to improve communication and guide clinical management. Classification includes stenosis severity (0–5), plaque burden (P1–P4), and modifiers (e.g., HRP, I, S, G, E) for CT-FFR and myocardial CT perfusion for ischemia assessment and is applicable to both stable and acute chest pain evaluations (Cury et al., 2022).

Background and Supporting Information

An observational study found that, compared with the Duke Activity Status Index, subjective assessment by clinicians generally underestimated exercise capacity

Upsloping ST segment depression is not considered to be an abnormal ETT finding because of its low specificity.

Health Equity Considerations

Health equity is the highest level of health for all individuals; health inequity is the avoidable difference in health status or distribution of health resources due to the social

conditions in which individuals are born, grow, live, work, and age. Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include the following: safe housing, transportation, and neighborhoods; racism, discrimination, and violence; education, job opportunities, and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Cardiac Imaging Guidelines

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Stress Testing

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Stress Testing with Imaging (CD-1.4)

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Criteria

Medically Necessary

Imaging stress test (PET MPI, SPECT MPI, Stress Echo, **or** Stress-perfusion CMR) is considered medically necessary in **any** of the following clinical settings:

Cardiac Chest Pain

New, recurrent or worsening cardiac chest pain as defined in **General Guidelines (CD-1.0)**

Symptomatic with known CAD

Prior history of PCI (percutaneous coronary intervention) or CABG (coronary artery bypass graft surgery) or a history of obstructive CAD as defined in **General Guidelines (CD-1.0) and any** of the following:

- Cardiac chest pain as defined in **General Guidelines (CD-1.0)**
- Anginal equivalents such as atypical chest pain, exertional dyspnea or exertional fatigue
- Symptoms similar to prior ischemic episode

Newly elevated troponin with known CAD

Prior history of PCI (percutaneous coronary intervention) or CABG (coronary artery bypass graft surgery) or a history of obstructive CAD as defined in **General Guidelines (CD-1.0) and** a new Troponin elevation after last evaluation with stress test, CCTA, or diagnostic cardiac catheterization

Symptomatic and does not meet the requirements for an ETT without imaging

New, recurrent, or worsening symptoms of chest pain, or new, recurrent, or worsening symptoms of exertional dyspnea or exertional fatigue that is not explained by another process, **and** the individual does not meet the medically necessary components needed for an ETT due to a history of **any** of the following:

- Findings that may alter the ECG changes during exercise or are uninterpretable for ischemia on a stress test:

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  - Complete Left Bundle Branch Block (bifasicular block involving right bundle branch and left anterior hemiblock does not render ECG uninterpretable for ischemia)
  - Ventricular paced rhythm
  - Pre-excitation pattern such as Wolff-Parkinson-White
  - ≥1.0mm ST segment depression (NOT nonspecific ST/T wave changes)
  - LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria)
  - T wave inversion in at least two contiguous inferior and/or lateral leads. This includes leads I, II, AVF, AVL, V5 or V6. (T wave inversion isolated in lead III or T wave inversion in lead V1 and V2 are not included).
  - Individual on digitalis preparation
- Inability to perform the exercise needed to achieve target heart rate (85% of the maximum age predicted heart rate or 220 minus the individual's age) on a treadmill or similar device (5 METs or greater) due to any of the following limitations:
  - Unable to safely perform ETT due to gait disturbances, use of assistive devices, or other documented neuromuscular abnormalities
  - Use of home oxygen for daily activity
  - Documented activity-limiting dyspnea or heart failure
  - Provider assessment that performing an ETT would be unsafe
  - Unstable angina with concern for active acute coronary syndrome, or recent elevated troponin
  - Severe aortic stenosis or other significant aortic valve disease
  - Severe hypertension that can not be controlled prior to stress testing

Symptomatic with inconclusive or abnormal ETT or elevated CAC

New, recurrent or worsening symptoms of chest pain, or new, recurrent, or worsening symptoms of exertional dyspnea or exertional fatigue that is not explained by another process, **and** any of the following:

- Inconclusive ETT (exercise treadmill test) due to any of the following:
  - <85% maximum predicted heart rate achieved
  - Exercise ECG is uninterpretable for ischemia (for example due to development of rate-related left bundle branch block during exercise)
- Abnormal ETT with any of the following results:
  - ST segment depression (horizontal or downsloping ≥1.0 mm below baseline)
  - Development of chest pain
  - Drop in systolic blood pressure >10 mmHg during exercise
  - Non-sustained ventricular tachycardia ≥3 consecutive ventricular beats at a rate of >100 beats per minute

  - Sustained ventricular tachycardia (ventricular rhythm at rate >100 beats/minute lasting >30 seconds or requiring termination due to hemodynamic compromise in <30 seconds)
- Coronary artery calcium (CAC) score ≥100

Symptomatic with risk factors

Stress test with imaging is medically necessary in individuals with **both** of the following conditions:

- New, recurrent or worsening symptoms of chest pain, or new, recurrent, or worsening symptoms of exertional dyspnea or exertional fatigue that is not explained by another process
- individuals 50 years of age or above with 2 or more of the following CV risk factors:
  - diabetes
  - tobacco smoker
  - family history of premature CAD in a first-degree relative (biologic parent, sibling, or child)
  - hypertension
  - hyperlipidemia
  - history of adverse pregnancy outcomes (APOs)

Heart failure or left ventricular systolic dysfunction

Stress test with imaging is medically necessary to evaluate heart failure or left ventricular systolic dysfunction when there is documentation of **any** of the following:

- New or worsening heart failure
- New left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
- Worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
- Significant ischemic ventricular dysfunction (suspected hibernating myocardium) to assess myocardial viability when there are persistent symptoms or heart failure and revascularization is being considered

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Note:

MRI, cardiac PET, SPECT MPI, or Dobutamine stress echo can be used to assess myocardial viability depending on physician preference. See also **Cardiac PET – Metabolic – Indications (CD-6.4)**

Syncope or arrhythmia

Stress test with imaging is medically necessary for **any** of the following:

- Syncope of suspected ischemic etiology not otherwise explained

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- Sustained ventricular tachycardia (ventricular rhythm at rate >100 beats/minute lasting >30 seconds or requiring termination due to hemodynamic compromise in <30 seconds).
- Non-sustained ventricular tachycardia ≥3 consecutive ventricular beats at rate >100 beats/minute
- Frequent PVCs (premature ventricular complexes) >30 PVCs per hour
- Prior to starting a Class IC antiarrhythmic agent (flecainide or propafenone) to assess for CAD and annually while taking the medication

With or without symptoms for moderate coronary artery stenosis

Stress test with imaging is medically necessary to evaluate the functional significance of moderate stenosis when there is documentation of **either** of the following:

- CCTA (coronary computed tomography angiography) with moderate stenosis (50 to 69%-CAD-RADS 3 as defined in **General Guidelines CD-1.0**)
- Invasive coronary angiography with intermediate severity stenosis and invasive physiological testing has not been done

Without symptoms

Stress test with imaging is medically necessary for any of the following:

- Prior to starting Interleukin-2
- An uninterpretable ECG as described in **General Guidelines (CD 1.0)** that has not been previously evaluated
- Every 2 years if there is a history of silent ischemia (absence of ischemic symptoms or signs prior to objective demonstration of ischemia by stress testing and/or demonstration of obstructive CAD as defined in **General Guidelines (CD-1.0)**
- Prior to starting a Class IC antiarrhythmic agent (flecainide or propafenone) to assess for CAD and annually while taking the medication
- Asymptomatic individual who has an ischemic EKG response on ETT (horizontal or downsloping ST depression ≥1.0mm below baseline)

Evidence Discussion

Peer-reviewed literature supports defining likely cardiac chest pain using classic ischemic symptom features typically precipitated by exertion or emotional stress and relieved by rest or nitroglycerin (Gulati et al., 2021; Virani et al., 2023). Available evidence also recognized symptoms that are less likely cardiac chest pain but may reflect a nonischemic cardiac etiology such as dyspnea, and syncope, and still warrant cardiac consideration (Gulati et al., 2021; Amsterdam et al., 2014). Non-cardiac chest pain was distinguished by pleuritic, positional, reproducible, localized, or non-exertional features and by the presence of an alternative non-cardiac explanation (Gulati et al., 2021; Erhardt et al., 2002).

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Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of myocardial perfusion imaging (MPI) with single photon emission computed tomography (SPECT) for individuals with signs or symptoms consistent with coronary artery disease (CAD) such as typical angina. In addition, they support the use of SPECT perfusion imaging in symptomatic individuals with known CAD and those with prior interventions such as coronary artery bypass surgery, coronary stenting, and preoperative risk stratification. These guidelines balance the appropriate testing of individuals with SPECT versus unnecessary and potentially harmful testing and downstream procedures.

Also, as supported by society guidelines, use of SPECT is medically necessary in detection of cardiac transthyretin amyloidosis (ATTR) after light chain amyloidosis (AL) is ruled out by appropriate blood and urine testing. Positron emission tomography (PET) is an advanced imaging approach in that it allows for more accurate attenuation correction than SPECT, which can be helpful in individuals with higher BMIs or other sources of attenuation. In addition, due to accurate attenuation correction and the unique attributes of PET radionuclides, PET allows the quantitation of myocardial blood flow and flow reserve which has been shown to be helpful in the diagnosis and prognosis of obstructive and no obstructive CAD.

Background and Supporting Information

- Imaging Stress Tests include any one of the following:
  - Stress Echo
  - SPECT MPI
  - Stress-perfusion MRI may include AQMBF
  - PET MPI may include AQMBF
- Stress testing with imaging can be performed with maximal exercise or chemical stress (adenosine, dipyridamole, dobutamine, or regadenoson)

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Stress Testing with Imaging-Preoperative (CD-1.5)

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Table-2 Cardiac Risk Stratification List

High-risk (> 5%)	Intermediate-risk (1-5%)	Low-risk (<1%)
• Open aortic and other major open vascular surgery • Open peripheral vascular surgery • Esophagectomy • Pneumonectomy • Open intraperitoneal and/or intrathoracic surgery with organ resection	• Open intraperitoneal and/or intrathoracic surgery without major organ resection • Open carotid endarterectomy • Head and neck surgery • Open orthopedic surgery • Open prostate surgery	• Endoscopic procedures • Superficial procedures • Cataract surgery • Breast surgery • Ambulatory surgery • Laparoscopic and endovascular procedures that are unlikely to require further extensive surgical intervention

Criteria

Imaging stress test meets criteria for an indication independent of planned surgery

An imaging stress test is considered medically necessary prior to planned surgery when criteria is met independent of planned surgery based on **Stress Testing with Imaging – Criteria (CD-1.4)** or **Hypertrophic Cardiomyopathy (HCM) (CD-14)** or **Cardiac Imaging in Transplants (CD-16)** or other condition specific criteria in this guideline

Pre-surgical imaging stress test based on surgical-risk (see Table-2)

Surgery risk-level:

- **High-risk Surgery:** An imaging stress test is considered medically necessary when any of these conditions apply:
  - it has been one year or more since the last imaging stress test
  - new cardiac symptoms have developed since the last imaging stress test
  - new EKG changes have developed since the last imaging stress test

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- **Intermediate-risk Surgery:** An imaging stress test is considered medically necessary when **all** of the following apply:
  - individual is unable to perform an ETT
  - it has been one year or more since the last imaging stress test **or** new cardiac symptoms have developed since the last imaging stress test **or** new EKG changes have developed since the last imaging stress test
  - clinical history documents **one** of the following clinical risk factors for cardiac death and non-fatal MI at time of non-cardiac surgery:
    - ischemic heart disease (previous MI, previous positive stress test, use of nitroglycerin, typical angina, ECG Q waves, previous PCI or CABG)
    - compensated heart failure (history of heart failure, previous pulmonary edema, third heart sound, bilateral fine crackles, chest x-ray showing heart failure)
    - previous TIA or stroke
    - diabetes mellitus
    - creatinine level >2mg/dL
- **Low-risk:** Pre-operative imaging stress testing is considered not medically necessary.

Evidence Discussion

Professional society guidelines support preoperative cardiac testing that considers whether the individual would meet criteria for stress imaging independent of surgery, the cardiac risk of the planned procedure, functional capacity, and clinical risk factors. The ACC/AHA perioperative cardiovascular evaluation guideline emphasizes selective testing and states that noninvasive stress testing should generally be performed only when results are expected to change management (Fleisher et al., 2014). The evidence base for preoperative stress imaging is primarily by professional society guidance, perioperative risk models, and observational evidence. Potential harms include false-positive findings, surgical delays, unnecessary angiography, radiation exposure for nuclear imaging, and pharmacologic stress-related adverse events.

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Stress Testing for Microvascular Dysfunction (CD-1.10)

CD.ST.0001.4.A
v1.0.2027

Criteria

Medical necessity requires the combined study (PET MPI with AQMBF or Stress-perfusion CMR with AQMBF).

PET MPI with AQMBF or Stress-perfusion CMR with AQMBF is considered medically necessary to evaluate coronary microvascular function in individuals with suspected or known non-obstructive CAD such as MINOCA, INOCA, or ANOCA, when there is persistent chest pain, exertional dyspnea, or exertional fatigue, and either of the following:

- a normal or equivocal ETT
- coronary angiography or CCTA did not identify obstructive coronary artery disease; **and**
  - there are persistent symptoms despite optimized medical therapy (OMT); **or**
  - there is evidence of myocardial ischemia on functional testing (e.g., invasive coronary function testing or noninvasive stress testing without AQMBF)

Evidence Discussion

Angina or ischemia with no obstructive coronary arteries (ANOCA/INOCA) should be considered when ischemic symptoms persist and coronary arteries are either normal or nonobstructive. These clinical presentations may reflect coronary microvascular or endothelial dysfunction, epicardial coronary spasm or microvascular spasm, myocardial bridging, or other occult coronary abnormalities despite the absence of obstructive epicardial CAD. The JACC state-of-the-art review on ANOCA notes that many affected individuals have normal findings on conventional diagnostic testing and that absence of obstructive CAD does not exclude coronary microvascular dysfunction (Samuels et al., 2023).

The 2021 multisociety chest pain guideline recognizes that individuals with ongoing symptoms concerning for ischemia and no obstructive coronary arteries benefit from microvascular function testing with PET MPI or CMR stress with myocardial blood flow measurement. (Gulati et al., 2021).

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Stress Testing with Imaging-Coding

CD.ST.0001.4.A
v1.0.2027

Stress echo, SPECT MPI or stress MRI

CPT®	Codes Addressed
	Stress-perfusion CMR
75559	Cardiac MRI for morphology and function without contrast, with stress imaging
75563	Cardiac MRI for morphology and function without and with contrast, with stress imaging
+0899T	Noninvasive determination of absolute quantitation of myocardial blood flow (AQMBF), derived by augmentative algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)
+0900T	Noninvasive estimate of absolute quantitation of myocardial blood flow (AQMBF), derived by assistive algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure).
	SPECT MPI
78451	MPI, tomographic (SPECT) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	MPI, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection

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CPT®	Codes Addressed
78453	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78454	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
Stress Echo	
93350	Echocardiography (TTE), (2D), with or without m-mode, during rest and cardiovascular stress, with interpretation and report
93351	Echocardiography (TTE), (2D), m-mode, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation
PET MPI	
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78491	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study at rest or stress (exercise or pharmacologic)
78492	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic)
+78434	Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)

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Quantitative Myocardial Blood Flow Assessment by PET MPI or Stress-perfusion CMR (CD-1.11)

CD.ST.0001.9.A
v1.0.2027

Criteria

Medically Necessary

Quantitative Myocardial Blood Flow Assessment is considered medically necessary as an add-on to the primary study (PET MPI or Stress-perfusion CMR) when criteria have been met for a PET MPI or a Stress-perfusion CMR

Background and Supporting Information

AQMBF is an add-on study reported in conjunction with myocardial perfusion imaging and is not a standalone procedure. Quantitation of myocardial blood flow at rest and with stress and the calculation of myocardial perfusion reserve (the ratio of stress to rest flow) can be used for diagnosis and prognosis of coronary artery disease and cardiac endothelial dysfunction that can be seen in diabetes, cardiac microvascular disease, left ventricular hypertrophy, and heart transplantation vasculopathy, among other conditions.

- AQMBF with PET (CPT® 78434) is an add-on procedure to a cardiac PET MPI (CPT® 78492 or 78431 only)
- AQMBF with Stress MRI (CPT® 0899T or 0900T) is an add-on procedure to a cardiac stress MRI (CPT® 75559 or 75561).

Coding

Code	Description
+0899T	Noninvasive determination of absolute quantitation of myocardial blood flow (AQMBF), derived from augmentative algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)

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Code	Description
+0900T	Noninvasive estimate of absolute quantitation of myocardial blood flow (AQMBF), derived from assistive algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)
+78434	Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)

Evidence Discussion

Myocardial perfusion imaging (MPI) is used for the diagnosis of coronary artery disease (CAD). Results of MPI have a high level of sensitivity and specificity. Positron emission tomography (PET) and MRI are imaging modalities that allow the performance of MPI and also have the ability to measure absolute myocardial blood flow (AQMBF).

Quantitative myocardial blood flow and myocardial perfusion reserve may provide additional clinical information in obstructive coronary artery disease (CAD), coronary microvascular dysfunction, endothelial dysfunction, and cardiac transplant vasculopathy among others. This use is consistent with multimodality appropriate use criteria supporting advanced stress imaging for detection and risk assessment of chronic coronary disease (Winchester et al., 2023).

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Echocardiography (ECHO)

Guideline Page

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Transthoracic Echocardiography (TTE) Initial Evaluation (CD-2.2)

CD.EC.0002.2.A
v1.0.2027

Criteria

Transthoracic Echocardiography (TTE) is considered medically necessary for the initial evaluation of **any** of the following:

Symptoms or signs suggesting cardiovascular disease

- chest pain/discomfort
- dyspnea/shortness of breath, or hypoxemia
- palpitations
- pre-syncope/syncope
- headache with transcranial Doppler evidence of a shunt or high-degree of suspicion for embolic process
- dependent lower extremity edema
- abnormal precordial or peripheral pulse
- new or changing heart murmur or click
- suspected hypertensive heart disease (initial evaluation)
- initial evaluation of known/suspected heart failure based on symptoms and/or signs
- suspected endocarditis with any:
  - fever
  - peripheral stigmata of endocarditis
  - new murmur
- history of rheumatic heart disease
- suspected pericardial diseases
- suspected cardiac injury due to blunt chest trauma

Diagnostic tests suggesting cardiovascular disease

- newly diagnosed RBBB or LBBB
- presence of pathological Q waves in 2 or more contiguous leads
- frequent VPCs defined as occurring more frequently than 30 times per hour or occurring in a pattern of bigeminy, trigeminy, or runs of ventricular tachycardia
- non sustained or sustained ventricular tachycardia (VT)
- ventricular fibrillation (VF)
- newly diagnosed atrial fibrillation/flutter

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- cardiomegaly on a Chest x-ray or other imaging
- elevated level of cardiac biomarkers (Creatinine Kinase isoforms, Troponin I or T, Brain Natriuretic Peptide (BNP), N-Terminal pro b-type natriuretic peptide (NT-proBNP) above the normal reference range as defined by the local laboratory assays)
- initial evaluation of known/suspected heart failure based on diagnostic tests
- suspected inherited or acquired cardiomyopathy (e.g., restrictive, infiltrative, dilated, hypertrophic)
- suspected pulmonary hypertension. See **Pulmonary Hypertension CD-8.1.**
  - ECG changes of right ventricular hypertrophy
  - right ventricular hypertrophy or pulmonary artery dilation on other imaging
  - pulmonary embolism with persistent or new symptoms
- dilated aortic root and/or ascending aorta seen on other imaging
- suspected endocarditis with positive blood cultures indicating bacteremia
- suspected pericardial diseases
- cardiac mass suspected on other imaging
- to rule out intra-cardiac thrombus in individuals with left ventricular systolic dysfunction prior to undergoing catheter ablation of ventricular arrhythmia.
- ≥6 weeks post-myocardial infarction

Extra-cardiac conditions and therapies associated with cardiovascular disease or risk

- CONDITIONS
  - Initial cardiac evaluation of a known systemic, congenital, or acquired disease that could be associated with structural heart disease
  - At risk for developing iron-overload cardiomyopathy (hereditary hemochromatosis or hereditary or acquired hematologic conditions requiring multiple transfusions)
  - Known or suspected connective tissue disease or a genetic condition that predisposes to an aortic aneurysm or dissection (may repeat every 2 years if negative). See **Screening for Vascular related genetic connective tissue Disorders PVD-2.2**.
  - At risk for pulmonary hypertension. See **Pulmonary Hypertension CD-8.1.**
    - scleroderma
    - lupus
    - mixed connective tissue disease
    - Hereditary Hemorrhagic Telangiectasia
    - individuals with pulmonary hypertension mutations (e.g., BMPR2)
  - Suspected pulmonary hypertension in the presence of:

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        - liver disease
        - lung disease
        - HIV
    - Newly diagnosed or strongly suspected cerebral ischemia or peripheral embolic event
- THERAPIES
    - Use of anorectic drugs, ergot derivatives, or other agents associated with valvular heart disease
    - Pre-procedure evaluation for TIPS (transjugular intrahepatic portosystemic shunt). See **Hepatic Arteries and Veins AB-43.1.**
    - Prior to solid organ transplant or hematopoietic stem cell transplant
    - Prior to exposure to cardiotoxic medications or radiation therapy. See **Cardiotoxic agent/Cancer Therapeutics-related Cardiac Dysfunction CD-12.1.**

Inherited cardiovascular conditions

- Individual has first-degree relative diagnosed with thoracic aortic aneurysm or dissection (may repeat every 2 years if negative). See **Screening for Vascular related genetic connective tissue Disorders PVD-2.2**, **Thoracic Aortic Aneurysm PVD-6.2.**
- One-time screening TTE when individual has first-degree relative diagnosed with bicuspid aortic valve. See also **Screening for TAA with Bicuspid Aortic Valves (PVD-2.3).**
- Individual has diagnosed first-degree relative or member is genotype positive for an inherited cardiomyopathy including any of the following:
    - hypertrophic cardiomyopathy
    - non compaction cardiomyopathy
    - familial Dilated Cardiomyopathy
    - arrhythmogenic Cardiomyopathy (e.g., ARVC)

Agitated Saline/Contrast

- One repeat echocardiogram is considered medically necessary if requested for agitated saline (bubble study) or contrast study (for evaluation of shunts or for left ventricular cavity opacification) when agitated saline or contrast were not administered at the time of the initial study and the results of the initial study indicate the need for agitated saline or contrast.

Evaluation of congenital heart disease: see **Adult Congenital Heart Disease CD-11** and **Congenital Heart Disease PEDCD-2** in the Pediatric Cardiology imaging guidelines.

Frequency of Echocardiography Testing (CD-2.3)

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Repeat Testing by Interval

Criteria

Repeat Transthoracic Echocardiography (TTE) is medically necessary for **any** of the following:

Every 3 years

Valvular heart disease (See also below criteria for Valve surgery or intervention)

- bicuspid aortic valve
- mild aortic stenosis or aortic valve sclerosis without stenosis
- mild aortic or mitral regurgitation
- any mitral stenosis that is not severe, mitral valve area >1.5cm^2
- rheumatic valve changes with commissural fusion
- valve surgery including **any** of the following:
  - surgical valve repair
  - mechanical valve replacement
  - bioprosthetic valve replacement when <10 years since implant

Cardiomyopathy

- First-degree relative with a diagnosis of inherited cardiomyopathy including:
  - Hypertrophic Cardiomyopathy
  - Familial Dilated Cardiomyopathy
  - Idiopathic Dilated Cardiomyopathy
- Individuals genotype-positive for:
  - Familial Dilated Cardiomyopathy

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- Arrhythmogenic Cardiomyopathy (e.g., ARVC)

Every 2 years

Vascular disease

- First-degree relative with known thoracic aortic aneurysm or dissection a repeat echocardiogram is allowed every 2 years when both:
  - Prior aortic imaging (echo, CT, MR) is negative.
  - Last aortic imaging was ≥2 years. See **Screening for Vascular related genetic connective tissue Disorders (PVD-2.2).**

Every year

Valvular heart disease (VHD)

(See also below criteria for valve surgery or intervention)

- moderate or severe regurgitation
- moderate or severe stenosis
- significant valve deformity (regardless of extent of regurgitation or stenosis) when there is documentation of either:
  - thickened myxomatous valve
  - bileaflet prolapse
- surgical bioprosthetic valve replacement when ≥10 years since implant
- post-transcatheter valve repair or replacement

Cardiomyopathy/heart failure

- history of left ventricular systolic dysfunction to evaluate the effectiveness of ongoing therapy
- hypertrophic cardiomyopathy see **Hypertrophic Cardiomyopathy CD-14**
- frequent right ventricular pacing >40%
- chronic LBBB
- frequent PVCs defined as >10,000 PVCs within 24 hours or >10% PVC burden over 24 hours
- left ventricular non-compaction cardiomyopathy
- at risk for developing iron-overload cardiomyopathy (hereditary hemochromatosis or hereditary or acquired hematologic conditions requiring multiple transfusions)
- inherited neuromuscular, metabolic, hematologic or cutaneous syndromes that are known to be associated with the development of cardiomyopathy
- infiltrative cardiomyopathy

Pericardial disease

- Chronic pericardial effusions when findings would potentially alter therapy

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Vascular disease

- Aortic root dilatation that has not yet been repaired. See **Thoracic aortic aneurysm PVD 6.2** and
- For post-repair, see **Post-Aortic Endovascular/Open Surgery Surveillance Studies PVD-6.8**.

At risk for pulmonary hypertension

See **Pulmonary Hypertension CD-8.1**.

- Systemic Sclerosis or Scleroderma
- individuals with pulmonary hypertension mutations (e.g., BMPR2)
- first-degree relatives of individuals with pulmonary hypertension
- connective tissue disorder with symptoms consistent with pulmonary hypertension
- individuals with TR velocity ≥2.8m/s, with no other findings on additional testing
- individuals being treated with medications associated with pulmonary hypertension
- individuals who have a concern documented for pulmonary hypertension and had a negative echocardiogram but still show signs or symptoms of pulmonary hypertension

Every 6 months or twice a year

Valvular heart disease

- Asymptomatic, severe mitral regurgitation if valve surgery is being considered

Pulmonary Hypertension

- See below criteria for Pulmonary Hypertension (See **Pulmonary Hypertension CD-8.1**).
- Surveillance of stable individuals with moderate or severe pulmonary hypertension (pulmonary artery systolic pressure ≥50mmHg)

Anytime

Repeat transthoracic echocardiogram is considered medically necessary **anytime** (without regard for the number or timing of previous echo studies) if there is a change in clinical status, or new signs and symptoms with documentation of **any** of the following:

- cardiac murmurs
- myocardial infarction or acute coronary syndrome
- heart failure (new or worsening):
  - new symptoms of dyspnea

Cardiac Imaging Guidelines

  - orthopnea
  - paroxysmal nocturnal dyspnea
  - elevated BNP
- known pericardial disease with clinical concern for cardiac tamponade or pericardial constriction
- infective endocarditis for any of the following:
  - repeat imaging within 5-7 days for initially negative or inconclusive imaging when clinical suspicion of endocarditis remains high
  - new or worsening symptoms or signs of endocarditis
  - as needed to guide changes in antibiotic therapy
  - at completion of antibiotic therapy
- stroke/transient ischemic attack
- decompression illness
- prosthetic valve dysfunction or thrombosis
- cardiac transplant
- individuals with Left Ventricular Assist Device (LVAD)
- See also section on **Repeat testing per condition** below and **Left ventricular assist devices (LVAD) (CD-9.4)**.

Repeat Testing Per Condition

Criteria

Repeat Transthoracic Echocardiography (TTE) is medically necessary for **any** of the following:

Valve surgery or intervention

Repeat Transthoracic Echocardiography (TTE) is medically necessary for any of the following:

Surgical valve repair or mechanical valve replacement
- 6 weeks post-surgery to establish baseline
- surveillance every 3 years after surgery

Surgical bioprosthetic valve replacement
- 6 weeks post-surgery to establish baseline
- surveillance every 3 years after surgery until 10 years
- then annually

TAVR follow-up
- 1 week after procedure to establish baseline

- 1 month post-procedure
- 1 year post-procedure
- then annually

Mitral Valve Repair (mitral valve clip) follow-up

- 1 month post-procedure
- 6 months post-procedure
- 1 year post-procedure
- then annually

Transcatheter Tricuspid Valve Replacement follow-up

- TTE (CPT® 93306) is considered medically necessary post-procedure at the following intervals:
  - 1 month
  - 6 months
  - 1 year
  - then annually

See also **Transcatheter Aortic Valve Replacement (TAVR) (CD-4.8).**

See also **Percutaneous Mitral Valve Repair (mitral valve clip) (CD-13.5)**.

