2026
Evolent Clinical Guidelines for Medical Necessity Review

Diagnostic Cardiology

Effective January 1, 202 – December 31, 202

Guidelines for Clinical Review Determination

Preamble

Evolent is committed to the philosophy of supporting safe and effective treatment for patients. The medical necessity criteria that follow are guidelines for the provision of diagnostic imaging. These criteria are designed to guide both providers and reviewers to the most appropriate diagnostic tests based on a patient's unique circumstances. In all cases, clinical judgment consistent with the standards of good medical practice will be used when applying the guidelines. Determinations are made based on both the guideline and clinical information provided at the time of the request. It is expected that medical necessity decisions may change as new evidence-based information is provided or based on unique aspects of the patient's condition. The treating clinician has final authority and responsibility for treatment decisions regarding the care of the patient.

Guideline Development Process

These medical necessity criteria were developed by Evolent for the purpose of making clinical review determinations for requests for therapies and diagnostic procedures. The developers of the criteria sets included representatives from the disciplines of radiology, internal medicine, nursing, cardiology, and other specialty groups. Evolent's guidelines are reviewed yearly and modified when necessary following a literature search of pertinent and established clinical guidelines and accepted diagnostic imaging practices.

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Diagnostic Cardiology Clinical Guidelines

Evolent Clinical Guideline 7275 for Coronary Artery Computed Tomography Angiography (CCTA)

Guideline Number: Evolent_CG_7275	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

Indications for determining medical necessity for Coronary and/or Cardiac Computed Tomographic Angiography (CCTA). Patients should be on maximally tolerated guideline directed medical therapy (GDMT), when applicable.

Special Note

See legislative language for specific mandates in **Washington** State.

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [1–5]

INDICATIONS FOR CORONARY COMPUTED TOMOGRAPHIC ANGIOGRAPHY (CCTA) [6–9]

Evaluation in Suspected Coronary Artery Disease (CAD) [10–14]

Probability

- Low pretest probability patients should be considered for exercise treadmill test (ETT) unless other criteria for CCTA are met [15]
- Intermediate and high pretest probability patients [16]
- Exercise ECG stress test with intermediate Duke Treadmill (- 10 to + 4)

Asymptomatic Patients

- Asymptomatic patients without known CAD:
  - Previously unevaluated ECG evidence of possible myocardial ischemia including ischemic ST segment or T wave abnormalities (see Uninterpretable baseline ECG section)
  - Previously unevaluated pathologic Q waves (see Uninterpretable baseline ECG section)
  - Previously unevaluated left bundle branch block

Symptomatic Patients

- Intermediate and high pretest probability patients [16]
- Low pretest probability patients should be considered for exercise treadmill test (ETT) unless other criteria for CCTA are met [15]
- Exercise ECG stress test with intermediate Duke Treadmill (- 10 to + 4)
- CCTA is being performed to avoid performing cardiac catheterization in patients with chest pain syndrome with intermediate pretest probability of CAD, uninterpretable ECG and are not able to exercise with no prior CCTA done within the last 12 months who have [15,16]:
  - Equivocal, borderline, or discordant stress evaluation with continued symptoms concerning for CAD **(AUC 8)** [8]
  - Repeat testing in patient with new or worsening symptoms since prior normal stress imaging **(AUC 7)** [8]
  - Chest pain of uncertain etiology, when non-invasive tests are negative, but symptoms are typical and management requires that significant coronary artery disease be excluded **(AUC 7)** [8]

Unevaluated Acute Coronary Syndrome (ACS)

- Prior acute coronary syndrome (with documentation in MD notes), without invasive or

non-invasive coronary evaluation within last 12 months

- Ventricular wall motion abnormality demonstrated by another imaging modality and CCTA is being performed to determine if the patient has occlusive coronary artery disease. No imaging stress test within the last 12 months

Heart Failure

- Newly diagnosed clinical systolic heart failure or diastolic heart failure, with reasonable suspicion of cardiac ischemia unless invasive coronary angiography is planned (SE diversion not required) [17,18] **(AUC 7)** [8]

Heart Valve

- Before valve surgery or transcatheter intervention as an alternative to coronary angiography [19–21]
- To establish the etiology of mitral regurgitation [21]
- Pre-TAVR (transaortic valve replacement) evaluation as an alternative to coronary angiography [22,23]

Arrhythmias

- Ventricular arrhythmias
    - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not immediately planned [18]
- Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, or frequent PVCs (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed [20]

Prior To Elective Non-Cardiac Surgery In Asymptomatic Patients

- An intermediate or high risk surgery with of one or more risk factors (see below), AND documentation of an inability to walk (or < 4 METs) AND there has not been an imaging stress test within 1 year [24–26]
    - Risk factors: history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine > 2.0 mg/dL
        - Surgical Risk:
            - High risk surgery: Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
            - Intermediate risk surgery: Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery
            - Low risk surgery: Endoscopic procedures, superficial procedure, cataract

surgery, breast surgery

- Planning for any organ or stem cell transplantation is an indication for preoperative MPI, if there has not been a conclusive stress evaluation, CTA, or heart catheterization within the past year, at the discretion of the transplant service [8,27]

Post Cardiac Transplant (SE Diversion Not Required)

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography

Heart Anomaly or Aneurysm

- Evaluation of coronary anomaly or aneurysm [24,25,28–30]
  - Evaluation prior to planned repair
  - Evaluation due to change in clinical status and/or new concerning signs or symptoms
  - Kawasaki disease and MIS-C follow up – for medium sized or greater aneurysms [26] periodic surveillance can be considered every 2-5 years. Once aneurysmal size has reduced to small aneurysms, surveillance can be performed every 3-5 years. No further surveillance once normalized.
- Evaluation of suspected pulmonary embolism

NOTE: CMR is favored in younger patients for coronary anomaly evaluation [27,28]

PCI or CABG

- Prior PCI or CABG history
  - Symptomatic patient with prior PCI or CABG history, with angina interfering in performing daily activities, despite being on guideline directed medical therapy, and with an equivocal stress test results. No prior CCTA done within the last 12 months **(AUC 7)** [8]
- Evaluation of coronary artery bypass grafts, to assess [8,31]:
  - Patency and location when invasive coronary arteriography was either nondiagnostic or not performed/planned **(AUC 7)** [8]
  - Location of grafts prior to cardiac or another chest surgery **(AUC 7)** [8]

Limited Prior or Replacement Imaging

- CCTA may be performed in patients who cannot tolerate moderate sedation that is required during transesophageal echo (TEE), for pre procedural evaluation for Left Atrial (LA) Appendage (LAA) Occlusion to look for LA/LAA thrombus, spontaneous contrast, LAA morphology and dimensions. *TEE however remains the preferred choice of modality for this procedure.*

Electrophysiologic Procedure Planning

- Evaluation of anatomy (pulmonary vein isolation planning) prior to radiofrequency ablation

LEGISLATIVE LANGUAGE

Washington

20211105A - Noninvasive Cardiac Imaging for Coronary Artery Disease [(32)]

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
  - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
  - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:
  - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
  - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
  - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or
  - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
  - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

Electrophysiologic Procedure Planning

- Evaluation of anatomy (pulmonary vein isolation planning) prior to radiofrequency ablation

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  - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

CODING AND STANDARDS

Codes

75574

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

A coronary computerized tomography angiogram (CCTA) is a noninvasive imaging study that uses intravenously administered contrast material and high-resolution, rapid imaging computed tomography (CT) [33,34]

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [2]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score – 4-6
- Rarely Appropriate Care - Median Score 1-3

Reduction in CCTA test quality

- The following can reduce the quality of the test in patients with [8]:
  - Morbid obesity
  - High or irregular heart rates
  - Severe coronary calcification

Patient Selection Criteria

- Patient selection for CCTA must be considered and may be inappropriate for the following:
  - Known history of severe and/or anaphylactic contrast reaction
  - Inability to cooperate with scan acquisition and/or breath-hold instructions
  - Pregnancy
  - Clinical instability (e.g., acute myocardial infarction, decompensated heart failure, severe hypotension)
  - Renal Impairment as defined by local protocols
  - Image quality depends on keeping HR optimally < 60 bpm (after beta blockers), a regular rhythm, stents > 3.0 mm in diameter, and vessels requiring imaging ≥ 1.5 mm diameter [35]

Definitions

- Stable patients without known CAD fall into 2 categories [6–8]:
  - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section)
  - **Symptomatic,** for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD
- Three Types of Chest Pain or Discomfort:
  - **Typical Angina (Definite)** is defined as including ALL **3** characteristics:
    - Substernal chest pain or discomfort with characteristic quality and duration
    - Provoked by exertion or emotional stress
    - Relieved by rest and/or nitroglycerin
  - **Atypical Angina (Probable)** has only **2** of the above characteristics
  - **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics
- The medical record should provide enough detail to establish the type of chest pain. From those details, the pretest probability of significant CAD is estimated from the Diamond Forrester Table below, recognizing that additional coronary risk factors could increase pretest probability [8]:

Diamond Forrester Table [36,37]

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40 – 49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50 – 59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very Low: < 5% pretest probability of CAD

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CAD

- An uninterpretable baseline ECG includes [6]:
  - ST segment depression is considered significant when there is 1 mm or more, not for non-specific ST - T wave changes
  - Ischemic-looking T waves are considered significant when there are at least 2.5 mm inversions (excluding V1 and V2)
  - Left ventricular hypertrophy (LVH) with repolarization abnormalities, Wolff-Parkinson-White (WPW) syndrome, a ventricular paced rhythm, or left bundle branch block
  - Digitalis use with associated ST - T abnormalities
  - Resting HR under 50 bpm on a beta blocker and an anticipated suboptimal workload
  - Note: Right bundle branch block (RBBB) with less than 1 mm ST depression at rest may be suitable for ECG treadmill testing
- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
  - > 40 ms (1 mm) wide
  - > 2 mm deep
  - > 25% of depth of QRS complex

- ECG Stress Test Alone versus Stress Testing with Imaging
  - Prominent scenarios suitable for an ECG stress test **WITHOUT** imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3 minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise [8]:
    - The (symptomatic) low pretest probability patient who can exercise and has an interpretable ECG [8]
    - The patient who is under evaluation for exercise-induced arrhythmia
    - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
    - For the evaluation of syncope or presyncope during exertion [38]
- Duke Exercise ECG Treadmill Score [39]
  - Calculates risk from ECG treadmill alone**:**
    - Duke treadmill score (DTS) equation is: DTS = exercise time in minutes - (5 x ST deviation in mm or 0.1 mV increments) - (4 x exercise angina score), with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
    - The score ranges from - 25 to + 15 with values corresponding to low-risk (score of ≥ + 5), intermediate risk (scores ranging from - 10 to + 4), and high-risk (score of ≤ - 11) categories
- Scenarios that can additionally support a CCTA over a regular exercise treadmill test in the low probability scenario [40]
  - Inability to Exercise
    - Physical limitations precluding ability to exercise for at least 3 full minutes of Bruce protocol
    - The patient has limited functional capacity (< 4 METS) such as **ONE** of the following:
      - Unable to take care of their activities of daily living (ADLs) or ambulate
      - Unable to walk 2 blocks on level ground
      - Unable to climb 1 flight of stairs
      - Unable to vacuum, dust, do dishes, sweep, or carry a small grocery bag
  - Other Comorbidities
    - Prior cardiac surgery (coronary artery bypass graft or valvular)
    - Left ventricular ejection fraction ≤ 50%
    - Severe chronic obstructive pulmonary disease (COPD) with pulmonary function test (PFT) documentation, severe shortness of breath on minimal exertion, or requirement of home oxygen during the day
    - Poorly controlled hypertension, with systolic blood pressure (BP) > 180 or Diastolic BP > 120

- ECG and Echo-Related Baseline Findings
  - Pacemaker or implantable cardioverter defibrillator (ICD)
  - Resting wall motion abnormalities on echocardiography
  - Complete LBBB
- Risk-Related scenarios
  - Intermediate or high global risk in patients requiring type IC antiarrhythmic drugs
  - Arrhythmia risk with exercise

- Global Risk of Cardiovascular Disease
  - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years.
    - **CAD Risk—Low**
      - 10-year absolute coronary or cardiovascular risk less than 10%
    - **CAD Risk—Moderate**
      - 10-year absolute coronary or cardiovascular risk between 10% and 20%
    - **CAD Risk—High**
      - 10-year absolute coronary or cardiovascular risk of greater than 20%

Websites for Global Cardiovascular Risk Calculators* (41–45)

Risk Calculator	**Websites for Online Calculator**
Framingham Cardiovascular Risk	**https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk**
Reynolds Risk Score Can use if no diabetes Unique for use of family history	**http://www.reynoldsriskscore.org/**
Pooled Cohort Equation	**http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example**
ACC/AHA Risk Calculator	**http://tools.acc.org/ASCVD-Risk-Estimator/**
MESA Risk Calculator	**https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx**

Risk Calculator	Websites for Online Calculator
With addition of Coronary Artery Calcium Score, for CAD-only risk	

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

- **Definitions of Coronary Artery Disease** [6,7,46–48]
  - Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).
    - Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. It is not a diagnostic tool so much as it is a **risk stratification** tool. Its incorporation into global risk can be achieved by using the MESA risk calculator.
    - Stenoses ≥ 70% are considered obstructive coronary artery disease (also referred to as clinically significant), while stenoses ≤ 70% are considered non-obstructive coronary artery disease [46]
    - Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:
      - Suggested by percentage diameter stenosis ≥ 70% by angiography; intermediate lesions are 50 – 69% [8]
      - For a left main artery, suggested by a percentage stenosis ≥ 50% or minimum luminal cross-sectional area on IVUS ≤ 6 square mm [6,47,48]
      - FFR (fractional flow reserve) ≤ 0.80 for a major vessel [47,48]
      - iFR (instantaneous wave-free ratio) ≤ 0.89 for a major vessel [48–51]
      - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree
    - A major vessel would be a coronary vessel that would be amenable to revascularization, if indicated. This assessment is made based on the diameter of the vessel and/or the extent of myocardial territory served by the vessel.
    - FFR is the distal to proximal pressure ratio across a coronary lesion during maximal hyperemia induced by either intravenous or intracoronary adenosine. Less than or equal to 0.80 is considered a significant reduction in coronary flow.
    - Newer technology that estimates FFR from CCTA images is covered under the Evolent Clinical Guideline 062-1 for Fractional Flow Reserve CT.
- Anginal Equivalent [6,38,52]
  - Development of an anginal equivalent (e.g., shortness of breath, fatigue, or

weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia), by presentation of clinical data such as respiratory rate, oximetry, lung exam, etc. (as well as D-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Syncope, per se, is not an anginal equivalent.

Acronyms/Abbreviations

ACS: Acute coronary syndrome

ADLs: Activities of daily living

CABG: Coronary artery bypass grafting surgery

CAD: Coronary artery disease

CCS: Coronary calcium score

CCTA: Coronary computed tomography angiography

CT(A): Computed tomography (angiography)

COPD: Chronic obstructive pulmonary disease

DTS: Duke Treadmill Score

ECG: Electrocardiogram

EF: Ejection fraction

FFR: Fractional flow reserve

ICD: Implantable cardioverter-defibrillator

iFR: Instantaneous wave-free ratio or instant flow reserve

IVUS: Intravascular ultrasound

LBBB: Left bundle branch block

LVH: Left ventricular hypertrophy

MESA: Multi-Ethnic Study of Atherosclerosis

METS: Metabolic equivalents

MI: Myocardial infarction

MPI: Myocardial perfusion imaging

PCI: Percutaneous coronary intervention

PFT: Pulmonary function test

RBBB: Right bundle branch block

SE: Stress echocardiography

TTE: Transthoracic echocardiography

WPW: Wolff-Parkinson-White syndrome

SUMMARY OF EVIDENCE

ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease [8]

Study Design: The study is a report by the American College of Cardiology (ACC) Solution Set Oversight Committee, in collaboration with several other cardiovascular societies. It updates the prior AUC for various cardiovascular imaging modalities, including radionuclide imaging, stress echocardiography, calcium scoring, coronary computed tomography angiography (CCTA), stress cardiac magnetic resonance (CMR), and invasive coronary angiography.

Target Population: The target population includes patients with known or suspected CCD, which encompasses stable ischemic heart disease (SIHD). The clinical scenarios cover both symptomatic and asymptomatic patients, with and without prior testing or revascularization.

Key Factors:

Clinical Scenarios: The document outlines 64 clinical scenarios for the detection and risk assessment of CCD, drawn from common applications and current clinical practice guidelines.

Rating Process: The clinical scenarios were rated by an independent panel using a modified Delphi process. Ratings were categorized as Appropriate (7-9), May Be Appropriate (4-6), or Rarely Appropriate (1-3).

Updates and Changes: Key changes include the removal of preoperative testing scenarios, simplification of clinical scenario tables, and incorporation of new evidence and guidelines.

Assumptions: The study assumes that each test is performed and interpreted by trained professionals, and that patients are receiving optimal standard care.

Advantages and Limitations: The document provides a table outlining the advantages and limitations of various imaging modalities, such as echocardiography, SPECT, PET, CMR, CCTA, and invasive angiography.

2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease [6]

Study Design: The guideline is based on a comprehensive literature search conducted from September 2021 to May 2022. The search included clinical studies, systematic reviews, meta-analyses, and other evidence conducted on human participants. The databases used for the search included MEDLINE (through PubMed), EMBASE, the Cochrane Library, and the Agency for Healthcare Research and Quality. The guideline was developed by the American Heart Association (AHA) and the American College of Cardiology (ACC) Joint Committee on Clinical Practice Guidelines, in collaboration with and endorsed by several other professional organizations.

Target Population: The guideline is intended for clinicians in primary care and cardiology specialties who care for patients with CCD in the outpatient setting. The target population includes patients with chronic coronary disease, which encompasses a heterogeneous group of conditions such as obstructive and nonobstructive coronary artery disease (CAD) with or without previous myocardial infarction (MI) or revascularization, ischemic heart disease diagnosed only by noninvasive testing, and chronic angina syndromes with varying underlying causes.

Key Factors:

Epidemiology and General Principles: The guideline addresses the prevalence of CCD, which varies by age, sex, race, ethnicity, and geographic region. It also highlights the role of social determinants of health in both risk and outcomes from CCD.

Evaluation, Diagnosis, and Risk Stratification: The guideline recommends the use of stress testing, invasive coronary angiography, and other diagnostic tools to assess the presence and extent of myocardial ischemia and guide therapeutic decision-making.

Treatment: The guideline emphasizes a patient-centered approach to treatment, incorporating shared decision-making, social determinants of health, and team-based care. It includes recommendations for lifestyle modifications, pharmacologic therapies, and revascularization.

Special Populations: The guideline provides specific recommendations for managing CCD in special populations, including patients with heart failure, valvular heart disease, young adults, cancer, women (including pregnancy and postmenopausal hormone therapy), older adults, chronic kidney disease, HIV, autoimmune disorders, and heart transplant recipients.

Patient Follow-Up: The guideline recommends regular follow-up to assess symptoms, functional status, adherence to lifestyle and medical interventions, and monitoring for complications of CCD and its treatments.

Cost and Value Considerations: The guideline includes recommendations for discussing out-of-pocket costs with patients to preempt cost-related nonadherence and ensure access to effective therapies.

Society for Cardiovascular Magnetic Resonance perspective on the ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 multi-modality appropriate use criteria for the detection and risk assessment of chronic coronary disease [9]

Study Design: The study design involves a review and discussion of the recommendations in the 2023 AUC, which updates the 2013 AUC for the management of stable ischemic heart disease (SIHD).

Target Population: The target population includes symptomatic and asymptomatic patients with a spectrum of scenarios in each of the two categories. The document aims to complement clinical practice guidelines and aid clinicians in decision-making for common clinical scenarios in CCD and implement best practices in patient care.

Key Factors:

The diagnostic accuracy, cost-effectiveness, and predictive value of stress perfusion cardiovascular magnetic resonance (CMR) in patients with CCD.

The comparison of stress CMR with other imaging modalities such as nuclear imaging, stress echocardiography, and coronary computed tomography angiography (CCTA).

The advantages and limitations of CMR, including its ability to assess wall motion, ischemia, and infarction in one study, and its higher spatial resolution for smaller-sized hearts.

The importance of clinician judgment, test advantages and disadvantages, and local expertise in choosing the appropriate test for an individual patient.

The inclusion of new categories such as "No Test" for low-risk patients and the emphasis on patient-specific and local factors in decision-making.

ANALYSIS OF EVIDENCE

Shared Conclusions [6,8,9]

1. **Chronic Coronary Disease (CCD) Management**: All three articles emphasize the importance of managing CCD through a combination of lifestyle changes, pharmacologic therapies, and diagnostic testing. They highlight the need for a patient-centered approach that considers individual risk factors, symptoms, and preferences.
2. **Diagnostic Testing**: The articles agree on the use of various diagnostic modalities such as stress echocardiography, myocardial perfusion imaging (MPI), cardiovascular magnetic resonance (CMR), and coronary computed tomography angiography (CCTA) for the detection and risk assessment of CCD. They emphasize the importance of selecting the appropriate test based on the patient's clinical scenario and the availability of local expertise and equipment.
3. **Appropriate Use Criteria (AUC)**: Both the Bandettini et al. and Winchester et al. articles discuss the AUC for multimodality imaging in CCD. They provide detailed guidelines on when specific tests are appropriate, may be appropriate, or rarely appropriate based on different clinical scenarios.

POLICY HISTORY

Date	Summary
July 2025	• This guideline merges two Evolent guidelines with identical clinical criteria: ECG 7275-01 for Coronary CT Angiography and ECG 062 for Coronary CT Angiography into Evolent Clinical Guideline 7275 for Coronary Artery Computed Tomography Angiography (CCTA) ○ This guideline also merges Procedure Codes from these two Evolent guidelines

Date	Summary
	● Added new bullet-point to the General Statement section ● Added indications for Unevaluated Acute Coronary Syndrome, Arrhythmias, Prior To Elective Non-Cardiac Surgery In Asymptomatic Patients, and Post Cardiac Transplant ● Added a Summary of Evidence and Analysis of Evidence ● Updated references

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7293 for Fractional Flow Reserve Computed Tomography (CT)

Guideline Number: Evolent_CG_7293	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

Fractional flow reserve computed tomography (FFR_{CT}) is a technology that estimates the effect of coronary arterial narrowing on blood flow based upon the images acquired in the coronary computerized tomographic angiography (CCTA) study. Its role is to provide information that can more appropriately select patients requiring invasive coronary angiography. [1]

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

In instances where an AUC has not been established through prior publication, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [2–6]

INDICATIONS FOR FRACTIONAL FLOW RESERVE CT

- Intermediate degrees of stenosis (40 - 90%) on CCTA to guide decision making and help identify those patients who would benefit from revascularization [1,7–9]
- Intermediate lesions in the above range and coronary calcification have made percentage stenosis interpretation difficult, thus could support approval of FFR_{CT}, in conjunction with the above criteria [10,11]

Additional Information

The following clinical scenarios below do not apply for the use of FFR_{CT} [10]:

- Problematic artifacts, and/or clinical circumstances:
  - When patients have artifacts (heavy calcium) or body habitus (BMI > 35) that could interfere with the examination, the suitability for FFR_{CT} is at the discretion of the vendor who provides the FFR_{CT} service
  - Known ischemic coronary artery disease that has not been revascularized and there has been no change in patient status or in the CCTA images
- Recent myocardial infarction within 30 days [12]
- Prior coronary artery bypass graft surgery
- Complex congenital heart disease or ventricular septal defect (VSD) with pulmonary-to-systemic flow ratio > 1.4
- Metallic stents ≤ 3.0 mm in diameter in the coronary system
- Coronary lesions with a vessel diameter < 1.8 mm [13,14]
- Severe wall motion abnormality on CCTA results
- Severe myocardial hypertrophy
- High risk indicators on stress test [14]
- Coronary angiography within the past 90 days [14]
- Marginal quality of the submitted imaging data, due to motion, blooming, misalignment, arrhythmia, etc.