PFO closure, TIPS, Cardiac device therapy, LVAD

Repeat Transthoracic Echocardiography (TTE) is medically necessary for any of the following:

- **PFO Closure**
  - pre-operative evaluation for closure of PFO
  - post-procedural evaluation of PFO repair
  - 6 month follow-up after PFO repair
  - annually if there is a residual shunt on post-operative imaging

  For ASD closure, see **ASD-Atrial septal defects (CD 11.2.1)**.
- **TIPS (transjugular intrahepatic portosystemic shunt).** See **Hepatic Arteries and Veins (AB 43.1)**.
  - 1 time post-procedure for routine follow-up
  - **any time** post-procedure (either):
    - for new signs or symptoms
    - for concern for new or worsening pulmonary hypertension or heart failure
- **Cardiac device therapy**
  - Re-evaluation of LVEF is medically necessary 40 days after MI, 3 months after revascularization, or 3 months after maximally tolerated optimal medical therapy to determine either:

        - candidacy for device therapy
        - optimal choice of device
    - 1 time follow up within 12 months of implantation of a CRT-D device
- **Ventricular assist device.** See **Ventricular Assist Devices (CD-9.4)**.
    - Prior to implant
    - Routine Post-implant at the following intervals:
        - 2 weeks
        - 1 month
        - 3 months
        - 6 months
        - 12 months
        - every 6 months thereafter

Pulmonary hypertension

Follow-up echocardiogram (TTE) on individuals with PH is considered medically necessary for any of the following:

- every 6 months for surveillance of stable individuals with moderate or severe pulmonary hypertension (pulmonary artery systolic pressure ≥50mmHg)
- 3 months after any change in PH therapy
- prior to planned intubation (e.g., for elective surgery)
- prior to planned pregnancy
- during pregnancy as often as requested by provider
- anytime, without regard for the number or timing of previous echo studies to evaluate change in clinical signs or symptoms

See also **Pulmonary Hypertension CD-8.1**.

Hypertrophic Cardiomyopathy (HCM)

Repeat Transthoracic Echocardiography (TTE) is medically necessary for individuals with hypertrophic cardiomyopathy for any of the following:

- **Surveillance imaging**
    - Every year
- **Post-Septal Reduction Therapy (SRT)**
    - Within 3 to 6 months after surgical myectomy or alcohol septal ablation
- **Cardiac myosin inhibitors**
    - TTE is considered medically necessary to monitor initiation of cardiac myosin inhibitor therapy (including mavacamten and aficamten) and dose titration as follows:
        - baseline study at the beginning of therapy

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- every 2 to 8 weeks during dose titration to maintenance dose
- every 3 months once maintenance dose is reached while on medication

◦ TTE is considered medically necessary while taking cardiac myosin inhibitors to evaluate symptoms or clinical findings that are new since the previous TTE

◦ TTE is considered medically necessary when there is a change in treatment while taking a cardiac myosin inhibitors as follows:

- after dose adjustment due to symptoms or clinical findings, or missed doses
- 4 week after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)
- 12 weeks after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)

See also **Hypertrophic Cardiomyopathy CD-14**.

Cardiac Transplant

Anytime (without regard for the number or timing of previous ECHO studies) when there is a history of cardiac transplant, per transplant center protocol

Cardiotoxic Agents

For re-evaluation in an individual previously or currently undergoing therapy with cardiotoxic agents or radiation therapy, follow **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1)**.

Transthoracic Echocardiography (TTE) General Information (CD-2.1.1)

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Criteria

- Complete transthoracic echocardiogram with spectral and color flow Doppler (CPT® 93306).
- Doppler codes (CPT® 93320, CPT® 93321, and CPT® 93325) are 'add-on codes' (as denoted by the + sign) and are assigned in addition to code for the primary procedure.
  - 93306 includes the Doppler exams, so CPT® codes 93320-93325 are considered not medically necessary as an add-on to CPT® 93306.
- Doppler echo may be used for evaluation of the following:
  - shortness of breath
  - known or suspected valvular disease
  - known or suspected hypertrophic obstructive cardiomyopathy
  - shunt detection
- For a 2D transthoracic echocardiogram without Doppler, report CPT® 93307.
- Limited transthoracic echocardiogram (CPT® 93308) should be billed if the report does not "evaluate or document the attempt to evaluate" all of the required structures.
  - A limited transthoracic echocardiogram is reported with CPT® 93308.
  - CPT® 93321 (not CPT® 93308 if Doppler is included in the study. CPT® 93325 can be reported with CPT® 93308 if color flow Doppler is included in the study.
  - A limited congenital transthoracic echocardiogram is reported with CPT® 93304.

Myocardial Contrast Perfusion Echocardiography (CD-2.11)

Criteria

- Further studies are needed to evaluate the accuracy, reliability, and clinical efficacy of myocardial contrast perfusion echocardiography (CPT® 0439T) and it is considered experimental, investigational, or unproven at this time

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Detection of Heart Failure with Preserved Ejection Fraction

Criteria

Artificial intelligence (AI) applications are being used to extract patterns from medical images in an effort to add clinically relevant information to that obtained by physician interpretation of images. AI algorithms have been employed in the software analysis of echocardiograms in an effort to aid detection of heart failure. Further studies are needed to evaluate the accuracy, reliability, and clinical efficacy of these applications.

- CPT® 0932T Noninvasive detection of heart failure derived from augmentative analysis of an echocardiogram is considered experimental, investigational, or unproven at this time

Evidence Discussion

Transthoracic Echocardiogram

- Transthoracic echocardiogram (TTE) is an ultrasonic examination of the heart through the chest wall. Given that sound waves are used (sonography), there is no exposure to ionizing radiation or possible complications related to contrast induced nephropathy.
- It is readily accessible and transportable allowing for the test to be performed at multiple different locations with no need for blood work.
- TTE is widely accepted as initial imaging modality of choice for the general evaluation of cardiac and pericardial structure and function.
- Multiple evidence-based professional society guidelines indicate that TTE can be appropriately used for the evaluation of multiple cardiac issues including but not limited to evaluation of cardiac symptoms, dyspnea, and pulmonary hypertension.
- A complete comprehensive TTE will utilize multiple acoustic windows and incorporate 2D imaging with appropriate data; including measurements with color and spectral Doppler imaging.
- The test is performed and interpreted by qualified individuals in a facility that is accredited in performing echocardiograms.
- TTE is the primary imaging tool for screening of family members with thoracic aortic disease as well as genetic syndromes that are associated with thoracic aortic aneurysms and dissection. It is not medically necessary for screening of asymptomatic individuals in the general public in the absence of family history of cardiac, vascular, or associated connective tissue disorder.
- TTE offers real-time hemodynamic assessment which may be used in the guidance of therapeutic interventions.

- Repeat echocardiograms may be done for the surveillance of known valvular heart disease, cardiomyopathies, pulmonary hypertension, and cardiotoxic agents. The need for surveillance echocardiograms are dependent on factors such as morphology, severity, family history of cardiomyopathies, timing of surgery, left ventricular function, symptoms, and for follow-up of post cardiac structural interventions. Timing of surveillance echocardiograms are in alignment with recommendations from various national and international medical specialty organization guidelines and Appropriate Use Criteria based on studies which analyzed progression of valvular disease and timing of invasive intervention.
- Decisions regarding routine echocardiographic follow-up should not be based on the degree of regurgitation alone but should take into account associated structural valvular and cardiac abnormalities. For example, a structurally normal mitral valve with moderate mitral regurgitation by color flow Doppler and normal left atrial size, does not generally require routine echocardiographic follow-up. However, a thickened, myxomatous appearing mitral valve with bi-leaflet prolapse and only trivial or mild mitral regurgitation should be followed echocardiographically at routine intervals.

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Transthoracic Echocardiogram (TTE)-Coding (CD-2.1)

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- Providers performing echocardiography on a pediatric individual may not know what procedure codes they will be reporting until the initial study is completed.
- If a congenital issue is found on the initial echocardiogram, a complete echocardiogram is reported with codes CPT® 93303, CPT® 93320, and CPT® 93325 because CPT® 93303 does NOT include Doppler and color flow mapping.
- If no congenital issue is discovered, then CPT® 93306 is reported alone and includes 2D, Doppler and color flow mapping.
- Since providers may not know the appropriate code(s) that will be reported at the time of the pre-authorization request, they may request all 4 codes (CPT® 93303, CPT® 93320, CPT® 93325, and CPT® 93306).
- CPT® 76376 and CPT® 76377 are not unique to 3D Echocardiography. These codes also apply to 3D rendering of MRI and CT studies. See **3D Echocardiography – Coding (CD-2.9)**.
- CPT® 93325 may also be used with fetal echocardiography.
- CPT® 93319 3D echocardiography imaging post-processing of TEE or TTE to evaluate congenital cardiac abnormalities. See **3D Echocardiography – Coding (CD-2.9)**.

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Cardiac Imaging Guidelines

Transesophageal Echocardiography (TEE) (CD-2.5)

CD.EC.0002.5.A
v1.0.2027

Transesophageal Echocardiography (TEE)- Indications

Criteria

TEE (CPT® 93312, 93320, and 93325) is considered medically necessary when there is documentation of **any** of the following:

- limited transthoracic echo window when further information is needed to guide management (e.g., suspected or confirmed endocarditis, suspected intracardiac mass, etc.)
- assessing valvular dysfunction, especially mitral regurgitation when TTE is inadequate and intervention is being considered to repair/replace valve
- evaluation of cardiac mass, suspected tumor, or thrombus
- pre-procedural assessment of PFO/ASD
- pre-operative evaluation prior to planned LVAD implant
- embolic source or intracardiac shunting when TTE is inconclusive
  - Examples: atrial septal defect, ventricular septal defect, patent foramen ovale, aortic cholesterol plaques, thrombus in cardiac chambers, valve vegetation, tumor
- embolic events when there is an abnormal TTE or a history of atrial fibrillation
  - clarify atria/atrial appendage, aorta, mitral/aortic valve beyond the information that other imaging studies have provided
- cardiac valve dysfunction
  - differentiation of tricuspid from bicuspid aortic valve in setting of aortic enlargement or significant stenosis or significant regurgitation
  - congenital abnormalities
- assessing for left atrial thrombus prior to cardioversion of atrial fibrillation or atrial flutter
- assessing for left atrial thrombus prior to planned atrial fibrillation ablation/pulmonary vein isolation procedure
- for initial imaging of ascending and descending thoracic aortic aneurysms
- For repeat imaging of established thoracic aneurysms, TEE is medically necessary **only** when imaging with CT or MR is contraindicated.

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- TEE is medically necessary for the evaluation of individuals with hypertrophic cardiomyopathy if TTE is inconclusive for **any** of the following:
  - mitral regurgitation secondary to structural abnormalities of the mitral valve
  - subaortic membrane or aortic valve stenosis
- pre-procedure planning for surgical myectomy or alcohol septal ablation
- Left atrial appendage (LAA) Closure device for any of the following:
  - pre-procedural evaluation
  - repeat imaging 45 days post-procedure
    - Another follow-up study is medically necessary before the 1-year surveillance when the imaging study at 45 days shows a peri-device gap ≥5 mm or Device Related Thrombus usually at 3-6 months.
  - 1 year post-procedure

Evidence Discussion

- Transesophageal echocardiogram (TEE) is a semi-invasive ultrasonic examination of the heart through the esophagus. Due to the proximity of the esophagus to the heart and great vessels, it allows for additional and more accurate information than transthoracic echocardiography for several specific diagnoses, catheter-based cardiac interventions, and cardiac surgery.
- TEE is utilized not only for diagnostic purposes but also for dynamic decision-making with cardioversion, surgical intervention, and assessment of surgical repair.
- TEE has become an essential imaging tool for pediatric and adult cardiologists, cardiac surgeons, and anesthesiologists and is used in outpatient and inpatient settings as well as operating rooms.
- The test is performed and interpreted by physicians that have demonstrated both cognitive and technical competence in TEE.
- TEE is readily accessible, has no ionizing radiation exposure, and does not require use of IV contrast.
- There are relative and absolute contraindications which are reviewed prior to insertion of the TEE probe which include and are not limited to esophageal pathology, coagulopathy, and cervical spine injury.

Transesophageal Echocardiography (TEE)-Coding

TEE coding

Transesophageal Echocardiography	CPT®
TEE with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93312

Transesophageal Echocardiography	CPT®
TEE probe placement only	93313
TEE image acquisition, interpretation, and report only	93314
TEE for congenital anomalies with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93315
TEE for congenital anomalies, probe placement only	93316
TEE for congenital anomalies, image acquisition, interpretation and report only	93317

Doppler Echocardiography

Description	CPT®
Doppler echo, pulsed wave and/or spectral display	+93320
Doppler echo, pulsed wave and/or spectral display, follow-up or limited study	+93321
Doppler echo, color flow velocity mapping	+93325
Doppler echo, if performed, may be reported separately in addition to the primary TEE codes: CPT® 93312, CPT® 93314, CPT® 93315, and CPT® 93317	

C codes

HCPCS	Description	CPT®
C8925	TEE with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93312
C8926	TEE for congenital anomalies with 2-D, M-mode, probe placement, image acquisition, interpretation and report	93315

- The complete transesophageal echocardiogram service, including both (1) probe (transducer) placement and (2) image acquisition/interpretation, is reported with CPT® 93312.
  - Probe placement only is reported with CPT® 93313.
  - The image acquisition/interpretation only is reported with CPT® 93314.
- Physicians assign codes CPT® 93312, CPT® 93313, and/or CPT® 93314 to report professional services if the test is performed in a hospital or other facility where the physician cannot bill globally.

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  - Modifier-26 (professional component) is appended to the appropriate code.
  - CPT® 93313 and CPT® 93314 should never be used together. If both services are provided, CPT® 93312 is reported.
- Hospitals should report TEE procedures using CPT® 93312 (the complete service). CPT® 93313 and CPT® 93314 are not used for hospital billing.

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Stress Echocardiography (Stress Echo) (CD-2.7)

CD.EC.0002.7.A
v1.0.2027

Stress Echocardiogram-Indications Other Than Ruling-out CAD (CD-2.7)

Criteria

CPT® 93350 or 93351

- See: **Stress Testing with Imaging – Indications (CD-1.4)**
- In addition to the evaluation of CAD, stress echo is considered medically necessary to evaluate the following conditions:
  - dyspnea on exertion (specifically to evaluate pulmonary hypertension)
  - right heart dysfunction
  - valvular heart disease when the outcome would affect a therapeutic or interventional decision
  - pulmonary hypertension when the outcome will measure response to therapy and/or prognostic information
  - hypertrophic cardiomyopathy (as defined in **Obstructive Hypertrophic Cardiomyopathy (HCM) (CD-12.3)** for **either** of the following:
    - Exercise stress echo (CPT® 93351 or 93350) is considered medically necessary for the detection and quantification of dynamic left ventricular outflow tract obstruction in symptomatic individuals with HCM who do **not** have a resting or provocable outflow tract gradient ≥50 mm Hg on TTE.
    - Repeat stress echo is considered medically necessary when there is documentation of **any** of the following:
      - in 1 to 2 years if the resting or provocable outflow tract gradient is <30 mm Hg on prior stress echo
      - worsening symptoms
      - There has been a therapeutic change (i.e., change in medication, surgical procedure performed).
- Spectral Doppler (CPT® 93320 or 93321) and color-flow Doppler (CPT® 93325) are considered medically necessary in the evaluation of the above conditions and can be added to the stress echo code.

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Evidence Discussion

The 2024 AHA/ACC/AMSSM/HRS/PACES/SCMR HCM guideline and ASE multimodality imaging recommendations support exercise stress echocardiography for detection and quantification of latent obstruction in symptomatic individuals without resting or provocable gradients ≥50 mm Hg. Repeat stress echocardiography is supported when symptoms worsen, when treatment changes occur, or when prior gradients were low and reassessment may affect management. Evidence is largely derived from physiologic studies, observational data, and expert consensus rather than randomized trials of imaging strategies; however, the relationship between LVOT obstruction, symptoms, and therapeutic decision-making is well established (Ommen et al., 2024; Nagueh et al., 2022).

Stress echocardiography is a ultrasonic examination of the heart through the chest wall during rest and stress. Given the ultrasound modality, there is no exposure to ionizing radiation or concern for contrast induced renal failure.

Stress echocardiography is used to assess for global and regional systolic function and evaluation of valvular function at rest and during stress. This allows for non-invasive diagnosis and management of coronary artery disease, various cardiomyopathies, pulmonary hypertension, and valvular heart disease.

A complete comprehensive stress echocardiogram will incorporate 2D imaging with multiple acquisition windows during rest and stress and may also incorporate color and spectral Doppler imaging. This provides a dynamic evaluation of myocardial and valvular structure and function under physiological (exercise) or pharmacological stress.

Stress Echo – Coding

Associated codes

Stress Echocardiography	CPT®
Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;	93350
Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: including performance of continuous electrocardiographic monitoring, with physician supervision	93351
Doppler Echocardiography	
Doppler echo, pulsed wave and/or spectral display	+93320

Stress Echocardiography	CPT®
Doppler echo, pulsed wave and/or spectral display, follow-up/limited study	+93321
Doppler echo, color flow velocity mapping	+93325

Associated HCPCS codes

CPT®	Stress Echocardiography	HCPCS
93350	Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;	C8928
93351	Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: including performance of continuous electrocardiographic monitoring, with physician supervision	C8930

CPT® 93350 and CPT® 93351 do not include Doppler studies.

Doppler echo (CPT® +93320 and CPT® +93325), if performed, may be reported separately in addition to the primary SE codes: CPT® 93350 or CPT® 93351.

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3D Echocardiography (CD-2.9)

CD.EC.0002.9.A
v1.0.2027

Criteria

Echocardiography with 3-dimensional (3D) rendering is becoming universally available, yet its utility remains limited based on the current literature.

- CPT ® 93319 with one of the following (CPT® 93303, 93304, 93312, 93314, 93315, or 93317) for is considered medically necessary to evaluate congenital cardiac abnormalities
- 3D Echo (CPT® 76376 or CPT® 76377) is considered medically necessary when **one** of the following is needed:
  - left ventricular volume and left ventricular ejection fraction assessment when measurements are needed for treatment decision (e.g., implantation of ICD, alteration in cardiotoxic chemotherapy, cardiac transplant)
  - mitral valve anatomy specifically related to mitral valve stenosis
  - pre-procedural evaluation of left atrial appendage occlusion
  - pre-operative evaluation for LVAD implant
  - guidance of transcatheter procedures such as:
    - mitral valve clipping
    - TAVR
    - left atrial appendage closure device

Evidence Discussion

- 3D echocardiography (3DE) is a newer modality of ultrasonic examination of the heart through the chest wall or through the esophagus that is added on to either a transthoracic or transesophageal echocardiogram.
- This allows for both real-time and post-processed 3D analysis of the cardiac structures and function. This produces images that are less constrained than that of 2D echocardiograms.
- 3DE is readily accessible and transportable allowing for the test to be done at multiple different locations with no need for blood work or IV line insertion.
- 3DE has become important in pre-surgical planning, guidance of catheter intervention, and functional assessment of the heart in various cardiac conditions including but not limited to congenital heart disease, valvular disease, and structural heart disease.

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3D Echocardiography – Coding

Code	Description
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
+93319	3D echocardiographic imaging and post-processing during transesophageal echocardiography, or during transthoracic echocardiography for congenital cardiac anomalies, for the assessment of cardiac structure(s) (e.g., cardiac chambers and valves, left atrial appendage, interatrial septum, interventricular septum) and function, when performed (List separately in addition to code for echocardiographic imaging) Code with (93303-93304, 93312, 93314, 93315, 93317, 93350-93351)

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Myocardial Strain Imaging (CD-2.12)

CD.EC.0002.12.A
v1.0.2027

Criteria

CPT® 93356

- Myocardial strain imaging (CPT® 93356, speckle tracking longitudinal strain) is considered medically necessary for the initial evaluation of LVH, in addition to the primary echocardiogram, when there is documentation of **both**:
  - unclear etiology of LVH not due to hypertensive heart disease
  - concern for infiltrative cardiomyopathy
- Myocardial strain imaging is considered medically necessary in heart transplant evaluation and surveillance per transplant protocol.
- Myocardial strain imaging (CPT® 93356) in addition to the primary echocardiogram in individuals receiving therapy with cardiotoxic agents for **any** of the following:
  - Initial evaluation-prior to treatment with **either**:
    - medications that could result in cardiotoxicity/heart failure
    - radiation that could result in cardiotoxicity/heart failure
  - re-evaluation of an individual previously or currently undergoing therapy as per echocardiogram parameters (see **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1))**
  - re-evaluation of an individual undergoing therapy with worsening symptoms

Evidence Discussion

- Myocardial strain imaging or speckle-tracking echocardiography (STE) is a modern ultrasound technique that is an adjunct to traditional transthoracic echocardiography to evaluate myocardial deformation.
- Given the ultrasound modality, there is no exposure to ionizing radiation or concern for contrast-induced renal failure.
- The main areas of application of this technique have been in the assessment of myocardial mechanics, ischemic heart disease, cardiomyopathies, LV diastolic dysfunction, and in detecting sub-clinical myocardial dysfunction in individuals undergoing chemotherapy for cancer or in those affected by heart valve diseases.
- STE is considered the optimal deformation parameter for the detection of subclinical LV dysfunction which allows for clinical intervention prior to reduction in LVEF particularly useful in the field of cardio-oncology.

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CD.EC.0002.A
v1.0.2027

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Nuclear Cardiac Imaging

Guideline Page

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Myocardial Perfusion Imaging (MPI) (CD-3.2)

CD.NC.0003.1.A
v1.0.2027

MPI Other Indications

Criteria

Medically Necessary

See: **Stress Testing with Imaging – Indications (CD-1.4)**

Not Medically Necessary

Absolute quantitation of myocardial blood flow obtained by CZT-SPECT (AQMBF) (SPECT) is considered experimental, investigational, or unproven at this time.

Nuclear Cardiac Imaging Procedure Codes

- The most commonly performed myocardial perfusion imaging are single (at rest or stress, CPT® 78451) and multiple (at rest and stress, CPT® 78452) SPECT studies. Less commonly ordered are planar studies (CPT 78453 and 78454) see **Stress Testing with Imaging – Criteria (CD-1.4)**.
  - Evaluation of the individual's left ventricular wall motion and left ventricular ejection fraction are routinely performed during MPI and are included in the code's definition.
  - First pass studies, (CPT® 78481 and CPT® 78483), MUGA, (CPT® 78472 and CPT® 78473) and SPECT MUGA (CPT® 78494) should not be reported in conjunction with MPI codes.
  - Attenuation correction, when performed, is included in the MPI service by code definition. No additional code should be assigned for the billing of attenuation correction.
- **Multi-day Studies:** In the absence of written payer guidelines to the contrary, it is not appropriate to bill separately for the rest and stress segments of MPI even if performed on separate calendar dates. A single code is assigned to define the entire procedure on the date all portions of the study are completed.

Evidence Discussion

Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of

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myocardial perfusion imaging (MPI) with single photon emission computed tomography (SPECT) for individuals with signs or symptoms consistent with coronary artery disease (CAD) such as typical angina. In addition, they support the use of SPECT perfusion imaging in symptomatic individuals with known CAD and those with prior interventions such as coronary artery bypass surgery, coronary stenting, and preoperative risk stratification.

Also, as supported by society guidelines, use of SPECT is medically necessary in detection of cardiac transthyretin amyloidosis (ATTR) after light chain amyloidosis (AL) is ruled out by appropriate blood and urine testing.

Coding

Codes	Description®
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (spect) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
78453	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78454	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
+0742T	Absolute quantitation of myocardial blood flow (AQMBF), single-photon emission computed tomography (SPECT), with exercise or pharmacologic stress, and at rest, when performed (List separately in addition to code for primary procedure)

Note:

3D rendering should not be billed in conjunction with MPI.

MUGA Study (CD-3.4)

CD.NC.0003.4.A
v1.0.2027

Criteria

MUGA (Multi Gated Acquisition) – Blood Pool Imaging is considered medically necessary for any of the following:

- recent TTE was technically limited and prevented accurate assessment of left ventricular function
- there is a significant discrepancy between LVEF assessment by TTE and another modality (i.e., one study reports normal LVEF and the other, a reduced LVEF) AND there is clear documentation as to how quantitative measurement of LVEF will affect individual management (e.g., implantation of an ICD, alteration in cardiotoxic chemotherapy, etc.).
- in place of a TTE in the following circumstances:
  - to determine candidacy for ICD/CRT and/or to determine optimal choice of device in individuals who meet criteria for ICD based on left ventricular ejection fraction and other criteria
  - when previously or currently undergoing therapy with potentially cardiotoxic agents, including chemotherapy and radiation, AND a history of previous low left ventricular ejection fraction (LVEF <50%). See **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1)**.

Right ventricular first pass study

- (CPT® 78472 and 78496) is considered medically necessary when ECHO is technically limited and prevents accurate assessment of RV function AND when further information about RV function is needed to guide management (e.g., established/diagnosed pulmonary hypertension, suspected or confirmed pulmonary embolus).

First pass studies

- First pass studies (CPT® 78481 and CPT® 78483) is considered medically necessary in place of MUGA when criteria are met for MUGA and/or there is need for information that cannot be obtained by MUGA.
- First pass studies, (CPT® 78481 and CPT® 78483), MUGA (CPT® 78472 and CPT® 78473), and SPECT MUGA (CPT® 78494) should not be reported in conjunction with MPI codes.

Not medically necessary

MUGA is not considered medically necessary to compare LVEF by the same modality because the prior study was a MUGA.

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Evidence Discussion

Multi-gated acquisition (MUGA) imaging (also referred to as radionuclide angiography, gated blood pool scan, equilibrium radionuclide angiography) is a method to measure left ventricular ejection fraction and wall motion of the heart. Echocardiography is the preferred method of following left ventricular systolic function.

Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of planar imaging and/or single photon emission computed tomography (SPECT) of labeled red blood cells for individuals who require accurate assessment of left ventricular ejection fraction and/or wall motion when echocardiography or other imaging approaches are inadequate or disparate. This includes individuals with cardiomyopathy and those exposed to cardio-toxic agents.

Multi-gated Acquisition (MUGA) Coding (CD-3.3)

Cardiac blood pool imaging, or radionuclide ventriculography, can be used to evaluate ventricular function. Cardiac blood pool imaging includes first pass studies (CPT® 78481 and 78483) as well as gated equilibrium studies (CPT® 78472, 78473, 78494, and +78496).

Gated equilibrium studies can also be referred to as multi-gated acquisition (MUGA) scan or equilibrium radionuclide angiography (ERNA). Imaging for gated equilibrium studies can be planar or 3D (single photon emission computed tomography, SPECT).

Of note, all cardiac blood pool imaging is synchronized with electrocardiographic RR interval (EKG-gated); thus, regular rhythm is required for accurate LV assessment.

- The technique employed for a MUGA service guides the code assignment.
  - CPT® 78472 is used for a planar MUGA scan at rest or stress.
  - CPT® 78473 for planar MUGA scans, multiple studies at rest and stress.
- Planar MUGA studies (CPT® 78472 and CPT® 78473) should not be reported in conjunction with:
  - SPECT MPI (CPT® 78451-CPT® 78454)
  - First pass studies (CPT® 78481-CPT® 78483)
  - SPECT MUGA (CPT® 78494).
- CPT® +78496 is assigned only in conjunction with CPT® 78472.

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Code	Description
Gated Equilibrium Studies – Planar	
78472	Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing
78473	Cardiac blood pool imaging, gated equilibrium; multiple studies, wall motion study plus ejection fraction, at rest and stress (exercise and/or pharmacologic), with or without additional quantification
Gated Equilibrium Studies-SPECT	
78494	Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing
First Pass studies	
78481	Cardiac blood pool imaging (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78483	Cardiac blood pool imaging (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
+78496	Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure)

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Myocardial Sympathetic Innervation Imaging in Heart Failure (CD-3.6)

CD.NC.0003.6.A
v1.0.2027

Criteria

- Nuclear imaging using I-123-meta-iodobenzylguanidine (I-123-mIBG) in an attempt to image increased myocardial sympathetic activity is considered to be experimental and investigational.
- The AMA has established the following set of Category III codes to report these studies:
  - CPT® 0331T Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment
  - CPT® 0332T Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT

Evidence Discussion

I-123-meta-iodobenzylguanidine (MIBG) imaging of the sympathetic nerve activity of the heart has been proposed and approved for the identification of individuals with heart failure. However, its clinical utility has not found widespread acceptance, and its clinical usefulness remains in question. There are no societal guidelines for its routine use. The guidelines contain many other imaging platforms such as echocardiography, magnetic resonance imaging, perfusion, and metabolic imaging that have proven superior for the diagnosis and management of individuals with heart failure.

Coding

Code	Description
0331T	Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment;
0332T	Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT

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Non-imaging Heart Function and Cardiac Shunt Imaging (CD-3.7)

CD.NC.0001.7.A
v1.0.2027

Criteria

- Procedures reported with CPT® 78414 and CPT® 78428 are essentially obsolete but are considered medically necessary when other preferred modalities are unavailable or non-diagnostic.
- Echocardiogram is the preferred method for cardiac shunt detection, rather than the cardiac shunt imaging study described by CPT® 78428.
- Left ventricular ejection fraction can be obtained by echocardiogram, SPECT MPI, MUGA study, cardiac MRI, cardiac CT, or cardiac PET depending on the clinical situation, rather than by the non-imaging heart function study described by CPT® 78414.

Evidence Discussion

Non-imaging Heart Function and Cardiac Shunt Imaging radionuclide techniques are no longer in use in current clinical practice. These techniques have been rendered obsolete and have been replaced by other cardiac imaging modalities that provide far superior structural and functional information to guide clinical management decisions. The preferred cardiac imaging modalities in current clinical use that have replaced the obsolete techniques include echocardiography, SPECT MPI, MUGA study, cardiac MRI, cardiac CT, and cardiac PET.

Coding

Codes	Description
78414	Determination of central c-v hemodynamics (non-imaging) (eg, ejection fraction with probe technique) with or without pharmacologic intervention or exercise, single or multiple determinations
78428	Cardiac shunt detection

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Myocardial Tc-99m Pyrophosphate Imaging in Cardiac Amyloidosis (CD-3.8)

CD.NC.0003.7.A
v1.0.2027

Criteria

CPT® 78469, 78803, or 78830

Tc-99m pyrophosphate imaging is considered medically necessary to diagnose cardiac ATTR in an individual with no history of an MI in the 4 weeks preceding the test when **any** of the following conditions exist:

- Serum kappa/lambda free light chain ratio or Serum or urine immunofixation electrophoresis screening excludes presence of a monoclonal light chain process i.e., AL amyloidosis
- cardiac MRI or echocardiography findings suggest cardiac amyloidosis
- individual has known systemic amyloidosis
- individual is ATTR gene positive
- suspected cardiac ATTR amyloidosis when there is a contraindication to CMR such as renal insufficiency or an implantable cardiac device

Note:

Cardiac follow-up should be based on Echocardiogram, Tn, NT-proBNP, clinical exam and symptom

Background and Supporting Information

- The following conditions would raise high index of suspicion:
  - left ventricular hypertrophy but low voltage on ECG
  - heart failure with preserved left ventricular ejection fraction and an increase in left ventricular wall thickness
  - unexplained heart failure with preserved left ventricular ejection fraction and concomitant right heart failure in an individual over the age of 60
  - individuals, especially elderly males, with signs/symptoms of heart failure and any of the following:
    - lumbar spinal stenosis
    - spontaneous biceps tendon rupture
    - bilateral carpal tunnel syndrome
    - atrial arrhythmia in the absence of usual risk factors

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- known or suspected familial amyloidosis
- low flow, low gradient aortic stenosis

Evidence Discussion

Appropriate Use Criteria from major professional societies including the American College of Cardiology and the American Heart Association support the use of myocardial perfusion imaging (MPI) with single photon emission computed tomography (SPECT) for individuals with signs or symptoms consistent with coronary artery disease (CAD) such as typical angina. In addition, they support the use of SPECT perfusion imaging in symptomatic individuals with known CAD and those with prior interventions such as coronary artery bypass surgery, coronary stenting, and preoperative risk stratification. These guidelines balance the appropriate testing of individuals with SPECT versus unnecessary and potentially harmful testing and downstream procedures.

Also, as supported by society guidelines, use of SPECT is medically necessary in detection of cardiac transthyretin amyloidosis (ATTR) after light chain amyloidosis (AL) is ruled out by appropriate blood and urine testing.

Coding

Codes	Cardiac Pyrophosphate Scan
78800	Radiopharmaceutical Localization Imaging Limited area
78466	Myocardial imaging, infarct avid, planar; qualitative or quantitative
78468	Myocardial imaging, infarct avid, planar; with ejection fraction by first pass technique
78469	Myocardial imaging, infarct avid, planar; tomographic SPECT with or without quantification
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) , single area (eg, head, neck, chest, pelvis), single day imaging

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Codes	Cardiac Pyrophosphate Scan
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis), single day imaging

- Historically this method of imaging the myocardium was used to identify recent infarction, hence, the term "infarct-avid scan." Although still available, the sensitivity and specificity for identifying infarcted myocardial tissue are variable and the current use for this indication is limited. See **Cardiac MRI (CD-5)**.
- Tc-99m pyrophosphate imaging (CPT® 78469, 78803, or 78830) is medically necessary to identify cardiac amyloidosis.
- Chest SPECT and planar imaging may be used, as well as whole-body imaging for identification of systemic ATTR (transthyretin) amyloidosis.
- For a single planar imaging session alone (without a SPECT study), report CPT® 78800 Radiopharmaceutical Localization Imaging Limited area
- Note: When reporting CPT 78803, planar imaging of a limited area or multiple areas should be included with the SPECT

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v1.0.2027

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Cardiac CT

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CT for Coronary Calcium Scoring (CD-4.2)

CD.CT.0004.2.A
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Criteria

CPT® 75571

CT Calcium Scoring-Asymptomatic and for CAD Screening

ASCVD Risk Score (Pooled Cohort Equation)

- Coronary artery calcium score is considered medically necessary when there is documentation of **all** of the following:
  - Results will impact risk-based decisions for preventive interventions.
  - an LDL-C level ≥70 mg/dL (1.8mmol/L) **and** <190mg/dL (4.9mmol/L)
  - Individual is an adult age 40-75
  - 10-year ASCVD risk including pooled cohort equation is between 5.0% to 19.9%
  - There is no documented CAD.
  - Individual is not currently on a statin.
  - Individual is not a tobacco smoker.
  - There is no history of diabetes.
  - There is no family history of premature CAD (occurring before age 56 in males or before age 66 in females).
  - There has been no calcium score performed in the previous 5 years.
  - There has been no prior calcium score >0

OR

PREVENT score

Coronary artery calcium score is considered medically necessary when there is documentation of **all** of the following:

- PREVENT score is 3% to 5%
- there is consideration for lipid lowering therapy
- individual is 30-79 years of age

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Repeat calcium scoring

Repeat CT calcium scoring is considered medically necessary when ASCVD risk >5%, there is no documented CAD, and when the results will help determine whether current lipid-lowering therapy should be intensified

Suspected or Known Low Gradient Aortic Stenosis

- Coronary artery calcium score is considered medically necessary in low gradient aortic stenosis when symptomatic, severe aortic stenosis is suspected. Low gradient aortic stenosis is defined as an AVA <1 and a mean gradient <40mmHg.

Individuals with a History of Chest Radiation Therapy

CT calcium scoring is considered medically necessary to evaluate for radiation induced CAD when all of the following conditions exist:

- no presence of symptoms suspicious for ischemia such as chest discomfort located retrosternally, epigastric, or referred pain (pain that is felt in a place different than the source) in the neck, shoulder, arm, or jaw described as pain, pressure, constricting, or tightness occurring with exertion or emotional stress and relieved by rest, nitroglycerin, or both.
- no clinical history or prior cardiac imaging documenting CAD.
- no prior calcium score >0.
- for the initial study, there has been at least 5 years since the last RT (radiotherapy/radiation) treatment or for subsequent testing, there has been at least 5 years since the last CT calcium scoring.

Not Medically Necessary

Evaluation of Known CAD

Coronary calcium scoring is considered **not** medically necessary in an individual with known CAD.

Evaluation of Suspected CAD in Symptomatic Individuals

CT calcium score is considered **not** medically necessary for the evaluation of CAD in symptomatic individuals.

Evidence Discussion

Coronary artery calcium (CAC) scoring is an established imaging modality for detection of subclinical coronary atherosclerosis. Contemporary multisociety guidelines identify CAC scoring as a decision-modifying tool when traditional risk assessment is inconclusive. Unlike risk calculators alone, CAC directly measures atherosclerotic burden, thereby linking diagnostic findings to future cardiovascular event risk.

Coronary artery calcium (CAC) scoring is supported by moderate-quality evidence demonstrating a strong and graded association with atherosclerotic cardiovascular

disease (ASCVD) events. Multisociety guidelines recommend CAC testing in primary prevention populations to further refine risk stratification when clinical risk assessment alone is insufficient to guide lipid-lowering therapy decisions . Although evidence is primarily derived from observational cohort data, the consistency of risk prediction have led to Class I and IIa recommendations. CAC directly measures atherosclerotic burden, thereby linking diagnostic findings to future cardiovascular event risk. This supports differentiation of individuals who would benefit from lipid-lowering therapy from those in whom deferral of therapy would be appropriate (Blumenthal et al., 2026).

In addition to CAC, the degree of calcification of the aortic valve has been demonstrated to correlate with the degree of aortic stenosis and prognosis. The utility of calcium scoring has been extended to the aortic valve in the setting of symptomatic, low gradient aortic stenosis (defined as an aortic valve area of less than 1cm^2 and mean gradient of less than 40mmHg), when severe aortic stenosis is suspected.

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Coronary CT Angiography (CCTA) (CD-4.3)

CD.CT.0004.3.A
v1.0.2027

Criteria

CCTA (CPT® 75574)

CCTA is considered medically necessary for any of the following:

- new, recurrent, or worsening cardiac chest pain as defined in **General Guidelines (CD-1.0)**
- new, recurrent, or worsening symptoms of chest pain, or unexplained exertional dyspnea, or unexplained exertional fatigue, and any of the following:
  - Symptoms persist after a normal stress test.
  - equivocal, borderline, abnormal or discordant prior noninvasive evaluation since the onset of symptoms where obstructive coronary artery disease remains a concern
  - new abnormal rest ECG findings since the onset of symptoms, such as a new LBBB or T-wave inversions (not including isolated T wave inversion in III or leads v1-2), when ischemia is a concern
  - a history of prior CABG when the **only** concern is for graft patency
  - Individual has undergone an urgent evaluation (ER or urgent care) of the symptoms since the onset.
  - history of cardiac transplant (e.g., concern for transplant vasculopathy)
  - history of chest radiation therapy
  - chest pain occurring with syncope
  - coronary artery calcium score (CAC) score ≥100
  - individuals 50 years of age or above with 2 or more of the following CV risk factors:
    - diabetes
    - tobacco smoker
    - family history of premature CAD in a first-degree relative (biologic parent, sibling, or child)
    - hypertension
    - hyperlipidemia
    - history of adverse pregnancy outcomes (APOs)

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  - Prior history of PCI (percutaneous coronary intervention) or CABG (coronary artery bypass graft surgery) or a history of obstructive CAD as defined in **General Guidelines (CD-1.0) and any** of the following:
    - Cardiac chest pain as defined in **General Guidelines (CD-1.0)**
    - Anginal equivalents such as atypical chest pain, exertional dyspnea or exertional fatigue
    - Symptoms similar to prior ischemic episode
- Evaluation of an individual under the age of 40 for suspected anomalous coronary artery(ies) or for treatment planning when there is a history of one or more of the following:
  - syncopal episodes during strenuous activities
  - persistent chest pain brought on by exertion or emotional stress and normal stress test
  - full sibling(s) with history of sudden death syndrome before age 40 or with documented anomalous coronary artery
  - resuscitated sudden death and contraindications for conventional coronary angiography
  - prior nondiagnostic coronary angiography in determining the course of the anomalous coronary artery in relation to the great vessels, origin of a coronary artery or bypass graft location (any):
    - Anomalies of origin:
      - LCA or the RCA arising from the pulmonary artery
      - interarterial course between the pulmonary artery and the aorta of either the RCA arising from the left sinus of Valsalva or the LCA arising from the right sinus of Valsalva
    - Anomalies of course:
      - myocardial bridging
    - Anomalies of termination:
      - coronary artery fistula
- Initial imaging study in individuals with hypertrophic cardiomyopathy and stable anginal symptoms
  - Chest discomfort is common in individuals with hypertrophic cardiomyopathy. The incidence of false positive myocardial perfusion imaging abnormalities is higher in these individuals, whereas the incidence of severe coronary artery stenosis is low.
- Individuals who have recovered from unexplained sudden cardiac arrest in lieu of invasive coronary angiography **(both)**:
  - confirm the presence or absence of ischemic heart disease
  - exclude the presence of an anomalous coronary artery

CCTA – Regardless of Symptoms (CD-4.4)

CD.CT.0004.4.A
v1.0.2027

Criteria

CPT® 75574

- Evaluation of newly diagnosed heart failure or cardiomyopathy (all):
  - No prior history of coronary artery disease, the left ventricular ejection fraction is <50%
  - No contraindications to cardiac CT angiography
  - No cardiac catheterization, SPECT, cardiac PET, or stress echocardiogram has been performed since the diagnosis of heart failure or cardiomyopathy.
- Unclear coronary artery anatomy despite conventional cardiac catheterization
- Evaluation of structural heart disease or CAD for use of class IC antiarrhythmic agent (flecainide or propafenone) in place of stress test with imaging
- Ventricular tachycardia (3-beat runs or greater), exercise induced ventricular tachycardia or ventricular fibrillation
- Re-do CABG **(either)**:
  - assess bypass graft patency
  - evaluate the location of the left internal mammary artery (LIMA) and or right internal mammary artery (RIMA) prior to repeat bypass surgery
- Follow-up Left main stent 1 time at 6-12 months
- Pre-procedural planning for Percutaneous Coronary Intervention (PCI) of Chronic Total Occlusion (CTO)
- Evaluate coronary artery anomalies and other complex congenital heart disease of cardiac chambers or great vessels:
  - To evaluate the great vessels, CTA Chest (CPT® 71275) can be performed instead of CCTA or in addition to CCTA.
  - For anomalous pulmonary venous return, can add CT Abdomen and Pelvis with contrast (CPT® 74177).
  - See **Adult Congenital Heart Disease CD-11** for lesion specific imaging.
- When CCTA will replace conventional invasive coronary angiography for any of the following:
  - Delayed presentation or retrospective evaluation of suspected Takotsubo syndrome (stress cardiomyopathy)

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- Preoperative assessment of the coronary arteries in planned surgery for any of the following:
  - Aortic dissection
  - Aortic aneurysm
  - Valvular surgery
  - Liver transplant (for initial pre-transplant evaluation and may be repeated once in 3 years)
- To assess for coronary involvement in individuals with systemic vasculitis (e.g. Giant Cell Arteritis, Takayasu's, Kawasaki's disease) when there are clinical features suggestive of underlying vasculitis including:
  - unexplained elevated cardiac markers (erythrocyte sedimentation rate, C-reactive protein)
  - constitutional symptoms (fever, chills, night sweats, weight loss)
  - multiple visceral infarcts in the absence of embolic etiology

- For **Cardiac Trauma**, see also **Cardiac Trauma – Imaging (CD-10.1)**.
- Preoperative assessment for either:
  - planned liver or kidney transplant
  - in place of stress testing with imaging for high-risk or intermediate-risk surgery as follows:
    - **High-risk Surgery:** An imaging stress test is considered medically necessary when any of these conditions apply:
      - it has been one year or more since the last imaging stress test
      - new cardiac symptoms have developed since the last imaging stress test
      - new EKG changes have developed since the last imaging stress test
    - **Intermediate-risk Surgery:** An imaging stress test is considered medically necessary when **all** of the following apply:
      - individual is unable to perform an ETT
      - it has been one year or more since the last imaging stress test **or** new cardiac symptoms have developed since the last imaging stress test **or** new EKG changes have developed since the last imaging stress test
      - clinical history documents **one** of the following clinical risk factors for cardiac death and non-fatal MI at time of non-cardiac surgery:
        - ischemic heart disease (previous MI, previous positive stress test, use of nitroglycerin, typical angina, ECG Q waves, previous PCI or CABG)
        - compensated heart failure (history of heart failure, previous pulmonary edema, third heart sound, bilateral fine crackles, chest x-ray showing heart failure)
        - previous TIA or stroke
        - diabetes mellitus
        - creatinine level >2mg/dL

- **Low-risk:** Pre-operative imaging stress testing is considered not medically necessary.

High-risk (> 5%)	Intermediate-risk (1-5%)	Low-risk (<1%)
• Open aortic and other major open vascular surgery • Open peripheral vascular surgery • Esophagectomy • Pneumonectomy • Open intraperitoneal and/or intrathoracic surgery with organ resection	• Open intraperitoneal and/or intrathoracic surgery without major organ resection • Open carotid endarterectomy • Head and neck surgery • Open orthopedic surgery • Open prostate surgery	• Endoscopic procedures • Superficial procedures • Cataract surgery • Breast surgery • Ambulatory surgery • Laparoscopic and endovascular procedures that are unlikely to require further extensive surgical intervention

Anatomical and Functional Analysis of CCTA Results (CD-4.5)

CD.CT.0004.5.A
v1.0.2027

Criteria

Fractional flow reserve by computed tomography

CPT® 75580

Fractional flow reserve (FFR) is typically measured using invasive techniques. FFR can be obtained non-invasively from coronary computed tomography angiography data (FFR-CT).

- Criteria:
  - FFR-CT is considered medically necessary to further assess CAD seen on a recent CCTA that is of uncertain physiologic significance

Coronary CTA plaque quantification

CPT® 75577

Coronary CT plaque quantification or coronary plaque analysis using data from CCTA is considered medically necessary when **all** of the following conditions exist:

- The individual has acute or stable chest pain with no known coronary artery disease (CAD)
- Results from the current completed and interpreted CCTA indicate any of the following risk categories:
  - intermediate risk
  - CAD-RADS 1
  - CAD-RADS 2
  - CAD-RADS 3
- Cardiac evaluation is negative or inconclusive for acute coronary syndrome.

Not medically necessary

- Coronary CTA plaque quantification or coronary plaque analysis using data from CCTA is not considered medically necessary in any of the following clinical scenarios:
  - unstable coronary syndromes
  - in conjunction with invasive coronary catheterization
  - for the purpose of screening or disease surveillance
  - within 30 days of a myocardial infarction

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- Current completed and interpreted CCTA documents any of the following results:
  - Normal CCTA
    - CAD-RADS-0
  - High-grade stenosis
    - CAD-RADS-4
    - CAD-RADS-5

Note:

See **General Guidelines CD 1.0** for **CAD-RADS** classifications

Evidence Discussion

Coronary Computed Tomography Angiography (CCTA) provides non-invasive anatomic coronary imaging with excellent sensitivity for detecting coronary plaques and stenosis. However, artifacts can significantly lower the specificity, which potentially leads to higher healthcare resource utilization. Notwithstanding this concern, the ability to characterize coronary plaques and stenosis on a CCTA proved to be advantageous over functional stress testing, with respect to diagnostic characteristics and prognostication, as demonstrated by high-quality evidence, including multiple randomized trials.

To ensure a clinically meaningful study, in addition to paying meticulous attention to the scanner functionality and protocol selection, careful individual selection is imperative. Based on the known performance characteristics of CCTA and high-quality clinical trials from Europe and North America, there is general agreement between the American and European guidelines to focus CCTA testing on the following general categories:

- Cardiac chest pain with no known coronary artery disease (CAD)
- Absence of symptoms or possible cardiac chest pain with no known CAD, when objective evidence of cardiac structure or function abnormality is present
- Information about specific coronary artery abnormalities, such as left main coronary stent and bypass graft patency, congenital coronary anomaly, non-atherosclerotic coronary disease may potentially alter clinical management decision.
- CCTA will replace conventional invasive coronary angiography when the likelihood of coronary intervention is not high based on clinical assessment.

CTA derived fractional flow reserve (FFRct) is one of the value-added technologies that have been shown to improve the accuracy of CAD diagnosis over and above CCTA alone. While it modestly adds negative predictive value to CCTA by excluding critical coronary lesion with a FFRct value >0.8, the positive predictive value is inadequate to confer confidence to locate lesions with significant stenosis. Effective adoption of this technology, therefore, is contingent upon ensuring optimal CCTA image quality and a

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mindful individual selection process; for example, avoid applying FFRct to those with left main coronary disease ≥50% or those with critical triple vessel disease.

Coronary Plaque Analysis (AI-QCT/AI-CPA) using coronary computed tomography angiography (CCTA) is an adjunctive tool used to assess intermediate risk plaque or CAD-RADS1 to CAD-RADS 3 category on CCTA done on individuals with chest pain and no known coronary artery disease. Multiple software have been developed as an adjunct to CCTA to aid in the visualization, characterization, and to improve accuracy of this assessment. This is intended to improve clinical diagnosis and management of CAD.

AI-CPA is currently being used to help stage medical treatment based on severity of plaque and to help predict those who are increased risk for ACS. It has also been shown to be consistent with consistent with invasive fractional flow reserve and intravascular ultrasound (IVUS). It is best used to target those most susceptible to acute coronary syndrome and to guide preventative measures of coronary artery disease.

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CT Heart for Evaluation of Cardiac Structure and Morphology (CD-4.6)

CD.CT.0004.6.A
v1.0.2027

Criteria

CPT® 75572

CT Cardiac for structure and morphology is considered medically necessary as follows:

- Cardiac vein identification for lead placement in left ventricular pacing
- To evaluate the anatomy of the pulmonary veins prior to a pulmonary vein isolation (ablation) procedure for atrial fibrillation
  - Post-procedure between 3-6 months after ablation

Note:

See also **Initial Transthoracic Echocardiography (TTE) Indications (PEDCD-8.2)**

- If echocardiogram is inconclusive for:
  - cardiac or pericardial tumor or mass
  - cardiac thrombus
  - pericarditis/constrictive pericarditis
  - complications of cardiac surgery
- In place of MRI when there is clinical suspicion of arrhythmogenic right ventricular dysplasia or arrhythmogenic cardiomyopathy (ARVD/ARVC) if the clinical suspicion is supported by established criteria. For ARVD, see **Cardiac MRI – Indications (excluding Stress MRI) (CD-5.2).**
- Recurrent laryngeal nerve palsy due to cardiac chamber enlargement
- Prior to planned valvular interventions (TAVR, TMVR and TTVR) in individuals with radiation-induced valve disease
- CT Cardiac Morphology is considered medically necessary instead of TEE for assessment of left atrial appendage (LAA) occlusion device or to assess for thrombus. See: **Transesophageal Echocardiography (TEE) – Indications (CD-2.5).**
  - pre-procedural evaluation
  - repeat imaging 45 days post-procedure
    - Another follow-up study is medically necessary before the 1-year surveillance when the imaging study at 45 days shows a peri-device gap ≥5 mm or Device Related Thrombus usually at 3-6 months.

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- 1 year post-procedure

Evidence Discussion

Cardiac CT for structure and morphology is an effective alternative or complement to echocardiography and CMR when image windows are limited or when comprehensive 3D anatomic definition is required, enabling evaluation of cardiac masses, pericardial disease, pulmonary veins, coronary venous anatomy for lead planning, and left-atrial appendage (LAA) occlusion devices (Otto et al., 2021; Blanke et al., 2019; Korsholm et al., 2020).

Compared with TEE or CMR, CT offers consistent visualization of posterior structures and calcification, facilitates annular sizing and spatial planning for structural interventions, and provides rapid high-resolution datasets that can alter procedural strategy. Modality selection should weigh iodinated contrast and radiation exposure against the expected management impact (Blanke et al., 2019; Otto et al., 2021; Korsholm et al., 2020).

Cardiac Imaging Guidelines

CT Heart for Congenital Heart Disease (CD-4.7)

CD.CT.0004.7.A
v1.0.2027

Criteria

CPT® 75573

CT Cardiac for evaluation of cardiac structure and morphology in the setting of congenital heart disease is considered medically necessary for any of the following:

- Coronary artery anomaly evaluation when cardiac catheterization did not identify all coronary arteries
- Thoracic arteriovenous anomaly evaluation when MRI Cardiac or CTA Chest suggested congenital heart disease
- Complex adult congenital heart disease evaluation when either of the following applies:
  - No CT Cardiac or MRI Cardiac has been performed, and there is a contraindication to MRI Cardiac.
  - A CT Cardiac or MRI Cardiac was performed 1 year ago or more.
- See also section **Adult Congenital Heart Disease (CD-11)**

Evidence Discussion

In adults with congenital heart disease, cardiac CT is valuable when rapid, high-resolution definition of complex anatomy is necessary or when CMR is contraindicated or nondiagnostic; key use cases include coronary artery anomaly definition, thoracic arteriovenous anomalies, and complementary planning for complex repairs (Stout et al., 2019; Kim et al., 2006; Gräni et al., 2017).

CT complements CMR and echocardiography by clarifying extracardiac vascular pathways, coronary origins/courses, conduit relationships, and calcification, which can directly affect interventional or surgical planning (Sachdeva et al., 2024; Stout et al., 2019).

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Transcatheter Aortic Valve Replacement (TAVR) (CD-4.8)

CD.CT.0004.8.A
v1.0.2027

CT Imaging in Transcatheter Aortic Valve Replacement (TAVR)

Criteria

Pre-TAVR imaging

Pre-aortic valve replacement

- Once the decision has been made for aortic valve replacement, the following may be used to determine if an individual is a candidate for TAVR:
  - CTA Chest (CPT® 71275), Abdomen and Pelvis (combination code CPT® 74174) are considered medically necessary; and
  - CT Cardiac Morphology (CPT® 75572) is considered medically necessary to measure the aortic annulus; or
  - CTA Cardiac (CPT® 75574) is considered medically necessary to both measure the aortic annulus and assess the coronary arteries in lieu of heart catheterization.
- A repeat diagnostic left heart catheterization is **not** considered medically necessary when the individual is undergoing a transcatheter aortic valve replacement (TAVR).

Transfemoral access not feasible

Alternative imaging can be obtained to evaluate vascular access for TAVR in individuals for whom it is documented either via the office note or prior imaging that transfemoral access would not be feasible due to **any** of the following exclusion criteria:

- small vessels
- highly calcified vessels
- stenosed or occluded vessels
- prior aortoiliac vascular intervention

Imaging is medically necessary based on the documented intended access site (transaxillary or transcarotid) and should be of the involved body areas. The following studies are medically necessary based on the documented planned access site:

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- CTA Head (CPT® 70496) or CTA Neck (CPT® 70498) or CTA Head and Neck (CPT® 70471) for transcarotid access
- CTA Chest (CPT® 71275) and/or Upper Extremity (CPT® 73206) for transaxillary access

Post-TAVR imaging

CT Cardiac (CPT® 75572) is considered medically necessary after TAVR in the setting of **any** of the following:

- post-TAVR TTE is indeterminate or raises a concern about **any** of the following:
  - valve thrombosis
  - infective endocarditis
  - structural degeneration
- A Valve-in-Valve implantation or surgical re-do AVR is being contemplated
- concern for hypoattenuated leaflet thickening (HALT) or other forms of bioprosthetic valve dysfunction due to an increase in mean transvalvular gradient of ≥10mmHg from baseline.
- Routine CT surveillance or follow up for incidental Hypoattenuated Leaflet Thickening (HALT) with or without restricted leaflet motion, also referred to as Hypoattenuation Affecting Motion (HAM), is NOT medically necessary.

Evidence Discussion

The American Heart Association scientific statement recognizes preoperative chest CT as a highly sensitive method for identifying aortic atherosclerosis, an important potential source of embolic stroke during cardiac surgery. In one cohort of 284 patients scheduled for nonemergent coronary artery bypass grafting, CT identified severe atherosclerotic lesions that made cannulation or cross-clamping high risk in 12.7% of patients. The statement notes that myocardial revascularization guidance recommended preoperative CT in those with evidence of extensive generalized atherosclerosis. When severe aortic disease is identified, modification of the operative technique to minimize aortic manipulation and reconsideration of the overall surgical risk-benefit balance are advised. (Gaudino et al., 2020).

A 2026 American College of Radiology review found that a meta-analysis of 18 studies involving 4,057 patients undergoing first-time cardiac surgery suggested that preprocedural CT may reduce perioperative stroke and mortality. The potential benefit was attributed to changes in aortic cannulation site, use of an off-pump approach, or cancellation or modification of surgery when extensive aortic disease was identified. However, much of the evidence was observational, and at least one retrospective case-control study of 405 patients found that aortic calcification was more frequent among patients who developed postoperative stroke, but the differences were not statistically significant.(Malik et al., 2026).

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Observational studies and meta-analyses have reported that preoperative CT is useful before repeat cardiac surgery. CT can identify high-risk anatomy, including extensive aortic calcification and a distance of less than 10 mm between the sternum and the right ventricle, aorta, or bypass graft. Identification of these findings resulted in cancellation of surgery in approximately 4% to 13% of cases and modification of the operative strategy in up to 80%. Other reported benefits included fewer sternal re-entry injuries, shorter perfusion or cross-clamp times, shorter intensive care unit stays, and possible reductions in perioperative myocardial infarction and stroke. Interpretation is constrained by predominantly nonrandomized study designs, differences in surgical populations and CT protocols, and the possibility of selection and surgical-expertise bias (Malik et al., 2026).

Trans-catheter Aortic Valve Replacement (TAVR)

The success of a Trans-catheter Aortic Valve Replacement (TAVR) procedure is contingent upon a meticulous pre-TAVR planning imaging study where cardiac CT allows accurate annulus sizing, coronary heights measurement, and calcification distribution evaluation, in addition to access site planning. Post-operatively, clinically suspected complications such as thrombus formation, infective endocarditis, or structural degeneration can be confirmed on a cardiac CT; a routine surveillance strategy, however, is not supported because of unclear or even potentially harmful outcome of treating incidental findings.