CODING AND STANDARDS

Codes

75580

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

General Overview

Fractional flow reserve (FFR) is used to determine the functional significance of a coronary stenosis in angiographically “intermediate” or “indeterminant” lesions which allows the operator to decide when percutaneous coronary intervention (PCI) may be beneficial or safely deferred. [16] During coronary catheterization, a catheter is inserted into the femoral (groin) or radial arteries (wrist) using a sheath and guidewire. FFR uses a small sensor (transducer) on the tip of the wire to measure pressure, temperature, and flow in order to determine the exact severity of the lesion during maximal blood flow (hyperemia). Hyperemia is induced by injecting products such as adenosine or papaverine. A pullback of the pressure wire is performed, and pressures are recorded across the vessel.

FFR is then calculated as the ratio of distal coronary pressure to aortic pressure measured during maximal hyperemia. A normal value for FFR is 1.0. FFR ≤ 0.80 in an angiographically intermediate lesion (50-70% stenosis) is considered to be a significant coronary lesion (>70% stenosis). [15]

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [2]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

The Development of FFR-CT as a Technology [16,17]

Fractional Flow Reserve (FFR) is the ratio of baseline coronary flow to coronary flow during maximal hyperemia. Its use in the cardiac catheterization laboratory has successfully demonstrated utility in the quantitation of intracoronary flow dynamics secondary to lesional and microvasculature conditions. This technology has proven helpful in evaluating individual patients, with respect to prognostication of coronary artery disease and decisions regarding the appropriateness of coronary revascularization.

Definitions

- CCTA has shown utility in the evaluation of patients with stable chest pain, typically intermediate pretest probability, warranting non-invasive evaluation, [14,18,19] as well as in low-risk emergency department scenarios. [20]
- Fractional flow reserve using CCTA seeks to provide an estimation of FFR by non-invasive methodology. Following assessment of quality CCTA images, in the appropriate subsets of patients with coronary stenoses, the technology makes mathematical assumptions to simulate maximal hyperemia and calculates an estimation of FFR (fractional flow reserve) for those coronary vessels with lesions, based upon the

principles of fluid mechanics inherent to the Navier-Stokes Theorem. [15,21]

- Quantitative estimation of coronary lesional hemodynamic severity using FFR_{CT} might enable deferral of invasive coronary arteriography when values are above 0.80, since such lesions would not warrant revascularization. [10]
- FFR_{CT} measurements appear reproducible, [22] with initial data demonstrating a strong correlation to invasive FFR, resulting in a high diagnostic performance. [23] Invasive FFR has excellent reproducibility [24] and a demonstrated track record of favorable outcomes when used in the selection of patients and vessels requiring PCI. [25–27] Evidence suggests that FFR_{CT} might be a better predictor of revascularization or adverse events than severe stenosis alone on CCTA [28] and that a negative FFR_{CT} in the evaluation of chest pain results in lower revascularization rates and lower cardiovascular death and MI at 1 year follow-up. [29]
- The FFR_{CT} data to date provides no evidence showing that revascularization based upon FFR_{CT} improves clinical outcomes over invasive angiographic assessment.
- Current revascularization guidelines do not advocate FFR_{CT} as a surrogate for invasive FFR, although, those guidelines refer to FFR_{CT} as an “emerging technology”. [30]

Acronyms / Abbreviations

BMI: Body Mass Index

CCTA: Coronary Computerized Tomographic Angiography

FFR: Fractional Flow Reserve

FFR_{CT}: Fractional Flow Reserve derived noninvasively from CCTA

ICA: Invasive Coronary Arteriography

MI: Myocardial Infarction

NPV: Negative Predictive Value

PCI: Percutaneous Coronary Intervention

VSD: Ventricular Septal Defect

SUMMARY OF EVIDENCE

2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines [1]

Study Design: The guideline is based on a comprehensive literature review conducted from November 11, 2017, to May 1, 2020, encompassing randomized and nonrandomized trials, observational studies, registries, reviews, and other evidence conducted on human subjects. Additional relevant studies published through April 2021 were also considered.

Target Population: The guideline focuses on adult patients presenting with chest pain in various clinical settings, including emergency departments and outpatient clinics. It aims to

provide recommendations and algorithms for clinicians to assess and diagnose chest pain in these patients.

Key Factors:

Initial Evaluation: The guideline emphasizes the importance of a focused history, physical examination, and diagnostic testing, including electrocardiograms (ECGs), chest radiography, and biomarkers such as cardiac troponins.

Risk Stratification: Patients are categorized into low-, intermediate-, and high-risk strata to facilitate disposition and subsequent diagnostic evaluation.

Diagnostic Testing: Various noninvasive and invasive diagnostic tests are recommended, including coronary computed tomography angiography (CCTA), invasive coronary angiography (ICA), exercise ECG, stress echocardiography, stress nuclear myocardial perfusion imaging (MPI), and cardiovascular magnetic resonance imaging (CMR).

Special Considerations: The guideline addresses unique considerations for women, older patients, diverse racial and ethnic backgrounds, and patients with specific conditions such as prior coronary artery bypass graft (CABG) surgery, dialysis, and substance use.

Shared Decision-Making: Emphasis is placed on shared decision-making between clinicians and patients, using decision aids to improve understanding and facilitate risk communication.

FFRCT: Current Status [10]

Study Design: The article reviews the current body of evidence on FFR CT through discussion of existing trials on the modality and provides case examples illustrating its current uses, limitations, and potential future applications.

Target Population: The review focuses on patients with coronary artery disease (CAD) and evaluates the physiologic significance of coronary artery stenosis using FFR CT.

Key Factors:

Conventional Fractional Flow Reserve: The article discusses the traditional invasive coronary angiography (ICA) method for evaluating lesion severity and its limitations.

Noninvasive Evaluation: Various noninvasive methods for evaluating coronary ischemia are reviewed, including stress echocardiography, myocardial perfusion imaging (MPI), stress cardiac MRI, and coronary CT angiography (CTA).

FFR CT Technique: The article explains the computational fluid dynamics method used to derive FFR CT from coronary CTA data and its advantages over traditional methods.

Evidence from Trials: Several large-scale multicenter trials are summarized, including DISCOVER-FLOW, DeFACTO, NXT, PACIFIC, ReASSESS, and others, highlighting the improved diagnostic accuracy and discrimination of FFR CT compared with coronary CTA alone.

Cost-Effectiveness: The article discusses studies investigating the cost-effectiveness of FFR CT and its impact on medical decision-making.

Limitations and Future Directions: Technical and logistical limitations of FFR CT are addressed, along with potential future advancements to improve its accessibility and use.

Clinical outcomes of fractional flow reserve by computed tomographic angiography-guided diagnostic strategies vs. usual care in patients with suspected coronary artery disease: the prospective longitudinal trial of FFR _{CT} : outcome and resource impacts study [14]

Study Design: The study, known as the PLATFORM trial, is a prospective, consecutive cohort study utilizing a comparative effectiveness observational design. It was conducted at 11 European sites and Duke Clinical Research Institute (DCRI) with fidelity to the protocol. The study enrolled 584 patients with new onset chest pain and compared usual testing (n=287) with CTA/FFRCT testing (n=297).

Target Population: The study focused on symptomatic outpatients aged 18 years or older without known CAD but with an intermediate likelihood of obstructive CAD. These patients had planned non-emergent, non-invasive, or invasive cardiovascular testing to evaluate suspected CAD.

Key Factors:

Primary Endpoint: The primary endpoint was the percentage of patients with planned invasive coronary angiography (ICA) who had no significant obstructive CAD within 90 days.

Secondary Endpoints: These included death, myocardial infarction, and unplanned revascularization, which were independently and blindly adjudicated.

Diagnostic Strategies: The study compared usual care testing with CTA/FFRCT-guided diagnostic strategies. In the CTA/FFRCT cohort, all subjects underwent CTA instead of the planned non-invasive or invasive evaluation.

Clinical Event Rates: Clinical event rates within 90 days were low in both the usual care and CTA/FFRCT arms.

Radiation Exposure: Cumulative radiation exposure within 90 days was similar between the usual care cohort and the CTA/FFRCT cohort.

Revascularization Rates: There were no differences in rates of revascularization between the CTA/FFRCT and usual care arms.

ANALYSIS OF EVIDENCE

Shared Conclusions:

1. **Fractional Flow Reserve (FFR) and Computed Tomographic Angiography (CTA)**: All three articles discuss the use of FFR derived from CTA (FFR-CT) as a non-invasive method to evaluate coronary artery disease (CAD). They highlight its importance in providing both anatomic and physiologic evaluation of coronary stenosis. **Douglas et al 2015** and **Chen et al 2021** emphasize the improved diagnostic accuracy of FFR-CT compared to traditional

methods like invasive coronary angiography (ICA) and stress testing. [10,14] **Gulati et al 2021** also mentions the role of FFR-CT in the evaluation and diagnosis of chest pain, [1] aligning with the findings of the other two articles.

2. **Diagnostic Accuracy and Specificity**: All three articles agree that FFR-CT improves diagnostic accuracy and specificity in detecting ischemia-causing coronary stenoses compared to traditional methods. **Douglas et al 2015** reports a significant reduction in the rate of invasive angiography showing no obstructive CAD when using FFR-CT. [14] **Chen et al 2021** highlights the improved specificity of FFR-CT in reducing unnecessary ICA. [10] **Gulati et al 2021** supports the use of FFR-CT for accurate diagnosis and management of chest pain. [1]

POLICY HISTORY

Date	Summary
July 2025	• Edited Original Date and Last Revised Date in the Title Table to reconcile the merging of guidelines in April 2025
June 2025	• Added a Summary of Evidence and Analysis of Evidence
April 2025	• This guideline merges and replaces two Evolent guidelines with identical clinical criteria: ECG 7293-01 for Fractional Flow Reserve CT and ECG 062-1 for Fractional Flow Reserve CT into Evolent Clinical Guideline 7293 for Fractional Flow Reserve Computed Tomography (CT) • New bullet-point added in the Statement/General Information section regarding guideline criteria • References updated

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of

their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7294 for Heart Positron Emission Tomography (PET) Scan

Guideline Number: Evolent_CG_7294	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Special Note

Indications for determining medical necessity for myocardial perfusion imaging (MPI) with appropriate preference for suitable alternatives, such as stress echocardiography (SE), when more suitable, unless otherwise stated (see **Definitions** section).

Indicated when all the criteria for MPI are met **AND** there is likely to be equivocal imaging results because of body mass index (BMI), large breasts or implants, mastectomy, chest wall deformity, pleural or pericardial effusion, or prior thoracic surgery or results of a prior MPI. [1,2] (**AUC Score 7**) [3]

See Legislative Language for specific mandates in **Washington**.

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [4–8]

INDICATIONS FOR HEART PET [9]

Suspected Coronary Artery Disease (CAD) [10–12]

When neither SE nor MPI have provided or are expected to provide optimal imaging

- **Symptomatic patients without known CAD** (use **Diamond Forrester Table** [13,14] [13,14]) (**AUC Score 9**) [3]
  - Intermediate pretest probability and unable to exercise
  - High pretest probability
  - Repeat testing in a patient with new or worsening symptoms and negative result at least one year ago **AND** meets one of the criteria above
- **Asymptomatic patients without known CAD**
  - Previously unevaluated ECG evidence of possible myocardial ischemia including substantial ischemic ST segment or T wave abnormalities (see **Background** section) [12]
  - Previously unevaluated pathologic Q waves (**AUC Score 6**) [3] (see **Background** section)
  - Unevaluated complete left bundle branch block (**AUC Score 8**) [3]

Abnormal Calcium Scores (CAC) [3,10]

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- STABLE SYMPTOMS with a prior Coronary Calcium Agatston Score of >100. No prior MPI done within the last 12 months (**AUC Score 7**) [10]
- ASYMPTOMATIC high global CAD risk patient with a prior Coronary Calcium Agatston Score of >100. No prior MPI done within the last 12 months [15]
- ASYMPTOMATIC patient with Coronary Calcium Agatston Score > 400 (or a qualitative assessment where 'severe' coronary artery calcification is stated in a report incidentally detected on CT imaging performed for other clinical indications) No prior stress imaging done within the last 12 months) [16]

Inconclusive CAD Evaluation and Obstructive CAD remain a Concern

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- Exercise stress ECG with low-risk Duke treadmill score (≥ 5) (see **Background** section) but patient's current symptoms indicate an intermediate or high pretest probability
- Exercise stress ECG with an intermediate Duke treadmill score (**AUC Score 8**) [3]
- Inconclusive/borderline coronary computed tomography angiography (CCTA) or Single Positron Emission Tomography (SPECT) nuclear stress testing (e.g., 40 - 70% lesions) (**AUC Score 8**) [3,10]

- Cardiac PET stress-rest perfusion and metabolic activity study (with ^{18}F-FDG PET) is appropriate in patients with ischemic cardiomyopathy to determine myocardial viability prior to revascularization following an inconclusive SPECT [10] (**AUC Score 9**) [3]
- Non-diagnostic exercise stress test with physical inability to achieve target heart rate (THR)
- An intermediate evaluation by prior stress imaging
- Coronary stenosis of unclear significance on previous coronary angiography [10] (**AUC Score 8**) [3]

Follow-Up Of Patient's Post Coronary Revascularization Percutaneous Coronary Intervention (PCI) or Coronary Artery Bypass Graft (CABG)

When neither SE nor MPI have provided, or are expected to provide, optimal imaging and any of the following [10]:

- **Asymptomatic, follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG), or percutaneous coronary intervention (PCI), (whichever is later), is appropriate only for patients with:
  - High risk: diabetes with accelerated progression of CAD, Chronic Kidney Disease (CKD), peripheral artery disease (PAD), prior brachytherapy, in-stent restinosis (ISR), or saphenous venous graft (SVG) intervention.
  - A history of silent ischemia or
  - A history of a prior left main stent
- For patients with high occupational risk (e.g., associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers, and firefighters)

New, recurrent, or worsening symptoms post coronary revascularization are an indication for stress imaging, if it will alter management

Follow-Up Of Known CAD [10]

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or FFR ≤ 0.80 or significant stenosis in a major vessel (≥ 50% left main coronary artery or ≥ 70% left anterior descending (LAD), left circumflex (LCX) or right coronary artery (RCA))), over two years ago, without intervening coronary revascularization is an appropriate indication for stress imaging in patients if it will alter management
- When there is a change in symptoms or functional capacity that persists despite guideline directed medical therapy [11]

Special Diagnostic Conditions Requiring Coronary Evaluation

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Unevaluated Acute Coronary Syndrome**
  - Prior acute coronary syndrome (as documented in MD notes), without subsequent invasive or non-invasive coronary evaluation within the last 12 months
  - Has ventricular wall motion abnormality demonstrated by another imaging modality and myocardial perfusion imaging is being performed to determine if the patient has myocardial ischemia. No imaging stress test within the last 12 months
- **Heart Failure**
  - Newly diagnosed systolic heart failure or diastolic heart failure, with *reasonable suspicion of cardiac ischemia (prior events, risk factors)*, unless invasive coronary angiography is immediately planned or adequate stress imaging has been done within the last 12 months [10] (**AUC Score 9**) [3]
- **Viability**
  - Reduced left ventricular ejection fraction (LVEF) ≤ 50% requiring myocardial viability assessment to assist with decisions regarding coronary revascularization. (Diversion from PET not required when LVEF less than or equal to 40%) (**AUC Score 9**) [3]
- **Ischemia and Nonobstructive Coronary Artery Disease (INOCA)**
  - To diagnose microvascular dysfunction in patients with persistent stable anginal chest pain with suspected ischemia and nonobstructive coronary artery disease (INOCA), as documented in provider notes (*no MPI diversion required*).
- **Arrhythmias**
  - Ventricular arrhythmias
    - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not the immediately planned test (**AUC Score 7**) [10]
    - Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, frequent premature ventricular contractions (PVC) (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed [3,10]
- **Anti-arrhythmic Drug Therapy**
  - Class IC antiarrhythmic drug
    - In the intermediate (**AUC Score 6**) [3] and high (**AUC Score 7**) [3] global risk patient prior to initiation of Class IC antiarrhythmic drug initiation (Propafenone or Flecainide) (**AUC Score 7**) [10]
    - Annually for intermediate and high global risk patients taking Class IC antiarrhythmic drug (Propafenone or Flecainide) (**AUC Score 7**) [3]

- **Coronary Anomaly and Aneurism**
  - Assessment of hemodynamic significance of one of the following documented conditions:
    - Anomalous coronary arteries [17] (**AUC Score 7**) [3]
    - Muscle bridging of coronary artery [18]
  - Coronary aneurysms in Kawasaki's disease [19] (**AUC Score 8**) [3] or due to atherosclerosis
- **Radiation**
  - Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter [20]
- **Cardiac Sarcoidosis**
  - May be approved as a combination study with MPI for the evaluation and treatment of sarcoidosis [3,21]
    - Evaluation and therapy monitoring in patients with sarcoidosis, after documentation of suspected cardiac involvement by echo or ECG, when cardiac magnetic resonance imaging (CMR) has not been performed
    - Evaluation of suspected cardiac sarcoid, after CMR has shown equivocal or negative findings in the setting of a high clinical suspicion
    - Evaluation of CMR findings showing highly probable cardiac sarcoidosis, when PET could serve to identify inflammation and the consequent potential role for immunosuppressive therapy [22] (**AUC Score 9**) [3]
    - Initial and follow-up PET in monitoring therapy for cardiac sarcoid with immunosuppressive therapy, typically about 4 times over 2 years
- **Infective Endocarditis**
  - In suspected infective endocarditis with moderate to high probability (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device), when transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) have been inconclusive with respect to diagnosis of infective endocarditis or characterization of paravalvular invasive complications [23]
- **Aortitis**
  - For diagnosis and surveillance of Aortitis, PET/CT or PET/MRI hybrid imaging [24]
  - **NOTE**: If PET/MRI study is requested, there is no specific CPT Code for this imaging study and a Health Plan review will be required. study is requested, there is no specific CPT Code for this imaging study and a Health Plan review will be required.

Prior To Elective Non-Cardiac Surgery

When neither SE nor MPI have provided or are expected to provide optimal imaging

- An intermediate or high-risk surgery with of one or more risk factors (see below), **AND** documentation of an inability to walk (or < 4 METs) **AND** there has not been an imaging

stress test within 1 year [25–28]

- **Risk factors**: history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine > 2.0 mg/dL.
- **Surgical Risk**:
  - **High risk surgery**: Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
  - **Intermediate risk surgery**: Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery
  - **Low risk surgery**: Endoscopic procedures, superficial procedure, cataract surgery, breast surgery

- Planning for any organ or stem cell transplantation is an indication for preoperative stress imaging, if there has not been a conclusive stress evaluation, computed tomography angiography (CTA), or heart catheterization within the past year, at the discretion of the transplant service [29]

Post Cardiac Transplant

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography [30]

LEGISLATIVE LANGUAGE

Washington

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease [31]

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
  - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
  - Adult patients with known CAD who have new or worsening symptoms.

- Single Positron Emission Tomography (SPECT) for:
  - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
  - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
  - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or
  - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
  - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

CODING AND STANDARDS

Codes

+78434, 78459, 78472, 78491, 78492, 93015, 93016, 93017, 93018, A9555

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

General Overview [1,2]

A PET study is a diagnostic test used to evaluate blood flow to the heart. During the test, a small amount of radioactive tracer is injected into a vein. A special camera, called a gamma camera, detects the radiation released by the tracer to produce computer images of the heart. Combined with a medication, the test can help determine if there is adequate blood flow to the heart during activity versus at rest. The medication simulates exercise for patients unable to exercise on a treadmill or stationary cycle.

PET prefusion studies illustrate myocardial blood flow by demonstrating tracer uptake. PET metabolic evaluation studies are used to demonstrate inflammation produced by infiltrative disease such as sarcoidosis, but also enhance the detection of viable (hibernating) myocardium. Hybrid PET-CT scanning combines anatomical information with blood flow assessment and is useful for assessing viable myocardium, especially in chronic heart failure patients with global ischemia, or in patients with multivessel diffuse coronary artery disease as opposed to focal stenotic lesions.

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [5]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories [3,10,11]:
  - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section).
  - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD (below):
- The THREE Types of Chest Pain or Discomfort
  - **Typical Angina (Definite)** is defined as including all **3** characteristics:
    - Substernal chest pain or discomfort with characteristic quality and duration
    - Provoked by exertion or emotional stress
    - Relieved by rest and/or nitroglycerine
  - **Atypical Angina (Probable)** has only **2** of the above characteristics
  - **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics

- The medical record should provide enough detail to establish the type of chest pain. From those details, the pretest probability of obstructive CAD is estimated from the Diamond Forrester Table below, recognizing that in some cases multiple additional coronary risk factors could increase pretest probability [3,10,11]:

Diamond Forrester Table [13,14]

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: < 5% pretest probability of CAD, usually not requiring stress evaluation

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CAD

- An uninterpretable baseline ECG includes [11]:
  - ST segment depression 1 mm or more; (not for non-specific ST- T wave changes)
  - Ischemic looking T waves; at least 2.5 mm inversions (excluding V1 and V2)
  - Bundle Branch Blocks (BBB)
    - Left BBB
    - Right BBB or intraventricular conduction delay (IVCD), either containing ST or T wave abnormalities (see above)
  - Left ventricular hypertrophy (LVH) with repolarization abnormalities
  - Ventricular paced rhythm
  - Digitalis use with associated ST segment abnormalities
  - Resting HR under 50 bpm on a medication, such as beta-blockers or calcium channel blockers, that is required for patient's treatment and cannot be stopped, with

an anticipated suboptimal workload

- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
  - 40 ms (1 mm) wide
  - 2 mm deep
  - 25% of depth of QRS complex
- ECG Stress Test Alone versus Stress Testing with Imaging
  - Prominent scenarios suitable for an ECG stress test **WITHOUT** imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3 minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise [10]:
    - The (symptomatic) low or intermediate pretest probability patient who can exercise and has an interpretable ECG [10]
    - The patient who is under evaluation for exercise-induced arrhythmia
    - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
    - For the evaluation of syncope or presyncope during exertion [32]
- Duke Exercise ECG Treadmill Score [33]
  - Calculates risk from ECG treadmill alone:
    - The equation for calculating the Duke treadmill score (DTS) is: DTS = exercise time in minutes - (5 x ST deviation in mm or 0.1 mV increments) - (4 x exercise angina score), with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
    - The score typically ranges from - 25 to + 15. These values correspond to low-risk (with a score of ≥ + 5), intermediate risk (with scores ranging from - 10 to + 4), and high-risk (with a score of ≤ - 11) categories
- Coronary application of PET includes evaluation of stable patients without known CAD, who fall into two categories [3,10,11]
  - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section).
  - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant (≥ 50%) CAD (below)
- Global Risk of Cardiovascular Disease
  - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years. **High global risk by itself generally lacks scientific**

support as an indication for stress imaging. There are rare exceptions, such as patients requiring IC antiarrhythmic drugs who might require coronary risk stratification prior to initiation of the drug.

- **CAD Risk—Low**
  - 10-year absolute coronary or cardiovascular risk less than 10%
- **CAD Risk—Moderate**
  - 10-year absolute coronary or cardiovascular risk between 10% and 20%
- **CAD Risk—High**
  - 10-year absolute coronary or cardiovascular risk of greater than 20%

*Websites for Global Cardiovascular Risk Calculators** [34–38]

Risk Calculator	Websites for Online Calculator
Framingham Cardiovascular Risk	**https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk**
Reynolds Risk Score Can use if no diabetes Unique for use of family history	**http://www.reynoldsriskscore.org/**
Pooled Cohort Equation	**http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example**
ACC/AHA Risk Calculator	**http://tools.acc.org/ASCVD-Risk-Estimator/**
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	**https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx**

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

- Definitions of Coronary Artery Disease [11]
  - Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more

accurately measured with intravascular ultrasound (IVUS).

- Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. Its incorporation into global risk can be achieved by using the Multi-Ethnic Study of Atherosclerosis (MESA) risk calculator.
- Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:
  - Suggested by percentage diameter stenosis ≥ 70% by angiography; intermediate lesions are 50 – 69%
  - For a left main artery, suggested by a percentage stenosis ≥ 50% or minimum lumen cross-sectional area on IVUS ≤ 6 square mm [11,39]
  - FFR (fractional flow reserve) ≤ 0.80 for a major vessel [39]
  - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree
- A major vessel would be a coronary vessel that would be amenable to revascularization if indicated. This assessment is made based on the diameter of the vessel and/or the extent of myocardial territory served by the vessel.
- FFR (fractional flow reserve) is the distal to proximal pressure ratio across a coronary lesion during maximal hyperemia induced by either intravenous or intracoronary adenosine. Less than or equal to 0.80 is considered a significant reduction in coronary flow.
- Newer technology that estimates FFR from CCTA image is covered under the Evolent Clinical Guideline 7293 for Fractional Flow Reserve CT.

- Anginal Equivalent [11,32]
  - Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons to suspect that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia), by presentation of clinical data, such as respiratory rate, oximetry, lung exam, etc. (as well as d-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Most syncope per se is not an anginal equivalent.

Acronyms/Abbreviations

ADLs: Activities of daily living

BMI: Body mass index

CABG: Coronary artery bypass grafting

CAC: Coronary artery calcium

CAD: Coronary artery disease

CCTA: Coronary computed tomography angiography

CMR: Cardiac magnetic resonance imaging

CT(A): Computed tomography (angiography)

DTS: Duke Treadmill Score

ECG: Electrocardiogram

FFR: Fractional flow reserve

IVUS: Intravascular ultrasound

LBBB: Left bundle-branch block

LVEF: Left ventricular ejection fraction

LVH: Left ventricular hypertrophy

MESA: Multi-Ethnic Study of Atherosclerosis

MET: Estimated metabolic equivalent of exercise

MI: Myocardial infarction

MPI: Myocardial perfusion imaging

MR(I): Magnetic resonance (imaging)

PCI: Percutaneous coronary intervention

PET: Positron emission tomography

PFT: Pulmonary function test

PVCs: Premature ventricular contractions

SE: Stress echocardiography

TEE: Transesophageal echocardiography

THR: Target heart rate

TTE: Transthoracic echocardiography

VF: Ventricular fibrillation

VT: Ventricular tachycardia

WPW: Wolff-Parkinson-White

SUMMARY OF EVIDENCE

American Society of Nuclear Cardiology and Society of Nuclear Medicine and Molecular Imaging Joint Position Statement on the Clinical Indications for Myocardial Perfusion PET [1]

Study Design: The document is a joint position statement that summarizes the properties and clinical indications of myocardial perfusion PET. It is based on extensive clinical investigations

and meta-analyses that demonstrate the advantages of PET over other noninvasive cardiac imaging modalities.

Target Population: The target population includes patients with known or suspected coronary artery disease (CAD) who meet appropriate criteria for a stress imaging test. This includes:

- Patients unable to complete a diagnostic-level exercise stress imaging study.
- Patients with prior stress imaging studies of poor quality or inconclusive results.
- High-risk patients, such as those with chronic kidney disease, diabetes mellitus, or suspected high-risk CAD.
- Young patients with established CAD who require repeated radiation-associated cardiac imaging procedures.

Key Factors:

1. **High Diagnostic Accuracy**: Myocardial perfusion PET has high sensitivity and specificity for detecting obstructive CAD, outperforming other noninvasive approaches.
2. **Consistent High-Quality Images**: PET images have high myocardial counts, spatial and contrast resolution, and accurate correction for tissue attenuation and scatter.
3. **Low Radiation Exposure**: PET scans expose patients to less than 5 mSv, significantly lower than other radiation-based cardiac assessments.
4. **Short Acquisition Protocols**: Complete rest-stress studies can be acquired in less than one hour, making it convenient for acutely ill or high-risk patients.
5. **Quantification of Myocardial Blood Flow**: PET allows for the measurement of myocardial flow reserve, improving interpretation confidence and patient selection for interventions.
6. **Strong Prognostic Power**: PET provides high discrimination between different levels of risk in all patient populations, including obese and non-obese individuals, men and women, diabetics, and patients with renal dysfunction.

Appropriate Use Criteria for PET Myocardial Perfusion Imaging [3]

Study Design: The document is a consensus guideline developed by a multidisciplinary workgroup representing several medical specialty societies. It is based on a systematic review of the literature, expert opinion, and clinical practice guidelines. The study design includes the development of clinical scenarios, systematic synthesis of available evidence, individual and group ratings of clinical indications, and recommendations based on final group ratings and discussions.

Target Population: The target population includes patients with suspected or known coronary artery disease (CAD), asymptomatic patients, patients with diagnosed heart failure, patients with known or suspected cardiac sarcoidosis, patients with arrhythmias, patients with syncope, patients with coronary microvascular disease (CMD), specific populations such as those with advanced obesity or familial hypercholesterolemia, patients undergoing prior testing or procedures, patients undergoing preoperative evaluation for noncardiac surgery, and patients requiring determination of exercise level before initiation of exercise prescription or cardiac rehabilitation.

Key Factors

1. **Appropriate Use Criteria (AUC)**: The document outlines AUC for PET MPI in 11 sections, covering various clinical scenarios and patient populations.
2. **Diagnostic and Prognostic Value**: PET MPI is highlighted for its high diagnostic accuracy, sensitivity, and specificity in detecting CAD and CMD. It provides incremental prognostic information that affects clinical decision-making and treatment options.
3. **Clinical Scenarios**: The document includes detailed clinical scenarios with appropriateness scores, ranging from rarely appropriate to appropriate, based on the likelihood of PET MPI affecting clinical management and outcomes.
4. **Methodology**: The AUC development process follows the RAND/UCLA Appropriateness Method, including systematic review, evidence synthesis, individual and group ratings, and consensus recommendations.
5. **Outcome Data**: The document emphasizes the importance of outcome data in guiding the use of PET MPI, particularly in high-risk populations and specific clinical contexts.

ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease [10]

Study Design: The study is a report by the American College of Cardiology (ACC) Solution Set Oversight Committee, in collaboration with several other cardiovascular societies. It updates the prior AUC for various cardiovascular imaging modalities, including radionuclide imaging, stress echocardiography, calcium scoring, coronary computed tomography angiography (CCTA), stress cardiac magnetic resonance (CMR), and invasive coronary angiography.

Target Population: The target population includes patients with known or suspected CCD, which encompasses stable ischemic heart disease (SIHD). The clinical scenarios cover both symptomatic and asymptomatic patients, with and without prior testing or revascularization.

Key Factors:

Clinical Scenarios: The document outlines 64 clinical scenarios for the detection and risk assessment of CCD, drawn from common applications and current clinical practice guidelines.

Rating Process: The clinical scenarios were rated by an independent panel using a modified Delphi process. Ratings were categorized as Appropriate (7-9), May Be Appropriate (4-6), or Rarely Appropriate (1-3).

Updates and Changes: Key changes include the removal of preoperative testing scenarios, simplification of clinical scenario tables, and incorporation of new evidence and guidelines.

Assumptions: The study assumes that each test is performed and interpreted by trained professionals, and that patients are receiving optimal standard care.

Advantages and Limitations: The document provides a table outlining the advantages and limitations of various imaging modalities, such as echocardiography, SPECT, PET, CMR, CCTA, and invasive angiography.

ANALYSIS OF EVIDENCE

Shared Conclusions [1,3,10]**:**

1. **Importance of PET MPI**: All three articles emphasize the significance of PET myocardial perfusion imaging (MPI) in diagnosing and managing coronary artery disease (CAD). They highlight its high diagnostic accuracy, ability to quantify myocardial blood flow, and prognostic value.
2. **Diagnostic Accuracy**: The articles agree on the high sensitivity and specificity of PET MPI for detecting obstructive CAD. They also note its superiority over other noninvasive imaging modalities in certain clinical scenarios.
3. **Prognostic Value**: The prognostic power of PET MPI is a common theme. The ability to predict future cardiovascular events and guide clinical decision-making is emphasized across all three studies.
4. **Clinical Utility**: The articles discuss the clinical utility of PET MPI in various patient populations, including those with suspected or known CAD, heart failure, and other cardiovascular conditions.

POLICY HISTORY

Date	Summary
July 2025	● This guideline merges two Evolent guidelines with identical clinical criteria: ECG 7294-01 for Heart (Cardiac) PET and ECG 072 for Heart (Cardiac) PET into Evolent Clinical Guideline 7294 for Heart Positron Emission Tomography (PET) Scan ○ This guideline also merges Procedure Codes from these two Evolent guidelines ● Added new bullet-point to the General Statement section ● Added a Summary of Evidence and Analysis of Evidence

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7296 for Heart Computed Tomography (CT)

Structure and Morphology, Congenital Studies

Guideline Number: Evolent_CG_7296	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

Indications for determining medical necessity for non-contrast cardiac computed tomography.

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [1–5]

INDICATIONS FOR HEART CT

Congenital Heart Disease [6,7]

For all indications below, either CT or cardiac magnetic resonance imaging (CMR) can be performed:

- All congenital lesions: prior to planned repair and for change in clinical status and/or new concerning signs or symptoms

Patent Ductus Arteriosus

- Routine surveillance (1-2 years) in a patient with postprocedural aortic obstruction (**AUC Score 7**) [6]

Aortic Dilation

- Routine surveillance (6-12 months) in a child with aortic sinus and/or ascending aortic dilation with increasing size (**AUC Score 7**) [6]

Aortic Coarctation and Interrupted Aortic Arch

- Routine surveillance (3–5 years) in a child or adult with mild aortic coarctation (**AUC Score 7**) [6]
- Post procedure (surgical or catheter-based) routine surveillance (3–5 years) in an asymptomatic patient to evaluate for aortic arch aneurysms, in-stent stenosis, stent fracture, or endoleak (**AUC Score 8**) [6]

Tetralogy of Fallot

- Post procedure routine surveillance (2–3 years) in a patient with valvular or ventricular dysfunction, right ventricular outflow tract obstruction, branch pulmonary artery stenosis, arrhythmias, or presence of a right ventricle (RV) to pulmonary artery (PA) conduit (**AUC Score 7**) [6]

D-Loop Transposition of the Great Arteries

- Post procedure routine surveillance (3–5 years) in an asymptomatic patient (**AUC Score 7**) [6]
- Post procedure routine surveillance (1–2 years) in a patient with dilated neoaortic root with increasing size, or neoaortic regurgitation (**AUC Score 7**) [6]
- Post procedure routine surveillance (3–12 months) in a patient with ≥ moderate systemic AV valve regurgitation, systemic RV dysfunction, left ventricular outflow tract (LVOT) obstruction, or arrhythmias (**AUC Score 7**) [6]

Congenitally Corrected Transposition of the Great Arteries

- Unrepaired: routine surveillance (3–5 years) in an asymptomatic patient (**AUC Score 7**) [6]
- Postoperative: routine surveillance (3–5 years) in an asymptomatic patient (**AUC Score 7**) [6]
- Postoperative anatomic repair: routine surveillance (6–12 months) in a patient with valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, or presence of an RV-to-PA conduit (**AUC Score 7**) [6]
- Postoperative physiological repair with VSD closure and/or LV-to-PA conduit: routine surveillance (3–12 months) in a patient with ≥ moderate systemic AV valve regurgitation,

systemic RV dysfunction, and/or left ventricle (LV) to PA conduit dysfunction (**AUC Score 7**) [6]

Truncus Arteriosus

- Routine surveillance (1–2 years) in an asymptomatic child or adult with ≥ moderate truncal stenosis and/or regurgitation (**AUC Score 7**) [6]

Single-Ventricle Heart Disease

Includes hypoplastic left heart syndrome, double-inlet LV, double-inlet RV, mitral atresia, tricuspid atresia, unbalanced A-V septal defect:

- Postoperative routine surveillance (3-5 years) in an asymptomatic patient (**AUC Score 7**) [6]

Cardiomyopathy [8]

- Quantification of myocardial (muscle) mass, when cardiovascular magnetic resonance (CMR) is contraindicated or cannot be performed [9–11] (**AUC Score 7**) [8]
- Assessment of left ventricular systolic dysfunction when prior noninvasive imaging has been inadequate (**AUC Score 7**) [8]
- Assessment of right ventricular morphology in suspected arrhythmogenic right ventricular cardiomyopathy (**AUC Score 7**), [12] based upon other findings such as [9]:
  - Non-sustained VT
  - Unexplained syncope
  - ECG abnormalities [11]
  - First-degree relative with positive genotype of ARVC (either, but CMR is superior to CT) [9,11]

Valvular Heart Disease [13,14]

- Characterization of native or prosthetic valves with clinical signs or symptoms suggesting valve dysfunction, when TTE, TEE, and/or fluoroscopy have been inadequate (**AUC Score 7**) [13]
- Evaluation of RV systolic function in severe TR, including systolic and diastolic volumes, when TTE images are inadequate and CMR is not readily available
- Pulmonary hypertension in the absence of severe valvular disease [15]
- Evaluation of suspected infective endocarditis with moderate to high pretest probability (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device), when TTE and TEE have been inadequate
- Evaluation of suspected paravalvular infections when the anatomy cannot be clearly delineated by TTE and TEE

Evaluation of Intra- and Extra-cardiac Structures [8]

- Evaluation of cardiac mass, suspected tumor or thrombus, or cardiac source of emboli, when imaging with TTE and TEE have been inadequate (**AUC Score 7**) [8]
- Re-evaluation of prior findings for interval change (i.e., reduction or resolution of atrial thrombus after anticoagulation) when a change in therapy is anticipated (**AUC Score 7**) [8,16]
- Evaluation of pericardial anatomy (**AUC Score 8**), [8,12] when TTE and/or TEE are inadequate or for better tissue characterization of a mass and detection of metastasis [CMR superior for physiologic assessment (constrictive versus restrictive) and tissue characterization, CT superior for calcium assessment] [9,17,18]

Electrophysiologic Procedure Planning [9,12]

- Evaluation of pulmonary venous anatomy prior to radiofrequency ablation of atrial fibrillation and for follow-up when needed for evaluation of pulmonary vein stenosis (**AUC Score 8**) [12]
- Non-invasive coronary vein mapping prior to placement of biventricular pacing leads (**AUC Score 8**) [12]

Transcatheter Structural Intervention Planning

- Evaluation for transcatheter aortic valve replacement (TAVR) (**AUC Score 9**) [13,19]
- When TTE and TEE cannot provide adequate imaging, CT imaging can be used for planning: robotic mitral valve repair, atrial septal defect closure, left atrial appendage closure, ventricular septal defect closure, endovascular grafts, and percutaneous pulmonic valve implantation [20]
- Evaluation for suitability of transcatheter mitral valve procedures, alone or in addition to TEE [21]

Aortic Pathology [8,13,22–24]

- CT, MR, or echo can be used for screening and follow-up, with CT and MR preferred for imaging beyond the proximal ascending thoracic aorta in the following scenarios:
  - Evaluation of dilated aortic sinuses or ascending aorta identified by TTE (**AUC Score 8**) [8]
  - Suspected acute aortic pathology, such as dissection (**AUC Score 9**) [8]
  - Re-evaluation of known aortic dilation or aortic dissection with a change in clinical status or cardiac examination or when findings would alter management (**AUC Score 8**) [8]
  - Screening first-degree relatives of individuals with a history of thoracic aortic aneurysm or dissection, or an associated high-risk mutation for thoracic aneurysm in common (**AUC Score 7**) [8]

- Screening second-degree relative of a patient with thoracic aortic aneurysm, when the first-degree relative has aortic dilation, aneurysm, or dissection
- Six-month follow-up after initial finding of a dilated thoracic aorta, for assessment of rate of change
- Annual follow-up of enlarged thoracic aorta with size up to 4.4 cm
- Biannual (twice/year) follow-up of enlarged aortic root ≥ 4.5 cm or showing growth rate ≥ 0.5 cm/year

- Patients with Marfan syndrome may undergo annual imaging with CT, MRI or TTE, with increase to biannual (twice-yearly) when diameter ≥ 4.5 cm or when expansions is > 0.5 cm/year (**AUC Score 8**) [8]
- Patient with Turner syndrome should undergo initial imaging with CT, MRI, or TTE for evidence of dilatation of the ascending thoracic aorta. If imaging is normal and there are no risk factors for aortic dissection, repeat imaging should be performed every 5 - 10 years, or if otherwise indicated. If the aorta is enlarged, appropriate follow-up imaging should be done according to size, as above
- Evaluation of the aorta in the setting of a known or suspected connective tissue disease or genetic condition that predisposes to aortic aneurysm or dissection (i.e., Loeys-Dietz, Ehlers-Danlos), with re-evaluation at 6 months for rate of expansion. Complete evaluation with CMR from the cerebrovascular circulation to the pelvis is recommended with Loeys-Dietz syndrome.

OTHER COMBINATION STUDIES WITH HEART CT

Chest MRA and Heart CT

- When medical necessity criteria indications are met for each Chest MRA (see Evolent Clinical Guideline 2021 for Chest Magnetic Resonance Angiography (MRA)) and Heart MRI (see Evolent Clinical Guideline 7297 for Heart Magnetic Resonance Imaging (MRI)) or Computed Tomography (CT) (such as for certain congenital malformations when evaluation of extra cardiac and cardiac structures are needed)

CODING AND STANDARDS

Codes

75572, +0722T

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

General Overview

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

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [(2)]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Acronyms / Abbreviations

ARVD/C: Arrhythmogenic right ventricular dysplasia/cardiomyopathy

CABG: Coronary artery bypass grafting surgery

CAD: Coronary artery disease

CCS: Coronary calcium score

CCT: Cardiac (Heart) CT

CHD: Coronary heart disease

CMR: Cardiac magnetic resonance (imaging)

CT: Computed tomography

CTA: Computed tomography angiography

ECG: Electrocardiogram

EF: Ejection fraction

HF: Heart failure

LVOT: Left ventricular outflow tract

MI: Myocardial infarction

MPI: Myocardial perfusion Imaging or cardiac nuclear imaging

MR(I): Magnetic resonance (imaging)

PA: Pulmonary artery

PCI: Percutaneous coronary intervention

PVML: Paravalvular mitral leak

RV: Right ventricle

SE: Stress echocardiogram

TAVR: Transcatheter aortic valve replacement

TMVR: Transcatheter mitral valve replacement

TR: Tricuspid regurgitation

TEE: Transesophageal echocardiography

TTE: Transthoracic echocardiography

VT: Ventricular tachycardia

SUMMARY OF EVIDENCE

ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients With Congenital Heart Disease [6]

Study Design: The study was conducted by the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, along with several other cardiovascular societies. It involved the development of appropriate use criteria (AUC) for multimodality imaging during the follow-up care of patients with congenital heart disease (CHD). The criteria were developed using guidelines, clinical trial data, and expert opinion in the field of CHD. The writing group developed 324 clinical indications, which were separated into 19 tables according to the type of cardiac lesion. These scenarios were presented to an independent

panel for rating, with each being scored on a scale of 1 to 9, with 1 to 3 categorized as "Rarely Appropriate," 4 to 6 as "May Be Appropriate," and 7 to 9 as "Appropriate".

Target Population: The target population includes both pediatric and adult patients with established congenital heart disease. The criteria address cardiac imaging in adult and pediatric patients with established CHD, focusing on evaluation before and after cardiac surgery or catheter-based intervention, routine surveillance, and evaluation of new-onset signs or symptoms.

Key Factors:

Indications: The study developed 324 clinical indications related to the follow-up care of patients with CHD. These indications were categorized into 19 tables based on the type of cardiac lesion.

Imaging Modalities: The study evaluated the use of various noninvasive cardiac imaging modalities, including transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiovascular magnetic resonance (CMR), cardiovascular computed tomography (CCT), stress imaging, and lung scan.

Rating System: Each clinical scenario was rated on a scale of 1 to 9, with 1 to 3 categorized as "Rarely Appropriate," 4 to 6 as "May Be Appropriate," and 7 to 9 as "Appropriate." The ratings were based on clinical practice guidelines, expert opinion, and available evidence.

Outcomes: The study aimed to provide guidance to clinicians in the care of patients with established CHD by identifying reasonable imaging modality options for evaluation and surveillance. It also aimed to serve as an educational and quality improvement tool to identify patterns of care and reduce the number of rarely appropriate tests in clinical practice.

2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease [7]

Study Design The study involved the development of the 2018 AHA/ACC Guideline for the Management of Adults with Congenital Heart Disease (ACHD). The guidelines were developed by the American College of Cardiology (ACC) and the American Heart Association (AHA) Task Force on Clinical Practice Guidelines. The process included a comprehensive review of published evidence, diagnostic and therapeutic procedures, and assessment of the risk-benefit ratio. The guidelines were developed by a task force of selected experts in the field, representing various ACC sub-specialty groups.

Target Population: The guidelines focus on adults with congenital heart disease (ACHD), including those with simple, moderate, and complex congenital heart defects. The target population encompasses a wide range of congenital heart conditions, such as atrial septal defect (ASD), ventricular septal defect (VSD), atrioventricular septal defect (AVSD), patent ductus arteriosus (PDA), left ventricular outflow tract obstruction (LVOTO), coarctation of the aorta (CoA), and aortopathies.

Key Factors:

Recommendations: The guidelines provide evidence-based recommendations for the diagnosis, management, and treatment of ACHD, including surgical and catheter interventions, medical therapy, and follow-up care.

Diagnostic Testing: The guidelines emphasize the importance of accurate diagnosis, risk assessment, and selection of the most suitable type of intervention. Diagnostic testing includes echocardiography, cardiovascular magnetic resonance imaging (CMR), cardiovascular computed tomography (CCT), and cardiac catheterization.

Medical Therapy: The guidelines recommend medical therapy for heart failure, arrhythmias, pulmonary hypertension, and other related conditions. Specific therapies include beta blockers, angiotensin-converting enzyme (ACE) inhibitors, angiotensin II receptor blockers (ARBs), and pulmonary vasodilators.

Surgical and Catheter Interventions: The guidelines provide detailed recommendations for surgical and catheter interventions for various congenital heart defects, including ASD, VSD, AVSD, PDA, LVOTO, CoA, and aortopathies.

Follow-up Care: The guidelines emphasize the importance of lifelong follow-up care for ACHD patients, including regular imaging, exercise testing, and monitoring for complications.

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease [8]

Study Design: The study is a report developed by the American College of Cardiology Appropriate Use Criteria Task Force, along with several other cardiovascular societies. It aims to provide appropriate use criteria (AUC) for multimodality imaging in nonvalvular heart disease. The clinical scenarios (indications) were developed by a diverse writing group and scored by an independent rating panel using standardized methodology.

Target Population: The target population includes patients with nonvalvular heart disease, encompassing various conditions such as heart failure, diseases of the aorta and pericardium, and any disorder involving abnormal cardiac structure or function excluding valvular diseases.

Key Factors:

Clinical Scenarios: The document covers 102 clinical scenarios representing patient presentations encountered in everyday practice. These scenarios were developed based on the most current American College of Cardiology/American Heart Association Clinical Practice Guidelines.

Imaging Modalities: The study evaluates multiple imaging modalities, including transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiovascular magnetic resonance imaging (CMR), computed tomography (CT), and others.

Appropriateness Ratings: Each clinical scenario was rated on a scale of 1 to 9, with scores of 7 to 9 indicating that a modality is considered appropriate, scores of 4 to 6 indicating that a modality may be appropriate, and scores of 1 to 3 indicating that a modality is considered rarely appropriate.

Objective: The primary objective is to provide a framework for the assessment of these scenarios by practices that will improve and standardize physician decision-making.