Transcatheter Mitral Valve Repair (mitral valve clip)

In non-interventional settings, cardiac CT provides an alternative to cardiac MRI when structural information cannot be adequately obtained by an echocardiography. Most notably, the evaluation of a cardiac mass, extent of pericardial disease, complex congenital heart disease and cardiomyopathy, can be performed by a cardiac CT when cardiac MRI is not available or contraindicated. Percutaneous treatment of mitral regurgitation can be accomplished using venous access to apply a clip device (e.g., MitraClip currently FDA approved) to provide edge-to-edge mitral leaflet coaptation, approximating opposing sections of the anterior and posterior mitral valve leaflets. FDA approved indications include treatment for individuals with symptomatic, moderate to severe, or severe primary mitral regurgitation whose surgical risks are prohibitive, as well as symptomatic moderate to severe or severe secondary mitral regurgitation who have failed optimal medical therapy. This therapy should include, if medically necessary, cardiac resynchronization therapy.

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Coding

Code	Description
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
73206	Computed tomographic angiography, upper extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
75571	Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)

Code	Description
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)

Cardiac Imaging Guidelines

3D Predictive Model Generation for Pre-planning of Cardiac Procedure (CD-4.9)

CD.CT.0004.9.A
v1.0.2027

Criteria

3D predictive model generation for pre-planning of a cardiac procedure, using data from cardiac computed tomographic angiography is considered to be experimental, investigational, or unproven.

Evidence Discussion

Cardiac Computed Tomography Angiography is a 3D imaging acquisition, viewing, and reporting system. Standard Cardiac Computed Tomography Angiography includes the viewing of 3D images. Currently, there is not enough data to support the use of 3D predictive model generation for pre-planning of cardiac procedures. It has not been shown to improve outcomes when compared with standard Cardiac Computed Tomography Angiography.

Coding

Description	HCPCS
3D predictive model generation for pre-planning of a cardiac procedure, using data from cardiac computed tomographic angiography with report	C9793

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Cardiac CT and CTA- Coding (CD-4.1)

CD.CT.0004.1.A
v1.0.2027

Associated Codes

Cardiac Imaging Procedure Codes

Codes	Description
75571	Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
75577	Quantification and characterization of coronary atherosclerotic plaque to assess severity of coronary disease, derived from augmentative software analysis of the data set from a coronary computed tomographic angiography, with interpretation and report by a physician or other qualified health care professional
75580	Noninvasive estimate of coronary fractional flow reserve (FFR) derived from augmentative software analysis of the data set from a coronary computed tomography angiography, with interpretation and report by a physician or other qualified health care professional

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- CPT® 75574 includes evaluation of 3D image post-processing, assessment of cardiac function, and evaluation of venous structures; therefore, additional codes for CT Cardiac and 3D post-processing are not needed

Cardiac Imaging Guidelines

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v1.0.2027

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Cardiac MRI

Guideline Page

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Cardiac MRI and Cardiac Indications for MRA Chest (CD-5.2)

CD.MRI.0005.2.A
v1.0.2027

Cardiac MRI and Cardiac Indications for MRA Chest

Criteria (excludes Stress-perfusion CMR)

- Assess myocardial viability (to differentiate hibernating myocardium from scar) when necessary to determine if revascularization should be performed (CPT® 75561)
- Assessment of global ventricular function, myocardial composition, and mass if a specific clinical question is left unanswered by a recent echocardiogram and results will affect individual management (CPT® 75557 or CPT® 75561). Particularly useful in evaluating:
  - cardiomyopathy (ischemic, nonischemic, diabetic, hypertrophic, or muscular dystrophy)
  - non-compaction
  - infiltrative heart disease such as amyloidosis and sarcoidosis
  - post cardiac transplant
  - hypertrophic cardiomyopathy
  - suspected acute myocarditis, cardiac aneurysm, trauma, and contusions
  - monitoring cancer chemotherapy effect on the heart (especially if an accurate assessment of right ventricular function is documented as necessary)
  - sickle cell disease
- Pre- and post-operative congenital heart disease assessment. See **Adult Congenital Heart Disease (CD-11)** for defect specific indications (CPT® 75557 or 75561).
  - MRA Chest (CPT® 71555) may be added if the aorta or pulmonary artery need to be visualized beyond the root.
  - May add CPT® +75565 in conjunction with CPT® 75557 or 75561, only if there is a need to clarify findings on a recent echocardiogram and cardiac Doppler study when there is documentation of **either** of the following:
    - significant valvular disease that may require intervention
    - intracardiac flow disturbances (e.g., ASD, VSD)
- Assessment of ventricular arrhythmia for ablation planning (CPT® 75557 or 75561)
- Assessment of arrhythmogenic left ventricular cardiomyopathy (ALVC) (CPT® 75557 or 75561)

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- Arrhythmogenic right ventricular dysplasia or arrhythmogenic right ventricular cardiomyopathy (ARVD/ARVC) suspicion (CPT® 75557 or 75561) must have one of the following:
  - non-sustained or sustained VT of LBBB morphology OR >500 PVCs over 24 hours on event recorder or Holter monitor
  - ARVD/ARVC confirmed in a first-degree relative either by criteria, autopsy, pathogenic genetic mutation or sudden death <35 years of age with suspected ARVD/ARVC
  - inverted T waves in right precordial leads (V1, V2 and V3) or beyond in individuals >14 years of age in the absence of complete RBBB
  - right ventricular akinesis, dyskinesis, or aneurysm noted on echo or RV angiography
- Differentiate constrictive pericarditis from restrictive cardiomyopathy (CPT® 75561)
- Evaluate cardiac tumor or mass when echocardiogram is inconclusive (CPT® 75557 or 75561)
- Evaluate valvular heart disease when echocardiogram is inconclusive:
  - CPT® 75557 **or** CPT® 75561
  - May add CPT® 75565 when there is documentation of either of the following:
    - significant valvular disease that may require intervention
    - intracardiac flow disturbances (e.g., ASD, VSD)
- Suspected cardiac thrombus when echocardiogram is inconclusive (CPT® 75557).
- Right ventricular function evaluation (CPT® 75557 in conjunction with CPT® +75565) if there has been a recent ECHO and there is documented need to perform Cardiac MRI in order to resolve an unanswered question about flow dynamics
- Cardiac MRI (CPT® 75557 or 75561) and CMR velocity flow mapping (CPT® 75565) for preoperative evaluation prior to planned LVAD implant
- Shunting through a VSD (CPT® 75557 in conjunction with CPT® +75565) if a recent ECHO has been done, including a bubble study, and there is documented need to perform Cardiac MRI in order to resolve an unanswered question about flow dynamics
- Conditions that would **not** require an ECHO prior to an MRI:
  - detect anomalous coronary arteries (CPT® 75561)
  - assess coronary arteries in Kawasaki disease
  - Fabry disease (CPT® 75561)
  - initial evaluation for cardiac sarcoidosis or iron overload cardiomyopathy (hemosiderosis, hemochromatosis)

Not Medically Necessary

C9762-Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with strain imaging. The use of CMR strain imaging for the

quantification of segmental dysfunction is considered investigational and experimental at this time.

Quantitative analysis of myocardial tissue composition by MRI (CPT® codes 0648T, 0649T, 0697T and 0698T) are considered experimental, investigational, or unproven at this time. There is insufficient clinical data to support their use.

Cardiac MRI – Aortic Root and Proximal Ascending Aorta

- See **Thoracic Aortic Aneurysm (TAA) (PVD-6.2)** in the Peripheral Vascular Disease imaging guidelines.

Cardiac MRI – Duchenne Muscular Dystrophy (DMD)

Criteria

Cardiac MRI (CPT® 75557 or 75561-does not include CPT® 75565 or 71555 unless otherwise indicated)

- Asymptomatic individual with documented DMD can have annual surveillance cardiac MRI starting at 6 years old (yearly echo is recommended prior to age 6)
- Asymptomatic, documented carrier of DMD can have cardiac MRI every 3 years starting at 18 years

Cardiac MRI – Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade

Criteria

- Contrast-enhanced cardiac MRI (CPT® 75561) is useful for evaluating pericarditis, neoplastic, and other effusion, tamponade, or myocardial infiltration if a specific clinical question is left unanswered by echocardiogram or another recent imaging study.

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Cardiac MRI – Myocarditis

Clinical evaluation of suspected myocarditis

Initial testing for suspected myocarditis should consist of an electrocardiogram, measurement of cardiac troponin, and an echocardiogram.

Criteria

Cardiac MRI (CPT® 75561) is considered medically necessary for suspected myocarditis in the presence of **all** of the following:

- New onset or persisting symptoms suggestive of myocarditis documented by **any** of the following:
  - dyspnea
  - chest pain
  - palpitations
  - syncope
  - effort intolerance
- Evidence for recent or ongoing myocardial injury documented by **any** of the following results on initial screening:
  - ventricular dysfunction noted on any cardiac imaging study, or
  - new or persisting ECG abnormalities suspicious for myocarditis
    - ST changes, T wave changes, Q waves, or
    - conduction abnormalities, such as LBBB or AV block, or
    - VT or VF
  - elevated troponin
- Strong suspicion for viral etiology of myocardial injury with documentation of **both**:
  - recent systemic viral disease, recent mRNA COVID-19 vaccination, or prior myocarditis
  - no evidence of coronary ischemia as documented by **any** of the following:
    - lack of risk factors for CAD
    - age < 35 years
    - negative cardiac imaging study, such as MPI, CCTA, catheterization

Return to Play Screening for athletes at risk for myocarditis

Criteria

Cardiac MRI (CPT® 75561) is considered medically necessary for **Return to Play Screening** for athletes when there is documentation of **both** of the following:

- Individual has a history of a clinical condition associated with myocarditis (i.e., COVID-19 infection or recent mRNA COVID-19 vaccination).

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- Initial screening has been performed with documentation of **either** of the following:
  - Initial screening (ECG, troponin, and TTE) showed evidence for recent or ongoing myocardial injury (as defined above in Clinical Evaluation of Suspected Myocarditis) with ongoing symptoms concerning for myocarditis (dyspnea, chest pain, palpitations, syncope, or effort intolerance).
  - Normal results of initial screening with persistent or new onset symptoms concerning for myocarditis.

Evidence Discussion

- Guidelines and appropriate use criteria support the use of transthoracic echocardiogram (TTE) as the initial study for a broad range of cardiac conditions. TTE can be used to evaluate cardiac morphology and function and provides information necessary to diagnose and guide treatment in conditions including heart failure and cardiomyopathy, ischemic heart disease, and valvular dysfunction. TTE is also used to initially assess intracardiac and extracardiac structures, including suspected cardiac masses, sources of emboli, and pericardial conditions. TEE visualizes portions of the great vessels and provides initial imaging of these structures.
- TTE has significant advantages over other imaging modalities; it is easily accessible and even portable, provides no exposure to radiation, is inexpensive, and has minimal, if any, risks.
- Like TTE, MRI assesses cardiac morphology and function; additionally, MRI provides information regarding myocardial perfusion, metabolism, and tissue composition.
- When questions remain unanswered after TTE, MRI can provide additional information due to its ability to assess myocardial composition and mass; these characteristics make cardiac MRI especially useful in the settings of cardiomyopathy, non-compaction, infiltrative heart disease, post cardiac transplant, cardiac masses, pericardial disease, and myocarditis.
- Beyond imaging with TTE, MRI can provide improved visualization of valvular pathology, because images are not limited by body habitus, is of high spatial resolution, can more accurately quantify the magnitude of valve insufficiency and stenosis, and can assess the effects of valve dysfunction on ventricular mass or volume. Qualities of MRI that augment evaluation of valvular disease may also improve visualization of intracardiac shunts over TTE alone.
- Advantages of MRI assessment of the great vessels include avoidance of ionizing radiation, provision of excellent spatial resolution of structures, and is not limited by body habitus.
- Conditions that are better evaluated initially by MRI, include coronary artery anomalies, and diseases of abnormal myocardial composition: Arrhythmogenic right ventricular dysplasia, Fabry disease-(Late enhancement MRI may predict the effect

of enzyme replacement therapy on myocardial changes that occur with this disease), cardiac sarcoidosis, and Duchenne Muscular Dystrophy.
- When TTE and other less advanced imaging provide the information necessary to diagnose and treat cardiovascular conditions, MRI is not medically necessary.
- Disadvantages of MRI include being less accessible and possibly being incompatible for use in those with implanted devices. The gadolinium contrast agents used in MRI require precautions in those with advanced renal disease and severe liver disease.
- The decision to use MR imaging is made in the context of other testing; duplication of information should be avoided, and more readily available modalities with lower risk, initially considered. An assessment should be made as to whether additional testing will provide complementary diagnostic, therapeutic, or prognostic information that will optimize care.

Cardiac MRI – Coding

Cardiac Imaging Procedure Codes

Cardiac MRI	CPT®/HCPCS
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
+75565	Cardiac magnetic resonance imaging for velocity flow mapping (list separately in addition to code for primary procedure)
C9762	Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with strain imaging

- Only 1 procedure code from the set (CPT® 75557-CPT® 75563) should be reported per session.
- Only 1 flow velocity measurement (CPT® +75565) should be reported per session when medically necessary.

Cardiac Stress MRI - (CD-5.3)

CD.MRI.0005.3.A
v1.0.2027

Other Reasons for Cardiac Stress MRI

Criteria

- If a nuclear perfusion (MPI) stress test was performed and was equivocal, a stress MRI is considered medically necessary.
- See **Stress Testing with Imaging – Criteria (CD-1.4)**. for other stress testing criteria

Not Medically Necessary

Quantification of segmental dysfunction

C9763-Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with stress imaging. The use of stress CMR for the quantification of segmental dysfunction is considered investigational and experimental at this time.

Evidence Discussion

Stress cardiovascular magnetic resonance (CMR) provides high-resolution perfusion imaging with concurrent assessment of ventricular function, ischemia, and tissue characterization (e.g., edema and scar), allowing further evaluation when other stress modalities are nondiagnostic or confounded by attenuation artifacts (Hundley et al., 2010; Li et al., 2023).

Contemporary multimodality Appropriate Use Criteria and the 2024 ESC chronic coronary syndromes guideline position stress CMR as appropriate across multiple stable chest pain scenarios and specifically as a follow-up option after inconclusive prior testing (Winchester et al., 2023; Vrints et al., 2024).

When prior SPECT MPI results are equivocal or discordant with symptoms, stress CMR improves diagnostic confidence and clinical decision-making because its higher spatial resolution and freedom from soft tissue attenuation support more accurate detection of ischemia and better risk reclassification (Winchester et al., 2023; Vrints et al., 2024).

Quantification of segmental dysfunction by stress CMR (C9763) is investigational consistent with AUC and guideline standards pending further evidence of clinical utility (Winchester et al., 2023; Vrints et al., 2024).

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Cardiac Stress MRI – Coding

Cardiac Imaging Procedure Codes

Code	Description
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
+75565	Cardiac magnetic resonance imaging for velocity flow mapping (list separately in addition to code for primary procedure)
C9763	Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with stress imaging
+0899T	Noninvasive determination of absolute quantitation of myocardial blood flow (AQMBF), derived from augmentative algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)
+0900T	Noninvasive estimate of absolute quantitation of myocardial blood flow (AQMBF), derived from assistive algorithmic analysis of the dataset acquired via contrast cardiac magnetic resonance (CMR), pharmacologic stress, with interpretation and report by a physician or other qualified health care professional (List separately in addition to code for primary procedure)

- Only 1 procedure code from the set (CPT® 75557- CPT® 75563) should be reported per session.
- Only 1 flow velocity measurement (CPT® +75565) should be reported per session when medically necessary.
- C9763-Cardiac magnetic resonance imaging for morphology and function, quantification of segmental dysfunction; with stress imaging. The use of stress CMR for the quantification of segmental dysfunction is considered investigational and experimental at this time.

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Cardiac PET

Guideline Page

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Cardiac PET/PET CT Perfusion (CD-6.2)

CD.PET.0006.2.A
v1.0.2027

Criteria

CPT® 78430, CPT® 78431, CPT® 78491 and CPT® 78492

- Cardiac PET is considered medically necessary when requested after an equivocal nuclear perfusion (SPECT MPI) stress test.
- Routine use in post heart transplant assessment of transplant CAD

See also **Stress Testing with Imaging (CD-1.4)** for stress imaging indications

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Cardiac PET Metabolic (CD-6.4)

CD.PET.0006.4.A
v1.0.2027

Criteria

CPT® 78429 or CPT® 78459 and CPT® 78451; or

CPT® 78432; or

CPT® 78433

Cardiac PET Metabolic and cardiac SPECT or cardiac PET perfusion is considered medically necessary as follows:

- to determine myocardial viability when a previous study has shown significant left ventricular dysfunction and revascularization is under consideration
- to diagnose strongly suspected cardiac sarcoid **or** monitor response to therapy for established cardiac sarcoid. See **Cardiac Sarcoidosis (CD-3.9)**.

Evidence Discussion

Metabolic FDG PET, often combined with perfusion imaging, informs viability assessment in patients with significant LV dysfunction being considered for revascularization and supports diagnostic clarification and therapeutic monitoring in suspected or established cardiac sarcoidosis (Murthy et al., 2018; Youssef et al., 2012).

For cardiac sarcoidosis, FDG PET detects active inflammation and adds prognostic information beyond perfusion or CMR alone. integration into care has been associated with improved risk stratification and response assessment to immunosuppression (Blankstein et al., 2014; Youssef et al., 2012).

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FDG PET/CT for Suspected or Known Infections (CD-6.5)

CD.PET.0006.5.A
v1.0.2027

Criteria

CPT® 78815 or CPT® 78429

FDG PET/CT is considered medically necessary to evaluate suspected or known infections as follows:

- to assess suspected prosthetic heart valve endocarditis when there is documentation of **both** of the following:
  - TTE and/or TEE are equivocal or non-diagnostic
  - Suspicion for prosthetic heart valve endocarditis remains high (all):
    - C-reactive protein ≥40mg/L
    - no evidence of prolonged antibiotic therapy
    - the implantation was ≥3 months ago and there is no evidence of surgical adhesives used during the valve implantation
- to assess suspected cardiac implantable electronic device (CIED) or other intracardiac prosthetic device infections
- to evaluate any ventricular assist device (e.g., RVAD, LVAD, BiVAD) driveline infection

Evidence Discussion

Cardiovascular implantable electronic device (CIED) infection

CIED infection carries substantial mortality, and accurate localization determines whether complete hardware extraction is required. Conventional evaluation is limited: transesophageal echocardiography cannot reliably distinguish infective vegetations from non-infective lead echodensities such as thrombus or fibrin, which are common and may prompt unnecessary extraction, while echocardiography is insensitive to pocket and generator involvement (Dilsizianet al., 2022; Baddouret al., 2024).

[^{18}F]FDG PET/CT addresses this gap by imaging metabolically active inflammatory cells. Pooled analyses across CIED infection studies report sensitivity of approximately 87% and specificity of approximately 94%.(Dilsizianet al., 2022).Performance is not uniform across compartments: accuracy is consistently higher for pocket and generator infection than for intravascular lead infection, where sensitivity falls and a negative study cannot exclude disease. The modality therefore has high positive but comparatively lower negative predictive value for lead

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involvement (Bourque et al., 2024).When FDG uptake is incorporated as a major criterion, diagnostic sensitivity of the Duke framework rises from roughly 52%–70% to 91%–97%, with the same reclassification benefit demonstrated for lead-related endocarditis (Dilsizianet al., 2022).

For non-CIED intracardiac prosthetic material annuloplasty rings, closure devices, patches, and conduits consensus supports PET/CT in persistent bacteremia with negative echocardiography and CT, where a negative scan effectively excludes prosthetic material infection and a positive scan localizes the source and identifies extracardiac seeding (Bourque et al., 2024).In durable ventricular assist devices, pooled sensitivity exceeds 90% with heterogeneous specificity, favoring an exclusionary role while distinguishing driveline from pump or cannula involvement (Tam et al., 2020).

Diagnostic yield is technique dependent. Sensitivity declines with prolonged antecedent antibiotic therapy and in low-grade infection, so imaging should be obtained early. Adequate myocardial glucose suppression, persistence of uptake on non-attenuation-corrected images to exclude metal artifact, late acquisition when blood-pool activity is high, and interpretation by experienced readers are each required for valid results. Surgical bioadhesives generate false positives (Bourque et al., 2024).

The 2024 AHA statement designates FDG PET/CT the preferred advanced imaging modality over radiolabeled leukocyte SPECT/CT, while noting that no prospective head-to-head trials exist and that imaging must never delay indicated extraction (Baddouret al., 2024; Bourque et al., 2024).

Suspected or Known Prosthetic Valve Endocarditis

Prosthetic valve endocarditis (PVE) is difficult to diagnose because echocardiography performs poorly around prosthetic material: transthoracic sensitivity is 40% to 50%, and transesophageal sensitivity for abscess or pseudoaneurysm falls to approximately 40% (Cuervo et al., 2024).

An individual-patient-data meta-analysis (537 patients, 17 studies) reported sensitivity 85% (95% CI 74.2%-91.8%) and specificity 86.5% (95% CI 75.8%-92.9%); single-center prosthetic-material series reported 93% sensitivity, 90% specificity, and 94% negative predictive value (de Camargo et al., 2020; O'Gorman et al., 2023). The principal value is diagnostic reclassification. Abnormal cardiac uptake as a major criterion reclassified 76% of initially "possible" cases to "definite," and 84% of "possible PVE" patients reached a conclusive diagnosis after imaging; overall Duke sensitivity rises from 52%-70% to 91%-97% (Cuervo et al., 2024; de Camargo et al., 2020; O'Gorman et al., 2023; Otto et al., 2021). The 2023 Duke-ISCVID criteria accordingly adopted PET/CT as a major criterion for prosthetic valve uptake and a minor criterion for extracardiac uptake (Fowler et al., 2023).

Performance is valve-type dependent: 93% sensitivity in PVE versus 22% in native valve endocarditis (NPV 66%), so a negative study cannot exclude native valve infection (de Camargo et al., 2020). Accuracy is confounder-sensitive: visual assessment yielded 74%/91% sensitivity/specificity, improving to 91%/95% after excluding CRP ≥40 mg/L and surgical adhesives; recent implantation was not a confounder, and an EARL-standardized SUV ratio ≥2.0 was 100% sensitive and 91% specific (Swart et al., 2018). Imaging should occur early, since prolonged antibiotics suppress inflammatory activity; adequate myocardial glucose suppression and experienced interpretation are required (Bourque et al., 2024b; Otto et al., 2021; Philip et al., 2020; Swart et al., 2018). Multisociety consensus rates PET/CT Appropriate when echocardiography is negative or equivocal with persistent suspicion, and preferred over leukocyte SPECT/CT in fungal and certain gram-negative infections; cardiac CTA remains superior for perivalvular anatomy and surgical planning (Bourque et al., 2024b; Budde et al., 2025).

Consensus ratings are modified-Delphi appropriate-use designations, not graded recommendations. Confounder-adjusted accuracy required exclusion of 43% of a retrospective cohort. Subgroup signals for mechanical and transcatheter valves rest on small numbers, and deferral within 3 months of surgery remains contested (Bourque et al., 2024a; Cuervo et al., 2024; O'Gorman et al., 2023; Philip et al., 2020; Swart et al., 2018).

FDG PET/CT materially improves diagnostic certainty in PVE, chiefly by resolving "possible" cases. Outcome-linked prospective data remain the principal unmet need (Cuervo et al., 2024; Godefroy et al., 2023; O'Gorman et al., 2023).

Cardiac Imaging Guidelines

Cardiac PET – Coding

CD.PET.0006.1.A
v1.0.2027

Cardiac Imaging Procedure Codes

Cardiac PET	CPT®
78429	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
+78434	Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)
78459	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study;

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Cardiac PET	CPT®
78491	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic)
78492	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic)
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh

- 3D rendering should not be billed in conjunction with PET.
- Separate codes for such related services as treadmill testing (CPT® 93015-CPT® 93018) and radiopharmaceuticals should be assigned in addition to perfusion PET. These services are paid according to each individual payer.

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References (CD-6)

v1.0.2027

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Diagnostic Heart Catheterization

Guideline Page

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Diagnostic Heart Catheterization (CD-7.3)

CD.DHC.0007.3.A
v1.0.2027

LHC – Unstable/Active Coronary Artery Syndromes (CD-7.3.1)

Criteria

CPT® 93454, 93455, 93458, 93459

The listed diagnostic heart catheterization codes are considered medically necessary for individuals with Acute Coronary Syndromes including unstable angina, NSTEMI and STEMI and should be handled as medical emergencies.

- Diagnostic left heart catheterization is considered medically necessary for new onset, accelerating, or worsening ischemic symptoms suggestive of acute coronary syndrome (ACS) occurring at rest, or with minimal exertion resolving with rest, including:
  - cardiac chest pain (typical angina) with or without new onset, evolving ischemic EKG changes
  - symptoms consistent with the known angina pattern in an individual with a history of CABG or PCI
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

Stable Established CAD Post Revascularization with CABG or PCI (CD-7.3.2)

Criteria

CPT® 93454, 93455, 93458, 93459

Note: These guidelines apply to individuals with stable conditions and who are not in the acute setting (acute coronary syndrome or unstable angina).

- Diagnostic left heart catheterization is medically necessary in individuals with established Coronary Artery Disease (CAD) post revascularization by percutaneous

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coronary intervention (PCI) or coronary artery bypass graft surgery (CABG) when there is documentation of **one** of the following:
  - new, recurrent, or worsening ischemic symptoms similar to prior ischemic episode
  - new, recurrent, or worsening cardiac chest pain as defined in **General Guidelines (CD-1.0)**
  - new, recurrent, or worsening symptoms of chest pain, exertional dyspnea, or exertional fatigue AND intermediate or high-risk findings on non-invasive stress testing as documented by one of the following:
    - cardiac chest pain induced by exercise treadmill testing or dobutamine stress testing
    - exercise treadmill testing inducing any of the following:
      - at least 1mm horizontal or downsloping ST-depression
      - at least 1mm ST-elevation in two leads
      - ventricular tachycardia of at least 3 consecutive beats
    - myocardial perfusion imaging (SPECT or PET) with ≥5% reversible ischemic burden
    - stress echo with at least 2 segments of inducible ischemia
    - severe stress induced left ventricular dysfunction (drop in left ventricular ejection fraction with stress ≥10%)
  - new left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
  - worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
  - new or worsened heart failure
  - ventricular fibrillation
  - sustained ventricular tachycardia
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

Stable Symptomatic Suspected or Established Coronary Artery Disease (CD-7.3.3)

Criteria

CPT® 93454, 93455, 93458, 93459

For the purpose of this guideline, cardiac chest pain is defined in **General Guidelines (CD-1.0)**.

- Diagnostic left heart catheterization with coronary arteriography (CPT® 93454, 93455, 93458, or 93459) is medically necessary when there is documentation of one of the following:
  - New onset, persistent, or worsening of cardiac chest pain symptoms and either:
    - Symptomatic failure of a 12 week trial of OMT including as tolerated all of the following:
      - anti-platelet therapy
      - statin and/or other lipid-lowering therapy
      - anti-anginal therapy implemented to pursue a goal heart rate of 60 beats per minute or less
      - anti-hypertensive therapy as may be indicated to pursue a goal systolic blood pressure (SBP) of <140mmHg and a goal diastolic blood pressure (DBP) of <90mmHg
    - Worsening of cardiac chest pain symptoms during 12 week trial of OMT
    - inconclusive stress imaging
  - New onset, persistent, or worsening of cardiac chest pain symptoms and documentation of **one** of the following:
    - Established CAD per **General Guidelines (CD-1.0)**or age ≥50 years and/or ≥2 CAD risk factors: diabetes mellitus, tobacco smoker, family history of premature CAD in a first-degree relative (biologic parent, sibling, or child), hypertension, dyslipidemia, hx of APOs
    - Cardiac chest pain at a low level of exercise or at rest despite optimal medical therapy
  - Diagnostic left heart catheterization is considered medically necessary irrespective of OMT for symptomatic (chest pain or dyspnea on exertion or exertional fatigue) individuals who also have high-risk findings on Coronary CT Angiography see **Coronary CT Angiography (CCTA) Criteria (CD-4.3)** to include any of the following:
    - left main coronary artery stenosis ≥40%
    - proximal or mid left anterior descending coronary artery stenosis ≥70%
    - proximal or mid double-vessel major epicardial coronary artery stenosis ≥60%
    - proximal or mid triple-vessel major epicardial coronary artery stenosis ≥50%
    - CT-FFR measured to be ≤0.8 in the proximal or mid segment of any coronary artery or major epicardial branch irrespective of degree of stenosis
  - Diagnostic left heart catheterization is considered medically necessary irrespective of OMT for symptomatic (chest pain or dyspnea on exertion or exertional fatigue) individuals who have high-risk findings on non-invasive stress testing including any of the following:
    - cardiac chest pain induced by exercise treadmill testing or dobutamine stress testing

        - myocardial perfusion imaging with at least 10% reversible ischemic burden
        - stress echo with 2 or more segments of inducible ischemia
        - exercise treadmill testing inducing at least 2.5 mm downsloping ST-depression or 3mm horizontal ST-depression in two leads
        - ventricular tachycardia of at least 3 consecutive beats induced by an exercise treadmill test
        - Stress CMR with **either** of the following findings:
            - 4 or more of 32 subsegments with ischemic perfusion defects during vasodilation stress
            - 3 or more of 16 segments with new or worsened dysfunction during exercise stages or progressive inotropic stress
    - Diagnostic left heart catheterization is considered medically necessary if coronary artery disease is the suspected etiology for **any** of the following findings:
        - new or worsened heart failure
        - new left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
        - worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
        - ventricular fibrillation or sustained ventricular tachycardia
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
    - The major component of the individual's symptoms is dyspnea
    - Newly diagnosed or worsening cardiomyopathy

Not Medically Necessary

Diagnostic left heart catheterization to screen for coronary artery disease (CAD) in asymptomatic individuals who are not anticipating other cardiac procedures is not considered medically necessary.