ANALYSIS OF EVIDENCE

Shared Conclusions [6–8]

1. **Importance of Multimodality Imaging**: All three articles emphasize the significance of using multiple imaging modalities to assess and manage heart disease. They highlight the strengths and limitations of different imaging techniques and recommend their use based on specific clinical scenarios.
2. **Individualized Care Plans**: The articles stress the need for personalized care plans tailored to the patient's specific condition and clinical status. This approach ensures that patients receive the most appropriate and effective care.
3. **Collaboration Among Healthcare Providers**: The importance of collaboration between cardiologists, surgeons, and other healthcare providers is a common theme. This multidisciplinary approach is crucial for optimizing patient outcomes and managing complex cases.

POLICY HISTORY

Date	Summary
July 2025	● This guideline merges two Evolent guidelines with identical clinical criteria: ECG 7296-01 for Heart CT and ECG 025 for Heart CT into Evolent Clinical Guideline 7296 for Heart Computed Tomography (CT) ○ Added a subtitle – Structure and Morphology, Congenital Studies ○ This guideline also merges Procedure Codes from these two Evolent guidelines ● Added new bullet-point to the General Statement section ● Checked the Medicare Advantage box in the Applicable Lines of Business table ● Added AUC Score section to the Background ● Added a Summary of Evidence and Analysis of Evidence ● Updated references

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7297 for Heart Magnetic Resonance Imaging (MRI)

Guideline Number: Evolent_CG_7297	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

Cardiac magnetic resonance imaging (CMR) is an imaging modality used to assess cardiac or vascular anatomy, function, perfusion, and tissue characteristics in a single examination. In lesions affecting the right heart, CMR provides excellent visualization and volume determination regardless of right ventricular (RV) shape. This is particularly useful in patients with congenital heart disease.

Special Note

Since many cardiac patients have cardiac implanted electrical devices, the risk of CMR to the patient and the device must be weighed against the benefit to the patient in terms of clinical value in optimal management. [1–4]

See legislative language for specific mandates in **Washington** State

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

In instances where an AUC has not been established through prior publication, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [5–9]

INDICATIONS FOR CARDIAC MAGNETIC RESONANCE

Cardiomyopathy & Heart Failure [10–12]

- To assess systolic and diastolic function in the evaluation of a newly diagnosed cardiomyopathy (**AUC Score 7**) [10]
- Suspected infiltrative disease such as amyloidosis, sarcoidosis, [13] iron overload (i.e., hemochromatosis or resulting from frequent transfusions), or endomyocardial fibrosis if PET has not been performed (**AUC Score 8**) [10]
- Monitoring of response to chelation therapy for myocardial iron overload (see **Background** section) [13]
- Suspected inherited or acquired cardiomyopathy (**AUC Score 7**) [10]
- Diagnosis of acute myocarditis, with suspicion based upon new, unexplained findings such as:
    - Rise in troponin not clearly due to acute myocardial infarction
    - Change in ECG suggesting acute myocardial injury or pericarditis, without evident myocardial infarction
- Assessment of hypertrophic cardiomyopathy (HCM) [14] (**AUC Score 8**) [10]
    - When TTE is inadequate for diagnosis, management, or operative planning, or when tissue characterization (degree of fibrosis) will impact indications for implantable cardioverter-defibrillator (ICD)
    - For patients with left ventricular hypertrophy (LVH) when there is a suspicion of alternative diagnoses, including infiltrative or storage disease as well as athlete's heart
    - For patients with obstructive HCM in whom the autonomic mechanism of obstruction is inconclusive on echocardiography, CMR is indicated for selection and planning of SRT (septal reduction therapy)
    - For patients with HCM, repeat imaging on a periodic basis (every 3-5 years) for the purpose of SCD risk stratification to evaluate changes in late gadolinium enhancement (LGE), ejection fraction (EF), development of apical aneurysm or LV wall thickness
- Arrhythmogenic right ventricular cardiomyopathy to aid in identification and diagnosis (assessment of myocardial fat, fibrosis, and RV tissue characteristics), based upon reason for suspicion, such as:
    - Nonsustained ventricular tachycardia (VT)
    - Unexplained syncope
    - ECG abnormalities
    - First-degree relatives with positive genotype for arrhythmogenic right ventricular dysplasia (ARVD)

- Noncompaction cardiomyopathy to aid in the diagnosis (measurement of compacted to noncompacted myocardium) when transthoracic echocardiography (TTE) is suggestive
- Viability assessment when Single Positron Emission Tomography (SPECT), Positron Emission Tomography (PET) or Dobutamine Echo has provided “equivocal or indeterminate” results
- Clinical symptoms and signs consistent with a cardiac diagnosis known to cause presyncope/syncope (including, but not limited to, hypertrophic cardiomyopathy) (**AUC Score 7**) [10]
- Pulmonary hypertension in the absence of severe valvular disease (**AUC Score 7**) [10]
- Cardiomyopathy
  - Hemosiderosis
  - Restrictive cardiomyopathy (**AUC Score 7**) [10]
  - Cardio toxic chemotherapy

Valvular Heart Disease

- Evaluation of valvular stenosis, regurgitation, or valvular masses when TTE is inadequate (**AUC Score 7**) [15]
- Pre-TAVR assessment if the patient has not undergone cardiac computed tomography (CT) [16]
- Prior to transcatheter mitral valve intervention, when TTE and transesophageal echocardiography (TEE) result in uncertain assessment of the severity of mitral regurgitation [17,18]
- Suspected clinically significant bioprosthetic valvular dysfunction and inadequate images from TTE and TEE (**AUC Score 7**) [15]

Evaluation of Intra- and Extra-Cardiac Structures

- Initial evaluation of cardiac mass, suspected tumor or thrombus, or potential cardiac source of emboli (**AUC Score 7**) [10]
- Re-evaluation of intracardiac mass when findings would change therapy; no prior imaging in the last three months (**AUC Score 7**) [10]
- Evaluation of pericardial disease to provide structural and functional assessment and differentiate constrictive vs restrictive physiology (**AUC Score 8**) [10]
- Assessment of left ventricular pseudoaneurysm, when TTE was inadequate
- Identification and characteristics of coronary aneurysms or anomalous coronary arteries (**AUC Score 7)** [10]

Pre-procedure Evaluation for Closure of ASD or PFO (AUC Score 7) [10]

- For assessment of atrial septal anatomy and atrial septal aneurysm
- For assessment of suitability for percutaneous device closure

Assessment Following LAA Occlusion

- For surveillance at 45 days or FDA guidance, if TEE or Heart CT was not done, to assess:
  - Device stability
  - Device leaks
  - To exclude device migration

Pre-Ablation Planning

- Evaluation of left atrium and pulmonary veins prior to radiofrequency ablation for atrial fibrillation, if cardiac CT has not been done

Aortic Pathology

- CT, MR, or echocardiogram can be used for screening and follow-up, with CT and MR preferred for imaging beyond the proximal ascending thoracic aorta (**AUC Score 8**) [10]
- Screening of first-degree relatives with a history of thoracic aortic aneurysm or dissection (**AUC Score 7**) [10]
- Six-month follow-up after initial diagnosis of thoracic aortic aneurysm to measure rate of change
- Annual follow-up for an enlarged thoracic aortic aneurysm (usually defined as > 4.4.cm)
- Biannual (2x/year) follow-up of enlarged aortic root or showing growth rate ≥ 0.5 cm/year
- Screening of first-degree relative with a bicuspid aortic valve
- Re-evaluation (<1 y) of the size and morphology of the aortic sinuses and ascending aorta in patients with a bicuspid AV and an ascending aortic diameter > 4 cm with 1 of the following:
  - Aortic diameter > 4.5 cm
  - Rapid rate of change in aortic diameter
  - Family history (first-degree relative) of aortic dissection
- Patients with Turner's syndrome annually if an abnormality exists; if initial study normal, can have imaging every 5 - 10 years [19]
- Evaluation in patients with known or suspected connective tissue disease or genetic condition that predispose to aortic aneurysm or dissection, such as Marfan syndrome,

Ehlers-Danlos or Loeys-Dietz syndrome (at the time of diagnosis and 6 months thereafter), followed by annual imaging (can be done more frequently if > 4.5 cm or rate of growth > 0.5 cm/year- up to twice per year) (**AUC Score 8**) [10]

Congenital Heart Disease

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

- All lesions: evaluation prior to planned repair and evaluation for change in clinical status and/or new concerning signs or symptoms
- Patent Ductus Arteriosus: routine surveillance (1-2 years) in a patient with postprocedural aortic obstruction (**AUC Score 7**) [20]
- In the absence of prior imaging documenting congenital heart disease, a cardiac MRI is appropriate for anomalous pulmonary venous drainage and pulmonary outflow tract obstruction
- Eisenmenger Syndrome and Pulmonary Hypertension associated with congenital heart disease (CHD) (**AUC Score 7**) [20]
    - Evaluation due to change in pulmonary arterial hypertension-targeted therapy
    - Initial evaluation with suspicion of pulmonary hypertension following CHD surgery
- Aortic Stenosis or Regurgitation:
    - Routine surveillance (6-12 months) in a child with aortic sinus and/or ascending aortic dilation with increasing size (**AUC Score 8**) [20]
    - Routine surveillance (2–3 years) in a child with aortic sinus and/or ascending aortic dilation with stable size (CMR only) (**AUC Score 7**) [20]
- Aortic Coarctation and Interrupted Aortic Arch: (**AUC Score 8**) [20]
    - In the absence of prior imaging documenting congenital heart disease, a cardiac MRI is appropriate for suspected Coarctation (**AUC Score 8**) [20]
    - Routine surveillance (3–5 years) in a child or adult with mild aortic coarctation
    - Post procedure (surgical or catheter-based) routine surveillance (3–5 years) in an asymptomatic patient to evaluate for aortic arch aneurysms, in-stent stenosis, stent fracture, or endoleak
- Coronary anomalies
- Tetralogy of Fallot:
    - Postoperative routine surveillance (2–3 years) in a patient with pulmonary regurgitation and preserved ventricular function (CMR only) (**AUC Score 7**) [20]
    - Routine surveillance (2–3 years) in an asymptomatic patient with no or mild sequelae (CMR only) (**AUC Score 7**) [20]
    - Routine surveillance (2–3 years) in a patient with valvular or ventricular dysfunction, right ventricular outflow tract obstruction, branch pulmonary artery stenosis, arrhythmias, or presence of an RV-to-pulmonary artery (PA) conduit (**AUC Score**

8) [20]

- Double Outlet Right Ventricle: Routine surveillance (3–5 years) in an asymptomatic patient with no or mild sequelae (CMR only)
- D-Loop Transposition of the Great Arteries (postoperative):
  - Routine surveillance (3–5 years) in an asymptomatic patient (**AUC Score 7**) [20]
  - Routine surveillance (1–2 years) in a patient with dilated aortic root with increasing size, or aortic regurgitation (**AUC Score 8**) [20]
  - Routine surveillance (3–12 months) in a patient with ≥ moderate systemic AV valve regurgitation, systemic RV dysfunction, left ventricular outflow (LVOT) obstruction, or arrhythmias
- Congenitally Corrected Transposition of the Great Arteries: (**AUC Score 7**) [20]
  - Unrepaired: routine surveillance (3–5 years) in an asymptomatic patient
  - Postoperative: routine surveillance (3–5 years) in an asymptomatic patient
  - Postoperative anatomic repair: routine surveillance (6–12 months) in a patient with valvular or ventricular dysfunction, right or left ventricular outflow tract obstruction, or presence of an RV-to-PA conduit
  - Postoperative physiological repair with VSD closure and/or LV-to-PA conduit: routine surveillance (3–12 months) in a patient with ≥ moderate systemic AV valve regurgitation, systemic RV dysfunction, and/or LV-to-PA conduit dysfunction
- Truncus Arteriosus: routine surveillance (1–2 years) in an asymptomatic child or adult with ≥ moderate truncal stenosis and/or regurgitation (**AUC Score 7**) [20]
- Single-Ventricle Heart Disease:
  - Postoperative routine surveillance (1–2 years) in an asymptomatic patient
  - Routine surveillance (1–2 years) in an asymptomatic adult postoperative Stage 2 palliation (CMR only) (**AUC Score 7**) [20]
- Ebstein's anomaly and Tricuspid Valve dysplasia (only CMR indicated):
  - Evaluation prior to planned repair and evaluation for change in clinical status and/or new concerning signs or symptoms (**AUC Score 7**) [20]
- Pulmonary Stenosis (only CMR indicated) (**AUC Score 7**) [20]
  - Unrepaired: routine surveillance (3–5 years) in an asymptomatic adult with PS and pulmonary artery dilation
  - Postprocedural (surgical or catheter-based): routine surveillance (1–3 years) in an asymptomatic adult with moderate or severe sequelae
- Pulmonary Atresia (postprocedural complete repair): routine surveillance (1–3 years) in an asymptomatic adult with ≥ moderate sequelae (**AUC Score 7**) [20]

Coronary Artery Disease Evaluation

CMR, which is done pharmacologically, is used for the assessment of coronary artery disease, and can be performed if the patient would otherwise be a candidate for a pharmacologic MPI.

- If the patient can walk and is having myocardial perfusion imaging (MPI) for another reason (left bundle branch block (LBBB), coronary artery bypass graft (CABG), etc.), MPI is chosen over CMR
- Assessment of LV wall motion to identify patients with akinetic segments that would benefit from coronary revascularization
- To identify the extent and location of myocardial necrosis in patients with chronic or acute ischemic heart disease
- Follow-up of known CAD
    - Coronary stenosis of unclear significance on previous coronary angiography [12,21]
- To diagnose microvascular dysfunction in patients with persistent stable anginal chest pain with suspected ischemia and nonobstructive coronary artery disease (INOCA) as documented in provider notes (no MPI diversion required). [22]

IMAGING IN KNOWN GENETIC CONDITIONS

- ADPKD (Autosomal Dominant Polycystic Kidney Disease) AND family history of thoracic aortic dissection [23]:
    - Every 2 years (including at diagnosis)

    NOTE: Either cardiac MRI or chest MRI, not both
- Beta-Thalassemia [24]:
    - Annually
- Fabry disease [25]:
    - At diagnosis
- Hemochromatosis [26]:
    - Every 6 months (including at diagnosis)

COMBINATION STUDIES WITH HEART MRI

Chest MRA and Heart MRI

- When medical necessity criteria indications are met for each Chest MRA (see Evolent Clinical Guideline 2021 for Chest Magnetic Resonance Angiography (MRA)) and Heart MRI or CT (see Evolent Clinical Guideline 7296 for Heart Computed Tomography (CT)) (such as for certain congenital malformations when evaluation of extra cardiac and

cardiac structures are needed)

LEGISLATIVE LANGUAGE

Washington

20211119A – Use of Cardiac Magnetic Resonance Angiography (CMRA) in Adults and Children [(27)]

Number and coverage topic:

20212229A – Use of Cardiac Magnetic Resonance Angiography (CMRA) in Adults and Children

HTCC coverage determination:

CMRA is a **covered benefit** for adults or children with known or suspected coronary vessel anomalies or congenital heart disease.

CMRA is a **covered benefit with conditions** for stable symptomatic adults with known or suspected coronary artery disease (CAD).

HTCC reimbursement determination:

Limitations of coverage: CMRA should not be a first line diagnostic tool in patients with stable symptoms consistent with CAD. CMRA is covered with conditions for stable symptomatic adults with known or suspected CAD when the following conditions are met:

- In consultation with a cardiologist, and
- The patient is unable to tolerate or safely participate in other noninvasive anatomic or functional testing.

CMRA is not a covered service in coronary artery bypass graft (CABG) patients without CAD symptoms, or in those requiring cardiac lead placement unless cardiac vascular anomalies are suspected.

Non-covered indicators:

N/A

CODING AND STANDARDS

Codes

+0698T, 75557, 75559, 75561, 75563, +75565

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

General Overview [28]

- CMR in CAD [21,29,30] is often required when transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) provide inadequate imaging data.
- Stress CMR for assessment of coronary artery disease (CAD) is performed pharmacologically either as a vasodilator perfusion imaging with gadolinium contrast or dobutamine inotropic wall motion (ventriculography).
- With respect to CAD evaluation, since CMR is only pharmacologic (non-exercise stress), and stress echocardiography (SE) or myocardial perfusion imaging (MPI) provide similar information about CAD:
    - Requests for stress CMR require diversion to exercise SE first, and to exercise MPI second.
    - Exemptions for the diversion to SE or exercise MPI:
        - If body habitus or marked obesity (e.g., BMI ≥ 40) would interfere significantly with imaging with SE and MPI [31]
        - Evaluation of young (< 55 years old) patients with documented complex CAD, who are likely to need frequent non-invasive coronary ischemia evaluation and/or frequent radiation exposure from other testing [32]
- Heart magnetic resonance imaging (MRI) is an imaging method that uses powerful magnets and radio waves to create pictures of the heart. It does not use radiation (x-rays).

Myocardial Iron Overload [13]

- T2* MRI imaging measures myocardial relaxation time (measured in milliseconds (ms)), which is inversely related to iron content (lower T2*= increased iron load)
- Frequency of surveillance imaging during treatment (i.e., chelation therapy) is based on T2* values:

- >20 ms: every other year
- 10-20 ms: annually
- <10 ms: every 6 months

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [6]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories [21,29,30]:
  - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online
  - **Symptomatic,** for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant (≥ 50%) CAD (below):
- The THREE Types of Chest Pain or Discomfort
  - **Typical Angina (Definite)** is defined as including all **3** characteristics:
    - Substernal chest pain or discomfort with characteristic quality and duration
    - Provoked by exertion or emotional stress
    - Relieved by rest and/or nitroglycerine
  - **Atypical Angina (Probable)** has only **2** of the above characteristics
  - **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics
- The medical record should provide enough detail to establish the type of chest pain. From those details, the pretest probability of obstructive CAD is estimated from the **Diamond Forrester Table** below, recognizing that in some cases multiple additional coronary risk factors could increase pretest probability [21]:

Diamond Forrester Table [33,34]

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40 – 49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50 – 59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: < 5% pretest probability of CAD, usually not requiring stress evaluation

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CA

- For additional information on stress imaging, please refer to Evolent Clinical Guideline 7312 for Myocardial Perfusion Imaging.

Acronyms/Abbreviations

ARVD/C: Arrhythmogenic right ventricular dysplasia/cardiomyopathy

ASD: Atrial septal defect

CABG: Coronary artery bypass grafting surgery

CAD: Coronary artery disease

CMR: Cardiac magnetic resonance (imaging)

CT: Computed tomography

ECG: Electrocardiogram

EF: Ejection fraction

HCM: Hypertrophic cardiomyopathy

ICD: Implantable cardioverter-defibrillator

LAA: Left atrial appendage

LBBB: Left bundle-branch block

LGE: Late gadolinium enhancement

LV: Left ventricle

LVH: Left ventricular hypertrophy

LVOT: Left ventricular outflow

MPI: Myocardial perfusion imaging

MR: Mitral regurgitation

MR(I): Magnetic resonance (imaging)

PA: Pulmonary artery

PET: Positron emission tomography

PFO: Patent foramen ovale

PS: Pulmonary stenosis

RV: Right ventricle

SCD: Sudden cardiac death

SE: Stress echocardiography

SRT: Septal reduction therapy

TAVR: Transcatheter Aortic Valve Replacement

TTE: Transthoracic Echo

TEE: Transesophageal Echo

VT: Ventricular tachycardia

SUMMARY OF EVIDENCE

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease [10]

Study Design: The study is a report developed by the American College of Cardiology Appropriate Use Criteria Task Force, along with several other cardiovascular societies. It aims to provide appropriate use criteria (AUC) for multimodality imaging in nonvalvular heart disease. The clinical scenarios (indications) were developed by a diverse writing group and scored by an independent rating panel using standardized methodology.

Target Population: The target population includes patients with nonvalvular heart disease, encompassing various conditions such as heart failure, diseases of the aorta and pericardium, and any disorder involving abnormal cardiac structure or function excluding valvular diseases.

Key Factors:

Clinical Scenarios: The document covers 102 clinical scenarios representing patient presentations encountered in everyday practice. These scenarios were developed based on the most current American College of Cardiology/American Heart Association Clinical Practice Guidelines.

Imaging Modalities: The study evaluates multiple imaging modalities, including transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiovascular magnetic resonance imaging (CMR), computed tomography (CT), and others.

Appropriateness Ratings: Each clinical scenario was rated on a scale of 1 to 9, with scores of 7 to 9 indicating that a modality is considered appropriate, scores of 4 to 6 indicating that a modality may be appropriate, and scores of 1 to 3 indicating that a modality is considered rarely appropriate.

Objective: The primary objective is to provide a framework for the assessment of these scenarios by practices that will improve and standardize physician decision-making.

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease [15]

Study Design: The study was conducted by the American College of Cardiology (ACC) Appropriate Use Criteria Task Force in collaboration with several other professional organizations, including the American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. The study aimed to develop AUC for multimodality imaging in the diagnosis and management of VHD.

Target Population: The target population includes patients with valvular heart disease, encompassing a wide range of clinical scenarios from asymptomatic patients at risk of developing VHD to patients with severe symptoms requiring surgical intervention. The study also addresses the use of imaging modalities in patients undergoing transcatheter aortic valve replacement (TAVR) and percutaneous mitral valve repair.

Key Factors

Clinical Scenarios: The study developed 92 clinical scenarios representing patient presentations encountered in everyday practice. These scenarios were evaluated and rated by an independent rating panel on a scale of 1 to 9.

Imaging Modalities: The study assessed the appropriateness of various imaging modalities, including transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiac computed tomography (CCT), cardiovascular magnetic resonance imaging (CMR), and others.

Rating System: The clinical scenarios were rated as Appropriate (scores 7-9), May Be Appropriate (scores 4-6), or Rarely Appropriate (scores 1-3) based on the expected incremental information, combined with clinical judgment, and the expected negative consequences.

Methodology: The study used a standardized methodology to develop the clinical scenarios and indications, which were reviewed and critiqued by the parent AUC Task Force and numerous external reviewers1. The scenarios were then rated by an independent panel to ensure an appropriate balance of specialized expertise and general practice.

ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients With Congenital Heart Disease [20]

Study Design: The study was conducted by the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, along with several other cardiovascular societies. It involved the development of appropriate use criteria (AUC) for multimodality imaging during the follow-up care of patients with congenital heart disease (CHD). The criteria were developed using guidelines, clinical trial data, and expert opinion in the field of CHD. The writing group developed 324 clinical indications, which were separated into 19 tables according to the type of cardiac lesion. These scenarios were presented to an independent panel for rating, with each being scored on a scale of 1 to 9, with 1 to 3 categorized as "Rarely Appropriate," 4 to 6 as "May Be Appropriate," and 7 to 9 as "Appropriate".

Target Population: The target population includes both pediatric and adult patients with established congenital heart disease. The criteria address cardiac imaging in adult and pediatric patients with established CHD, focusing on evaluation before and after cardiac surgery or catheter-based intervention, routine surveillance, and evaluation of new-onset signs or symptoms.

Key Factors:

Indications: The study developed 324 clinical indications related to the follow-up care of patients with CHD. These indications were categorized into 19 tables based on the type of cardiac lesion.

Imaging Modalities: The study evaluated the use of various noninvasive cardiac imaging modalities, including transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiovascular magnetic resonance (CMR), cardiovascular computed tomography (CCT), stress imaging, and lung scan.

Rating System: Each clinical scenario was rated on a scale of 1 to 9, with 1 to 3 categorized as "Rarely Appropriate," 4 to 6 as "May Be Appropriate," and 7 to 9 as "Appropriate." The ratings were based on clinical practice guidelines, expert opinion, and available evidence.

Outcomes: The study aimed to provide guidance to clinicians in the care of patients with established CHD by identifying reasonable imaging modality options for evaluation and surveillance. It also aimed to serve as an educational and quality improvement tool to identify patterns of care and reduce the number of rarely appropriate tests in clinical practice.

ANALYSIS OF EVIDENCE

Shared Findings [10,15,20]**:**

1. **Appropriate Use Criteria (AUC)**: All three articles focus on the development and application of Appropriate Use Criteria for multimodality imaging in different contexts of heart disease. They emphasize the importance of standardized methodology and evidence-based guidelines to improve patient care and outcomes.
2. **Multimodality Imaging**: Each article discusses the use of various imaging modalities such as transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiovascular magnetic resonance (CMR), cardiovascular computed tomography (CCT), and stress imaging. They highlight the strengths and limitations of these modalities in different clinical scenarios.
3. **Evaluation and Surveillance**: The articles address the need for routine surveillance and evaluation of patients with heart disease, whether valvular, non-valvular, or congenital. They provide guidelines on the frequency and appropriateness of imaging tests based on patient symptoms, clinical status, and specific heart conditions.

POLICY HISTORY

Date	Summary
July 2025	• This guideline merges two Evolent guidelines with identical clinical criteria: ECG 7297-01 for Heart MRI and ECG 028 for Heart MRI into Evolent Clinical Guideline 7297 for Heart Magnetic Resonance Imaging (MRI) ○ This guideline also merges Procedure Codes from these two Evolent guidelines • Added new bullet-point to the General Statement section • Added indications for myocardial iron overload and imaging in known genetic conditions • Checked the Medicare Advantage box in the Applicable Lines of Business table • Added a Summary of Evidence and Analysis of Evidence • Updated references

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7298 for Heart Positron Emission Tomography (PET) with Computed Tomography (CT) for Attenuation

Guideline Number: Evolent_CG_7298	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

TABLE OF CONTENTS

STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Special Note

Indications for determining medical necessity for myocardial perfusion imaging (MPI) with appropriate preference for suitable alternatives, such as stress echocardiography (SE), when more suitable, unless otherwise stated (see **Definitions** section).

Indicated when all the criteria for MPI are met **AND** there is likely to be equivocal imaging results because of body mass index (BMI), large breasts or implants, mastectomy, chest wall deformity, pleural or pericardial effusion, or prior thoracic surgery or results of a prior MPI. [1,2] (**AUC Score 7**) [3]

See Legislative Language for specific mandates in **Washington**.

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [4–8]

INDICATIONS FOR HEART PET WITH CT FOR ATTENUATION [9]

Suspected Coronary Artery Disease (CAD) [10–12]

When neither SE nor MPI have provided or are expected to provide optimal imaging

- **Symptomatic patients without known CAD** (use **Diamond Forrester Table** [13,14]) (**AUC Score 9**) [3]
  - Intermediate pretest probability and unable to exercise
  - High pretest probability
  - Repeat testing in a patient with new or worsening symptoms and negative result at least one year ago **AND** meets one of the criteria above
- **Asymptomatic patients without known CAD**
  - Previously unevaluated ECG evidence of possible myocardial ischemia including substantial ischemic ST segment or T wave abnormalities (see **Background** section) [12]
  - Previously unevaluated pathologic Q waves (**AUC Score 6**) [3] (see **Background** section)
  - Unevaluated complete left bundle branch block (**AUC Score 8**) [3]

Abnormal Calcium Scores (CAC) [3,10]

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- STABLE SYMPTOMS with a prior Coronary Calcium Agatston Score of >100. No prior MPI done within the last 12 months (**AUC Score 7**) [10]
- ASYMPTOMATIC high global CAD risk patient with a prior Coronary Calcium Agatston Score of >100. No prior MPI done within the last 12 months [15]
- ASYMPTOMATIC patient with Coronary Calcium Agatston Score > 400 (or a qualitative assessment where 'severe' coronary artery calcification is stated in a report incidentally detected on CT imaging performed for other clinical indications) No prior stress imaging done within the last 12 months) [16]

Inconclusive CAD Evaluation and Obstructive CAD remain a Concern

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- Exercise stress ECG with low-risk Duke treadmill score (≥ 5) (see **Background** section) but patient's current symptoms indicate an intermediate or high pretest probability
- Exercise stress ECG with an intermediate Duke treadmill score (**AUC Score 8**) [3]

- Inconclusive/borderline coronary computed tomography angiography (CCTA) or Single Positron Emission Tomography (SPECT) nuclear stress testing (e.g., 40 - 70% lesions) (**AUC Score 8**) [3,10]
- Cardiac PET stress-rest perfusion and metabolic activity study (with ^{18}F-FDG PET) is appropriate in patients with ischemic cardiomyopathy to determine myocardial viability prior to revascularization following an inconclusive SPECT [10] (**AUC Score 9**) [3]
- Non-diagnostic exercise stress test with physical inability to achieve target heart rate (THR)
- An intermediate evaluation by prior stress imaging
- Coronary stenosis of unclear significance on previous coronary angiography [10] (**AUC Score 8**) [3]

Follow-Up Of Patient's Post Coronary Revascularization Percutaneous Coronary Intervention (PCI) or Coronary Artery Bypass Graft (CABG)

When neither SE nor MPI have provided, or are expected to provide, optimal imaging and any of the following [10]:

- **Asymptomatic, follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG), or percutaneous coronary intervention (PCI), (whichever is later), is appropriate only for patients with:
  - High risk: diabetes with accelerated progression of CAD, Chronic Kidney Disease (CKD), peripheral artery disease (PAD), prior brachytherapy, in-stent restinosis (ISR), or saphenous venous graft (SVG) intervention.
  - A history of silent ischemia or
  - A history of a prior left main stent
- For patients with high occupational risk (e.g., associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers, and firefighters)

New, recurrent, or worsening symptoms post coronary revascularization are an indication for stress imaging, if it will alter management

Follow-Up Of Known CAD [10]

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or FFR ≤ 0.80 or significant stenosis in a major vessel (≥ 50% left main coronary artery or ≥ 70% left anterior descending (LAD), left circumflex (LCX) or right coronary artery (RCA))), over two years ago, without intervening coronary revascularization is an appropriate indication for stress imaging in patients if it will alter

management

- When there is a change in symptoms or functional capacity that persists despite guideline directed medical therapy [11]

Special Diagnostic Conditions Requiring Coronary Evaluation

When neither SE nor MPI have provided, or are expected to provide, optimal imaging

- **Unevaluated Acute Coronary Syndrome**
  - Prior acute coronary syndrome (as documented in MD notes), without subsequent invasive or non-invasive coronary evaluation within the last 12 months
  - Has ventricular wall motion abnormality demonstrated by another imaging modality and myocardial perfusion imaging is being performed to determine if the patient has myocardial ischemia. No imaging stress test within the last 12 months
- **Heart Failure**
  - Newly diagnosed systolic heart failure or diastolic heart failure, with *reasonable suspicion of cardiac ischemia (prior events, risk factors)*, unless invasive coronary angiography is immediately planned or adequate stress imaging has been done within the last 12 months [10] (**AUC Score 9**) [3]
- **Viability**
  - Reduced left ventricular ejection fraction (LVEF) ≤ 50% requiring myocardial viability assessment to assist with decisions regarding coronary revascularization. (Diversion from PET not required when LVEF less than or equal to 40%) (**AUC Score 9**) [3]
- **Ischemia and Nonobstructive Coronary Artery Disease (INOCA)**
  - To diagnose microvascular dysfunction in patients with persistent stable anginal chest pain with suspected ischemia and nonobstructive coronary artery disease (INOCA), as documented in provider notes (*no MPI diversion required*).
- **Arrhythmias**
  - Ventricular arrhythmias
    - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not the immediately planned test (**AUC Score 7**) [10]
    - Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, frequent premature ventricular contractions (PVC) (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed [3,10]
- **Anti-arrhythmic Drug Therapy**
  - Class IC antiarrhythmic drug
    - In the intermediate (**AUC Score 6**) [3] and high (**AUC Score 7**) [3] global risk

patient prior to initiation of Class IC antiarrhythmic drug initiation (Propafenone or Flecainide) (**AUC Score 7**) [10]

- Annually for intermediate and high global risk patients taking Class IC antiarrhythmic drug (Propafenone or Flecainide) (**AUC Score 7**) [3]

- **Coronary Anomaly and Aneurism**
  - Assessment of hemodynamic significance of one of the following documented conditions:
    - Anomalous coronary arteries [17] (**AUC Score 7**) [3]
    - Muscle bridging of coronary artery [18]
  - Coronary aneurysms in Kawasaki's disease [19] (**AUC Score 8**) [3] or due to atherosclerosis
- **Radiation**
  - Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter [20]
- **Cardiac Sarcoidosis**
  - May be approved as a combination study with MPI for the evaluation and treatment of sarcoidosis [3,21]
    - Evaluation and therapy monitoring in patients with sarcoidosis, after documentation of suspected cardiac involvement by echo or ECG, when cardiac magnetic resonance imaging (CMR) has not been performed
    - Evaluation of suspected cardiac sarcoid, after CMR has shown equivocal or negative findings in the setting of a high clinical suspicion
    - Evaluation of CMR findings showing highly probable cardiac sarcoidosis, when PET could serve to identify inflammation and the consequent potential role for immunosuppressive therapy [22] (**AUC Score 9**) [3]
    - Initial and follow-up PET in monitoring therapy for cardiac sarcoid with immunosuppressive therapy, typically about 4 times over 2 years
- **Infective Endocarditis**
  - In suspected infective endocarditis with moderate to high probability (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device), when transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) have been inconclusive with respect to diagnosis of infective endocarditis or characterization of paravalvular invasive complications [23]
- **Aortitis**
  - For diagnosis and surveillance of Aortitis, PET/CT or PET/MRI hybrid imaging [24]
  - **NOTE**: If PET/MRI study is requested, there is no specific CPT Code for this imaging study and a Health Plan review will be required. study is requested, there is no specific CPT Code for this imaging study and a Health Plan review will be required.

Prior To Elective Non-Cardiac Surgery

When neither SE nor MPI have provided or are expected to provide optimal imaging

- An intermediate or high-risk surgery with of one or more risk factors (see below), **AND** documentation of an inability to walk (or < 4 METs) **AND** there has not been an imaging stress test within 1 year [25–28]
    - **Risk factors**: history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine > 2.0 mg/dL.
    - **Surgical Risk**:
        - **High risk surgery**: Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
        - **Intermediate risk surgery**: Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery
        - **Low risk surgery**: Endoscopic procedures, superficial procedure, cataract surgery, breast surgery
- Planning for any organ or stem cell transplantation is an indication for preoperative stress imaging, if there has not been a conclusive stress evaluation, computed tomography angiography (CTA), or heart catheterization within the past year, at the discretion of the transplant service [29]

Post Cardiac Transplant

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography [30]

LEGISLATIVE REQUIREMENTS

Washington

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease [31]

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
  - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
  - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:
  - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
  - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
  - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of CAD, or
  - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
  - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

CODING AND STANDARDS

Codes

78429, 78430, 78431, 78432, 78433, +78434, 78459, 78472, 78491, 78492, 93015, 93016, 93017, 93018, A9555

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

General Overview [1,2]

A PET study is a diagnostic test used to evaluate blood flow to the heart. During the test, a small amount of radioactive tracer is injected into a vein. A special camera, called a gamma camera, detects the radiation released by the tracer to produce computer images of the heart. Combined with a medication, the test can help determine if there is adequate blood flow to the heart during activity versus at rest. The medication simulates exercise for patients unable to exercise on a treadmill or stationary cycle.

PET prefusion studies illustrate myocardial blood flow by demonstrating tracer uptake. PET metabolic evaluation studies are used to demonstrate inflammation produced by infiltrative disease such as sarcoidosis, but also enhance the detection of viable (hibernating) myocardium. Hybrid PET-CT scanning combines anatomical information with blood flow assessment and is useful for assessing viable myocardium, especially in chronic heart failure patients with global ischemia, or in patients with multivessel diffuse coronary artery disease as opposed to focal stenotic lesions.

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [5]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories [3,10,11]:
  - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section).
  - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD (below):
- The THREE Types of Chest Pain or Discomfort
  - **Typical Angina (Definite)** is defined as including all **3** characteristics:
    - Substernal chest pain or discomfort with characteristic quality and duration
    - Provoked by exertion or emotional stress
    - Relieved by rest and/or nitroglycerine
  - **Atypical Angina (Probable)** has only **2** of the above characteristics

- **Nonanginal Chest Pain/Discomfort** has only **0 - 1** of the above characteristics

- The medical record should provide enough detail to establish the type of chest pain. From those details, the pretest probability of obstructive CAD is estimated from the Diamond Forrester Table below, recognizing that in some cases multiple additional coronary risk factors could increase pretest probability [3,10,11]:

Diamond Forrester Table [13,14]

Age (Years)	Gender	Typical/ Definite Angina Pectoris	Atypical/ Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: < 5% pretest probability of CAD, usually not requiring stress evaluation

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CAD

- An uninterpretable baseline ECG includes [11]:
  - ST segment depression 1 mm or more; (not for non-specific ST- T wave changes)
  - Ischemic looking T waves; at least 2.5 mm inversions (excluding V1 and V2)
  - Bundle Branch Blocks (BBB)
    - Left BBB
    - Right BBB or intraventricular conduction delay (IVCD), either containing ST or T wave abnormalities (see above)
  - Left ventricular hypertrophy (LVH) with repolarization abnormalities
  - Ventricular paced rhythm
  - Digitalis use with associated ST segment abnormalities

- Resting HR under 50 bpm on a medication, such as beta-blockers or calcium channel blockers, that is required for patient's treatment and cannot be stopped, with an anticipated suboptimal workload

- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
  - 40 ms (1 mm) wide
  - 2 mm deep
  - 25% of depth of QRS complex
- ECG Stress Test Alone versus Stress Testing with Imaging
  - Prominent scenarios suitable for an ECG stress test **WITHOUT** imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3 minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise [10]:
    - The (symptomatic) low or intermediate pretest probability patient who can exercise and has an interpretable ECG [10]
    - The patient who is under evaluation for exercise-induced arrhythmia
    - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
    - For the evaluation of syncope or presyncope during exertion [32]
- Duke Exercise ECG Treadmill Score [33]
  - Calculates risk from ECG treadmill alone:
    - The equation for calculating the Duke treadmill score (DTS) is: DTS = exercise time in minutes - (5 x ST deviation in mm or 0.1 mV increments) - (4 x exercise angina score), with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
    - The score typically ranges from - 25 to + 15. These values correspond to low-risk (with a score of ≥ + 5), intermediate risk (with scores ranging from - 10 to + 4), and high-risk (with a score of ≤ - 11) categories
- Coronary application of PET includes evaluation of stable patients without known CAD, who fall into two categories [3,10,11]
  - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see Websites for Global Cardiovascular Risk Calculators section).
  - **Symptomatic**, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant (≥ 50%) CAD (below)
- Global Risk of Cardiovascular Disease
  - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known

cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years. **High global risk by itself generally lacks scientific support as an indication for stress imaging**. There are rare exceptions, such as patients requiring IC antiarrhythmic drugs who might require coronary risk stratification prior to initiation of the drug.

- **CAD Risk—Low**
  - 10-year absolute coronary or cardiovascular risk less than 10%
- **CAD Risk—Moderate**
  - 10-year absolute coronary or cardiovascular risk between 10% and 20%
- **CAD Risk—High**
  - 10-year absolute coronary or cardiovascular risk of greater than 20%

*Websites for Global Cardiovascular Risk Calculators** *(34–38)*

Risk Calculator	Websites for Online Calculator
Framingham Cardiovascular Risk	**https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk**
Reynolds Risk Score Can use if no diabetes Unique for use of family history	**http://www.reynoldsriskscore.org/**
Pooled Cohort Equation	**http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example**
ACC/AHA Risk Calculator	**http://tools.acc.org/ASCVD-Risk-Estimator/**
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	**https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx**

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

- Definitions of Coronary Artery Disease [11]
  - Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).
    - Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. Its incorporation into global risk can be achieved by using the Multi-Ethnic Study of Atherscleroses (MESA) risk calculator.
    - Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:
      - Suggested by percentage diameter stenosis ≥ 70% by angiography; intermediate lesions are 50 – 69%
      - For a left main artery, suggested by a percentage stenosis ≥ 50% or minimum lumen cross-sectional area on IVUS ≤ 6 square mm [11,39]
      - FFR (fractional flow reserve) ≤ 0.80 for a major vessel [39]
      - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree
    - A major vessel would be a coronary vessel that would be amenable to revascularization if indicated. This assessment is made based on the diameter of the vessel and/or the extent of myocardial territory served by the vessel.
    - FFR (fractional flow reserve) is the distal to proximal pressure ratio across a coronary lesion during maximal hyperemia induced by either intravenous or intracoronary adenosine. Less than or equal to 0.80 is considered a significant reduction in coronary flow.
    - Newer technology that estimates FFR from CCTA image is covered under the Evolent Clinical Guideline 7293 for Fractional Flow Reserve CT.
- Anginal Equivalent [11,32]
  - Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons to suspect that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia), by presentation of clinical data, such as respiratory rate, oximetry, lung exam, etc. (as well as d-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Most syncope per se is not an anginal equivalent.

Acronyms/Abbreviations

ADLs: Activities of daily living

BMI: Body mass index

CABG: Coronary artery bypass grafting

CAC: Coronary artery calcium

CAD: Coronary artery disease

CCTA: Coronary computed tomography angiography

CMR: Cardiac magnetic resonance imaging

CT(A): Computed tomography (angiography)

DTS: Duke Treadmill Score

ECG: Electrocardiogram

FFR: Fractional flow reserve

IVUS: Intravascular ultrasound

LBBB: Left bundle-branch block

LVEF: Left ventricular ejection fraction

LVH: Left ventricular hypertrophy

MESA: Multi-Ethnic Study of Atherosclerosis

MET: Estimated metabolic equivalent of exercise

MI: Myocardial infarction

MPI: Myocardial perfusion imaging

MR(I): Magnetic resonance (imaging)

PCI: Percutaneous coronary intervention

PET: Positron emission tomography

PFT: Pulmonary function test

PVCs: Premature ventricular contractions

SE: Stress echocardiography

TEE: Transesophageal echocardiography

THR: Target heart rate

TTE: Transthoracic echocardiography

VF: Ventricular fibrillation

VT: Ventricular tachycardia

WPW: Wolff-Parkinson-White

SUMMARY OF EVIDENCE

American Society of Nuclear Cardiology and Society of Nuclear Medicine and Molecular Imaging Joint Position Statement on the Clinical Indications for Myocardial Perfusion PET [1]

Study Design: The document is a joint position statement that summarizes the properties and clinical indications of myocardial perfusion PET. It is based on extensive clinical investigations and meta-analyses that demonstrate the advantages of PET over other noninvasive cardiac imaging modalities.

Target Population: The target population includes patients with known or suspected coronary artery disease (CAD) who meet appropriate criteria for a stress imaging test. This includes:

- Patients unable to complete a diagnostic-level exercise stress imaging study.
- Patients with prior stress imaging studies of poor quality or inconclusive results.
- High-risk patients, such as those with chronic kidney disease, diabetes mellitus, or suspected high-risk CAD.
- Young patients with established CAD who require repeated radiation-associated cardiac imaging procedures.

Key Factors:

1. **High Diagnostic Accuracy**: Myocardial perfusion PET has high sensitivity and specificity for detecting obstructive CAD, outperforming other noninvasive approaches.
2. **Consistent High-Quality Images**: PET images have high myocardial counts, spatial and contrast resolution, and accurate correction for tissue attenuation and scatter.
3. **Low Radiation Exposure**: PET scans expose patients to less than 5 mSv, significantly lower than other radiation-based cardiac assessments.
4. **Short Acquisition Protocols**: Complete rest-stress studies can be acquired in less than one hour, making it convenient for acutely ill or high-risk patients.
5. **Quantification of Myocardial Blood Flow**: PET allows for the measurement of myocardial flow reserve, improving interpretation confidence and patient selection for interventions.
6. **Strong Prognostic Power**: PET provides high discrimination between different levels of risk in all patient populations, including obese and non-obese individuals, men and women, diabetics, and patients with renal dysfunction.

Appropriate Use Criteria for PET Myocardial Perfusion Imaging [3]

Study Design: The document is a consensus guideline developed by a multidisciplinary workgroup representing several medical specialty societies. It is based on a systematic review of the literature, expert opinion, and clinical practice guidelines. The study design includes the development of clinical scenarios, systematic synthesis of available evidence, individual and group ratings of clinical indications, and recommendations based on final group ratings and discussions.

Target Population: The target population includes patients with suspected or known coronary artery disease (CAD), asymptomatic patients, patients with diagnosed heart failure, patients with known or suspected cardiac sarcoidosis, patients with arrhythmias, patients with syncope, patients with coronary microvascular disease (CMD), specific populations such as those with advanced obesity or familial hypercholesterolemia, patients undergoing prior testing or procedures, patients undergoing preoperative evaluation for noncardiac surgery, and patients requiring determination of exercise level before initiation of exercise prescription or cardiac rehabilitation.

Key Factors

1. **Appropriate Use Criteria (AUC)**: The document outlines AUC for PET MPI in 11 sections, covering various clinical scenarios and patient populations.
2. **Diagnostic and Prognostic Value**: PET MPI is highlighted for its high diagnostic accuracy, sensitivity, and specificity in detecting CAD and CMD. It provides incremental prognostic information that affects clinical decision-making and treatment options.
3. **Clinical Scenarios**: The document includes detailed clinical scenarios with appropriateness scores, ranging from rarely appropriate to appropriate, based on the likelihood of PET MPI affecting clinical management and outcomes.
4. **Methodology**: The AUC development process follows the RAND/UCLA Appropriateness Method, including systematic review, evidence synthesis, individual and group ratings, and consensus recommendations.
5. **Outcome Data**: The document emphasizes the importance of outcome data in guiding the use of PET MPI, particularly in high-risk populations and specific clinical contexts.

ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease [10]

Study Design: The study is a report by the American College of Cardiology (ACC) Solution Set Oversight Committee, in collaboration with several other cardiovascular societies. It updates the prior AUC for various cardiovascular imaging modalities, including radionuclide imaging, stress echocardiography, calcium scoring, coronary computed tomography angiography (CCTA), stress cardiac magnetic resonance (CMR), and invasive coronary angiography.

Target Population: The target population includes patients with known or suspected CCD, which encompasses stable ischemic heart disease (SIHD). The clinical scenarios cover both symptomatic and asymptomatic patients, with and without prior testing or revascularization.

Key Factors:

Clinical Scenarios: The document outlines 64 clinical scenarios for the detection and risk assessment of CCD, drawn from common applications and current clinical practice guidelines.

Rating Process: The clinical scenarios were rated by an independent panel using a modified Delphi process. Ratings were categorized as Appropriate (7-9), May Be Appropriate (4-6), or Rarely Appropriate (1-3).

Updates and Changes: Key changes include the removal of preoperative testing scenarios, simplification of clinical scenario tables, and incorporation of new evidence and guidelines.

Assumptions: The study assumes that each test is performed and interpreted by trained professionals, and that patients are receiving optimal standard care.

Advantages and Limitations: The document provides a table outlining the advantages and limitations of various imaging modalities, such as echocardiography, SPECT, PET, CMR, CCTA, and invasive angiography.

ANALYSIS OF EVIDENCE

Shared Conclusions [1,3,10]**:**

1. **Importance of PET MPI**: All three articles emphasize the significance of PET myocardial perfusion imaging (MPI) in diagnosing and managing coronary artery disease (CAD). They highlight its high diagnostic accuracy, ability to quantify myocardial blood flow, and prognostic value.
2. **Diagnostic Accuracy**: The articles agree on the high sensitivity and specificity of PET MPI for detecting obstructive CAD. They also note its superiority over other noninvasive imaging modalities in certain clinical scenarios.
3. **Prognostic Value**: The prognostic power of PET MPI is a common theme. The ability to predict future cardiovascular events and guide clinical decision-making is emphasized across all three studies.
4. **Clinical Utility**: The articles discuss the clinical utility of PET MPI in various patient populations, including those with suspected or known CAD, heart failure, and other cardiovascular conditions.