Background and Supporting Information

In addition to OMT, physician-guided behavioral modification therapy (BMT) is medically necessary including all of the following:

- Mediterranean diet
- Moderate intensity physical activity for at least thirty minutes per day at least five times per week as possible
- Attempts at smoking cessation to include at least one of the following:
    - Cognitive behavioral therapy
    - Nicotine withdrawal replacement therapy

Inconclusive stress imaging

- for stress echo
  - 3 or more dysfunctional segments of the 16 segments during stress
- for stress CMR
  - 4 or more 32 subsegments with ischemic perfusion defects during vasodilation stress OR
  - 3 of 16 segments with new or worsened dysfunction during exercise stages or progressive inotropic stress

Exclusion of Significant Coronary Artery Disease Involvement in Other Cardiac Pathology (CD-7.3.4)

Criteria

CPT® 93454, 93455, 93458, 93459

- Diagnostic left heart catheterization is medically necessary when the etiology is unclear for **any** of the following conditions when coronary artery disease is suspected:
  - new or worsened heart failure
  - new left ventricular systolic dysfunction (left ventricular ejection fraction <50%)
  - worsening left ventricular systolic dysfunction (decline in left ventricular ejection fraction ≥10%)
  - ventricular fibrillation or sustained ventricular tachycardia
  - unheralded syncope (not near syncope)
  - suspected myocarditis
  - CCTA findings with high risk findings such as:
    - left main disease with ≥50% stenosis
    - three-vessel disease with ≥70 stenosis
    - two-vessel disease with ≥70% stenosis, including the proximal LAD
    - one-vessel disease of the proximal LAD with ≥70% stenosis and FFR-CT ≤0.8
- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

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Evaluation of Structural Heart Disease (CD-7.3.5)

Criteria

CPT® 93454, 93455, 93458, 93459

Diagnostic left heart catheterization with coronary arteriography is medically necessary for any of the following:

- Evaluation prior to planned invasive procedure or surgery
  - Ruling out coronary artery disease prior to planned non-coronary cardiac or great vessel surgery including any of the following:
    - cardiac valve surgery
    - surgical myectomy for hypertrophic cardiomyopathy
    - aortic dissection
    - aortic aneurysm
    - congenital disease repair such as atrial septal defect
  - Pre-organ transplant (non-cardiac)-in place of stress imaging for initial pre-transplant evaluation (per the transplant center's protocol) **or** if stress imaging is positive for ischemia. Repeat periodic screening while on a transplant waiting list (in the absence of other clinical indications) is not medically necessary. See **Kidney Transplant, Pre-Transplant Imaging Studies (AB-42.5)**.
  - Prior to catheter ablation of ventricular arrhythmia at one of the following sites:
    - sinus of Valsalva
    - coronary venous system
    - epicardium
- Valvular heart disease when either:
  - There is a discrepancy between the clinical findings (history, physical exam, and non-invasive test results).
  - Valvular surgery is being considered.
- Suspected pericardial disease
- Previous cardiac transplant:
  - per transplant center protocol
  - to assess for accelerated coronary artery disease associated with cardiac transplantation

Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:

- The major component of the individual's symptoms is dyspnea
- Newly diagnosed or worsening cardiomyopathy

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Evidence Discussion

Medical specialty organization guidelines recommend guideline directed medical therapy as the cornerstone of management of chronic coronary artery disease. These recommendations are based on a large body of evidence; including multiple large randomized controlled clinical trials (COURAGE, ISCHEMIA, and BARI-2D), and meta-analyses that demonstrate a significant improvement in angina symptoms, and cardiac events with guideline directed medical therapy. These trials further demonstrate that there is no improvement in survival or cardiac events with routine revascularization compared to guideline directed medical therapy.

Management options for coronary artery disease should account for the risks of invasive coronary angiography weighed against the benefits. Invasive coronary angiography is associated with cardiac (e.g., coronary artery injury and myocardial infarction) and extra-cardiac (e.g., vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury) risks. Invasive coronary angiography should be utilized as the treatment option when there is a favorable benefit-to-risk assessment.

Based on medical specialty organization guidelines and Appropriate Use Criteria, indications for invasive coronary angiography include the following:

- angina despite guideline directed medical therapy
- angina with high-risk findings on stress testing
- new left ventricular systolic dysfunction or heart failure of suspected ischemic etiology
- known coronary artery disease with prior revascularization with recurrent angina
- prior to non-coronary cardiac surgery, major vascular surgery, or organ transplant

  In addition to OMT, physician-guided behavioral modification therapy (BMT) is recommended including all of the following:
  - Mediterranean diet
  - Moderate intensity physical activity for at least thirty minutes per day at least five times per week as possible
  - Attempts at smoking cessation to include at least either cognitive behavioral therapy or nicotine withdrawal replacement therapy

Angiography-Derived Fractional Flow Reserve (CD-7.3.6)

Criteria

Angiography-Derived Fractional Flow Reserve based on three-dimensional reconstruction of angiographic images is considered to be experimental, investigational, or unproven.

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Coding

Code	Description
C7557	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed and intraprocedural coronary fractional flow reserve (FFR) with 3D functional mapping of color-coded FFR values for the coronary tree, derived from coronary angiogram data, for real-time review and interpretation of possible atherosclerotic stenosis(es) intervention

Background and Supporting Information

Fractional flow reserve (FFR) is an index of the physiological significance of a coronary artery stenosis. It is derived by using a coronary artery pressure guidewire to measure the distal coronary artery pressure. Angiography-Derived Fractional Flow Reserve is an alternative approach to derive FFR without the use of a coronary artery pressure guidewire, based on 3D reconstruction of angiographic images. Mathematical modeling based on hemodynamic laws is then applied to the 3D reconstruction to derive the pressure dynamics along the coronary artery, with results displayed in a color-coded map. Further research is needed to evaluate the accuracy and applicability of Angiography-Derived Fractional Flow Reserve.

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Right Heart Catheterization and Right and Left Heart Catheterization without Coronary Angiography (CD-7.4)

CD.DHC.0007.4.A
v1.0.2027

Criteria

- Diagnostic right heart catheterization (CPT® 93451) OR diagnostic right and left heart catheterization without coronary angiography (CPT® 93453) is medically necessary when results will impact the diagnosis and management of **any** of the following:
  - atrial septal defect (ASD) including shunt detection and quantification
  - ventricular septal defect (VSD) including shunt detection and quantification
  - patent foramen ovale (PFO)
  - anomalous pulmonary venous return
  - congenital defects including persistent left vena cava
  - pulmonary hypertension
  - pericardial diseases
  - valvular disease
  - right heart failure
  - left heart failure
  - newly diagnosed or worsening cardiomyopathy
  - preoperative evaluation for valve surgery
  - during a left heart catheterization where the etiology of the symptoms remains unclear
  - pre-lung transplant to assess pulmonary pressures
  - pre-liver transplant to assess pulmonary pressures
  - uncertain intravascular volume status with an unclear etiology
  - prior to LVAD implant and post LVAD implant as needed for hemodynamic assessment to guide changes to therapy
  - assessment post-cardiac transplant
    - for routine endomyocardial biopsy
    - assess for rejection
    - assess pulmonary artery pressure
    - can be done per the institution protocol or anytime organ rejection is suspected and biopsy is needed for assessment
  - evaluation of right ventricular morphology.

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- suspected arrhythmogenic right ventricular dysplasia.

Evidence Discussion

General information RHC (CPT® 93451)

- It is performed most commonly from the femoral vein, less often through the subclavian, brachial, or internal jugular vein and inter-atrial septal puncture approach.
- It includes a full oximetry for detection and quantification of shunts.
- Cardiac outputs are calculated by several techniques including the Fick thermodilution.
- Diagnostic right heart catheterization or right and left heart catheterization is performed for functional hemodynamic evaluation and may be combined with cardiac angiography for structural cardiac imaging and coronary angiography for anatomical evaluation of the coronary arteries. Diagnostic right heart catheterization or right and left heart catheterization is medically necessary in selected situations to obtain specific clinical information required for management decisions if it was not provided by non-invasive evaluation. This may be medically necessary in selected situations for management of valvular heart disease, myocardial disease, pericardial disease, congenital heart disease, pulmonary hypertension, heart failure, and post-cardiac transplantation. These indications are addressed in established evidence-based medical specialty organization guidelines pertaining to these conditions. If the clinical information required for management decisions was already provided by non-invasive evaluation, diagnostic heart catheterization does not add to management and, moreover, carries cardiac and extra-cardiac risks including coronary artery injury, myocardial infarction, vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury.

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Combined Right and Left Heart Catheterization Indications (CD-7.5)

CD.DHC.0007.5.A
v1.0.2027

Criteria

Combined right and left heart catheterization (CPT® 93460 or 93461) is considered medically necessary for pre-operative surgical planning for any of the following procedures:

- heart valve surgery
- congenital heart defect repair
- lung transplant
- liver transplant

Background and Supporting Information

- Left and right heart catheterization (CPT® 93460 or 93461) is considered medically necessary in place of a left heart catheterization when criteria has been met for a left heart catheterization and there is documentation of **any** of the following conditions:
  - The major component of the individual's symptoms is dyspnea
  - Newly diagnosed or worsening cardiomyopathy

Note:

See the individual diagnostic heart catheterization sections for more information.

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Planned (Staged) Coronary Interventions or Invasive Coronary Function Testing (CD-7.6)

CD.DHC.0007.6.A
v1.0.2027

Criteria

Planned (Staged) Coronary Interventions

A repeat diagnostic left heart catheterization is considered not medically necessary when the individual is undergoing a planned staged percutaneous coronary intervention

Invasive Physiologic Evaluation

CPT® 93454 Coronary angiography

Coronary angiography is considered medically necessary for symptomatic individuals with persistent chest pain and CAD when requested as part of invasive coronary physiologic testing to guide treatment.

Evidence Discussion

Diagnostic cardiac catheterization with coronary angiography is performed prior to an interventional percutaneous coronary intervention (PCI) procedure. PCI may be performed on the same day as the diagnostic coronary angiogram (ad-hoc PCI) or on a later day (planned staged PCI). Diagnostic coronary angiogram is required only once prior to the interventional procedure. A repeat diagnostic coronary angiogram is not medically necessary prior to a planned staged percutaneous coronary intervention. A repeat diagnostic coronary angiogram does not add to the findings of the initial diagnostic coronary angiogram and, moreover, carries cardiac and extra-cardiac risks including coronary artery injury and myocardial infarction, vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury.

Planned (Staged) Coronary Interventions applies to individuals with clinically stable symptoms if there is documentation of a recent diagnostic catheterization finding of a significant lesion that was not intervened as part of the initial procedure and the documentation explicitly states that a subsequent procedure will be performed for planned/staged PCI of that lesion.

The 2021 AHA/ACC Chest Pain Guideline provides a Class IIa (B-NR) recommendation for invasive coronary function testing to improve the diagnosis of coronary microvascular

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dysfunction in individuals with known nonobstructive CAD, persistent stable chest pain who have at least mild myocardial ischemia on imaging (Gulati et al., 2021)
The 2023 AHA/ACC Chronic Coronary Disease Guideline included a Class IIa (B-R) recommendation for stratified medical therapy guided by invasive coronary physiologic testing in symptomatic individuals with nonobstructive CAD based on the CorMicA trial (Virani et al., 2023).

Coding

Code	Description
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation

Note:

The CPT codes for percutaneous coronary interventions (PCI) include the following imaging services necessary for the procedure(s); contrast injection, angiography, 'road-mapping', and fluoroscopic guidance, vessel measurement angiography following coronary angioplasty, stent placement, and atherectomy. Separate codes for these services should not be assigned in addition to the PCI code(s) because the services are already included.

Cardiac Imaging Guidelines

Evaluation of Conditions Other than Coronary Artery Disease (CD-7.7)

CD.DHC.0077.A
v1.0.2027

Criteria

- Combined right and left heart catheterization (CPT® 93453) is considered medically necessary for any of the following:
  - preoperative assessment prior to planned valvular surgery
  - evaluation of pulmonary hypertension out of proportion to or unexplained by the severity of valvular disease documented by other non-invasive imaging modalities (i.e., echo, CMR)
  - left ventricular dysfunction out of proportion to the severity of valvular disease documented by other non-invasive imaging modalities
  - suspected pericardial tamponade as documented by clinical findings or other non-invasive imaging modalities
  - suspected, or clinical uncertainty, between constrictive pericarditis versus restrictive cardiomyopathy physiology when there are questions left unanswered by other cardiac non-invasive imaging modalities
  - known or suspected cardiomyopathy with or without heart failure documented by prior advanced imaging
  - re-evaluation of known cardiomyopathy for any of the following:
    - change in clinical status
    - change in cardiac exam
    - when required to guide therapy
  - hypertrophic cardiomyopathy
  - subvalvular aortic stenosis
- Right and left heart catheterization (CPT® 93453) is medically necessary when there is uncertainty between clinical impression and other non-invasive imaging modalities to evaluate the following valvular diseases:
  - mitral stenosis
  - mitral regurgitation
  - aortic stenosis
  - aortic regurgitation
- Left heart catheterization (CPT® 93452) for hemodynamic evaluation of the left ventricle and aorta is medically necessary to evaluate aortic stenosis when there

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is uncertainty between the clinical impression and non-invasive imaging modality findings.

Evidence Discussion

Diagnostic right heart catheterization or right and left heart catheterization is performed for functional hemodynamic evaluation and may be combined with coronary angiography for structural cardiac imaging and coronary angiography for anatomical evaluation of the coronary arteries. Diagnostic right heart catheterization or right and left heart catheterization is medically necessary in selected situations to obtain specific clinical information required for management decisions if it was not provided by non-invasive evaluation. This may be medically necessary in selected situations for management of valvular heart disease, myocardial disease, pericardial disease, congenital heart disease, pulmonary hypertension, heart failure, and post-cardiac transplantation. These indications are addressed in established evidence-based medical specialty organization guidelines pertaining to these conditions. If the clinical information required for management decisions was already provided by non-invasive evaluation, diagnostic heart catheterization does not add to management and, moreover, carries cardiac and extra-cardiac risks including coronary artery injury, myocardial infarction, vascular access site bleeding, ischemic stroke, and contrast-mediated acute kidney injury.

Coding

Codes	Description
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed

Diagnostic Heart Catheterization – Coding Notes (CD-7.2)

CD.DHC.0007.1.A
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- Diagnostic heart catheterization (CPT® 93451-CPT® 93461) includes all "road mapping" angiography necessary to place the catheters, including any injections and imaging supervision, interpretation, and report.
- Diagnostic heart catheterization (CPT® 93452-CPT® 93461) (for all conditions other than congenital heart disease) includes contrast injections, imaging supervision, interpretation, and report for imaging typically performed.
- Catheter placements in native coronaries or bypass grafts (CPT® 93454-CPT® 93461) include intraprocedural injections for bypass graft angiography, imaging supervision, and interpretation.
- Injection codes CPT® 93563-CPT® 93565 should not be used in conjunction with CPT® 93452-CPT® 93461.
- Codes CPT® 93451-CPT® 93461 do not include contrast injections and imaging supervision, interpretation, and report for imaging that is separately identified by the following specific procedure codes: CPT® 93566, CPT® 93567 and CPT® 93568.
- Separate diagnostic cardiac catheterization codes should only be assigned in conjunction with interventional procedures in the following circumstances:
  - No prior or recent diagnostic catheterization is available to guide therapy.
  - Individual's condition has significantly changed since the last diagnostic catheterization.
  - The treatment plan may be affected.
  - Other vessels may be identified for treatment.
  - Further establishment of a diagnosis from a non-invasive study is necessary.

Diagnostic Heart Catheterization – Coding

Cardiac Catheterization Procedure Codes

Codes	Description
93451-93464 93566-93568	Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve

Codes	Description
RHC without LHC or coronaries	
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
LHC without RHC or coronaries	
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
RHC and retrograde LHC without coronaries	
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
Native coronary artery catheterization	
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
with bypass grafts	
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
with RHC	
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
with RHC and bypass grafts	

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Codes	Description
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
with LHC	
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with LHC and bypass grafts	
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
with RHC and LHC	
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with RHC and LHC and bypass grafts	
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93593-93597	**Congenital Heart Disease Code "Set"**

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Codes	Description
CPT® 93593 to 93597 are appropriate for invasive evaluation of congenital heart disease	
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

- CPT® 93593 to 93597 are medically necessary for invasive evaluation of congenital heart disease. See specific conditions in **Adult Congenital Heart Disease.**

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Cardiac Imaging Guidelines

Pulmonary Vascular Imaging

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Cardiac Imaging Guidelines

Pulmonary Hypertension (PH) (CD-8.1)

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v1.0.2027

Criteria

Screening

CPT® 93306

A screening echocardiogram (TTE) for PH is considered medically necessary in individuals with documented history of **any** of the following:

- pre-operative for planned liver transplant
- individuals evaluated for transjugular portosystemic shunt
- portal hypertension
- liver disease with signs and symptoms of PH
- bronchopulmonary dysplasia

Annual screening echocardiogram (TTE) is considered medically necessary in individuals with a documented history of any of the following:

- systemic sclerosis (SSc)
- individuals with PH mutations (e.g., BMPR2)
- first-degree relatives of individuals with PH
- connective tissue disorder with symptoms consistent with PH
- individuals with TR velocity ≥2.8m/s, with no other findings on additional testing
- individuals being treated with medications associated with PH
- individuals who have a concern documented for PH and had a negative echocardiogram but still show signs or symptoms of PH

Follow-up testing is not medically necessary in individuals with TR velocity <2.8m/s and no other signs, symptoms, or risk factors of PH.

Initial Imaging for PH

Transthoracic echocardiogram (TTE)

(CPT® 93306) is considered medically necessary when clinical evaluation indicates a concern for PH including **any** of the following findings:

- clinical notes document concern for pulmonary hypertension
- EKG findings concerning for PH such as **any** of the following:
  - right ventricular hypertrophy (RVH)

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  - right axis deviation
  - right atrial enlargement
- right ventricular hypertrophy or pulmonary artery dilation on other images
- history of pulmonary embolism with persistent or new onset DOE, or exercise limitation
- suspected PH in individuals with lung disease
- DOE with a history of connective tissue disorder, HIV, portal hypertension, or systemic sclerosis (SSc)
- symptoms of PH (**any** of the following):
  - breathlessness
  - SOB
  - decreased exercise tolerance
  - fatigue and rapid exhaustion
  - palpitations
  - dyspnea on bending forward
  - hemoptysis
  - exercise induced abdominal distention and nausea
  - weight gain due to fluid retention
  - syncope during or shortly after physical activity
  - exertional chest pain

Stress echo

(CPT® 93350 or 93351) is considered medically necessary to evaluate PH in the setting of **either** of the following conditions:

- concomitant valvular disease
- a documented concern for pulmonary hypertension

Cardiac MRI

(CPT® 75557) is considered medically necessary when TTE is equivocal or unclear (e.g., for RV function) .

Other advanced imaging

Any of the following imaging is considered medically necessary after TTE:

- High-resolution CT Chest (CPT® 71250) in the setting of hypoxemia to rule out restrictive lung disorders such as pulmonary fibrosis.
- CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555) to evaluate for suspected acute or chronic pulmonary embolism.
- V/Q scan (CPT® 78580 or CPT® 78582) and SPECT imaging (CPT® 78803) or SPECT/CT imaging (CPT® 78830) to evaluate for any of the following:
  - suspected acute pulmonary embolism

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  - to evaluate for chronic thromboembolic pulmonary hypertension (CTEPH) at 3 to 6 months post pulmonary embolism if both of the following apply:
    - persistent or new onset DOE or exercise limitation
    - evidence of PH on TTE
  - to evaluate for CTEPH in individuals with PH of uncertain etiology
- TEE or CCTA or CMR to identify CHD to detect or exclude **any** of the following:
  - sinus venosus
  - atrial septal defects
  - patent ductus arteriosus
  - anomalous pulmonary venous connections

Indications for initial catheterization

CPT® 93451

Right heart catheterization (RHC) is medically necessary to evaluate known or suspected PH in the setting of **any** of the following:

- echocardiogram findings
  - TR velocity ≥3.4m/second
  - TR velocity ≥2.9m/second and presence of other PH signs on echo or other testing, or risk factors or associated indications
- individuals with SSc where breathlessness remains unexplained (RHC is recommended despite normal echocardiogram)
- individuals who have symptoms or concerns for PH with a negative or equivocal echocardiogram
- to determine if shunt closure is recommended due to congenital heart disease
- PH on echocardiogram
- prior to starting PH medical therapy
- Individuals with **low**-risk profile (based on an evidence based PAH Risk Score Calculator such as REVEAL 2.0, ESC/ERS & Compera 2.0) only need catheterization if medically necessary for another reason or equivocal studies.
- when left heart catheterization meets criteria for separate indication.
- preoperative for surgical intervention treating the cause of PH (MV, TV, AV, PV)
- Eisenmenger syndrome

Left heart catheterization (LHC) or Right and left heart catheterization as per the following guidelines:

- **Evaluation of Conditions Other than Coronary Artery Disease (CD-7.7)**
- **Diagnostic Heart Catheterization (CD-7.3)**

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Repeat Testing

CPT® 93306

Follow-up echocardiogram (TTE) on individuals with PH is considered medically necessary for any of the following:

- every 6 months for surveillance of stable individuals with moderate or severe pulmonary hypertension (pulmonary artery systolic pressure ≥50mmHg)
- 3 months after any change in PH therapy
- prior to planned intubation (e.g., for elective surgery)
- prior to planned pregnancy
- during pregnancy as often as requested by provider
- anytime, without regard for the number or timing of previous echo studies to evaluate change in clinical signs or symptoms

CPT® 75557

CMR may replace TTE for the above follow up imaging when future echocardiograms are expected to be non-diagnostic or inconclusive due to a persistent anatomic or physiologic condition.

Pulmonary embolism (PE)

TTE (CPT® 93306) is considered medically necessary 3 to 6 months post pulmonary embolism if **any** of the following apply:

- persistent or new onset dyspnea on exertion, or exercise limitation
- pulmonary hypertension or right ventricular dysfunction on initial echo at PE diagnosis
- history of recurrent pulmonary embolism

CPT® 93451

RHC is medically necessary for known PH as follows:

- at baseline
- then every 6 months
- anytime for clinical changes or with treatment changes

Evidence Discussion

Pulmonary hypertension (PH) is a complex, chronic disease with multiple etiologies that requires extensive evaluation, including ECG (right ventricular hypertrophy with/without strain, right atrial dilatation); chest x-ray; arterial blood gas, pulmonary function testing, CT angiography based on the etiology.

PH can be subdivided into the following 5 groups based on the underlying cause:

- Pulmonary arterial hypertension (PAH)

- PH due to left heart disease
- PH due to lung disease
- Chronic thromboembolic PH (CTEPH)
- PH with unclear and/or multifactorial mechanisms

Probability of PH is assessed at initial evaluation:

- High probability:
  - TR velocity ≥3.4m/s
  - TR velocity between 2.9m/s to 3.4m/s and **one** of the following:
    - Right ventricle or pulmonary artery enlargement
    - Interventricular septum flattening
    - Right ventricular systolic dysfunction
- Intermediate probability:
  - TR velocity between 2.9m/s to 3.4m/s in the absence of other signs of PH
- Low probability:
  - TR velocity <2.8m/s

Peak TR velocity ≥2.8m/s may suggest PH; however, the presence or absence of PH cannot be reliably determined by TR velocity alone.

In addition to the tricuspid regurgitation velocity, other findings on echo can increase the probability of PH. Examples of these findings include:

- abnormal tricuspid annular plane systolic excursion (TAPSE)
- abnormal RV fractional area change (RV-FAC)
- abnormal RV free-wall strain
- abnormal tricuspid annulus velocity (S wave) derived from tissue Doppler imaging
- abnormal RV ejection fraction (RVEF) derived from 3D echocardiography

Pulmonary hypertension (PH) represents a heterogeneous group of disorders, including pulmonary arterial hypertension, PH due to left heart disease, PH due to lung disease or hypoxemia, chronic thromboembolic PH, and PH with multifactorial or unclear mechanisms. Professional society guidelines support transthoracic echocardiography (TTE) as the initial noninvasive test when PH is suspected based on symptoms such as dyspnea, fatigue, exertional chest pain, palpitations, syncope, abnormal ECG findings, right ventricular hypertrophy, pulmonary artery dilation, persistent dyspnea after pulmonary embolism, or risk factors such as connective tissue disease, systemic sclerosis, liver disease, HIV, lung disease, PH-associated medications, or pathogenic PH-related mutations (Humbert et al., 2022; Simonneau et al., 2013; Khanna et al., 2013). TTE provides noninvasive estimation of PH probability through tricuspid regurgitation velocity, right-sided chamber enlargement, septal flattening, right ventricular dysfunction, and pulmonary artery abnormalities, although echocardiographic estimates may be limited by image quality and do not replace invasive hemodynamic confirmation (Humbert et al., 2022).

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Current evidence supports a multimodality approach when TTE is equivocal, when PH etiology requires clarification, or when treatment decisions require more definitive assessment. Cardiac MRI is useful when echocardiography is unclear, particularly for right ventricular size and function, while CT or high-resolution CT can help evaluate lung parenchymal disease, pulmonary vascular abnormalities, or thromboembolic disease. Ventilation-perfusion imaging, including V/Q scan or SPECT/SPECT-CT, is recommended in the evaluation of suspected chronic thromboembolic pulmonary hypertension because it remains a sensitive screening test for chronic thromboembolic disease (Humbert et al., 2022; Remy-Jardin et al., 2021). Right heart catheterization remains the gold standard for diagnosis, classification, hemodynamic assessment, shunt assessment, and pre-treatment evaluation when PH-specific therapy or procedural management is being considered (Humbert et al., 2022).

Follow-up imaging is supported when results are expected to affect management, including surveillance of stable moderate or severe PH, assessment after PH therapy changes, evaluation before pregnancy or planned intubation, and evaluation of new or worsening symptoms. TTE every 6 months for stable moderate or severe PH and 3 months after a therapy change is consistent with the need to monitor right ventricular function and disease progression, although supporting evidence is largely guideline and consensus-based rather than derived from randomized imaging-frequency trials (Humbert et al., 2022; Faqih et al., 2016).

Coding

Code	Description
71250	Computed tomography, thorax, diagnostic; without contrast material
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
78580	Pulmonary perfusion imaging (eg, particulate)
78582	Pulmonary ventilation (eg, aerosol or gas) and perfusion imaging
78803	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (eg, head, neck, chest, pelvis) or acquisition, single day imaging

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Code	Description
78830	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis) or acquisition, single day imaging
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed

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Cardiac Imaging Guidelines

Pulmonary Vein Imaging (CD-8.2)

CD.CS.0008.2.A
v1.0.2027

Pulmonary Vein Isolation Procedure

Criteria

- MRI Cardiac (CPT® 75557 or 75561), or MRV Chest (CPT® 71555), or CTV Chest (CPT® 71275), or CT Cardiac (CPT® 75572) is considered medically necessary to evaluate the pulmonary veins as follows
  - prior to planned atrial fibrillation ablation/pulmonary vein isolation procedure
  - post-procedure between 3-6 months after ablation
    - If no pulmonary vein stenosis is present, no further follow-up imaging is required.
    - If pulmonary vein stenosis is present on imaging following ablation and symptoms of pulmonary vein stenosis (usually shortness of breath) are present, imaging is considered medically necessary at 1, 3, 6, and 12 months.

Evidence Discussion

Pulmonary vein imaging is supported primarily for pre-procedural planning before atrial fibrillation ablation or pulmonary vein isolation and for evaluation of post-ablation pulmonary vein stenosis. CT cardiac imaging, CTV/CTA chest, cardiac MRI, and MRV/MRA chest provide detailed assessment of pulmonary venous anatomy, including ostial size, venous branching, number of pulmonary veins, anatomic variants, and relationship to the left atrium. CT is frequently used because of rapid acquisition, high spatial resolution, and 3-dimensional reconstruction capabilities, while MRI/MRA may be appropriate when radiation avoidance is preferred or CT contrast exposure is contraindicated (Hamdan et al., 2009; Korsholm et al., 2020). Echocardiography is less reliable for detailed pulmonary vein anatomy and is generally not the preferred modality for pre-ablation venous mapping.