POLICY HISTORY

Date	Summary
July 2025	● This guideline merges two Evolent guidelines with identical clinical criteria: ECG 7298-01 for Heart PET with CT for Attenuation and ECG 079 for Heart PET with CT for Attenuation into Evolent Clinical Guideline 7298 for Heart Positron Emission Tomography (PET) with Computed Tomography (CT) for Attenuation ○ This guideline also merges Procedure Codes from these two Evolent guidelines ● Added new bullet-point to the General Statement section ● Checked the Medicare Advantage box in the Applicable Lines of

Date	Summary
	Business table ● Added a Summary of Evidence and Analysis of Evidence

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7311 for Multiple Gated Acquisition Scan (MUGA)

Guideline Number: Evolent_CG_7311	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose [1–3]

Multiple-gated acquisition (MUGA) scanning uses radiolabeled red blood cells to scan right and left ventricular images in a cine loop format that is synchronized with the electrocardiogram.

A prior MUGA scan is not an indication for repeat MUGA (if another modality would be suitable, i.e., transthoracic echocardiography (TTE)).

Special Note

See legislative language for specific mandates in **Washington** State

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [4–8]

INDICATIONS FOR MULTIPLE GATED ACQUISITION (MUGA) SCAN [9]

- To evaluate left ventricular function in a patient with coronary artery disease, valvular heart disease, myocardial disease, or congenital heart disease, in any of the following scenarios:
  - When ventricular function is required for management, and TTE or other imaging has proven inadequate [1,10]
  - Radionuclide ventriculography is being performed for assessment of right ventricular (RV) function with no prior MUGA done within the last 3 months
- In the course of treatment with cardiotoxic medication when TTE images are inadequate to evaluate left ventricular systolic function [1,10–13]:
  - Baseline assessment prior to initiation of therapy
  - Monitoring during therapy. The frequency of testing should be left to the discretion of the ordering provider but in the absence of new abnormal findings, generally no more often than every 6 weeks while on active therapy
  - Long term surveillance after completion of therapy may be required, especially for those who have been exposed to anthracycline medication. The frequency of testing is generally every 6-12 months, or at the discretion of the provider

LEGISLATIVE LANGUAGE

Washington

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease [14]

Number and Coverage Topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
  - Symptomatic adult patients (≥18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
  - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:

- Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.

- Positron Emission Tomography (PET) for:
  - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
  - Symptomatic adult patients (≥18 years of age) at intermediate or high risk of CAD, or
  - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
  - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

CODING AND STANDARDS

Codes

78472, 78473, 78494, +78496, A9512, A9560

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

The two types of radionuclide studies commonly used for cardiac evaluation are myocardial perfusion imaging and ventriculography. Myocardial perfusion imaging is used primarily for the evaluation of coronary artery disease. Ventriculography is sometimes referred to as multiple gated acquisition scanning (MUGA) and is primarily used to evaluate valvular disease and cardiomyopathies. Either type of study may be obtained at rest or stress.

Radionuclide Ventriculography is a medical imaging test used to determine a patient's cardiac function in the right, or more typically, left ventricle. Cardiac ventriculography involves injecting a radioisotope into the heart's ventricle(s) through a peripheral vein to measure the volume of blood pumped. Both regional and global left ventricular function (ejection fraction) as well as left ventricular size is measured.

AUC Score

A reasonable diagnostic or therapeutic procedure care can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost effective manner. [5]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Acronyms / Abbreviations

EF: Ejection fraction

MUGA: Multiple gated acquisition (nuclear scan of ventricular function)

TTE: Transthoracic echocardiography

SUMMARY OF EVIDENCE

2013 ACCF/ACR/ASE/ASNC/SCCT/SCMR Appropriate Utilization of Cardiovascular Imaging in Heart Failure [1]

Study Design: The study is a joint report by the American College of Radiology Appropriateness Criteria Committee and the American College of Cardiology Foundation Appropriate Use Criteria Task Force. It involves a multidisciplinary rating panel comprising imagers, cardiovascular clinicians, general practitioners, and outcomes experts. The panel assessed the appropriateness of imaging procedures for various clinical indications in heart failure patients using a modified Delphi exercise.

Target Population: The target population includes patients with heart failure, which is a rapidly growing epidemic affecting approximately 5.8 million patients in the United States. The study focuses on patients with suspected, incompletely characterized, or known heart failure, including those with ischemic and nonischemic etiologies.

Key Factors

- **Prevalence and Clinical Significance**: Heart failure is a significant cause of morbidity and mortality, with a 5-year mortality rate of approximately 50% after diagnosis.
- **Economic Impact**: Annual medical expenditures related to heart failure in the United States exceed $39.2 billion.
- **Imaging Modalities**: The study evaluates various imaging modalities, including echocardiography, cardiovascular magnetic resonance (CMR), single-photon emission

computed tomography (SPECT), positron emission tomography (PET), cardiovascular computed tomography (CCT), and conventional diagnostic cardiac catheterization.

- **Clinical Scenarios**: The study identifies key clinical scenarios for imaging use, such as newly suspected heart failure, evaluation for ischemic etiology, viability evaluation, consideration and follow-up for implantable cardioverter-defibrillator (ICD) or cardiac resynchronization therapy (CRT), and repeat evaluation of heart failure.
- **Appropriateness Criteria**: The study provides detailed criteria for the appropriateness of imaging procedures based on clinical indications, emphasizing the importance of balancing risk and benefit in the context of available resources.

ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2009 Appropriate Use Criteria for Cardiac Radionuclide Imaging [(2)]

Study Design: The study conducted by the American College of Cardiology Foundation (ACCF) and several other specialty societies aimed to revise the original Single-Photon Emission Computed Tomography Myocardial Perfusion Imaging (SPECT MPI) Appropriateness Criteria published four years earlier. The revision was necessary to reflect changes in test utilization, new clinical data, and to clarify RNI use where omissions or lack of clarity existed in the original criteria. The study involved developing 67 clinical scenarios by a writing group and scoring them by a separate technical panel on a scale of 1 to 9 to designate appropriate use, inappropriate use, or uncertain use.

Target Population: The target population for this study included patients with various cardiovascular conditions where cardiac RNI is frequently considered. This included patients with coronary artery disease (CAD), acute coronary syndrome (ACS), heart failure, atrial fibrillation, ventricular tachycardia, syncope, elevated troponin levels, and those undergoing preoperative evaluation for noncardiac surgery.

Key Factors

- **Appropriate Use Criteria (AUC)**: The study aimed to provide guidance on the appropriate use of cardiac RNI for diverse clinical scenarios. The criteria were expected to be useful for clinicians, healthcare facilities, and third-party payers engaged in the delivery of cardiovascular imaging.
- **Clinical Scenarios**: The study developed 67 clinical scenarios that were scored by the technical panel. The scenarios included detection of CAD, risk assessment without ischemic equivalent, risk assessment with prior test results and/or known chronic stable CAD, risk assessment within 3 months of an ACS, postrevascularization, assessment of viability/ischemia, and evaluation of ventricular function.
- **Scoring System**: The technical panel scored each indication on a scale of 1 to 9, with scores 7-9 indicating appropriate use, 4-6 indicating uncertain use, and 1-3 indicating inappropriate use.
- **Impact on Clinical Decision Making**: The results of the study were anticipated to have a significant impact on physician decision making, test performance, and reimbursement policy, and to help guide future research.

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease [9]

Study Design: The study is a report developed by the American College of Cardiology Appropriate Use Criteria Task Force, along with several other cardiovascular societies. It aims to provide appropriate use criteria (AUC) for multimodality imaging in nonvalvular heart disease. The clinical scenarios (indications) were developed by a diverse writing group and scored by an independent rating panel using standardized methodology.

Target Population: The target population includes patients with nonvalvular heart disease, encompassing various conditions such as heart failure, diseases of the aorta and pericardium, and any disorder involving abnormal cardiac structure or function excluding valvular diseases.

Key Factors:

- **Clinical Scenarios**: The document covers 102 clinical scenarios representing patient presentations encountered in everyday practice. These scenarios were developed based on the most current American College of Cardiology/American Heart Association Clinical Practice Guidelines.
- **Imaging Modalities**: The study evaluates multiple imaging modalities, including transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiovascular magnetic resonance imaging (CMR), computed tomography (CT), and others.
- **Appropriateness Ratings**: Each clinical scenario was rated on a scale of 1 to 9, with scores of 7 to 9 indicating that a modality is considered appropriate, scores of 4 to 6 indicating that a modality may be appropriate, and scores of 1 to 3 indicating that a modality is considered rarely appropriate.
- **Objective**: The primary objective is to provide a framework for the assessment of these scenarios by practices that will improve and standardize physician decision-making.

ANALYSIS OF EVIDENCE

Shared Conclusions [1,2,9]

1. **Appropriate Use Criteria (AUC)**: All three articles emphasize the importance of appropriate use criteria (AUC) in guiding clinical decision-making for cardiovascular imaging. They highlight the need for standardized methodologies to evaluate the appropriateness of various imaging modalities in different clinical scenarios.
2. **Multimodality Imaging**: The articles agree on the value of multimodality imaging in assessing cardiac structure and function. They discuss the use of echocardiography, cardiovascular magnetic resonance (CMR), single-photon emission computed tomography (SPECT), positron emission tomography (PET), and computed tomography (CT) in various clinical contexts.
3. **Clinical Guidelines**: Each article references clinical guidelines from the American College of Cardiology (ACC) and the American Heart Association (AHA) to support their

recommendations. They emphasize the importance of adhering to these guidelines to ensure high-quality cardiovascular care.

POLICY HISTORY

Date	Summary
July 2025	● This guideline merges two Evolent guidelines with identical clinical criteria: ECG 7311-01 for Multiple Gated Acquisition Scan and ECG 027 for Multiple Gated Acquisition Scan into Evolent Clinical Guideline 7311 for Multiple Gated Acquisition Scan (MUGA) ○ This guideline also merges Procedure Codes from these two Evolent guidelines ● Added new bullet-point to the General Statement section ● Added a Summary of Evidence and Analysis of Evidence

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such

criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7312 for Myocardial Perfusion Imaging (MPI)

Guideline Number: Evolent_CG_7312	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Special Note

Medical necessity for myocardial perfusion imaging (MPI) will consider the preference for appropriate alternatives, such as stress echocardiography (SE), when deemed more suitable, unless contraindications are present (see **DEFINITIONS** section). Preference toward stress echocardiography will be denoted by SE

See legislative language for specific mandates in **Washington** State.

When a noncardiac explanation is provided for symptoms, no testing is required **(AUC Score 8)** [1]

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [2–6]

INDICATIONS FOR MPI [1,7–10]

Suspected Coronary Artery Disease (CAD)

- **Symptomatic patients without known CAD. No imaging stress test within the last 12 months.** *The terms "typical," "atypical," and "non-anginal symptoms" can still be observed in medical records (consult the **Diamond Forrester table** in the **Definitions** section). However, the American College of Cardiology (ACC) has simplified its terminology to "Less likely anginal symptoms" and "Likely anginal symptoms" (refer to definitions) and utilized below.*
  - Less likely anginal symptoms **(AUC Score 6)** [1]
    - When a patient cannot walk a treadmill
    - When baseline EKG makes standard exercise test inaccurate (see **Definitions** section).SE
  - Likely Anginal Symptoms (typical angina) [1]
    - < 50 years old with ≤ one risk factor if an ECG treadmill test cannot be done. **AUC scores for this bullet point are identical for MPI, stress echo, and ETT **(AUC Score 7)**. Although the ACC guideline does not specify youth and gender, decisions should be guided by best medical judgment, considering factors such as safety and radiation exposure.
    - ≥ 50 years old **(AUC Score 8)** [1]
  - Repeat testing in a patient with new or worsening symptoms **AND** negative result at least one year prior **AND** meets one of the criteria aboveSE
- **Asymptomatic patients without known CAD (AUC Score 7)** [1]
  - A pharmacologic MPI is indicated for those unable to exercise with previously unevaluated ECG evidence of possible myocardial ischemia including ischemic ST segment or T wave abnormalities (see **DEFINITIONS** section).
  - Previously unevaluated pathologic Q waves (see **DEFINITIONS** section)
  - Previously unevaluated complete left bundle branch block

Abnormal Calcium Scores [1,11–14]

- STABLE SYMPTOMS with a prior Coronary Calcium Agatston Score of >100. No prior stress imaging done within the last 12 months **(AUC Score 7)** [1] SE
- ASYMPTOMATIC high global CAD risk patient with a prior Coronary Calcium Agatston Score of >100. No prior stress imaging done within the last 12 months SE
- ASYMPTOMATIC patient with Coronary Calcium Agatston Score > 400 (or a qualitative assessment where 'severe' coronary artery calcification is stated in a report incidentally detected on CT imaging performed for other clinical indications). No prior stress imaging done within the last 12 months [15] SE

Inconclusive CAD Evaluation and Obstructive CAD

REMAINS A CONCERN:

- Exercise stress ECG with low-risk Duke treadmill score (≥5), (see **DEFINITIONS** section) but patient's current symptoms indicate increasing likelihood of disease (**AUC score 8)** [1]
- Exercise stress ECG with an intermediate Duke treadmill score SE *(of note, SE diversion is not required* for symptoms consistent with likely anginal symptoms)
- Intermediate coronary computed tomography angiography (CCTA) (40 - 70% lesions) performed less than 90 days ago. **(AUC Score 7)** [1]
- Non-diagnostic exercise stress test with inability to achieve target heart rate (THR) defined as greater than 85% age predicted maximal heart rate by physiologic exercise
- An indeterminate (equivocal, borderline, or discordant) evaluation by prior stress imaging (SE or CMR) within the last 12 months
- Coronary stenosis of unclear significance on previous coronary angiography not previously evaluated [1]

Follow-Up of Patient's Post Coronary Revascularization (PCI or CABG) [1]

Any ONE of the following:

- **Asymptomatic follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI) (whichever is later) is appropriate for patients with: **(AUC Score 6)** [1] SE *(of note, SE diversion is not required* for post CABG patients)
  - **High risk:** diabetes with accelerated progression of CAD, chronic kidney disease (CKD), peripheral artery disease (PAD), prior brachytherapy, in-stent restenosis (ISR), or saphenous venous graft (SVG) intervention.
  - A history of silent ischemia or
  - A history of a prior left main stent
- For patients with high occupational risk, associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers and firefighters SE (of note, *SE diversion not required for post-CABG patients*)
- **New, recurrent, or worsening symptoms, treated medically or by revascularization** is an indication for stress imaging, if it will alter management for typical anginal symptoms or symptoms documented to be similar to those prior to revascularization if no imaging stress test within the last 12 months. **(AUC Score 8)** [1,16]

Follow-Up of Known CAD

- **Follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive

assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or fractional flow reserve (FFR) ≤ 0.80 or significant stenosis in a major vessel (≥ 50% left main coronary artery or ≥ 70 % left-anterior descending (LAD), left circumflex (LCX), right coronary artery (RCA))), over two years ago, without intervening coronary revascularization is an appropriate indication for stress imaging in patients if it will alter management. SE [1]

Special Diagnostic Conditions Requiring Coronary Evaluation

Unevaluated Acute Coronary Syndrome

- Prior acute coronary syndrome (with documentation in MD notes), without invasive or non-invasive coronary evaluation within last 12 months
- Has ventricular wall motion abnormality demonstrated by another imaging modality and myocardial perfusion imaging is being performed to determine if the patient has myocardial ischemia. No imaging stress test within the last 12 months

Heart Failure

- Newly diagnosed systolic heart failure or diastolic heart failure, *with reasonable suspicion of cardiac ischemia (prior events, risk factors*), unless invasive coronary angiography is immediately planned. [8,17–19] No imaging stress test done within the last 12 months.

Viability

- Left ventricular ejection fraction (LVEF) requiring myocardial viability assessment to assist with decisions regarding coronary revascularization **(AUC Score 9)** [1,16]

Suboptimal Revascularization

- MPI is being done to evaluate the effectiveness of the intervention in a high-risk patient who has undergone cardiovascular re-perfusion (CABG or Percutaneous Coronary Intervention, PCI) with suboptimal and/or incomplete revascularization results. No imaging stress test has been done within the last 12 months. **(AUC Score 7)** [1,16]

Arrhythmias

- Ventricular arrhythmias **(AUC Score 7)** [1]
    - Sustained ventricular tachycardia (VT) > 100 bpm, ventricular fibrillation (VF), or exercise-induced VT, when invasive coronary arteriography is not immediately planned [20]
    - Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, or frequent premature ventricular contractions (PVC) (defined as greater than or equal to 30/hour on remote monitoring) without known cause or associated cardiac pathology, when an exercise ECG cannot be performed [21]

Anti-Arrhythmic Drug Therapy

- Class IC antiarrhythmic drug
  - In the intermediate and high global risk patient prior to initiation of Class IC antiarrhythmic drug initiation (Propafenone or Flecainide)
  - Annually in intermediate and high global risk patients taking Class IC antiarrhythmic drug (Propafenone or Flecainide) [22]

Coronary Anomaly and Aneurism

- Assessment of hemodynamic significance of one of the following documented conditions:
  - Anomalous coronary arteries [23]
  - Myocardial bridging of coronary artery [24]
- Coronary aneurysms in Kawasaki's disease [25] or due to atherosclerosis

Radiation and Chemotherapy SE

- Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter [26]

Sarcoidosis and Amyloidosis (PYP study)

- Cardiac sarcoidosis: as a combination study with Heart PET for the evaluation and treatment of cardiac sarcoidosis [27]
- Cardiac amyloidosis: for the diagnosis of cardiac transthyretin amyloidosis (ATTR)

***Not** to be used for the diagnosis of cardiac light chain amyloidosis (AL) [28]

Prior To Elective Non-Cardiac Surgery In Asymptomatic Patient

- An intermediate or high-risk surgery with of one or more risk factors (see below), AND documentation of an inability to walk (or <4 METs) AND there has not been an imaging stress test within 1 year [29–31]
  - **Risk factors:** history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine >2.0 mg/dL
  - **Surgical Risk:**
    - **High risk surgery:** Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
    - **Intermediate risk surgery:** Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery

- **Low risk surgery**: Endoscopic procedures, superficial procedure, cataract surgery, breast surgery

- Planning for any organ or stem cell transplantation is an indication for preoperative MPI, if there has not been a conclusive stress evaluation, computed tomography angiography (CTA), or heart catheterization within the past year, at the discretion of the transplant service. [32,33]

Post Cardiac Transplant (SE Diversion Not Required)

- Annually, for the first five years post cardiac transplantation, in a patient not undergoing invasive coronary arteriography

LEGISLATIVE LANGUAGE

Washington

20211105A - Noninvasive Cardiac Imaging for Coronary Artery Disease [34]

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
  - Symptomatic adult patients (≥18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
  - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:
  - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
  - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
  - Symptomatic adult patients (≥18 years of age) at intermediate or high risk of CAD, or
  - Adult patients with known CAD who have new or worsening symptoms.

- CCTA with Fractional Flow Reserve (FFR) for:
    - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

CODING AND STANDARDS

Codes

78451, 78452, 78453, 78454, 78466, 78468, 78469, 78481, 78483, 78499, 93015, 93016, 93017, 93018, +0742T, A9500, A9502, A9505, J0153, J1245, J2785

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

Myocardial perfusion imaging is used primarily for the evaluation of coronary artery disease and determining prognosis. Myocardial perfusion imaging is a cardiac radionuclide imaging procedure that evaluates blood flow to the cardiac muscle during rest or stress. Stress may be provided by exercise or with pharmacologic agents. A variety of radionuclides may be used, including Technetium tc-99M sestamibi, thallium201 and Technetiumtc-99M tetrofosmin.

For those patients who are unable to complete the exercise protocol without achieving >85% of predicted maximal heart rate, a pharmacological nuclear stress test is recommended. This testing method uses a drug to mimic the response of the cardiovascular system to exercise. Adenosine, Persantine, Dobutamine, or Regadenoson are vasodilators used in pharmacological nuclear stress testing. A gamma camera is used to record images in planar or tomographic (single photon emission computed tomography, SPECT) projections.

High global CAD risk is defined as 10-year CAD risk of >20%. CAD equivalents (e.g., DM, PAD) can also define high risk.

10-year CAD risk (%) is defined based on the risk factors- Sex, Age, Race, Total Cholesterol, HDL Cholesterol, Systolic Blood Pressure, and Treatment for High Blood Pressure, Diabetes Mellitus, and Smoker.

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [3]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories [1,8,9]:
  - **Asymptomatic**, for whom global risk of CAD events can be determined from coronary risk factors, using calculators available online (see **Websites for Global Cardiovascular Risk Calculators** section).
  - **Symptomatic,** for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD (below):
- The medical record should provide enough detail to establish the type of chest pain:
  - **Likely Anginal symptoms** encompass chest/epigastric/shoulder/arm/jaw pain, chest pressure/discomfort occurring with exertion or emotional stress and relieved by rest, nitroglycerine or both.
  - **Less-Likely Anginal symptoms** include dyspnea, or fatigue not relieved by rest/nitroglycerin, as well as generalized fatigue or chest discomfort with a time course not indicative of angina (e.g., resolving spontaneously within seconds or lasting for an extended period unrelated to exertion).
- **Risk Factors for Coronary disease include (but not limited to)**: diabetes mellitus, smoking, family history of premature CAD (men age less than 55, females less than 65), hypertension, dyslipidemia.
- Beginning 2023, the classification terms for angina were updated within the ACC's Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease to **Less Likely Anginal Symptoms** and **Likely Anginal Symptoms** as in #2. Previously, the document referred to "Typical Angina", "Atypical Angina" and "Non-Anginal" symptoms, defined by the **Diamond Forrester Table**. We still provide this information for your reference [1,8,9]:

Diamond Forrester Table [35,36]

Age (Years)	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40-49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50-59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: < 5% pretest probability of CAD, usually not requiring stress evaluation; **Low:** 5 - 10% pretest probability of CAD; **Intermediate:** 10% - 90% pretest probability of CAD; **High:** > 90% pretest probability of CAD

- An uninterpretable baseline ECG includes [8]:
  - ST segment depression is considered significant when there is 1 mm or more, not for non-specific ST - T wave changes
  - Ischemic looking T waves are considered significant when there are at least 2.5 mm inversions (excluding V1 and V2)
  - Bundle Branch Blocks (BBB)
  - Left BBB
  - Right BBB or intraventricular conduction delay (IVCD), containing ST or T wave abnormalities
  - LVH with repolarization abnormalities
  - Ventricular paced rhythm
  - Digitalis use with associated ST segment abnormalities
  - Resting HR under 50 bpm on a medication, such as beta-blockers or calcium channel blockers, that is required for patient's treatment and cannot be stopped, with an anticipated suboptimal workload
- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
  - 40 ms (1 mm) wide

- 2 mm deep
- 25% of depth of QRS complex

- ECG Stress Test Alone versus Stress Testing with Imaging
- Prominent scenarios suitable for an ECG stress test WITHOUT imaging (i.e., exercise treadmill ECG test) require that the patient can exercise for at least 3 minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise [1]:
  - The (symptomatic) low or intermediate pretest probability patient who can exercise and has an interpretable ECG [1]
  - The patient who is under evaluation for exercise-induced arrhythmia
  - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
  - For the evaluation of syncope or presyncope during exertion [37]
  - When exercise cannot be performed, pharmacologic stress can be considered.
- Duke Exercise ECG Treadmill Score [38]
  - Calculates risk from ECG treadmill alone**:**
    - The equation for calculating the Duke treadmill score (DTS) is: DTS = exercise time in minutes - (5 x ST deviation in mm or 0.1 mV increments) - (4 x exercise angina score), with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting
    - The score typically ranges from - 25 to + 15. These values correspond to low-risk (with a score of ≥ + 5), intermediate risk (with scores ranging from - 10 to + 4), and high-risk (with a score of ≤ - 11) categories
- MPI may be performed without diversion to a SE in any of the following [1,39]:
  - Inability to Exercise
    - Physical limitations precluding ability to exercise for at least 3 full minutes of Bruce protocol
    - Limited functional capacity (< 4 METS) **such as one** of the following:
    - Unable to take care of their ADLs or ambulate
    - Unable to walk 2 blocks on level ground
    - Unable to climb 1 flight of stairs
  - Other Comorbidities
    - Severe chronic obstructive pulmonary disease (COPD) with pulmonary function test (PFT) documentation, severe shortness of breath on minimal exertion, or requirement of home oxygen during the day
    - Poorly controlled hypertension, with systolic BP > 180 or diastolic BP > 120 (and clinical urgency not to delay MPI)

- ECG and Echo-Related Baseline Findings
  - Prior cardiac surgery (coronary artery bypass graft or valvular)
  - Documented poor acoustic imaging window
  - Left ventricular ejection fraction ≤ 40%
  - Pacemaker or ICD
  - Persistent atrial fibrillation
  - Resting wall motion abnormalities that would make SE interpretation difficult
  - Complete left bundle branch block (LBBB)
- Risk-Related scenarios
  - High pretest probability in suspected CAD
  - Intermediate or high global risk in patients requiring type IC antiarrhythmic drugs (prior to initiation of therapy and annually)
  - Arrhythmia risk with exercise
  - Previously unevaluated pathologic Q waves (in two contiguous leads)

- Global Risk of Cardiovascular Disease
  - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years.
    - **CAD Risk—Low**
      10-year absolute coronary or cardiovascular risk less than 10%.
    - **CAD Risk—Moderate**
      10-year absolute coronary or cardiovascular risk between 10% and 20%.
    - **CAD Risk—High**
      10-year absolute coronary or cardiovascular risk of greater than 20%.