Pulmonary vein stenosis is a recognized complication after atrial fibrillation ablation. Although uncommon, reported post-ablation stenosis may be asymptomatic or may present with dyspnea, hemoptysis, recurrent pulmonary edema, pulmonary hypertension, or unexplained respiratory symptoms. If stenosis is present and symptomatic, serial imaging at 1, 3, 6, and 12 months is medically reasonable to assess progression, stability, or response to intervention consistent with observational evidence

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indicating that most pulmonary vein stenoses remain stable over 1 year, while a smaller proportion progress (Hamdan et al., 2009; Korsholm et al., 2020).

Coding

Codes	Description
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)

Cardiac Imaging Guidelines

References (CD-8)

CD.CS.0008.2.A
v1.0.2027

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Cardiac Imaging Guidelines

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Cardiac Imaging Guidelines

Heart Failure

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Cardiac Imaging Guidelines

Heart Failure (CD-9)

CD.CS.0009.A
v1.0.2027

Criteria (CD-9.1)

- Heart failure (HF), including post-cardiac transplant failure:
  - Echocardiogram is the first study after the clinical evaluation for suspected HF.
  - MUGA, cardiac MRI, or cardiac CT may be medically necessary if the ECHO is limited or does not completely answer the question.
  - Stress test to assess for CAD may be medically necessary. Follow stress testing guideline: **Stress Testing with Imaging – Indications (CD-1.4).**
- Arteriovenous fistula with "high output" heart failure:
  - CT Chest with contrast (CPT® 71260) and/or CT Abdomen and/or CT Pelvis with contrast (CPT® 74160 or 72193 or 74177) **or**
  - CTA Chest (CPT® 71275) and/or CTA Abdomen and/or CTA Pelvis (CPT® 74175 or CPT® 72191 or CPT® 74174) **or**
  - MRI Chest and/or MRI Abdomen and/or MRI Pelvis without and with contrast (CPT® 71552 and/or 74183 and/or 72197) **or**
  - MRA Chest and/or MRA Abdomen and/or MRA Pelvis (CPT® 71555 and/or CPT® 74185 and/or CPT® 72198)
- Right-sided heart failure can be a manifestation of pulmonary hypertension or serious lung disease.
  - CT Chest (CPT® 71260) or CTA Chest (CPT® 71275) to evaluate for recurrent pulmonary embolism

Evidence Discussion

- Congestive heart failure is a complex clinical syndrome with signs and symptoms that are a result of structural and/or functional impairment of ventricular ejection or filling which results in objective evidence of pulmonary or systemic congestion.
- Identification of the etiology of the cardiac dysfunction is crucial in the diagnosis of heart failure (HF) to determine subsequent management.
- Evaluation of HF usually entails multiple different diagnostic tools incorporating tools such as echocardiogram, stress testing, genetic testing, nuclear imaging, CT/ MRI imaging, endomyocardial biopsy and cardiac catheterization.
- Treatment of HF is targeted towards treating the underlying cause, improving the function and structure of the heart, and reducing mortality and morbidity. This not only includes medications but may also entail the use of cardiac resynchronization

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devices, monitoring devices, ventricular assist devices, cardiothoracic surgery, and heart transplant.

Coding

Codes	Description
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
72191	Computed tomographic angiography, pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
72193	Computed tomography, pelvis; with contrast material(s)
72197	Magnetic resonance (eg, proton) imaging, pelvis; without contrast material(s), followed by contrast material(s) and further sequences
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
74160	Computed tomography, abdomen; with contrast material(s)
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74175	Computed tomographic angiography, abdomen, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
74183	Magnetic resonance (eg, proton) imaging, abdomen; without contrast material(s), followed by with contrast material(s) and further sequences
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)

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Ventricular Assist Devices (CD-9.4)

Criteria

Ventricular assist devices (e.g., RVAD, LVAD, BiVAD) are implantable devices used in individuals with advanced heart failure refractory to medical therapy as a bridge to transplantation or as a destination therapy.

Pre-ventricular assist device implant criteria

The following imaging studies are medically necessary for preoperative evaluation prior to any planned ventricular assist device (e.g., RVAD, LVAD, BiVAD) implant:

- TTE (CPT® 93306)
- 3D rendering for echocardiography (CPT® 76376 or 76377)
- Cardiac MRI (CPT® 75557 or 75561) and CMR velocity flow mapping (CPT® 75565)
- CT Chest (CPT® 71250 or 71260) or CTA Chest (CPT® 71275) or MRI Chest (CPT® 71552) or MRA Chest (CPT® 71555)
- CTA Abdomen and Pelvis (CPT® 74174) or MRA Abdomen and Pelvis (CPT® 74185 and 72198)
- CT Coronary Angiography (CPT® 75574) in individuals post-coronary artery bypass grafting to assess the location and course of the bypass grafts to guide the surgical approach
- Transesophageal echocardiography (CPT® 93312, 93320, 93325)
- Right heart catheterization (CPT® 93451) or Right and left heart catheterization (CPT® 93453)

Post ventricular assist device implant criteria

TTE (CPT® 93306) is medically necessary as follows:

- Post-implant at the following intervals:
  - 2 weeks
  - 1 month
  - 3 months
  - 6 months
  - 12 months
  - Every 6 months thereafter

CT

- CTA Chest (CPT® 71275) or CT Chest with contrast (CPT® 71260) is medically necessary for evaluation of ventricular assist device malfunction.

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- CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260) is medically necessary for the evaluation of ventricular assist device -related infections.

FDG PET/CT for ventricular assist device driveline infection (CPT® 78815 orCPT® 78429)

- Early infection detection for ventricular assist device drivelines is desirable, since once the infection extends to the cannula and pump pocket, eradication becomes difficult. CT findings are nonspecific and metal device artifacts of the driveline itself affects sensitivity.
- FDG PET/CT is medically necessary for suspected LVAD infection if other studies and examination remain inconclusive.
- See **FDG PET/CT for Infections (CD-6.5)**.

Right heart catheterization (RHC)

- RHC (CPT® 93451) or Right and Left heart catheterization (CPT® 93453) as needed for hemodynamic assessment to guide changes to therapy.

Coding

Codes	Description
76377	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; requiring image postprocessing on an independent workstation
76376	3D rendering with interpretation and reporting of computed tomography, magnetic resonance imaging, ultrasound, or other tomographic modality with image postprocessing under concurrent supervision; not requiring image postprocessing on an independent workstation
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
+75565	Cardiac magnetic resonance imaging for velocity flow mapping (list separately in addition to code for primary procedure)
71552	Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences

Codes	Description
71555	Magnetic resonance angiography, chest (excluding myocardium), with or without contrast material(s)
72198	Magnetic resonance angiography, pelvis, with or without contrast material(s)
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74185	Magnetic resonance angiography, abdomen, with or without contrast material(s)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
78429	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan
78815	Positron emission tomography (PET) with concurrently acquired computed tomography (CT) for attenuation correction and anatomical localization imaging; skull base to mid-thigh
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93312	Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report

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Codes	Description
+93320	Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); complete
+93325	Doppler echocardiography color flow velocity mapping (List separately in addition to codes for echocardiography)
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed

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CD.CS.0009.A
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Cardiac Trauma

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Cardiac Trauma Imaging (CD-10.1)

CD.CS.0010.1.A
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Criteria

- One of the following can be used to evaluate cardiac or aortic trauma:
  - Echocardiogram (TTE, TEE)
  - Cardiac MRI Cardiac (CPT® 75557 or 75561, and 75565)
  - Cardiac CT Cardiac (CPT® 75572)
  - CCTA (CPT® 75574)
  - Chest CTA Chest (CPT® 71275)
  - Chest CT Chest (CPT® 71260, CPT 71270)

Evidence Discussion

Imaging in cardiac trauma is performed initially with transthoracic or transesophageal echocardiography for rapid hemodynamic assessment and pericardial evaluation. ECG-gated CT is also indicated when structural injury, great-vessel involvement, or complex anatomic clarification is needed. CMR is indicated in select subacute scenarios to characterize contusion, edema, or scar when management decisions depend on tissue diagnosis (Otto et al., 2021; Blanke et al., 2019; Hundley et al., 2010).

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Adult Congenital Heart Disease

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ASD-Atrial Septal Defects (CD-11.2.1)

CD.CHD.0011.2.1.A
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Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CCT **or** CMR, and/or TEE are considered medically necessary when TTE is suboptimal as follows:
    - when ASD is suspected
    - to evaluate pulmonary venous connections in known ASD
    - to define the defect size, morphology, or rim anatomy
  - MRA Chest or CTA Chest are considered medically necessary for pulmonary venous anomalies on other imaging
    - If normal, repeat pulmonary vein imaging is not required.
- Diagnostic heart catheterization is considered medically necessary when there is either:
  - evidence of pulmonary hypertension
  - unanswered questions on CMR or CCT for venous drainage
- Stress imaging and coronary artery imaging is based on **Stress Testing with Imaging – Indications (CD-1.4)**.

Consideration of surgery

- Transesophageal echocardiogram (TEE) is recommended to guide percutaneous ASD closure.

Post-procedure imaging

- TTE is medically necessary post ASD device placement:
  - 1 week (if Amplatzer)
  - 1 month
  - 6 months (evaluate for erosion)
  - 12 months
  - then every 1-2 years
- Due to low-risk of erosion in PFO devices, PFO device closure requires follow-up at 6-12 months. No additional evaluation unless PFO not closed (see **Frequency of Echocardiography Testing (CD-2.3) PFO closure, TIPS, Cardiac device therapy, LVAD).**

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Surveillance imaging ASD surgically closed or without surgical interventions

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	A	B	C	D
TTE	36	12	12	12

Cardiac Imaging Guidelines

Anomalous Pulmonary Venous Connections (CD-11.2.2)

CD.CHD.0011.2.2.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest at time of diagnosis if any issues with pulmonary veins or RV volume
  - Diagnostic heart catheterization at time of diagnosis for hemodynamic data and issues not answered on other imaging
- Routine stress imaging or coronary artery imaging not required
- TTE and either CCT **or** CMR for clinical changes
  - Diagnostic heart catheterization when other advanced imaging is inconclusive

Consideration of surgery

- TTE and either CCT **or** CMR
- Diagnostic heart catheterization when other advanced imaging is inconclusive

Imaging Post-repair

- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest for new cardiac symptoms

Surveillance imaging anomalous pulmonary venous connections

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	24	12	12

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Ventricular Septal Defect (VSD) (CD-11.2.3)

CD.CHD.0011.2.3.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization at time of diagnosis if pulmonary hypertension (PH) or shunt size is a question

Consideration of surgery

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization if pulmonary hypertension (PH) or shunt size is a question

Surveillance imaging VSD

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	12	12	12

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Atrioventricular Septal Defect (AV Canal, AVSD, Endocardial Cushion Defect) (CD-11.2.4)

CD.CHD.0011.2.4.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern
- Stress imaging per Stress Testing with Imaging – Indications (CD-1.4)

Consideration of surgery

- TTE
  - CCT **or** CMR when TTE is suboptimal or inconclusive
  - Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern

Post repair

- Diagnostic heart catheterization when there is concern for LVOT obstruction

Surveillance imaging AVSD

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	24	12	12	12

Cardiac Imaging Guidelines

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Patent Ductus Arteriosus (PDA) (CD-11.2.5)

CD.CHD.0011.2.5.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - MRI Chest **or** MRA Chest **or** CT Chest **or** CTA Chest if TTE is suboptimal or equivocal
  - Diagnostic heart catheterization when other advanced imaging is inconclusive
- Stress imaging per **Stress Testing with Imaging – Indications (CD-1.4)**

Note:

if planned device closure, diagnostic cardiac catheterization is not medically necessary as it is included in the procedure code

Consideration of surgery

- TTE
- MRI Chest **or** MRA Chest **or** CT Chest **or** CTA Chest if TTE is suboptimal or equivocal

Surveillance imaging PDA

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	12	12	12

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Cor Triatriatum (CD-11.2.6)

CD.CHD.0011.2.6.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest at baseline and with cardiac clinical changes
- Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern
- TEE at diagnosis to identify the size and location of the membrane orifice or when TTE is inconclusive or suboptimal

Consideration of surgery

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive for treatment planning or pulmonary hypertension is a concern

Surveillance imaging- Cor Triatriatum

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	36	12	12	12

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Congenital Mitral Stenosis (CD-11.2.7)

CD.CHD.0011.2.7.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes
- TTE

Consideration of surgery
- TTE

Surveillance imaging congenital mitral stenosis

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	A	B	C	D
Echo (TTE)	36	24	12	12

Cardiac Imaging Guidelines

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Subaortic Stenosis (SAS) (CD-11.2.8)

CD.CHD.0011.2.8.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- Echocardiogram (TTE) (CPT® 93303 or 93304 or 93306 or 93308)
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)
  - once at the time of diagnosis
  - new or changed signs or symptoms of ischemia
  - changes in cardiac function
  - any signs or symptoms allowed in **Stress Testing with Imaging – Indications (CD-1.4)**

Consideration of surgery

- Echocardiogram (TTE) (CPT® 93303 or 93304 or 93306 or 93308)
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI)

Surveillance imaging SAS

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echo (TTE)	36	24	12	12
Stress imaging	N/A	24	24	12

Background and Supporting Information

This section relates to subaortic stenosis caused by a discrete membrane. For tunnel-like obstruction or hypertrophic cardiomyopathy, please refer to **Hypertrophic Cardiomyopathy (HCM) (CD-14)**.

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Congenital Valvular Aortic Stenosis (CD-11.2.9)

CD.CHD.0011.2.9.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- TEE is medically necessary when TTE is limited or equivocal.
- MRA Chest or CTA Chest as follows:
  - there is suspicion of Coarctation of the aorta (COA) based on exam and echocardiogram; **or**
  - the proximal ascending aorta not well visualized on TTE; **or**
  - the degree of aortic dilatation is as follows:
    - 4.8cm or more in an individual with risk factors of family history of aortic dissection, aortic growth rate greater than or equal to 0.3cm/year, COA, or root-phenotype aortopathy; **or**
    - 5.3cm or more in an individual with none of the above listed risk factors

Consideration of surgery

- TTE
- TEE is medically necessary when TTE is limited or equivocal.

Surveillance imaging congenital valvular aortic stenosis

Modality	Physiological stage / intervals for routine imaging (months)			
Stage (valvular AS)	**Progressive (stage B) Mild Vmax 2.0-2.9 m/s**	**Progressive (stage B) Moderate Vmax 3.0-3.9 m/s**	**Severe (stage C) ≥4.0 m/s**	**Aortic root dilation >4.0cm**
TTE	36	12	6	12
MRA Chest or CTA Chest	N/A	N/A	N/A	12 (if ascending)

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Degree of aortic stenosis (AS) severity			
	Mild AS	**Moderate AS**	**Severe AS**
Vmax (m/s)[a] maximum Doppler velocity	2.0-2.9	3.0-3.9	≥4.0
Mean gradient (mmHg)[a]	<20	20-39	≥40
AVA (cm^2) aortic valve area	>1.5	1.0-1.5	<1.0
AVAi (cm^2/m^2 BSA) indexed aortic valve area	≥1.0	0.6-0.9	<0.6
[a]At normal transvalvular flow, BSA= body surface area			

Adapted from: 2025 ACC/AHA/HRS/ISACHD/SCAI Guideline for the Management of Adults With Congenital Heart Disease: A Report of the American College of Cardiology/ American Heart Association Joint Committee on Clinical Practice Guidelines (Gurvitz et al., 2026).

Background and Supporting Information

- degree of aortic dilatation is within 0.2cm of the interventional criteria (as follows):
  - 5.0cm when there are risk factors of risk family history of aortic dissection, aortic growth rate ≥0.3 cm/year, COA, or root-phenotype aortopathy
  - 5.5cm when there are no additional risk factors

Aortic Disease in Turner Syndrome (CD-11.2.10)

CD.CHD.0011.2.10.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- MRA Chest or CTA Chest if mid aorta was not seen on TTE

Consideration of surgery

- TTE
- MRA Chest or CTA Chest if mid aorta was not seen on TTE

Surveillance imaging aortic disease in Turner Syndrome

- Echocardiogram (TTE) yearly
  - MRA Chest or CTA if mid ascending aorta not visualized
- For documented thoracic aortic aneurysm (TAA) ≤4cm
  - Routine MRA Chest or CTA yearly
- For documented thoracic aortic aneurysm (TAA) >4cm
  - MRA Chest or CTA every 6 months.

Evidence Discussion

Dissection more common for a given aortic diameter. Mid-ascending aortic disease more common and my not be reliably seen on echocardiogram. A 25-year prospective study of 400 women with Turner syndrome published in 2023 evaluated predictors of aortic dissection. The investigators found that absolute ascending aortic diameter and Turner syndrome–specific z-scores predicted dissection better than ASI. The traditional ASI cutoff of 2.5 cm/m² had a sensitivity of only 17% for predicting dissection. An absolute ascending aortic diameter of 3.3 cm showed better predictive risk for dissection (Thunstrom et al., 2023).

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Supravalvular Aortic Stenosis (CD-11.3.1)

CD.CHD.0011.3.1.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- MRA Chest or CTA Chest
- Diagnostic heart catheterization **or** CMR **or** CCTA to assess coronary ostia
- New cardiac symptoms-any of the following:
  - CCT **or** CMR
  - CTA Chest or MRA Chest
  - Stress imaging as per **Stress Testing with Imaging – Indications (CD-1.4)**

Consideration of surgery

- Diagnostic heart catheterization for any individuals pre-cardiac intervention for coronary arteries

Surveillance imaging- Supravalvular AS

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	24	12	12
CMR or CCT	36	36	36	36

Background and Supporting Information

Supravalvular aortic stenosis is a relatively rare condition overall but is seen commonly in individuals with Williams syndrome, homozygous familial hypercholesterolemia or nonsyndromic elastic arteropathy syndrome.

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Coarctation of the Aorta (CD-11.3.2)

CD.CHD.0011.3.2.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - No further imaging is required if echocardiogram (TTE), blood pressure, and exam rule out Coarctation.
  - If echocardiogram and exam are equivocal or positive, one of the following is medically necessary:
    - CTA Chest
    - MRA Chest
  - Individuals with Coarctation of the aorta do not require intra-cardiac MRI unless issue cannot be resolved on echocardiogram.
  - Screening for intracranial aneurysm by MRA (CPT® 70544, 70545, 70546) or CTA (CTP® 70496) of head is medically necessary.
- ETT for diagnosis of exercise-induced hypertension does not require imaging.
- CMR not required unless issues unresolved by echo for intracardiac anatomy.
- Diagnostic catheterization is medically necessary prior to stenting of the coarctation.
- Stress imaging, TEE, CMR or CCT, Coronary imaging are not routine.

Symptomatic

- Individuals with Coarctation are at risk for dissection. When individual has new or worsening symptoms any of the following:
  - TTE
  - MRA Chest or CTA Chest
- For exertional symptoms, one of the following:
  - Stress imaging per **Stress Testing with Imaging – Indications (CD-1.4)**
  - CCT **or** CMR

Consideration of surgery

- TTE
- MRA Chest or CTA Chest if TTE is equivocal or positive
- Diagnostic heart catheterization is medically necessary prior to stenting of the coarctation.

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Surveillance Imaging Coarctation of the Aorta - Unrepaired

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	A	B	C	D
TTE	24	24	12	12
MRA Chest or CTA Chest	36	36	12	12

Surveillance Imaging Coarctation of the Aorta - Repaired

Modality	Intervals for routine imaging (years)	
MRA Chest or CTA Chest	Every 5 years	

Background and Supporting Information

Coarctation is suspected based on clinical findings:

- BP higher in upper extremities than in the lower extremities
- absent femoral pulses
- continuous murmur
- abdominal bruit
- berry aneurysm with hemorrhage
- rib notching on x-ray
- abnormal thoracic aortic imaging and blood pressure

Valvular Pulmonary Stenosis (CD-11.3.3)

CD.CHD.0011.3.3.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest when TTE is inconclusive or suboptimal

Consideration of surgery

- TTE
- CCT/CCTA and/or CTA Chest **or** CMR and/or MRA Chest when TTE is inconclusive or suboptimal

Surveillance imaging Valvular PS

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	36	24	12	12

Isolated Pulmonary regurgitation after PS repair-Echo and CMR at same interval as TOF

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	12	12	12
CMR	36	24	12	12

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Background and Supporting Information

- Echocardiogram-stages
  - Mild PS-peak gradient <36 mmHg (peak velocity <3m/s)
  - Moderate PS-peak gradient 36-64 mmHg (peak velocity 3-4 m/s)
  - Severe PS-peak gradient >64 mmHg (peak velocity >4m/s); or mean gradient >35mmHg.

Cardiac Imaging Guidelines

Branch and Peripheral Pulmonary Stenosis (CD-11.3.4)

CD.CHD.0011.3.4.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- MRA Chest or CTA Chest
- CCT **or** CMR
- Diagnostic heart catheterization may be considered if other advanced imaging is not adequate for management.
- VQ scan or MRA Chest for differential blood flow

Consideration of surgery

- TTE
- MRA Chest or CTA Chest
- CCT **or** CMR
- Diagnostic heart catheterization is considered medically necessary when other advanced imaging does not provide necessary information for surgical management.

Surveillance imaging branch and peripheral pulmonary stenosis

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	24	12	12
CCT **or** CMR	36	36	24	24
MRA Chest or CTA Chest	36	36	24	24

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Background and Supporting Information

Risk factors include:

- surgeries of right ventricular outflow (TOF)
  - Noonan
  - Alagille
  - Williams
- maternal rubella exposure
- Keutel syndrome
- post-op arterial switch procedure-Lecompte maneuver

Cardiac Imaging Guidelines

Double Chambered RV (CD-11.3.5)

CD.CHD.0011.3.5.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes
- TTE
- CCT **or** CMR when TTE is suboptimal or inconclusive

Consideration of surgery
- TTE
- Diagnostic heart catheterization when other advanced imaging is inconclusive
- CCT **or** CMR when TTE is suboptimal or inconclusive

Surveillance imaging double chambered right ventricle (RV)

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	24	24	12	6

Cardiac Imaging Guidelines

Ebstein Anomaly (CD-11.3.6)

CD.CHD.0011.3.6.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE with 3D rendering (CPT® 93319) when requested
- TEE when TTE is inconclusive or suboptimal
- CCT **or** CMR

Consideration of surgery

- TEE
- CCT **or** CMR
- Diagnostic heart catheterization when other advanced imaging is inconclusive

Surveillance imaging Ebstein Anomaly

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	12	12	12	12
CCT **or** CMR	60	36	24	12

Cardiac Imaging Guidelines

Tetralogy of Fallot (TOF, VSD with PS) (CD-11.3.7)

CD.CHD.0011.3.7.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

Baseline

- TTE
- TEE including 2D, 3D, Doppler, and strain imaging as requested
- CCT/CCTA **or** CMR
- MRA Chest or CTA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive

New or worsening symptoms

- Repeat baseline advanced imaging
  - new or worsening symptoms
  - new EKG changes
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) allowed for typical chest pain, even if intermediate pretest probability at atypical symptoms in individuals with known or undefined coronary artery (CA) anatomy or CA pathology
- VQ scan or MRA Chest for left/right perfusion abnormality
- Diagnostic heart catheterization when pulmonary hypertension is a concern

Prior to cardiac intervention or surgery

- Repeat baseline imaging (TTE/MR/CT)
- Diagnostic heart catheterization prior to surgery or intervention
  - If planned Catheter Pulmonary Valve replacement, procedure includes diagnostic catheterization and hemodynamics, and diagnostic catheterization is not billed separately.

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Surveillance imaging Tetralogy of Fallot (TOF)

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	12	12	6
CCT/CCTA **or** CMR	36	24	12	6
CTA Chest or MRA	36	24	12	6

Background and Supporting Information

These guideline recommendations apply to individuals with Tetralogy of Fallot who have undergone a repair earlier in life and do not apply to individuals with **unrepaired** Tetralogy of Fallot

Right Ventricle-to-Pulmonary Artery Conduit (CD-11.3.8)

CD.CHD.0011.3.8.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) when there are cardiac symptoms

Consideration of surgery- Surgical repair for many lesions such as TOF/ Truncus / Pulmonary atresia

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
- Diagnostic heart catheterization when other advanced imaging is inconclusive

Surveillance imaging Right Ventricle-to-Pulmonary Artery Conduit

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	12	12	12	12
CCT/CCTA **or** CMR	36	36	12	12
MRA Chest or CTA Chest	36	36	12	12

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Transposition of the Great Arteries (TGA) (CD-11.3.9)

CD.CHD.0011.3.9.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

  In addition to repeat imaging with the above baseline studies, the following studies are medically necessary as follows:
  - Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) when there are cardiac symptoms
  - V/Q scan for left to right PA perfusion or MRA Chest
  - Diagnostic heart catheterization (right and left heart) when above advanced imaging does not explain clinical issues

Consideration of surgery

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Surveillance imaging TGA

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	12	12	12	12
CCT/CCTA **or** CMR	36	24	12	12

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Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
MRA Chest or CTA Chest	36	24	12	12

Arterial Switch

Imaging	Neoaortic diameter <5cm and unobstructed or mildly obstructed branch PAs	Neoaortic diameter ≥5 cm in any segment and/ or moderate or greater branch PA stenosis
CCT/CCTA **or** CMR	36	12

Background and Supporting Information

Includes s/p atrial switch, arterial switch, and Rastelli repair

Cardiac Imaging Guidelines

Congenitally Corrected TGA (CD-11.3.10)

CD.CHD.0011.3.10.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes
- TTE (with speckle tracking CPT® 93356 as requested)
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Consideration of surgery
- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Surveillance imaging congenitally corrected TGA

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	12	12	12	12
CCT/CCTA **or** CMR	36	36	12	12
CTA Chest or MRA Chest	36	36	12	12

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Fontan Palliation of Single Ventricle Physiology (CD-11.3.11)

CD.CHD.0011.3.11.A
v1.0.2027

Criteria

Including Tricuspid Atresia and Double Inlet Left Ventricle, HLHS, HRHS, PA, Mitral atresia, AVC unbalanced, single ventricle, DIRV, pulmonary atresia, HLHS, Glen procedure, TA, double outlet right ventricle (DORV), and single ventricle physiology

Imaging at baseline and for cardiac clinical changes

- TTE
- CCT/CCTA **or** CMR for issues that are equivocal on TTE
- Echocardiogram/CMR/CCT or CCTA/MRA Chest or CTA Chest/catheterization with any new signs or symptoms
- V/Q scan or MRA for lung perfusion left vs. right

Consideration of surgery

- Diagnostic heart catheterization prior to surgical interventions

Surveillance imaging Fontan Palliation of Single Ventricle Physiology

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
Echocardiogram (TTE)	12	12	12	6
CCT/CCTA **or** CMR	36	24	24	24
CTA Chest or MRA	36	24	24	24
Diagnostic heart catheterization	120 (10 years)	120 (10 years)	120 (10 years)	120 (10 years)

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Severe Pulmonary Hypertension (PH) and Eisenmenger Syndrome (CD-11.3.12)

CD.CHD.0011.3.12.A
v1.0.2027

Criteria

Imaging at baseline or for cardiac clinical changes

- TTE
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest
  - echocardiogram (TTE) results suggest PH
  - new signs or symptoms with PH
- Diagnostic heart catheterization when pulmonary hypertension is a concern

Consideration of surgery or for treatment planning

- TTE
- Diagnostic heart catheterization when other advanced imaging is inconclusive
- CMR **and/or** MRA Chest **or** CCT/CCTA **and/or** CTA Chest

Surveillance imaging Severe Pulmonary artery hypertension (PH) and Eisenmenger syndrome

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	N/A	N/A	12	6
CCT/CCTA **or** CMR	N/A	N/A	As needed	As needed
MRA Chest or CTA Chest	N/A	N/A	As needed	As needed
Diagnostic heart catheterization	N/A	N/A	As needed	As needed

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Coronary Artery Anomalies (CD-11.3.13)

CD.CHD.0011.3.13.A
v1.0.2027

Criteria

Imaging at baseline and for cardiac clinical changes

- TTE
  - at baseline
  - any signs or symptoms
- CCT/CCTA **or** CMR or Diagnostic heart catheterization for initial evaluation
- Imaging stress test (Stress Echo, Stress-perfusion CMR, SPECT MPI, or PET MPI) for coronary artery from wrong sinus or for any cardiac signs or symptoms

Consideration of surgery

- TTE
- CCT/CCTA **or** CTA Chest **or** CMR **or** diagnostic heart catheterization

Surveillance imaging coronary artery anomalies

Modality	Physiological stage / intervals for routine imaging (months)			
Physiological stage	**A**	**B**	**C**	**D**
TTE	24	24	12	12

Background and Supporting Information

This section includes anomalous aortic origin of a coronary artery as well as anomalous coronary artery arising from the pulmonary artery.

For Kawasaki guideline regarding echo, Stress imaging, coronary imaging, see pediatric guideline Kawasaki Disease (PEDCD-6) in the Pediatric Cardiac Imaging Guidelines.

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Congenital Heart Disease Background and Supporting Information (CD-11.1)

CD.CHD.0011.1.A
v1.0.2027

- For other associated disorders, please see the condition specific sections.
  - Marfan Syndrome
  - Hypertrophic cardiomyopathy (HCM)
  - Bicuspid aortic valve (BAV)

Definitions (CD-11.1.1)

Physiological stages (A, B, C, D)

Each congenital heart lesion is divided into 4 physiological stages (A, B, C, D).

Characteristics	Physiological stage			
	A	B	C	D
NYHA functional class	I	II	III	IV
Hemodynamic or anatomic sequelae	None	Mild ventricular enlargement of dysfunction, small shunt	Moderate or greater, ventricular dysfunction. Any venous or arterial stenosis	Moderate or greater, ventricular dysfunction. Any venous or arterial stenosis
Valvular	None	Mild	Moderate or greater	None
Aortic enlargement	None	Mild	Moderate	Severe

Cardiac Imaging Guidelines

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Characteristics	Physiological stage			
	A	B	C	D
Exercise capacity limitation	Normal	Abnormal objective cardiac limitation	Moderate	Severe
Renal hepatic pulmonary dysfunction	None	None	Mild but responsive to medication	Refractory to treatment
Cyanosis/ hypoxemia	None	None	Mild	Severe
Arrhythmias	None	Arrhythmia not requiring treatment	Needs medical therapy	Refractory to medical therapy
Pulmonary hypertension	None	None	Mild to moderate	Severe or Eisenmenger

- CHD Anatomic classification
  - Class I-Simple
    - Native disease
      - isolated small ASD
      - isolated small VSD
      - mild isolated pulmonic stenosis
    - Repaired conditions
      - previously ligated or occluded ductus arteriosus
      - repaired secundum ASD or sinus venosus defect without significant residual shunt or chamber enlargement
      - repaired VSD without significant residual shunt or chamber enlargement
  - Class II-Moderate Complexity
    - Repaired or unrepaired conditions
      - aorto-left ventricular fistula
      - anomalous pulmonary venous connection, partial or total
      - anomalous coronary artery arising from the pulmonary artery
      - anomalous aortic origin of a coronary artery from the opposite sinus

Cardiac Imaging Guidelines

- AVSD (partial or complete, including primum ASD)
- congenital aortic valve disease
- congenital mitral valve disease
- coarctation of the aorta
- Ebstein anomaly (disease spectrum includes mild, moderate, and severe variations)
- infundibular right ventricular outflow obstruction
- ostium primum ASD
- moderate and large unrepaired secundum ASD
- moderate and large persistently patent ductus arteriosus
- pulmonary valve regurgitation (moderate or greater)
- pulmonary valve stenosis (moderate or greater)
- peripheral pulmonary stenosis
- sinus of Valsalva fistula/aneurysm
- sinus venosus defect
- subvalvular aortic stenosis (excluding HCM; HCM not addressed in these guidelines)
- supravalvular aortic stenosis
- straddling atrioventricular valve
- repaired tetralogy of Fallot
- VSD with associated abnormality and/or moderate or greater shunt

◦ Class III-Great Complexity (or Complex)
- cyanotic congenital heart defect (unrepaired or palliated, all forms)
- double-outlet ventricle
- Fontan procedure
- interrupted aortic arch
- mitral atresia
- single ventricle (including double inlet left ventricle, tricuspid atresia, hypoplastic left heart, any other anatomic abnormality with a functionally single ventricle)
- pulmonary atresia (all forms)
- TGA (classic or d-TGA; CCTGA or l-TGA)
- truncus arteriosus
- other abnormalities of atrioventricular and ventriculoarterial connection (i.e., crisscross heart, isomerism, heterotaxy syndromes, ventricular inversion)

Modalities (CD-11.1.2)

• Echocardiogram-transthoracic (TTE) or transesophageal (TEE)

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- Transthoracic echocardiography (TTE) is an indispensable tool in the initial and serial follow-up evaluation to identify abnormalities and changes that commonly influence management decisions.

- Cardiac MRI (MRI Cardiac)
  - MRI Cardiac plays a valuable role in assessment of RV size and function, because it provides data that are reproducible and more reliable than data obtained with alternative imaging techniques.
  - For intracardiac congenital heart disease, MRI Cardiac will typically include flow velocity mapping for shunts and flow assessment.
  - Imaging that only requires aortic arch imaging, does not require intracardiac MRI Cardiac, only MRA Chest.
- Cardiac Computed Tomography (CT Cardiac) and Cardiac Computed Tomography Angiography (CTA Cardiac)
  - The most important disadvantage of CT Cardiac (including CT angiography) as an imaging technique is the associated exposure to ionizing radiation.
- Diagnostic heart catheterization
  - (hemodynamic and/or angiographic) in individuals with adult CHD AP classification II and III, or interventional cardiac catheterization in individuals with adult CHD AP classification I to III should be performed by, or in collaboration with, cardiologists with expertise in adult CHD.
- Exercise Testing
  - Exercise test does not imply stress imaging.
- Stress Imaging
  - includes SPECT MPI, stress echo, stress MRI, PET MPI
- Circumstances where MRI Cardiac, CT Cardiac, TEE, and/or diagnostic heart catheterization may be Superior to TTE
  - assessment of RV size and function in repaired Tetralogy of Fallot (TOF), systemic right ventricles, and other conditions associated with right ventricular (RV) volume and pressure overload
  - identification of anomalous pulmonary venous connections
  - serial assessment of thoracic aortic aneurysms, especially when the dilation might extend beyond the echocardiographic windows
  - accurate assessment of pulmonary artery (PA) pressure and pulmonary vascular resistance
  - assessment for re-coarctation of the aorta
  - sinus venosus defects
  - vascular rings
  - evaluation of coronary anomalies
  - quantification of valvular regurgitation

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Coding (CD-11.1.3)

Modality (Abbreviation)	
Transthoracic echocardiogram (TTE)	
93303	Transthoracic echocardiography for congenital cardiac anomalies; complete
93304	TTE for congenital cardiac anomalies; limited study
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93307	TTE (2D) with or without m-mode recording; complete
93308	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study
Transesophageal echocardiogram (TEE)	
93312	TEE (2D) including probe placement, imaging, interpretation, and report
93315	TEE for congenital cardiac anomalies; including probe placement, imaging, interpretation, and report
Cardiac MRI (CMR)	
75557	Cardiac MRI for morphology and function without contrast
75561	Cardiac MRI for morphology and function without and with contrast
MRI Chest	
71550	MRI Chest without contrast
71551	MRI Chest with contrast

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Modality (Abbreviation)	
71552	MRI Chest with and without contrast
MR Angiography Chest (MRA Chest)	
71555	MRA Chest (excluding myocardium) with or without contrast
Cardiac CT (CCT)	
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
Coronary CT Angiography (CCTA)	
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
CT Chest	
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71270	Computed tomography, thorax, diagnostic; without contrast material, followed by contrast material(s) and further sections
CT Angiography Chest (CTA Chest)	
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing

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Modality (Abbreviation)	
Stress Echo	
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/ or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/ or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
Stress-perfusion MRI (Stress-perfusion CMR)	
75559	Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging
75563	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging
Myocardial perfusion imaging SPECT (SPECT MPI)	
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (spect) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
PET or PET/CT Myocardial perfusion imaging (PET MPI)	
78430	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan

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Modality (Abbreviation)	
78431	Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/ or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
Pulmonary perfusion imaging (V/Q)	
78580	Pulmonary perfusion imaging (eg, particulate)
78582	Pulmonary ventilation (eg, aerosol or gas) and perfusion imaging

Cardiac Catheterization Procedure Codes

Codes	Description
93451-93464 93566-93568	**Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve**
RHC without LHC or coronaries	
93451	Right Heart Catheterization Including Measurement(S) Of Oxygen Saturation And Cardiac Output, When Performed
LHC without RHC or coronaries	
93452	Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
RHC and retrograde LHC without coronaries	

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Codes	Description
93453	Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed
Native coronary artery catheterization	
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
with bypass grafts	
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography
with RHC	
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
with RHC and bypass grafts	
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
with LHC	
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with LHC and bypass grafts	

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Codes	Description
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
with RHC and LHC	
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
with RHC and LHC and bypass grafts	
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93593-93597	**Congenital Heart Disease Code "Set"**
CPT® 93593 to 93597 are appropriate for invasive evaluation of congenital heart disease	
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections

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Codes	Description
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

Evidence Discussion (CD-11)

Adult Congenital Heart Disease Imaging

- Management of Adult Congenital heart (ACHD) disease involves a multimodal imaging approach. Multimodal imaging helps account for patient-specific considerations, strengths and weaknesses of each modality, institutional resources, and available expertise. Approaches to limit and monitor radiation exposure are recommended during imaging of individuals with ACHD, and studies that do not involve ionization radiation should be prioritized whenever appropriate.
- Echocardiogram, MRI, CT, catheterization, and nuclear stress testing all have strengths and weaknesses, including varying radiation levels, temporal resolution, spatial resolution, and ability to image blood flow. Advantages of the various modalities are as follows: MRI has the ability to image the right ventricle in 3D; Echocardiograms include high temporal resolution and availability, and the ability to measure pressures with catheterizations; Cardiac CTs have the ability to rapidly acquire 3D imaging; and nuclear imaging allows the ability to measure myocardial perfusion concerns.

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Cardiotoxic Agent-Related Cardiac Dysfunction

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Cardiotoxic Agent-Related Cardiac Dysfunction (CD-12)

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Cardiotoxic Agent/Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD) (CD-12.1)

Criteria

Transthoracic Echocardiogram (TTE)

Transthoracic Echocardiogram (TTE) is medically necessary to determine Left Ventricular (LV) function in individuals on cardiotoxic chemotherapeutic drugs.

- 3D echocardiography (CPT® 93319) is medically necessary in addition to the primary TTE and is the preferred echocardiography modality for the assessment of left ventricular ejection fraction (LVEF) and cardiac volumes. See **3D Echocardiography (CD 2.9)**.
- Myocardial strain imaging (CPT® 93356) to obtain a Global Longitudinal Strain (GLS) is medically necessary as an important adjunct in screening for CTRCD. See **Myocardial Strain Imaging (CD 12.2).**

Criteria

Multimodality Imaging

- Guidelines support using echocardiography rather than MUGA for the determination of LVEF and/or wall motion EXCEPT in one of the circumstances described previously in **MUGA Study – Cardiac Indications (CD-3.4)** (see **Background and supporting Information** below).
- CT calcium scoring is considered medically necessary to evaluate for radiation induced CAD when all of the following conditions exist:
  - no presence of symptoms suspicious for ischemia such as chest discomfort located retrosternally, epigastric, or referred pain (pain that is felt in a place different than the source) in the neck, shoulder, arm, or jaw described as pain, pressure, constricting, or tightness occurring with exertion or emotional stress and relieved by rest, nitroglycerin, or both.
  - no clinical history or prior cardiac imaging documenting CAD.
  - no prior calcium score >0.

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- for the initial study, there has been at least 5 years since the last RT (radiotherapy/ radiation) treatment or for subsequent testing, there has been at least 5 years since the last CT calcium scoring.

- Cardiac MRI (CMR) is medically necessary in the evaluation of CTRCD for the following:
  - TTE is not diagnostic
  - Tissue characterization for cardiomyopathy or myocarditis, particularly when Immune Checkpoint Inhibitor Myocarditis is being questioned
  - See also **Cardiac MRI and MRA Chest – Indications (CD 5.2)**.

Criteria

Frequency of CTRCD screening

- Baseline
  - All individuals can have a baseline TTE prior to initiation of cardiotoxic agents.
- During treatment with cardiotoxic agents
  - The frequency of monitoring depends on the agent administered and the individual's baseline cardiovascular toxicity risk. (see **Background and Supporting Information** below)
- Post treatment with cardiotoxic agents surveillance
  - One TTE is medically necessary 3 to 12 months after completion of therapy.
- Adult cancer survivors
  - Long term surveillance TTE is medically necessary every 5 years, except in those with low risk.
  - Additional surveillance TTE at 1 and 3 years after cancer therapy completion is medically necessary in those deemed to be high risk for CTRCD.
- Adult survivors of childhood and adolescent cancer
  - Surveillance TTE is medically necessary every 2 years for survivors with indeterminate risk due to unknown cancer therapy history.
  - Surveillance TTE is medically necessary every 2 years for high risk survivors, defined as a history of any of the following:
    - Radiation dose ≥30 Gy
    - Anthracycline dose of ≥100 mg/m^2 and radiation dose ≥15 Gy
    - Anthracycline dose ≥250 mg/m^2
  - Surveillance TTE is medically necessary every 5 years for moderate risk survivors, defined as a history of any of the following:
    - Radiation dose ≥15 to <30 Gy

    - Anthracycline dose of < 250 mg/m^2 and radiation dose <15 Gy
  - No screening is medically necessary in low risk survivors, defined as a history of any of the following:
    - Anthracycline dose of >0 to <100 mg/m^2
    - Radiation dose >0 to <15 Gy
- TTE is medically necessary for cancer survivors with a history of chest radiotherapy or anthracycline exposure who are pregnant or planning to become pregnant as follows:
  - Baseline exam
  - 12 weeks of pregnancy if missed the baseline TTE or in high risk survivors
  - 20 weeks of pregnancy for high risk survivors
  - TTE can be repeated for any cardiac symptoms at any other time as needed during or immediately following pregnancy
- For adults who received anthracyclines in childhood, see **Cardiotoxicity and Echocardiography (PEDONC-19.2).**

Background and Supporting Information

- High value screening protocol to detect CTRCD using TTE (CPT® 93306 or 93308) is contingent upon careful baseline cardiotoxicity risk assessment and stratification into low, moderate, and high risk. Currently, there is no universally accepted risk score. Documentation of risk by the provider is sufficient to guide screening strategy.
- Advantages of Echocardiography in comparison to MUGA in individuals on cardiotoxic chemotherapy:
  - no ionizing radiation
  - no IV access required when echo contrast is not used
  - allows view of the pericardium to look for effusion
  - allows estimate of pulmonary pressure
  - may allow visualization of a clot or tumor in the Inferior Vena Cava (IVC) and/or the right heart

Myocardial Strain Imaging (CD-12.2)

Criteria

- Myocardial strain imaging (CPT® 93356) in addition to the primary echocardiogram in individuals receiving therapy with cardiotoxic agents for **any** of the following:
  - Initial evaluation-prior to treatment with **either**:
    - medications that could result in cardiotoxicity/heart failure
    - radiation that could result in cardiotoxicity/heart failure

- re-evaluation of an individual previously or currently undergoing therapy as per echocardiogram parameters (see **Cardiotoxic agent/Cancer Therapeutics-Related Cardiac Dysfunction (CD-12.1))**
- re-evaluation of an individual undergoing therapy with worsening symptoms

Cardiac Myosin Inhibitors for Obstructive Hypertrophic Cardiomyopathy (HCM) (CD-12.3)

Criteria- Monitoring Treatment

Echocardiogram (CPT® 93306) for individuals treated with cardiac myosin inhibitors (including mavacamten or aficamten) for class II-III obstructive HCM as follows:

Titration of cardiac myosin inhibitors to maintenance dose

TTE is considered medically necessary to monitor initiation of cardiac myosin inhibitor therapy (including mavacamten and aficamten) and dose titration as follows:

- baseline study at the beginning of therapy
- every 2 to 8 weeks during dose titration to maintenance dose
- every 3 months once maintenance dose is reached while on medication

Changes symptoms while on cardiac myosin inhibitors

TTE is considered medically necessary while taking cardiac myosin inhibitors to evaluate symptoms or clinical findings that are new since the previous TTE

Changes in treatment

TTE is considered medically necessary when there is a change in treatment while taking a cardiac myosin inhibitors as follows:

- after dose adjustment due to symptoms or clinical findings, or missed doses
- 4 week after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)
- 12 weeks after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)

See also **Hypertrophic Cardiomyopathy (HCM) (CD-14)**

Background and Supporting Information

Hypertrophic Cardiomyopathy (HCM) is a clinical diagnosis, established by imaging with 2D echocardiography or cardiovascular magnetic resonance (CMR) showing a maximal end-diastolic wall thickness of ≥15mm anywhere in the left ventricle, in the absence of another cause of hypertrophy in adults. More limited hypertrophy (13mm-14mm) can be diagnostic, particularly when present in family members of an individual with HCM or in

conjunction with a positive genetic test, and/or associated with typical dynamic outflow obstruction, or distinctly abnormal ECG patterns.

Evidence Discussion

Cardiac myosin inhibitors, such as mavacamten, require structured echocardiographic monitoring because excessive reduction in contractility may lead to decreased LVEF and heart failure risk. TTE at baseline, 2 weeks to 8 weeks, and 12 weeks after initiation, followed by imaging every 12 weeks during therapy supports a range of prescribing information requirements. Repeat imaging is also supported after treatment interruption, dosage change, initiation of interacting medications such as CYP2C19 or CYP3A4 inhibitors, or new/worsening symptoms. This monitoring approach is consistent with prescribing information and professional society guidance for obstructive HCM treated with cardiac myosin inhibitors. Echocardiography is used to confirm preserved systolic function, assess LVOT gradient response, and identify excessive LVEF reduction that may require treatment interruption or dose adjustment. The evidence base includes pivotal clinical trial data and regulatory labeling demonstrating symptomatic and hemodynamic benefit in selected individuals with obstructive HCM, balanced against the need for ongoing safety monitoring. Broader use outside labeled or guideline-supported populations remains limited by the need for careful selection, serial imaging, and long-term outcome data (Ommen et al., 2024; Bristol Myers Squibb prescribing information).

Coding

Coding

Codes	Description
78472	Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing
78473	Cardiac blood pool imaging, gated equilibrium; multiple studies, wall motion study plus ejection fraction, at rest and stress (exercise and/or pharmacologic), with or without additional quantification
78481	Cardiac blood pool imaging (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78483	Cardiac blood pool imaging (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification

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Codes	Description
78494	Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing
+78496	Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93308	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study
+93319	3D echocardiographic imaging and postprocessing during transesophageal echocardiography, or during transthoracic echocardiography for congenital cardiac anomalies, for the assessment of cardiac structure(s) (eg, cardiac chambers and valves, left atrial appendage, interatrial septum, interventricular septum) and function, when performed (List separately in addition to code for echocardiographic imaging)
+93356	Myocardial strain imaging using speckle tracking-derived assessment of myocardial mechanics (List separately in addition to codes for echocardiography imaging)

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Pre- and Post Surgical Cardiac Imaging

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Cardiac Surgery Imaging (CD-13)

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Pre-surgical Cardiac Testing General Information (CD-13.1)

Criteria

- CT Chest without contrast (CPT® 71250) is considered medically necessary prior to cardiac surgery as follows (either):
  - to visualize the extent and location of aortic atherosclerosis
  - to change the operative strategy such as those problematic areas are avoided

Background and Supporting Information

- It is important to differentiate requests for preoperative CT imaging before cardiac surgery according to type of procedure planned:
  - Primary cardiac operation – individuals who have not had prior heart surgery
  - Redo procedures – individuals who have had a prior procedure (it is important to determine the type of procedure as this may impact which modality is most appropriate for the pre-operative assessment)
  - Minimally invasive procedures, such as minimally invasive aortic valve operations, minimally invasive or robotic mitral operations, TAVR, MitraClip™ or other percutaneous valve procedures (such as valve in valve aortic or mitral, percutaneous tricuspid and TMVR which will be increasing in the future)
- In re-operative cardiac surgery, the benefit of preoperative CT is to assess for aortic calcifications, to evaluate the anatomic relationships in the mediastinum, such as the location of the various cardiac chambers and great vessels and proximity to the sternum, and to assess for the location of prior bypass grafts. Information can then be used to change the operative strategy including non-midline approach, peripheral vascular exposure, and alternative cannulation sites and for establishing cardiopulmonary bypass before re-sternotomy. These techniques can result in decreased incidence of intraoperative injury to heart, great vessels and prior bypass grafts and lower rates of postoperative stroke. IV contrast is necessary with these studies to delineate the anatomic structures. However, in individuals with renal insufficiency, the provider might choose to forgo the contrast if they do not want to contrast load the individual prior to placing them on the heart-lung machine.
- Aortic atherosclerosis is recognized as the single most important determinant of postoperative stroke. There is evidence to support that preoperative CT is associated with lower postoperative stroke rates and mortality after primary cardiac surgery.

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Primary Cardiac Surgery – No Previous Cardiac Surgery (CD-13.2)

Criteria

- CT Chest without contrast (CPT® 71250) to evaluate for the presence of ascending aortic calcification is considered medically necessary prior to primary cardiac surgery when there is documented high risk for aortic calcification including any of the following:
  - aortic calcification on chest x-ray or other diagnostic test (TEE, fluoroscopy, etc.)
  - calcific aortic stenosis
  - end stage renal disease (dialysis)

Re-operative Cardiac Surgery (CD-13.3)

Criteria

- **One** of the following tests for preoperative assessment:
  - CT Chest with contrast
  - CTA Chest
  - CCTA only if prior CABG (this might be in addition to CT with contrast as CCTA will not show the extent of the thoracic aorta that needs to be visualized)
  - CT Heart usually does not provide the necessary information and is not medically necessary routinely.

Minimally Invasive or Robotic Cardiac Surgery (CD-13.4)

Criteria

- CTA Chest CPT® 71275 (or CT Chest with contrast CPT® 71260) and CTA Abdomen and Pelvis CPT® 74174 (or CT Abdomen and Pelvis with contrast CPT® 74177) are considered medically necessary for pre-operative planning when minimally invasive or robotic cardiac surgical procedures are being considered including any of the following:
  - valve repair or replacement
  - coronary artery bypass graft surgery
  - aortic root or ascending aorta repair
  - resection of intracardiac tumor, or thrombus or vegetation
  - open lead extraction
  - atrial septal defect repair

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Transcatheter Valve Interventions (CD-13.5)

Criteria

Transcatheter Mitral Valve Repair (TMVR) (mitral valve clip)

Pre-procedure imaging

All of the following imaging studies are considered medically necessary to determine eligibility for TMVR or for pre- procedure planning:

- Transthoracic echo (TTE) with or without 3D rendering
- Transesophageal echo with or without 3D rendering
- Heart catheterization, including coronary angiography and right heart catheterization if requested
- CT Cardiac Morphology CPT® 75572
- CTV Chest CPT® 71275
- CTV Abdomen and Pelvis CPT® 74174

Post-procedure follow-up

Post-procedure transthoracic echo (TTE) can be performed at the following intervals:

- 1 month
- 6 months
- 1 year
- then annually

CT Imaging in Transcatheter Aortic Valve Replacement (TAVR)

Criteria

Pre-TAVR imaging

Pre-aortic valve replacement

- Once the decision has been made for aortic valve replacement, the following may be used to determine if an individual is a candidate for TAVR:
  - CTA Chest (CPT® 71275), Abdomen and Pelvis (combination code CPT® 74174) are considered medically necessary; and
  - CT Cardiac Morphology (CPT® 75572) is considered medically necessary to measure the aortic annulus; or
  - CTA Cardiac (CPT® 75574) is considered medically necessary to both measure the aortic annulus and assess the coronary arteries in lieu of heart catheterization.

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- A repeat diagnostic left heart catheterization is **not** considered medically necessary when the individual is undergoing a transcatheter aortic valve replacement (TAVR).

Transfemoral access not feasible

Alternative imaging can be obtained to evaluate vascular access for TAVR in individuals for whom it is documented either via the office note or prior imaging that transfemoral access would not be feasible due to **any** of the following exclusion criteria:

- small vessels
- highly calcified vessels
- stenosed or occluded vessels
- prior aortoiliac vascular intervention

Imaging is medically necessary based on the documented intended access site (transaxillary or transcarotid) and should be of the involved body areas. The following studies are medically necessary based on the documented planned access site:

- CTA Head (CPT® 70496) or CTA Neck (CPT® 70498) or CTA Head and Neck (CPT® 70471) for transcarotid access
- CTA Chest (CPT® 71275) and/or Upper Extremity (CPT® 73206) for transaxillary access

Post-TAVR imaging

CT Cardiac (CPT® 75572) is considered medically necessary after TAVR in the setting of **any** of the following:

- post-TAVR TTE is indeterminate or raises a concern about **any** of the following:
  - valve thrombosis
  - infective endocarditis
  - structural degeneration
- A Valve-in-Valve implantation or surgical re-do AVR is being contemplated
- concern for hypoattenuated leaflet thickening (HALT) or other forms of bioprosthetic valve dysfunction due to an increase in mean transvalvular gradient of ≥10mmHg from baseline.
- Routine CT surveillance or follow up for incidental Hypoattenuated Leaflet Thickening (HALT) with or without restricted leaflet motion, also referred to as Hypoattenuation Affecting Motion (HAM), is NOT medically necessary.

Evidence Discussion

The American Heart Association scientific statement recognizes preoperative chest CT as a highly sensitive method for identifying aortic atherosclerosis, an important potential

source of embolic stroke during cardiac surgery. In one cohort of 284 patients scheduled for nonemergent coronary artery bypass grafting, CT identified severe atherosclerotic lesions that made cannulation or cross-clamping high risk in 12.7% of patients. The statement notes that myocardial revascularization guidance recommended preoperative CT in those with evidence of extensive generalized atherosclerosis. When severe aortic disease is identified, modification of the operative technique to minimize aortic manipulation and reconsideration of the overall surgical risk-benefit balance are advised. (Gaudino et al., 2020).

A 2026 American College of Radiology review found that a meta-analysis of 18 studies involving 4,057 patients undergoing first-time cardiac surgery suggested that preprocedural CT may reduce perioperative stroke and mortality. The potential benefit was attributed to changes in aortic cannulation site, use of an off-pump approach, or cancellation or modification of surgery when extensive aortic disease was identified. However, much of the evidence was observational, and at least one retrospective case-control study of 405 patients found that aortic calcification was more frequent among patients who developed postoperative stroke, but the differences were not statistically significant.(Malik et al., 2026).

Observational studies and meta-analyses have reported that preoperative CT is useful before repeat cardiac surgery. CT can identify high-risk anatomy, including extensive aortic calcification and a distance of less than 10 mm between the sternum and the right ventricle, aorta, or bypass graft. Identification of these findings resulted in cancellation of surgery in approximately 4% to 13% of cases and modification of the operative strategy in up to 80%. Other reported benefits included fewer sternal re-entry injuries, shorter perfusion or cross-clamp times, shorter intensive care unit stays, and possible reductions in perioperative myocardial infarction and stroke. Interpretation is constrained by predominantly nonrandomized study designs, differences in surgical populations and CT protocols, and the possibility of selection and surgical-expertise bias (Malik et al., 2026).

Trans-catheter Aortic Valve Replacement (TAVR)

The success of a Trans-catheter Aortic Valve Replacement (TAVR) procedure is contingent upon a meticulous pre-TAVR planning imaging study where cardiac CT allows accurate annulus sizing, coronary heights measurement, and calcification distribution evaluation, in addition to access site planning. Post-operatively, clinically suspected complications such as thrombus formation, infective endocarditis, or structural degeneration can be confirmed on a cardiac CT; a routine surveillance

strategy, however, is not supported because of unclear or even potentially harmful outcome of treating incidental findings.

Transcatheter Mitral Valve Repair (mitral valve clip)

In non-interventional settings, cardiac CT provides an alternative to cardiac MRI when structural information cannot be adequately obtained by an echocardiography. Most notably, the evaluation of a cardiac mass, extent of pericardial disease, complex congenital heart disease and cardiomyopathy, can be performed by a cardiac CT when cardiac MRI is not available or contraindicated. Percutaneous treatment of mitral regurgitation can be accomplished using venous access to apply a clip device (e.g., MitraClip currently FDA approved) to provide edge-to-edge mitral leaflet coaptation, approximating opposing sections of the anterior and posterior mitral valve leaflets. FDA approved indications include treatment for individuals with symptomatic, moderate to severe, or severe primary mitral regurgitation whose surgical risks are prohibitive, as well as symptomatic moderate to severe or severe secondary mitral regurgitation who have failed optimal medical therapy. This therapy should include, if medically necessary, cardiac resynchronization therapy.