*Websites for Global Cardiovascular Risk Calculators** *(40–44)*

Risk Calculator	Websites for Online Calculator
Framingham Cardiovascular Risk	**https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk**
Reynolds Risk Score Can use if no diabetes Unique for use of family history	**http://www.reynoldsriskscore.org/**

Risk Calculator	Websites for Online Calculator
Pooled Cohort Equation	**http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example**
ACC/AHA Risk Calculator	**http://tools.acc.org/ASCVD-Risk-Estimator/**
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	**https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx**

*Patients who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.

Definitions [8,9,13,45]

- Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).
- Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. Its incorporation into global risk can be achieved by using the MESA risk calculator.
- Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate) generally implies at least one of the following:
    - Suggested by percentage diameter stenosis ≥ 70% by angiography; intermediate lesions are 50 – 69% [1]
    - For a left main artery, suggested by a percentage stenosis ≥ 50% [8,45,46]
    - FFR (fractional flow reserve) ≤ 0.80 for a major vessel [45,46]
    - Demonstrable ischemic findings on stress testing (ECG or stress imaging), that are at least mild in degree
- FFR (fractional flow reserve) is the distal to proximal pressure ratio across a coronary lesion. Less than or equal to 0.80 is considered a significant reduction in coronary flow.

Anginal Equivalent [8,37]

- Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons to suspect that symptoms other than chest discomfort are not

due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia). This may include respiratory rate, oximetry, lung exam, etc. (as well as d-dimer, chest CT(A), and/or pulmonary function tests (PFT), when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Syncope per se is not an anginal equivalent.

Acronyms / Abbreviations

ADLs: Activities of daily living

BSA: Body surface area in square meters

CABG: Coronary artery bypass grafting

CAD: Coronary artery disease

CMR: Cardiac magnetic resonance imaging

CTA: Computed tomography angiography

ECG: Electrocardiogram

FFR: Fractional flow reserve

IVUS: Intravascular ultrasound

LBBB: Left bundle-branch block

LVEF: Left ventricular ejection fraction

LVH: Left ventricular hypertrophy

MI: Myocardial infarction

MET: Estimated metabolic equivalent of exercise

MPI: Myocardial perfusion imaging

PCI: Percutaneous coronary intervention

PFT: Pulmonary function test

PVCs: Premature ventricular contractions

SE: Stress echocardiography

THR: Target heart rate

VT: Ventricular tachycardia

VF: Ventricular fibrillation

WPW: Wolf Parkinson White

SUMMARY OF EVIDENCE

2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease [8]

Study Design: The guideline is based on a comprehensive literature search conducted from September 2021 to May 2022. The search included clinical studies, systematic reviews, meta-analyses, and other evidence conducted on human participants. The databases used for the search included MEDLINE (through PubMed), EMBASE, the Cochrane Library, and the Agency for Healthcare Research and Quality. The guideline was developed by the American Heart Association (AHA) and the American College of Cardiology (ACC) Joint Committee on Clinical Practice Guidelines, in collaboration with and endorsed by several other professional organizations.

Target Population: The guideline is intended for clinicians in primary care and cardiology specialties who care for patients with CCD in the outpatient setting. The target population includes patients with chronic coronary disease, which encompasses a heterogeneous group of conditions such as obstructive and nonobstructive coronary artery disease (CAD) with or without previous myocardial infarction (MI) or revascularization, ischemic heart disease diagnosed only by noninvasive testing, and chronic angina syndromes with varying underlying causes.

Key Factors:

Epidemiology and General Principles: The guideline addresses the prevalence of CCD, which varies by age, sex, race, ethnicity, and geographic region. It also highlights the role of social determinants of health in both risk and outcomes from CCD.

Evaluation, Diagnosis, and Risk Stratification: The guideline recommends the use of stress testing, invasive coronary angiography, and other diagnostic tools to assess the presence and extent of myocardial ischemia and guide therapeutic decision-making.

Treatment: The guideline emphasizes a patient-centered approach to treatment, incorporating shared decision-making, social determinants of health, and team-based care. It includes recommendations for lifestyle modifications, pharmacologic therapies, and revascularization.

Special Populations: The guideline provides specific recommendations for managing CCD in special populations, including patients with heart failure, valvular heart disease, young adults, cancer, women (including pregnancy and postmenopausal hormone therapy), older adults, chronic kidney disease, HIV, autoimmune disorders, and heart transplant recipients.

Patient Follow-Up: The guideline recommends regular follow-up to assess symptoms, functional status, adherence to lifestyle and medical interventions, and monitoring for complications of CCD and its treatments.

Cost and Value Considerations: The guideline includes recommendations for discussing out-of-pocket costs with patients to preempt cost-related nonadherence and ensure access to effective therapies.

2024 ESC Guidelines for the management of chronic coronary syndromes [9]

Study Design: The guidelines were developed through a comprehensive review and evaluation

of the published literature on diagnostic and therapeutic approaches for chronic coronary syndromes. The task force performed a critical review of the scientific and medical knowledge available at the time of publication. The strength of each recommendation and the level of evidence supporting them were weighed and scored according to predefined scales. The guidelines were subject to multiple rounds of double-blind peer review by external experts, including members from across the ESC region, all National Cardiac Societies of the ESC, and relevant ESC subspecialty communities.

Target Population: The guidelines are intended for use by health professionals involved in the medical care of patients with chronic coronary syndromes. The target population includes patients with various clinical presentations of coronary artery disease during stable periods, particularly those preceding or following an acute coronary syndrome. The guidelines address the management of patients with suspected or confirmed chronic coronary syndromes, including those with obstructive and non-obstructive coronary artery disease, microvascular angina, and vasospastic angina.

Key Factors:

Diagnostic Testing: Recommendations for non-invasive and invasive diagnostic tests, including coronary computed tomography angiography (CCTA), stress echocardiography, myocardial perfusion imaging (SPECT/PET), cardiac magnetic resonance imaging (CMR), and invasive coronary angiography with coronary pressure assessment.

Risk Stratification: Assessment of clinical likelihood of obstructive coronary artery disease, estimation of adverse-event risk, and identification of high-risk patients.

Treatment: Guideline-directed medical therapy, lifestyle optimization, antianginal medication, antithrombotic therapy, lipid-lowering drugs, anti-inflammatory agents, and revascularization strategies.

Special Populations: Management of patients with heart failure, angina/ischaemia with non-obstructive coronary arteries, older adults, sex differences, high bleeding-risk patients, and patients with inflammatory rheumatic diseases, hypertension, atrial fibrillation, valvular heart disease, chronic kidney disease, cancer, and human immunodeficiency virus.

ASNC model coverage policy: 2023 cardiac positron emission tomography [7]

Study Design: The policy document is an update to the 2014 model coverage policy for cardiac PET imaging studies. It describes various clinical situations for which a cardiac PET study is currently indicated, supported by numerous references and cross-referenced with appropriate use criteria (AUC). The document includes new sections on the evaluation of coronary microvascular disease, myocardial viability, cardiac sarcoidosis, and infection.

Target Population: The target population includes patients with known or suspected ischemic heart disease (IHD), coronary artery disease (CAD), myocardial viability, cardiac sarcoidosis, and infection. The policy aims to simplify the process for payers to provide coverage for appropriate cardiac PET procedures and serves as a resource for ASNC members, the cardiology community, referring physicians, and patients.

Key Factors

Clinical Indications: The document details various indications under eight categories, justifying the medical necessity for each indication with evidence provided.

ICD-10 Codes: The policy includes ICD-10 Clinical Modification codes and how they pertain to each appropriate indication.

Evaluation of Coronary Microvascular Disease: The document highlights the importance of PET in evaluating coronary microvascular disease, myocardial viability, cardiac sarcoidosis, and infection.

Radiation Exposure: The policy discusses the radiation exposure associated with cardiovascular PET imaging and emphasizes the goal of reducing radiation exposure without affecting image quality or accuracy.

Coding Guidelines: The document provides detailed coding guidelines for ICD-10 codes, Bill Type codes, Revenue Codes, and CPT/HCPCS codes.

ANALYSIS OF EVIDENCE

Shared Conclusions [7–9]

All three articles emphasize the importance of comprehensive management strategies for chronic coronary disease (CCD) and chronic coronary syndromes (CCS). They highlight the need for a multidisciplinary approach, including lifestyle modifications, pharmacological treatments, and revascularization when necessary.

Diagnostic Approaches

- **Horgan et al 2023 JNuclCardiol**: This article focuses on the use of positron emission tomography (PET) for myocardial perfusion imaging (MPI) and metabolic imaging. It discusses the clinical indications for cardiac PET, including its diagnostic accuracy and prognostic value. [7]
- **Virani et al 2023 JACC**: This guideline provides a detailed approach to the evaluation, diagnosis, and risk stratification of patients with chronic coronary disease. It emphasizes the use of non-invasive imaging techniques such as coronary computed tomography angiography (CCTA) and stress echocardiography. [8]
- **Vrints et al 2024 EurHeartJ**: This guideline outlines a stepwise approach to the initial management of individuals with suspected chronic coronary syndrome. It includes recommendations for history taking, risk factor assessment, and the use of various diagnostic tests, including CCTA and stress echocardiography. [9]

Treatment Strategies

- **Horgan et al 2023 JNuclCardiol**: The article discusses the role of PET MPI in guiding therapeutic decision-making, including the assessment of myocardial blood flow and the evaluation of myocardial viability. [7]
- **Virani et al 2023 JACC**: This guideline provides recommendations for the management of patients with chronic coronary disease, including the use of guideline-directed management and therapy (GDMT), revascularization, and the management of special populations. [8]

- **Vrints et al 2024 EurHeartJ**: The guideline emphasizes the importance of patient education, lifestyle optimization, and exercise therapy. It also discusses the use of antianginal and anti-ischemic medications, antithrombotic therapy, and lipid-lowering drugs. [9]

POLICY HISTORY

Date	Summary
July 2025	• This guideline merges two Evolent guidelines with identical clinical criteria: ECG 7312-01 for Myocardial Perfusion Imaging and ECG 024 for Myocardial Perfusion Imaging into Evolent Clinical Guideline 7312 for Myocardial Perfusion Imaging (MPI) ○ This guideline also merges Procedure Codes from these two Evolent guidelines • Added new bullet-point to the General Statement section • Added a Summary of Evidence and Analysis of Evidence • Updated references

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7328 for Stress Echocardiogram

Guideline Number: Evolent_CG_7328	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

This guideline is for stress imaging, specifically Stress Echocardiography (SE) with appropriate preference for suitable alternatives, such as an exercise treadmill exam without imaging, when more suitable, unless otherwise stated (refer to **Background section**).

Special Note

See Legislative Language for specific mandates in **Washington**.

When a noncardiac explanation is provided for symptoms, no testing is required **(AUC Score 8)** [1]

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [2–6]

INDICATIONS FOR STRESS ECHOCARDIOGRAPHY (1,7–10)

Suspected Coronary Artery Disease (CAD)

- **Symptomatic patients without known CAD. No imaging stress test within the last 12 months.** The terms 'typical', 'atypical', and 'non-anginal symptoms' can still be observed in medical records (consult the **Diamond Forrester table** in the **Definitions** section). However, the American College of Cardiology (ACC) has simplified its terminology to 'Less likely anginal symptoms' and 'Likely anginal symptoms' (refer to **Definitions**) and utilized below.
  - Less-likely anginal symptoms
    - When baseline EKG makes standard exercise test inaccurate (see **Definitions** section) **(AUC Score 8)** (1)
  - Likely Anginal Symptoms (typical angina)
    - < 50 years old with ≤ one risk factor if an electrocardiogram (ECG) treadmill test cannot be done. **AUC scores for this bullet point are identical for myocardial perfusion imaging (MPI), stress echo, and exercise tolerance test (ETT) **(AUC Score 7).** (1) Although the ACC guideline does not specify youth and gender, decisions should be guided by best medical judgment, considering factors such as safety and radiation exposure.
    - ≥ 50 years old **(AUC Score 8)** (1)
  - Repeat testing in patient with new or worsening symptoms and negative result at least one year ago **AND** meets one of the criteria above
- **Asymptomatic patients without known CAD**
  - Previously unevaluated ECG evidence of possible myocardial ischemia including ischemic ST segment or T wave abnormalities (see **Background** section)
  - Previously unevaluated pathologic Q waves (see **Background** section)
  - Previously unevaluated complete left bundle branch block

Abnormal Calcium Scores (11,12)

- STABLE SYMPTOMS with a prior Coronary Calcium Agatston Score of >100. No prior stress imaging done within the last 12 months (1,11) **(AUC Score 7)** (1)
- ASYMPTOMATIC high global CAD risk patient with a prior Coronary Calcium Agatston Score of >100. No prior stress imaging done within the last 12 months (11,13)
- ASYMPTOMATIC patient with Coronary Calcium Agatston Score > 400 (or a qualitative assessment where 'severe' coronary artery calcification is stated in a report incidentally detected on CT imaging performed for other clinical indications) No prior stress imaging done within the last 12 months (14)

Inconclusive CAD Evaluation and Obstructive CAD Remains a Concern

- Exercise stress ECG with low-risk Duke treadmill score ≥5, but patient's current symptoms indicate an indicate increasing likelihood of disease
- Exercise stress ECG with an intermediate Duke treadmill score **(AUC 8)** [1]
- A previously unevaluated ventricular wall motion abnormality demonstrated by another imaging modality and stress echo is being performed to determine if the patient has myocardial ischemia [1,15] **(AUC Score 5)** [1]
- Intermediate coronary computed tomography angiography (CCTA) defined as 40%-70% lesion **(AUC Score 7)** [1]
- Coronary stenosis of unclear significance on previous coronary angiography not previously evaluated

Follow-Up of Patient's Post Coronary Revascularization (PCI or CABG) [1]

- **Asymptomatic follow-up stress imaging** at a minimum of 2 years post coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI) (whichever is later) is appropriate for patients with:
  - **High risk:** diabetes with accelerated progression of CAD, chronic kidney disease (CKD), peripheral artery disease (PAD), prior brachytherapy, In-Stent Restenosis (ISR), or saphenous vein graph (SVG) intervention **(AUC Score 7)** [1]
  - A history of silent ischemia **(AUC Score 7)** [1]
  - A history of a prior left main stent **(AUC Score 5)** [1]
- For patients with high occupational risk, associated with public safety, airline and boat pilots, bus and train drivers, bridge and tunnel workers/toll collectors, police officers and firefighters
- **New, recurrent, or worsening symptoms, treated medically or by revascularization** is an indication for stress imaging, if it will alter management for typical anginal symptoms or symptoms documented to be similar to those prior to revascularization if no imaging stress test within the last 12 months. **(AUC Score 8)** [1,11]

Follow-Up of Known CAD [1]

- **Routine follow-up of asymptomatic or stable symptoms** when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or fractional flow reserve (FFR) ≤ 0.80 or significant stenosis in a major vessel (≥ 50% left main coronary artery or ≥ 70% left anterior descending artery (LAD), left circumflex artery (LCX), right coronary artery (RCA)), over two years ago without intervening coronary revascularization, is an appropriate indication for stress imaging

Special Diagnostic Conditions Requiring Coronary Evaluation

- Prior acute coronary syndrome (with documentation in MD notes), within last 12 months, without a prior stress test or coronary angiography performed since that time
- Newly diagnosed systolic or diastolic heart failure, **with reasonable suspicion of cardiac ischemia (prior events, risk factors),** unless invasive coronary angiography is immediately planned [16]
- Ventricular arrhythmias [17]
    - Sustained ventricular tachycardia (VT) > 100 bpm **(AUC Score 7)** [1], ventricular fibrillation (VF) **(AUC Score 7)** [1], or exercise-induced VT **(AUC Score 8)** [1], when invasive coronary arteriography has not been performed
    - Non-sustained VT, multiple episodes, each ≥ 3 beats at ≥ 100 bpm, frequent premature ventricular contractions (PVCs) (defined as greater than or equal to 30/hour on remote monitoring), when an exercise ECG cannot be performed **(AUC Score 7)** [1]
- For intermediate and high-risk global patients who require initiation of Class IC antiarrhythmic drugs. It can be performed annually thereafter until discontinuation of drug use [17] **(AUC Score 7)** [1]
- Hemodynamic assessment of ischemia in one of the following documented conditions:
    - Anomalous coronary arteries in an asymptomatic individual without prior stress echocardiography **(AUC Score 8)** [18]
    - Myocardial bridging of a coronary artery [19]
- Coronary aneurysms in Kawasaki's disease [20]
- Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter [21] **(AUC Score 6)** [1]

Valvular

Evaluation with Inclusion of Doppler

- For the evaluation of aortic stenosis and flow (contractile) reserve in symptomatic patients with severe aortic stenosis by calculated valve area, low flow / low gradient, and ejection fraction < 50% [2,22]
- For evaluation of asymptomatic moderate or severe aortic stenosis (AS) for measurement of changes in valve hemodynamics [2,22] **(AUC Score 8)** [22]
- Non-severe aortic regurgitation (AR) with symptoms: Assessment of functional capacity and to assess for other causes of symptoms [2,22] **(AUC Score 7)** [22]
- For evaluation of mitral stenosis (MS) if there is [2,22]:
    - Exertional shortness of breath which suggests the amount of MS is worse than is seen on the resting echocardiogram **(AUC Score 8)** [22]

- For evaluation for mitral regurgitation (MR) if there is one of the following [2,22,23]:
  - Exertional shortness of breath which suggests the amount of MR is worse than is seen on the resting echocardiogram **(AUC Score 8)** [22]
  - The echocardiogram is not able to distinguish whether the MR is moderate or severe in a patient that is asymptomatic **(AUC Score 7)** [22]
- For symptomatic patients with hypertrophic cardiomyopathy (HCM), who do not have resting or provocable outflow tract gradient ≥ 50 mmHg on transthoracic echocardiogram (TTE), for detection and quantification of dynamic left ventricular outflow tract (LVOT) obstruction [24]
- For asymptomatic patients with HCM who do not have a resting or provocable outflow tract gradient ≥ 50 mmHg on TTE [24]

Diastolic Function

- For unexplained dyspnea and suspected heart failure with preserved left ventricular ejection fraction (LVEF) heart failure with preserved ejection fraction (HFpEF) with normal or equivocal diastolic function on resting images **(AUC Score 8)** [1]

Prior To Elective Non-Cardiac Surgery

- An intermediate or high-risk surgery with of one or more risk factors (see below), **AND** documentation of an inability to walk (or < 4 METs) **AND** there has not been an imaging stress test within 1 year [25–27] **(AUC Score 6)** [28]
  - **Risk factors:** history of ischemic heart disease, history of congestive heart failure, history of cerebrovascular disease, preoperative treatment with insulin, and preoperative serum creatinine >2.0 mg/dL.
  - **Surgical Risks:**
    - **High risk surgery:** Aortic and other major vascular surgery, peripheral vascular surgery, anticipated prolonged surgical procedures associated with large fluid shifts and/or blood loss
    - **Intermediate risk surgery:** Carotid endarterectomy, head and neck surgery, intraperitoneal and intrathoracic surgery, orthopedic surgery, prostate surgery
    - **Low risk surgery**: Endoscopic procedures, superficial procedure, cataract surgery, breast surgery

Pre Organ-Transplant

- Planning for any organ or stem cell transplantation is an indication for preoperative stress imaging, if there has not been a conclusive stress evaluation, CTA, or heart catheterization within the past year, at the discretion of the transplant service **(AUC Score 6)** [28]

Post Cardiac Transplantation

- Annually, post cardiac transplantation, in a patient not undergoing invasive coronary arteriography

LEGISLATIVE LANGUAGE

Washington

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease [(29)]

Number and coverage topic:

20211105A – Noninvasive Cardiac Imaging for Coronary Artery Disease

HTCC coverage determination:

Noninvasive cardiac imaging is a **covered benefit with conditions**.

HTCC reimbursement determination:

Limitations of coverage: The following noninvasive cardiac imaging technologies are **covered with conditions**:

- Stress echocardiography for:
  - Symptomatic adult patients (≥ 18 years of age) at intermediate or high risk of Coronary Artery Disease (CAD), or
  - Adult patients with known CAD who have new or worsening symptoms.
- Single Positron Emission Tomography (SPECT) for:
  - Patients under the same conditions as stress echocardiography when stress echocardiography is not technically feasible or clinically appropriate.
- Positron Emission Tomography (PET) for:
  - Patients under the same conditions as SPECT, when SPECT is not technically feasible or clinically appropriate.
- Coronary Computed Tomographic Angiography (CCTA) for:
  - Symptomatic adult patients (≥18 years of age) at intermediate or high risk of CAD, or
  - Adult patients with known CAD who have new or worsening symptoms.
- CCTA with Fractional Flow Reserve (FFR) for:
  - Patients under the same conditions as CCTA, when further investigation of functional significance of stenoses is clinically indicated.

Non-covered indicators:

N/A

Notes:

- Out of scope/data not reviewed for this decision:
  - Asymptomatic individuals, follow up of prior abnormal cardiac imaging studies, myocardial viability, preoperative evaluation
  - Patients presenting for evaluation of cardiac pathologies other than CAD
- This determination supersedes the following previous determinations:
  - Coronary Computed Tomographic Angiography for detection of Coronary Artery Disease (20081114A)
  - Cardiac Nuclear Imaging (20130920A)

CODING AND STANDARDS

Codes

+93320, +93321, +93325, 93350, 93351, +93352, +93356

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

Stress echocardiography is an exercise stress test which utilizes echocardiography to provide information on exercise tolerance, ischemic burden, and structural heart disease including valvular disease and provides analysis of left ventricular function.

Stress echocardiography (SE) refers to ultrasound imaging of the heart during exercise electrocardiography (ECG) testing, during which visualized wall motion abnormalities can provide evidence of potential significant coronary artery disease (CAD).

While drug-induced stress with dobutamine can be an alternative to exercise stress testing in patients who are unable to exercise, this guideline does not require use of this modality. Hence, reference in this document to SE predominantly refers to exercise stress echocardiography.

Although SE provides comparable accuracy without radiation risk, relative to myocardial perfusion imaging (MPI), scenarios which do not permit effective use of SE might be better suited for stress imaging with MPI, cardiovascular magnetic resonance imaging (CMR) or positron emission tomography (PET), or coronary computed tomography angiography (CCTA).