Coding

Code	Description
70471	Computed tomographic angiography (CTA), head and neck, with contrast material(s), including noncontrast images, when performed, and image postprocessing
70496	Computed tomographic angiography, head, with contrast material(s), including noncontrast images, if performed, and image postprocessing
70498	Computed tomographic angiography, neck, with contrast material(s), including noncontrast images, if performed, and image postprocessing
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing
73206	Computed tomographic angiography, upper extremity, with contrast material(s), including noncontrast images, if performed, and image postprocessing

Code	Description
74174	Computed tomographic angiography, abdomen and pelvis, with contrast material(s), including noncontrast images, if performed, and image postprocessing
74177	Computed tomography, abdomen and pelvis; with contrast material(s)
75571	Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium
75572	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3d image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)
75573	Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3d image postprocessing, assessment of lv cardiac function, rv structure and function and evaluation of venous structures, if performed)
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)

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Cardiac Imaging Guidelines

Hypertrophic Cardiomyopathy

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Cardiac Imaging Guidelines

Hypertrophic Cardiomyopathy (HCM) (CD-14)

CD.CS.0014.A
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Criteria

Screening

- For screening for inherited hypertrophic cardiomyopathy, see **Transthoracic Echocardiography (TTE-Indications (CD-2.2)** and **Frequency of Echocardiography Testing (CD-2.3).**

Initial imaging, new or changed symptoms

Transthoracic echocardiography (TTE)

- TTE is medically necessary for the initial evaluation of a genotype positive individual with inherited hypertrophic cardiomyopathy.

Transesophageal echocardiography (TEE) (CPT® 93312, 93320, 93325)

- TEE is medically necessary for the evaluation of individuals with hypertrophic cardiomyopathy if TTE is inconclusive for **any** of the following:
  - mitral regurgitation secondary to structural abnormalities of the mitral valve
  - subaortic membrane or aortic valve stenosis

Stress echocardiogram

- Exercise stress echo (CPT® 93351 or 93350) is medically necessary for the detection and quantification of dynamic left ventricular outflow tract obstruction in symptomatic individuals with HCM who do **not** have a resting or provocable outflow tract gradient ≥50 mm Hg on TTE.
- Stress echo can be repeated when there is documentation of **any** of the following:
  - In 1 to 2 years if the resting or provocable outflow tract gradient is <30 mm Hg on prior stress echo
  - Worsening symptoms
  - There has been a therapeutic change (e.g., change in medication, surgical procedure performed).

Cardiac CTA (CPT® 75574)

- Initial imaging study in individuals with hypertrophic cardiomyopathy and stable anginal symptoms

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- Chest discomfort is common in individuals with hypertrophic cardiomyopathy. The incidence of false positive myocardial perfusion imaging abnormalities is higher in these individuals, whereas the incidence of severe coronary artery stenosis is low.

Cardiac MRI (CMR)

- Cardiac MRI (CPT® 75557 or CPT® 75561) is considered medically necessary when TTE is inconclusive or nondiagnostic for HCM.

Pre-procedure testing

All of the following modalities are considered medically necessary:

- TTE
- CMR
- TEE for pre-procedure planning for surgical myectomy or alcohol septal ablation
- Left heart catheterization with coronary arteriography to rule out coronary artery disease prior to planned surgical myectomy.

Post- Septal Reduction Therapy (SRT)

TTE is medically necessary within 3 to 6 months after SRT (surgical myectomy or alcohol septal ablation) to evaluate the procedural results in individuals with hypertrophic cardiomyopathy

Surveillance imaging

- TTE is considered medically necessary every year in individuals who have no change in clinical status or treatment.

Criteria- Monitoring Treatment

Echocardiogram (CPT® 93306) for individuals treated with cardiac myosin inhibitors (including mavacamten or aficamten) for class II-III obstructive HCM as follows:

Titration of cardiac myosin inhibitors to maintenance dose

TTE is considered medically necessary to monitor initiation of cardiac myosin inhibitor therapy (including mavacamten and aficamten) and dose titration as follows:

- baseline study at the beginning of therapy
- every 2 to 8 weeks during dose titration to maintenance dose

- every 3 months once maintenance dose is reached while on medication

Changes symptoms while on cardiac myosin inhibitors

TTE is considered medically necessary while taking cardiac myosin inhibitors to evaluate symptoms or clinical findings that are new since the previous TTE

Changes in treatment

TTE is considered medically necessary when there is a change in treatment while taking a cardiac myosin inhibitors as follows:

- after dose adjustment due to symptoms or clinical findings, or missed doses
- 4 week after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)
- 12 weeks after initiating a weak CYP2C19 inhibitor (e.g., omeprazole) or moderate CYP3A4 inhibitor (e.g., ciprofloxacin)

HCM Supporting Information

Background and Supporting Information

Hypertrophic Cardiomyopathy (HCM) is a clinical diagnosis, established by imaging with 2D echocardiography or cardiovascular magnetic resonance (CMR) showing a maximal end-diastolic wall thickness of ≥15mm anywhere in the left ventricle, in the absence of another cause of hypertrophy in adults. More limited hypertrophy (13mm-14mm) can be diagnostic, particularly when present in family members of an individual with HCM or in conjunction with a positive genetic test, and/or associated with typical dynamic outflow obstruction, or distinctly abnormal ECG patterns.

Evidence Discussion

The peer-reviewed published literature and professional society guidelines support transthoracic echocardiography (TTE) as the primary initial imaging modality for suspected or known hypertrophic cardiomyopathy (HCM). HCM is diagnosed by imaging evidence of otherwise unexplained left ventricular hypertrophy, typically maximal end-diastolic wall thickness ≥15 mm in adults, or 13–14 mm when supported by family history, genetic testing, abnormal electrocardiographic findings, or typical dynamic obstruction. TTE provides assessment of wall thickness distribution, left ventricular systolic function, diastolic filling, mitral valve anatomy, systolic anterior motion, and left ventricular outflow tract (LVOT) gradients. Current AHA/ACC and ESC guidelines recommend echocardiography for initial diagnosis and for phenotype screening in first-degree relatives or genotype-positive individuals because HCM expression may be age dependent and may evolve over time (Ommen et al., 2024; Ommen et al., 2020; Arbelo et al., 2023).

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Cardiac myosin inhibitors, such as mavacamten, require structured echocardiographic monitoring because excessive reduction in contractility may lead to decreased LVEF and heart failure risk. TTE at baseline, 2 weeks to 8 weeks, and 12 weeks after initiation, followed by imaging every 12 weeks during therapy supports a range of prescribing information requirements. Repeat imaging is also supported after treatment interruption, dosage change, initiation of interacting medications such as CYP2C19 or CYP3A4 inhibitors, or new/worsening symptoms. This monitoring approach is consistent with prescribing information and professional society guidance for obstructive HCM treated with cardiac myosin inhibitors. Echocardiography is used to confirm preserved systolic function, assess LVOT gradient response, and identify excessive LVEF reduction that may require treatment interruption or dose adjustment. The evidence base includes pivotal clinical trial data and regulatory labeling demonstrating symptomatic and hemodynamic benefit in selected individuals with obstructive HCM, balanced against the need for ongoing safety monitoring. Broader use outside labeled or guideline-supported populations remains limited by the need for careful selection, serial imaging, and long-term outcome data (Ommen et al., 2024; Bristol Myers Squibb prescribing information).

Coding

Code	Description
75557	Cardiac magnetic resonance imaging for morphology and function without contrast material;
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
75574	Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3d image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with Spectral doppler echocardiography, and with color flow doppler echocardiography
93312	Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report

Code	Description
93350	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;
93351	Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed

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Perinatal Imaging in Cardiovascular Disease

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Diagnostic Cardiovascular Imaging Pre-Pregnancy to Post-Partum (CD-15.1)

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Peripartum Red Flag Signs and Symptoms

Imaging as requested, as listed within **Imaging Modalities in Maternal Imaging** (Echocardiogram, Exercise stress echo, Coronary angiography, Cardiac MRI), is medically necessary for peripartum individuals for any of the following **red flag** signs or symptoms:

- chest pain
- dyspnea
- orthopnea
- cough
- lower extremity edema when there is a concern for heart disease
- tachycardia
- unheralded syncope
- headache
- acute visual changes
- new onset hypotension
- hypertension

Imaging Modalities

General information

Ultrasound and magnetic resonance are the preferred imaging modalities to minimize radiation exposure in pregnancy. When imaging using ionizing radiation is necessary, radiation exposure should follow the ALARA principle (As Low As Reasonably Achievable). Shared decision-making regarding diagnostic testing should occur in consultation with the individual, cardiologist, and obstetrical team when weighing the risk of fetal exposure to radiation against the need to diagnose or plan treatment for serious illness.

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Transthoracic echocardiography (TTE)

- TTE (CPT® 93306) is the primary cardiac imaging modality in pregnancy. Baseline and surveillance echocardiography is medically necessary for several conditions as noted in **Maternal imaging in cardiovascular disease (CD-15.2)** Table 1.
- A repeat echocardiogram is medically necessary when there are new or worsening cardiovascular signs or symptoms, as described in **Peripartum Red Flags**, **Transthoracic Echocardiography (TTE)– Indications/initial evaluation (CD-2.2)** and **Frequency of Echocardiography Testing (CD-2.3)**, during and after pregnancy.

Exercise Stress Echo

- Exercise stress echo (CPT® 93350, 93351) is medically necessary pre-conception to assist with risk stratification in individuals with a documented history of **any** of the following:
  - current left ventricular dysfunction
  - previous history of left ventricular dysfunction
  - valvular heart disease of any severity
  - There is a concern for myocardial reserve.
- See Stress echocardiogram in **Stress Testing with Imaging – Indications (CD-1.4)** and **Stress echo–indications other than ruling out CAD (CD-2.7)**.
- See **Hypertrophic Cardiomyopathy (CD-14).**

Coronary Angiography

- Fetal risk from ionizing radiation is highest before 20 weeks gestational age. When coronary angiography is medically necessary, the ALARA principle should be followed. Invasive management of acute coronary syndrome is associated with lower in-hospital mortality and should be considered. See **Diagnostic Heart Catheterization**.

Cardiac MRI

- Cardiac MRI (CPT® 75557) is utilized in pregnant individuals to measure aortic dimensions, wall motion, and ventricular function when the echocardiogram is non-diagnostic. Gadolinium-based contrast agents are not necessary in aortic imaging or most other indications in pregnancy. See **Cardiac MRI**.

Evidence Discussion

- Cardiovascular disease (CVD) in pregnancy has become increasingly prevalent in recent years.
- The increase in plasma volume during pregnancy requires significant physiological adaptation.
- Maternal mortality has increased in the last two decades with CVD accounting for 33% of all deaths.

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- Invasive management of myocardial infarction (MI) is associated with lower in-hospital mortality.
- Research has underrepresented females of childbearing age leading to significant deficits in our knowledge of cardiovascular care of these individuals.
- Cardiac Imaging using ionizing radiation
  - Multiple imaging modalities expose the pregnant individual and fetus to ionizing radiation.
  - This exposure causes concern for an elevated risk of childhood cancer.
  - Shared decision-making should be employed when weighing the fetal exposure to radiation against the need to diagnose serious illness.

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Maternal Imaging in Cardiovascular Disease (CD-15.2)

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Criteria

Table 1: Suggested frequency of echo monitoring during pregnancy

Cardiovascular disease	Monitoring frequency
Hypertensive disorders of pregnancy (BP ≥130/90)	• An echocardiogram (TTE) (CPT® 93303, 93304, 93306, 93307, 93308) is medically necessary once during pregnancy in all hypertensive disorders of pregnancy. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Valvular disorders/ Native and Prosthetic	• 1 TTE is medically necessary during the first trimester (weeks 1-12 of pregnancy) for individuals with known or suspected valvular heart disease. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Severe Aortic stenosis (AS)	• A repeat TTE is medically necessary every 1-2 months or when there are new or worsening cardiovascular signs or symptoms.
Mitral stenosis (MS)	• TTE is medically necessary each trimester (12 weeks) and prior to delivery in individuals with mild MS. • TTE is medically necessary every 1–2 months in individuals with moderate to severe MS. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Dilated cardiomyopathy	• TTE is medically necessary during each trimester (12 weeks). • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.

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Cardiovascular disease	Monitoring frequency
Hypertrophic cardiomyopathy	• TTE is medically necessary in **asymptomatic** individuals each trimester. • TTE is medically necessary in **symptomatic** individuals every 1-2 months. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms.
Peripartum cardiomyopathy	• TTE is medically necessary in individuals with signs and symptoms of heart failure. • A repeat TTE is medically necessary when there are new or worsening cardiovascular signs or symptoms. ◦ TTE is medically necessary in subsequent pregnancies: ▪ at the time of the first prenatal visit ▪ at the end of the first and second trimesters ▪ 1 month prior to delivery ▪ after delivery prior to discharge ▪ 1 month postpartum ▪ at any time when there are worsening signs or symptoms of heart failure • TTE is medically necessary as requested when the individual is being treated with Cabergoline
Pulmonary hypertension	• TTE is medically necessary in individuals with signs and symptoms of pulmonary hypertension. • A repeat TTE is medically necessary at the discretion of the health care provider.

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Maternal Imaging in Individuals with Aortopathy (CD-15.3)

CD.MI.0015.3.A
v1.0.2027

Criteria

Pre-pregnancy imaging

Individuals at risk for aortic aneurysms **(Table 15-3-1)** should be evaluated with echocardiogram (TTE) **and** Computed Tomography (CT)/Magnetic Resonance Imaging (MRI) of the Chest/Abdomen/Pelvis **(Table 15-3-2)** within 1 year prior to conception to evaluate for aortic valve disease and aortic dimensions.

Table 15-3-1

Individuals at risk for aortic aneurysm, aortic dissection, limb-threatening ischemia
Bicuspid Aortic Valve
Turner Syndrome
Coarctation of the Aorta
Marfan Syndrome
Type IV Ehlers-Danlos
Loeys-Dietz
Familial Thoracic Aortic Disease and Aortic Dissection (defined as first-degree relative with history of aortic dissection or thoracic aortic aneurysm or two second-degree relatives with history of aortic dissection or thoracic aortic aneurysm)

Table 15-3-2

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Imaging for Aortic conditions	CPT®
CT Chest and/or Abdomen and/or Pelvis	71260 74177 74160 72193
CTA Chest and/or Abdomen and/or Pelvis	71275 74175 72191 74174
MRA Chest and/or Abdomen and/or Pelvis	71555 74185 72198
Transthoracic Echocardiogram (TTE)	93303 93304 93306 93307 93308
Transesophageal Echocardiogram (TEE)	93312 93313 93314 93315 93316 93317

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Imaging for Aortic conditions	CPT®
Doppler echocardiography is medically necessary as add-on codes for TEE	+93320 +93321 +93325

Surveillance imaging during pregnancy and postpartum

Follow-up imaging with Echocardiogram (TTE) and CTA/MRA. TEE can be substituted if TTE is equivocal.

Suggested Frequency of Aortic Imaging during pregnancy and postpartum in individuals known to be high-risk for aortic aneurysm

Table 15-3-3

Condition	WHO Class	Imaging frequency	Postpartum (up to 42 days after birth)
Turner Syndrome	• II-III: Aortic root <20mm/m^2 with associated risk factors or <25mm/m without associated risk factors	• Once during pregnancy if normal aortic dimension, or every 2 months if repaired coarctation	• Once during the postpartum period
	• IV: Aortic root ≥20mm/m2 with associated risk factors or ≥25mm/m without associated risk factors	• Every 6 weeks if aorta diameter dilated >30mm	• Once during the postpartum period
	• Any individual with Turner who has severe coarctation	• At discretion of provider	• Once during the postpartum period
Marfan Syndrome	• III: Aortic root <45mm, mod-severe Aortic Insufficiency	• Every trimester if <40mm	• Once during the postpartum period
	• IV: Aortic root ≥45mm, history of dissection	• Every 6 weeks if aorta is ≥40mm	• Once during the postpartum period

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Condition	WHO Class	Imaging frequency	Postpartum (up to 42 days after birth)
Vascular Ehlers-Danlos	• Type IV	• Every 6 weeks	• Once during the postpartum period
Loeys-Dietz	• III: Aortic diameter <40mm	• Every 6 weeks	• Once during the postpartum period
	• IV: Aortic diameter ≥40mm	• Every 6 weeks	• Once during the postpartum period
Familial thoracic aortic aneurysms and dissections	• III: Aortic diameter <40mm	• Every trimester if <40mm aortic diameter	• Once during the postpartum period
	• IV: Aortic diameter ≥40mm	• Every 6 weeks if ≥40mm aortic diameter	• Once during the postpartum period

Background and Supporting Information

First-degree relative (sibling, parent, child)

Second-degree relative (aunt/uncles, grandparent, niece, nephew, cousin, or half-sibling of an individual)

Imaging in Pregnancy with Congenital Heart Disease (CHD) (CD-15.4)

CD.MI.0015.4.A
v1.0.2027

Criteria

Pre-pregnancy imaging based on the World Health Organization (WHO) chart for imaging in pregnancy with CHD

Imaging modality and indication	CPT®
Echocardiogram (TTE) when planning pregnancy	93306
TEE if TTE equivocal	93312
CMR (cardiac MRI) can be performed prior to pregnancy in those lesions where CMR would be routinely performed at some later date	75557
CTA or MRA of chest if known aortic disease, Pulmonary artery disease, anomalous pulmonary veins, anomalous systemic veins (also see peripartum aortopathy table)	71275, 71555
Echocardiogram with new signs or symptoms	93303, 93304, 93306, 93308
Postpartum imaging per provider requested frequency	imaging as noted above
Stress imaging pre/during pregnancy when known coronary artery anomaly, pulmonary hypertension, LVOT obstruction, cardiac dysfunction, single ventricle	93350, 93351, 93320, 93325
WHO II, III, IV, can have echo/MR/CT/stress imaging prior to pregnancy	imaging as noted above

- Congenital heart disease imaging in pregnancy
  - Echocardiogram (TTE) when planning pregnancy
  - TEE if TTE equivocal

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- CMR can be performed prior to planning pregnancy in those lesions where CMR would be routinely performed at some later date.
- CTA Chest or MRA Chest of arch if known disease with aortic involvement or if known dilation
- Repeat echocardiogram and MR (can be without gad) can be performed based on the WHO classification II, III, IV, or other risk factors.
- Severe complex CHD TTE (CPT® 93306)
  - Every 2-4 weeks for major physiological changes
  - As often as needed for any of the following:
    - pulmonary hypertension
    - changes in function
    - to guide delivery after 24 weeks
- Echocardiogram can be performed if there are new signs or symptoms during pregnancy.
- Postpartum first year can have more frequent imaging.
- Stress imaging pre/during pregnancy for individuals with known coronary artery anomaly, pulmonary hypertension, LVOT obstruction, cardiac dysfunction, single ventricle.
- WHO II, III, IV can have echocardiogram/MR/CT/stress imaging prior to pregnancy
- WHO I-one echocardiogram during pregnancy
- WHO II-one echocardiogram per trimester during pregnancy
- WHO II/III-echocardiogram every 2 months during pregnancy
- WHO III/IV-echocardiogram monthly during pregnancy
  - Individuals may require more (even weekly) if treatment decision, delivery is considered.

- Syndromes that allow cardiac imaging at the time of diagnosis if not previously done. This list is not exhaustive.
  - DiGeorge/velocardiofacial (22q11.2)
  - Down syndrome (trisomy 21)
  - Holt Oram (TBX5)
  - Klinefelter syndrome (47 XXY)
  - Noonan (PTPN11, KRAS, SOS1 RAF1, NRAS, BRAF, MAP2K1)
  - Turner (45X)
  - Williams (7q11.23 deletion)
  - any syndrome associated with congenital heart disease
- Echocardiogram at time of diagnosis (either genetic testing or clinical features)
- CMR or CCTA if arch involved in disease.

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Surveillance Imaging

Surveillance imaging after baseline studies

After initial imaging, TTE should be performed at regular intervals. For individuals with aortopathy, Chest MRA may be added at the same frequency. If echocardiographic imaging is known to be poor or inadequate, CMR may be used instead of TTE.

The World Health Organization modified classification of maternal cardiovascular risk

The World Health Organization established a modified classification of maternal cardiovascular risk used as a tool to evaluate risk status for pregnant individuals with various cardiovascular conditions.

Class	Risk	Sample Lesions
WHO Class I	No detectable increased risk of maternal mortality and no or mild increase in morbidity.	• Mild Pulmonary stenosis • Small PDA • Mild MVP • Successfully repaired simple lesions (ASD, VSD, PDA, anomalous pulmonary venous drainage) • Isolated PACs or PVCs
WHO Class II	Small increased risk of maternal mortality or moderate increase in morbidity.	• Un-operated ASD or VSD • Repaired TOF (uncomplicated) • Most arrhythmias
WHO Class II-III	Intermediate increased risk of maternal mortality or moderate to severe increase in morbidity.	• Mild left ventricular impairment • Hypertrophic cardiomyopathy • Native or tissue valvular heart disease not considered WHO I or IV • Aorta <45 mm in aortic disease associated with bicuspid aortic valve • Repaired coarctation

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Class	Risk	Sample Lesions
WHO Class III	Significantly increased risk of maternal mortality or severe morbidity. • Expert counseling required. • If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth, and the postpartum period.	• Mechanical valve • Systemic right ventricle • Fontan circulation • Unrepaired cyanotic heart disease • Other complex congenital heart disease
WHO Class IV	Extremely high-risk of maternal mortality or severe morbidity. • Pregnancy contraindicated. • If pregnancy occurs, termination should be discussed. • If pregnancy continues, care for as WHO class III.	• Pulmonary arterial hypertension from any cause • Severe systemic ventricular dysfunction (LVEF <30%, NYHA functional class III-IV) • Severe mitral stenosis; severe symptomatic aortic stenosis • Aortic dilation ≥50mm in aortic disease associated with bicuspid aortic valve • Native severe coarctation of the aorta

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v1.0.2027

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Cardiac Imaging in Individuals with Known or Planned Transplants

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Cardiac Imaging Guidelines

Cardiac Imaging in Transplants (CD-16)

CD.ST.0001.6.A
v1.0.2027

Criteria

Non-cardiac transplants

- Stress Testing in Individuals for Non-Cardiac Transplant
  - Imaging stress testing every year (stress echocardiogram, SPECT MPI, stress MRI, or PET MPI per the transplant center's protocol) is medically necessary prior to transplant for candidates for any type of organ, bone marrow, or stem cell transplant. See **Kidney Transplant, Pre-Transplant Imaging Studies (AB-42.5)**.
  - An imaging stress test can be repeated annually after transplant for at least 2 years or within 1 year of a prior cardiac imaging study if there is evidence of progressive vasculopathy.
  - After 2 consecutive normal imaging stress tests, repeated testing is not medically necessary more often than every other year without evidence for progressive vasculopathy or new symptoms.
  - Stress testing after 5 years may proceed according to normal patterns of consideration.

Cardiac transplant

- Pre-Cardiac Transplant evaluation
  - One of the following is considered medically necessary for candidates being evaluated for heart transplant as suggested by the transplant center protocol:
    - SPECT MPI
    - Stress MRI
    - Stress echocardiogram
    - PET MPI
  - All of the following modalities are considered medically necessary for an individual being evaluated for cardiac transplant:
    - CT Chest (CPT® 71250 or 71260) **and**
    - Abdominal imaging with: Ultrasound Abdomen (CPT® 76700 or 76705) or CT Abdomen (CPT® 74150 or 74160) and/or MRI Abdomen (CPT® 74181 or 74183) **and**
    - Right heart catheterization (CPT® 93451) or Right and left heart catheterization (CPT® 93453) or left heart catheterization (CPT® 93458)
- Post-Cardiac transplant assessment:

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- Echocardiogram, 3D echocardiogram (CPT® 93319, CPT® 76376, CPT® 76377,) and strain imaging (CPT® 93356) is considered medically necessary as needed per transplant protocol
- CTA Cardiac is considered medically necessary to evaluate for transplant vasculopathy
- **One** of the following imaging studies is considered medically necessary annually:
  - SPECT MPI (CPT® 78451, CPT® 78452)
  - Stress echocardiogram (CPT® 93350, CPT® 93351)
  - Stress MRI (CPT® 75559, CPT® 75563)
  - PET MPI (CPT® 78430, CPT® 78431, CPT® 78491, CPT® 78492)

Background and Supporting Information

Individuals who have undergone organ transplant are at increased risk for ischemic heart disease secondary to their medication. Risk of vasculopathy is 7% at 1-year, 32% at 5 years, and 53% at 10 years.

For individuals being evaluated for cardiac transplant, MRI may be performed as the initial abdominal imaging modality or for further evaluation after initial abdominal imaging with Ultrasound or CT.

Evidence Discussion

Stress testing with imaging is medically necessary to exclude the presence of significant coronary artery disease as part of evaluating candidacy for any type of organ, bone marrow, or stem cell transplant. While on the transplant waiting list, stress testing with imaging is medically necessary annually to exclude progression of coronary artery disease. Stress testing with any imaging modality (stress echo, SPECT MPI, stress MRI, or stress cardiac PET perfusion) is supported per the transplant center's protocol. Recommendations regarding stress testing with imaging for pre-transplant evaluation are provided in established evidence-based medical specialty organization guidelines.

Stress testing with imaging also has a role in surveillance following cardiac transplant to evaluate for development of obstructive coronary artery disease due to cardiac allograft vasculopathy. Stress testing with any imaging modality (stress echo, SPECT MPI, stress MRI, or stress cardiac PET perfusion) is medically necessary annually post cardiac transplant. Recommendations regarding stress testing with imaging for post cardiac transplant surveillance are provided in established evidence-based medical specialty organization guidelines.

Codes Included

- SPECT MPI (CPT® 78451, 78452)
- Stress echocardiogram (CPT® 93350, 93351)

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- Stress MRI (CPT® 75559, 75563)
- PET MPI (CPT® 78430, CPT® 78431, CPT® 78491, 78492)
- CT Chest (CPT® 71250 or 71260)
- CCTA (CPT® 75574) for transplant vasculopathy
- Ultrasound abdomen (CPT® 76700 or 76705)
- CT Abdomen (CPT® 74150 or 74160)
- MRI Abdomen (CPT® 74181 or 74183)
- Right heart catheterization (CPT® 93451)
- Right and left heart catheterization (CPT® 93453)
- Left heart catheterization (CPT® 93458)
- Echocardiogram (CPT® 93306)
- 3D echocardiogram (CPT® 93319, 76376, 76377)
- Strain imaging (CPT® 93356)

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Cardiac Sarcoidosis

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Cardiac Sarcoidosis (CD-3.9)

CD.CS.0003.9.A
v1.0.2027

Criteria

Suspected cardiac sarcoidosis

- Cardiac MRI with gadolinium (CPT® 75561) is medically necessary initial imaging for identification of suspected cardiac sarcoidosis.
- Cardiac PET (CPT® 78432 or 78433) **or** PET metabolic study (CPT® 78459 or 78429) and SPECT perfusion image (CPT® 78451) is medically necessary for suspected cardiac sarcoidosis for any of the following indications:
  - initial imaging when there is a contraindication to MRI imaging (non MRI-safe pacemaker, renal failure)
  - initial Cardiac MRI is equivocal or additional information is needed based on results from the MRI
  - to confirm diagnosis if suggested by MRI
  - initial imaging to evaluate for suspected cardiac sarcoidosis when there is documented sarcoidosis outside of the heart

Monitoring of treatment of established cardiac sarcoidosis

- PET-Cardiac PET metabolic is medically necessary to monitor therapy in cardiac sarcoidosis. Requires PET with F-18 FDG metabolic study combined with a PET perfusion study (CPT® 78432 or 78433) OR PET metabolic study (CPT® 78459 or 78429) and SPECT perfusion image (CPT® 78451).
  - prior to treatment of cardiac sarcoidosis
  - PET (heart FDG metabolic with perfusion study as above) can be repeated at 3-6 month intervals if there is active disease or to make therapeutic decisions.

Evidence Discussion

- Cardiac imaging is reasonable to detect cardiac sarcoidosis in the following:
  - any individual with extra cardiac sarcoidosis even if no cardiac symptoms
  - echo with basal thinning of the intraventricular septum, depressed LVEF <50 or regional wall motion abnormality not associated with CAD
  - young individuals with unexplained ventricular tachycardia, especially monomorphic VT

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  - individuals with unexplained cardiomyopathy or heart failure (i.e., CAD has been ruled out)
  - individuals with unexplained arrhythmia especially advanced AV block or VT
- Initial imaging should be cardiac MRI with late gadolinium enhancement (LGE) protocol unless there is a contraindication to MRI imaging (non MRI-safe pacemaker, renal failure). Absence of LGE is a strong negative predictor for low rates of cardiac morbidity and mortality from cardiac sarcoidosis and further testing is not usually medically necessary.
- PET – Metabolic imaging with F-18 FDG for diagnosis if there is a contraindication to MRI and cardiac sarcoidosis is suspected. This requires PET with F-18 FDG metabolic study combined with a PET perfusion study.
- Full body PET/CT (CPT® 78815) is not medically necessary for the diagnosis or monitoring response to therapy of cardiac sarcoidosis. It may be considered to assist in diagnosis and/or treatment options in some instances of pulmonary sarcoidosis. See **Sarcoid (CH-15.1)** in the Chest Imaging Guidelines.

Coding

Codes	Description
75561	Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences;
78429	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan
78432	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);
78433	Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan
78451	Myocardial perfusion imaging, tomographic (spect) including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)

Codes	Description
78459	Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study;

Cardiac Imaging Guidelines

References (CD-3.9)

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