Cardiac Doppler ultrasound is a form of ultrasound that can detect and measure blood flow. Doppler ultrasound depends on the Doppler Effect, a change in the frequency of a wave resulting from the motion of a reflector, the red blood cell. There are three types of Doppler ultrasound performed during a cardiac Doppler examination:

- Pulsed Doppler
- Continuous wave Doppler
- Color flow Doppler

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [4]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Definitions

- Stable patients without known CAD fall into 2 categories [1,7,8]:
  - **Asymptomatic patients**, for whom Global Risk of CAD events can be determined from coronary risk factors using calculators available online (see **Websites for Global Cardiovascular Risk Calculators** section)
  - **Symptomatic patients,** for whom we estimate the Pretest Probability that their chest-related symptoms are due to clinically significant CAD (see below):
- The medical record should provide enough detail to establish the type of chest pain:
  - **Likely Anginal symptoms** encompass chest/epigastric/shoulder/arm/jaw pain, chest pressure/discomfort occurring with exertion or emotional stress and relieved by rest, nitroglycerine or both.
  - **Less-Likely Anginal symptoms** include dyspnea, or fatigue not relieved by rest/nitroglycerin, as well as generalized fatigue or chest discomfort with a time course not indicative of angina (e.g., resolving spontaneously within seconds or lasting for an extended period unrelated to exertion).
- **Risk Factors for Coronary disease include (but not limited to)**: diabetes mellitus, smoking, family history of premature CAD (men age less than 55, females less than 65), hypertension, dyslipidemia.
- Beginning 2023, the classification terms for angina were updated within the ACC's

Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease to **Less Likely Anginal Symptoms** and **Likely Anginal Symptoms** as in #2. Previously, the document referred to 'Typical Angina', 'Atypical Angina' and 'Non-Anginal' symptoms, defined by the **Diamond Forrester Table**. We still provide this information for your reference [1,7,8]:

Diamond Forrester Table [30,31]

Age (Years)	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Nonanginal Chest Pain
≤ 39	Men	Intermediate	Intermediate	Low
	Women	Intermediate	Very low	Very low
40 – 49	Men	High	Intermediate	Intermediate
	Women	Intermediate	Low	Very low
50 – 59	Men	High	Intermediate	Intermediate
	Women	Intermediate	Intermediate	Low
≥ 60	Men	High	Intermediate	Intermediate
	Women	High	Intermediate	Intermediate

Very low: < 5% pretest probability of CAD, usually not requiring stress evaluation

Low: 5 - 10% pretest probability of CAD

Intermediate: 10% - 90% pretest probability of CAD

High: > 90% pretest probability of CAD

- MPI may be performed without diversion to SE in any of the following [1,32]:
  - Inability to exercise
    - Physical limitations precluding ability to exercise for at least 3 full minutes of Bruce protocol
    - Limited functional capacity (< 4 metabolic equivalents) **such as one** of the following:
      - Cannot take care of their activities of daily living (ADLs) or ambulate
      - Cannot walk 2 blocks on level ground
      - Cannot climb 1 flight of stairs
      - Cannot vacuum, dust, do dishes, sweep, or carry a small grocery bag
  - Other Comorbidities

- Severe chronic obstructive pulmonary disease with pulmonary function test (PFT) documentation, severe shortness of breath on minimal exertion, or requirement of home oxygen during the day
- Poorly controlled hypertension, with systolic BP > 180 or Diastolic BP > 120 (and clinical urgency not to delay MPI)

- ECG and Echo-Related Baseline Findings
  - Prior cardiac surgery (coronary artery bypass graft or valvular)
  - Documented poor acoustic imaging window
  - Left ventricular ejection fraction ≤ 40%
  - Pacemaker or ICD
  - Persistent atrial fibrillation
  - Resting wall motion abnormalities that would make SE interpretation difficult
  - Complete left bundle branch block (LBBB)
- Risk-related scenarios
  - High pretest probability in suspected CAD
  - Intermediate or high global risk in patients requiring type IC antiarrhythmic drugs (prior to initiation of therapy and annually)
  - Arrhythmia risk with exercise
- Previously unevaluated pathologic Q waves (in two contiguous leads) defined as the following:
  - 40 ms (1 mm) wide
  - 2 mm deep
  - 25% of depth of QRS complex

- ECG Stress Test Alone versus Stress Testing with Imaging
  Prominent scenarios suitable for an ECG stress test **WITHOUT** imaging (i.e., exercise treadmill ECG test) are inferred from the guidelines presented above, often requiring that the patient can exercise for at least 3 minutes of Bruce protocol with achievement of near maximal heart rate **AND** has an interpretable ECG for ischemia during exercise [(1)]:
  - The (symptomatic) low or intermediate pretest probability patient who can exercise and has an interpretable ECG
  - The patient who is under evaluation for exercise-induced arrhythmia
  - For the evaluation of syncope or presyncope during exertion
  - The patient who requires an entrance stress test ECG for a cardiac rehab program or for an exercise prescription
  - When exercise cannot be performed, pharmacologic stress can be considered.
- Duke Exercise ECG Treadmill Score [(33)]

Calculates risk from ECG treadmill alone**:**

- The equation for calculating the Duke treadmill score (DTS) is: DTS = exercise time in minutes - (5 x ST deviation in mm or 0.1 mV increments) - (4 x exercise angina score), with angina score being 0 = none, 1 = non-limiting, and 2 = exercise-limiting.
- The score typically ranges from - 25 to + 15. These values correspond to low-risk (with a score of ≥ + 5), intermediate risk (with scores ranging from - 10 to + 4), and high-risk (with a score of ≤ -11) categories.

- An uninterpretable baseline ECG includes [7]:
  - ST segment depression is considered significant when there is 1 mm or more, not for non-specific ST- T wave changes
  - Ischemic looking T waves are considered significant when there are at least 2.5 mm inversions (excluding V1 and V2)
  - LVH with associated STT abnormalities, pre-excitation pattern such as WPW, a ventricular paced rhythm, or left bundle branch block
  - Digitalis use
  - Resting HR under 50 bpm on a medication, such as beta-blockers or calcium channel blockers, that is required for patient's treatment and cannot be stopped, with an anticipated suboptimal workload
- Global Risk of Cardiovascular Disease
  - **Global risk** of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to **asymptomatic** patients without known cardiovascular disease. It should be determined using one of the risk calculators below. A high risk is considered greater than a 20% risk of a cardiovascular event over the ensuing 10 years. High global risk by itself generally lacks scientific support as an indication for stress imaging. There are rare exemptions, such as patients requiring IC antiarrhythmic drugs, who might require coronary risk stratification prior to initiation of the drug.
    - **CAD Risk—Low**
      10-year absolute coronary or cardiovascular risk less than 10%.
    - **CAD Risk—Moderate**
      10-year absolute coronary or cardiovascular risk between 10% and 20%.
    - **CAD Risk—High**
      10-year absolute coronary or cardiovascular risk of greater than 20%.

*Websites for Global Cardiovascular Risk Calculators** [34–38]

Risk Calculator	Link to Online Calculator
Framingham Cardiovascular Risk	**https://reference.medscape.com/calculator/framingham-cardiovascular-disease-risk**
Reynolds Risk Score Can use if no diabetes Unique for use of family history	**http://www.reynoldsriskscore.org/**
Pooled Cohort Equation	**http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx?example**
ACC/AHA Risk Calculator	**http://tools.acc.org/ASCVD-Risk-Estimator/**
MESA Risk Calculator With addition of Coronary Artery Calcium Score, for CAD-only risk	**https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx**

*Patients who have known CAD are already at high global risk and are not applicable to the calculators.

- **Definitions of Coronary Artery Disease** [7,8,12,39,40]

  Percentage stenosis refers to the reduction in diameter stenosis when angiography is the method and can be estimated or measured using angiography or more accurately measured with intravascular ultrasound (IVUS).

  - Coronary artery calcification is a marker of risk, as measured by Agatston score on coronary artery calcium imaging. Its incorporation into Global Risk can be achieved by using the MESA risk calculator.
  - Ischemia-producing disease (also called hemodynamically or functionally significant disease, for which revascularization might be appropriate), generally implies at least one of the following:
    - Suggested by percentage diameter stenosis $\geq$ 70% by angiography; intermediate lesions are 50 – 69% [1]
    - For a left main artery, suggested by a percentage stenosis ≥ 50% or minimum lumen cross-sectional area on IVUS ≤ 6 square mm [7,40,41]

        - FFR (fractional flow reserve) ≤ 0.80 for a major vessel [40,41]
    - FFR (fractional flow reserve) is the distal to proximal pressure ratio across a coronary lesion during maximal hyperemia induced by either intravenous or intracoronary adenosine. Less than or equal to 0.80 is considered a significant reduction in coronary flow

- Anginal Equivalent [7,42,43]
    - Development of an anginal equivalent (e.g., shortness of breath, fatigue, or weakness) either with or without prior coronary revascularization should be based upon the documentation of reasons to suspect that symptoms other than chest discomfort are not due to other organ systems (e.g., dyspnea due to lung disease, fatigue due to anemia). This may include respiratory rate, oximetry, lung exam, etc. (as well as d-dimer, chest CT(A), and/or PFTs, when appropriate), and then incorporated into the evaluation of coronary artery disease as would chest discomfort. Syncope per se is not an anginal equivalent.

Acronyms/Abbreviations

ACC: American College of Cardiology

ADLs: Activities of daily living

CABG: Coronary artery bypass grafting surgery

CAD: Coronary artery disease

CCTA: Coronary computed tomography angiography

CKD: Chronic kidney disease

CMR: Cardiovascular magnetic resonance imaging

CT(A): Computed tomography (angiography)

DTS: Duke Treadmill Score

ECG: Electrocardiogram

ETT: Exercise tolerance test

FFR: Fractional flow reserve

HCM: Hypertrophic cardiomyopathy

ISR: : In-Stent Restenosis

IVUS: Intravascular ultrasound

LAD: Left anterior descending artery

LBBB: Left bundle-branch block

LCX: left circumflex artery

LVEF: Left ventricular ejection fraction

LVH: Left ventricular hypertrophy

LVOT: Left ventricular outflow tract

MESA: Multi-Ethnic Study of Atherosclerosis

MET: Estimated metabolic equivalent of exercise

MI: Myocardial infarction

MPI: Myocardial perfusion imaging

MR: Mitral regurgitation

MS: Mitral stenosis

PAD: peripheral artery disease

PCI: Percutaneous coronary intervention

PET: Positron emission tomography

PFT: Pulmonary function test

PVCs: Premature ventricular contractions

RCA: Right coronary artery

SE: Stress echocardiography

SPECT: Single-photon emission computed tomography

SVG: Saphenous vein graph

TTE: Transthoracic echocardiography

VT: Ventricular tachycardia

VF: Ventricular fibrillation

WPW: Wolff-Parkinson-White

SUMMARY OF EVIDENCE

ACC/AHA/ASE/ASNC/ASPC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2023 Multimodality Appropriate Use Criteria for the Detection and Risk Assessment of Chronic Coronary Disease [(1)]

Study Design: This document is an appropriate use criterion (AUC) for the detection and risk assessment of chronic coronary disease. It was developed by the American College of Cardiology Solution Set Oversight Committee and other specialty societies.

Target Population: Patients with known or suspected chronic coronary disease, including those with symptoms of ischemia, those without symptoms but at risk for atherosclerotic cardiovascular disease, and those with other cardiovascular conditions.

Key Factors: The AUC provides ratings for various diagnostic and prognostic tests, including stress testing, imaging, and invasive procedures. It aims to guide clinicians in selecting appropriate tests based on clinical scenarios, considering factors such as patient symptoms, prior testing, and risk factors. The document also includes a "no test" option for certain scenarios, emphasizing the importance of clinical judgment and patient preferences.

2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease [7]

Study Design: This document is a practice guideline for the diagnosis and management of patients with stable ischemic heart disease. It was developed by the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, along with other associations.

Target Population: Adult patients with stable known or suspected ischemic heart disease, including those with new-onset chest pain or stable pain syndromes.

Key Factors: The guideline covers various aspects such as clinical evaluation, risk assessment, treatment recommendations, and patient follow-up. It emphasizes the importance of patient involvement in decision-making and provides detailed recommendations for diagnosis, risk assessment, and treatment, including lifestyle modifications and medical therapy.

2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease [9]

Study Design: This guideline provides an update on the management of patients with chronic coronary disease, consolidating new evidence since the previous guidelines. It was developed by the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines.

Target Population: Patients with chronic coronary disease, including those with stable ischemic heart disease and those who have had a myocardial infarction or revascularization.

Key Factors: The guideline emphasizes a patient-centered approach, considering social determinants of health and incorporating shared decision-making and team-based care. It includes recommendations for lifestyle changes, medical therapy, revascularization, and management of special populations.

ANALYSIS OF EVIDENCE

Analysis [1,7,9]:

Stress echocardiography is consistently recognized as a valuable tool for diagnosing and managing patients with CAD and SIHD. The shared conclusions across the three articles highlight its diagnostic accuracy, non-invasive nature, and role in risk stratification. However, the articles differ in their focus on methodology, clinical scenarios, and technological advancements. The 2012 guidelines provide a foundational review of evidence, while the 2023 updates incorporate new studies and advancements in imaging technologies. The appropriate use criteria in the Winchester 2023 article offer practical guidance for clinicians in selecting the right test based on patient characteristics and clinical presentation.

Shared Conclusions:

- All three articles emphasize the diagnostic value of stress echocardiography in detecting myocardial ischemia and assessing cardiac function. Stress echocardiography is highlighted as a reliable method for evaluating patients with suspected coronary artery disease (CAD) and stable ischemic heart disease (SIHD).

- Stress echocardiography is consistently recommended for risk stratification in patients with known or suspected CAD. It helps in identifying patients at higher risk for adverse cardiovascular events, guiding therapeutic decision-making.
- The non-invasive nature of stress echocardiography is praised across all articles. It is considered a safer alternative to invasive procedures like coronary angiography, especially for initial diagnostic purposes

POLICY HISTORY

Date	Summary
July 2025	• This guideline merges and replaces two Evolent guidelines with identical clinical criteria: ECG 7328-01 for Stress Echocardiography and ECG 026 for Stress Echocardiography into Evolent Clinical Guideline 7328 for Stress Echocardiogram • Added in general information statement regarding guideline criteria development by reputable sources, standard of care, and best practices • Updated AUC scores • Applicable Line of Business adjusted – Medicare checked • Added a Summary of Evidence and Analysis of Evidence

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Clinical Services Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider

agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7336 for Transesophageal Echocardiogram (TEE)

Guideline Number: Evolent_CG_7336	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

Transesophageal echocardiography (TEE) enables cardiac ultrasound imaging from within the esophagus, which provides a window for enhanced quality images as well as additional views, beyond that acquired by standard transthoracic echocardiography (TTE).

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [1–5]

INDICATIONS FOR TRANSESOPHAGEAL ECHOCARDIOGRAPHY (TEE)

General Criteria [6,7]

- TEE may be performed after a nondiagnostic transthoracic echocardiogram (TTE) due to inadequate visualization of relevant structures, or if there is a high likelihood of a nondiagnostic TTE **(AUC Score 7)** [8]

Aortic Pathology

- Suspected acute aortic pathology, such as aortic dissection [9]
- Dilated aortic sinuses or ascending aorta on TTE **(AUC Score 7)** [8]
- Evaluation of aortic sinuses, sinotubular junction, or ascending aorta in patients with bicuspid aortic valve when morphology cannot be assessed by TTE, and other imaging including CT or MRI (Magnetic Resonance Imaging) have not been done **(AUC Score 7)** [8]

Valvular Disease [6,10]

- Discordance between clinical assessment and TTE assessment of the severity of mitral regurgitation (MR) **(AUC Score 9)** [6]
- Evaluation of mitral stenosis, when there is a discrepancy between clinical signs or symptoms, and TTE is inadequate **(AUC Score 6)** [6]
- Discordance between clinical assessment and TTE assessment of the severity of aortic regurgitation (AR) **(AUC Score 8)** [6]
- Evaluation of native or prosthetic valves with clinical signs or symptoms suggesting valve dysfunction, when TTE is inadequate **(AUC Score 8)** [6]
- Re-evaluation of known prosthetic valve dysfunction when it would change management or guide therapy, (and TTE is inadequate) **(AUC Score 7)** [6]

Infective Endocarditis [6,11]

- Suspected infective endocarditis (IE) of native valve, prosthetic valve, or endocardial lead with positive blood culture or new murmur **(AUC Score 8)** [6]
- Moderate to high pretest probability of IE (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device) when TTE is negative **(AUC Score 9)** [6]
- Re-evaluation of IE in a patient with a change in clinical status or cardiac examination (e.g., new murmur, embolism, persistent fever, heart failure (HF), abscess, or atrioventricular block) **(AUC Score 8)** [6]
- Re-evaluation of IE if the patient is at elevated risk for progression/complications or when the findings alter therapy, when TTE is inadequate **(AUC Score 6)** [6]

Cardiac Mass or Source of Emboli [8,11–13]

- Initial evaluation of patient to exclude cardiac origin of TIA or ischemic stroke **(AUC Score 7)** [8]
- Evaluation of cardiac mass, suspected tumor, or thrombus, when other cardiac imaging is inconclusive **(AUC Score 7)** [8]
- Re-evaluation of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation), when the findings would change therapy **(AUC Score 7)** [8]

Atrial Fibrillation/Flutter [12,13]

- Evaluation for clinical decision-making regarding anticoagulation, cardioversion, and/or radiofrequency ablation

TAVR (Transcatheter Aortic Valve Replacement/Repair) [6,14]

(AUC Score 7) [6]

- Pre-procedural assessment of annular size and shape, number of cusps, and degree of calcification, when computed tomography (CT) or CMR (Cardiovascular Magnetic Resonance) cannot be performed
- Post-procedural assessment of degree of aortic regurgitation (including valvular and paravalvular) with suspicion of valve dysfunction, if TTE is inadequate

Patent Foramen Ovale or Atrial Septal Defect [15]

- Evaluation for anatomy, potential cardiac source of emboli, and suitability for percutaneous device closure **(AUC Score 7)** [15]
- Evaluation post device closure with clinical concern for infection, malposition, embolization, or persistent shunt **(AUC Score 8)** [15]

Left Atrial Appendage Occlusion

- Evaluation of anatomy, potential cardiac source of emboli, and suitability for percutaneous occlusion device placement **(AUC Score 9)** [8]
- Surveillance at 45 days and 1 year or FDA (U.S. Food and Drug Administration) guidance/guidelines for follow-up to assess device stability and device leak, and exclude migration, displacement, or erosion [16] **(AUC Score 8)** [8]
    - Reassessment at 6 months if 45-day TEE shows incomplete closure of left atrial appendage [16]

Percutaneous Mitral Valve Repair [6]

- Determination of patient eligibility for percutaneous mitral valve procedures **(AUC Score 9)** [6]
- Procedural evaluation for percutaneous mitral valve procedures may be performed in addition to CT imaging [17]
- To exclude the presence of intracardiac mass, thrombus, or vegetation prior to (within 3 days of) the procedure **(AUC Score 9)** [6]

Hypertrophic Cardiomyopathy [17]

- When TTE is inconclusive in planning for myectomy, to exclude subaortic membrane or mitral regurgitation, or to assess need for septal ablation

Adult Congenital Heart Disease [15,18]

- Imaging with provocative maneuvers (Valsalva, cough) to assess the presence of right-to-left cardiac shunt **(AUC Score 7)** [15]
- Evaluation prior to planned repair of the following lesions when TTE, CMR, or CT are not adequate:
  - Isolated secundum atrial septal defect **(AUC Score 7)** [15]
  - Sinus venosus defect and/or partial anomalous pulmonary venous connection **(AUC Score 7)** [15]
  - Congenital mitral stenosis or mitral regurgitation **(AUC Score 7)** [15]
  - Subvalvular aortic stenosis **(AUC Score 7)** [15]
  - Transposition of the Great Arteries **(AUC Score 8)** [15]
- Evaluation postoperative or post catheter-based repair due to change in clinical status and/or new concerning signs or symptoms when TTE, CMR, or CT are not adequate **(AUC Score 7)** [15]

Ventricular Assist Devices [19]

- Preoperative evaluation of suitability for ventricular assist device (VAD) [8]
- Re-evaluation of VAD-related complication or suspected infection **(AUC Score 7)** [8]

CODING AND STANDARDS

Codes

93312, 93313, 93314, 93315, 93316, 93317, 93318, 93319, +93320, +93321, +93325, 96374

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [4]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Acronyms/Abbreviations

AR: Aortic regurgitation

CMR: Cardiac magnetic resonance

CT(A): Computed tomography (angiography)

HF: Heart failure

IE: Infective endocarditis

MR: Mitral regurgitation

MRI: Magnetic resonance imaging

TAVR: Transcatheter aortic valve replacement/repair

TEE: Transesophageal echocardiography

TIA: Transient ischemia attack

TTE: Transthoracic echocardiography

VAD: Ventricular assist device

SUMMARY OF EVIDENCE

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease [6]

Study Design: This document presents the 2017 Appropriate Use Criteria (AUC) for multimodality imaging in valvular heart disease. It was developed by the American College of Cardiology and other related societies.

Target Population: The criteria apply to patients with valvular heart disease, including those undergoing initial evaluation, follow-up, and pre- and post-procedural assessments.

Key Factors: The document provides a comprehensive framework for the appropriate use of various imaging modalities such as transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiac magnetic resonance (CMR), and computed tomography (CT). It includes detailed tables outlining the indications for each modality based on clinical scenarios

Transesophageal Versus Transthoracic Echocardiography for Assessment of Left Ventricular Diastolic Function [7]

Study Design: This study compares transesophageal echocardiography (TEE) and transthoracic echocardiography (TTE) for the assessment of left ventricular diastolic function (LVDF) in patients with systemic lupus erythematosus (SLE) and healthy controls.

Target Population: The study included 66 patients with SLE (mean age 36 years, 91% women) and 26 age- and sex-matched healthy volunteers (mean age 34 years, 85% women).

Key Factors: The study found that LVDF parameters were worse in SLE patients than in controls by both TEE and TTE. Most LVDF parameters were similar within each group by TEE and TTE, and the parameters were significantly correlated between the two techniques. The study supports the use of TEE for assessing LVDF in appropriate clinical settings.

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease [8]

Study Design: This document is the 2019 Appropriate Use Criteria for multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease. It was developed by the American College of Cardiology and other related societies.

Target Population: The criteria apply to patients with nonvalvular heart disease, including those undergoing initial evaluation, follow-up, and pre- and post-procedural assessments.

Key Factors: The document provides a comprehensive framework for the appropriate use of various imaging modalities such as TTE, TEE, CMR, and CT. It includes detailed tables outlining the indications for each modality based on clinical scenarios. The document also addresses the evaluation of cardiac structure and function in patients undergoing transcatheter interventions .

ANALYSIS OF EVIDENCE

Analysis [6–8]:

In summary, while all three documents support the use of TEE and TTE for cardiac imaging, Win et al. 2020 provides specific evidence for the use of TEE in assessing LVDF in SLE patients, demonstrating its diagnostic and prognostic value in this population. The Doherty et al. 2017 and 2019 documents offer comprehensive guidelines for the appropriate use of TEE and TTE in a wider range of cardiac conditions.

Shared Conclusions

- **TEE and TTE Utility**: All three documents highlight the utility of TEE and TTE in assessing cardiac function. Doherty et al. 2017 and 2019 emphasize the appropriate use of TEE and TTE in various clinical scenarios, while Win et al. 2020 specifically compares the two techniques for LVDF assessment.

- **Correlation of Parameters**: Win et al. 2020 found significant correlations between LVDF parameters assessed by TEE and TTE, suggesting that both techniques provide similar diagnostic value. This aligns with the general consensus in Doherty et al. 2017 and 2019 that TEE and TTE are valuable tools for cardiac imaging.

POLICY HISTORY

Date	Summary
July 2025	● This guideline merges and replaces two Evolent guidelines with identical clinical criteria: Evolent Clinical Guideline 7336-01 for Transesophageal Echocardiography and Evolent Clinical Guideline 066 for Transesophageal Echocardiography into Evolent Clinical Guideline 7336 for Transesophageal Echocardiogram (TEE) ○ This guideline also merges procedural codes from these two Evolent guidelines ● Added and updated AUC Scores ● Applicable Line of Business adjusted – Medicare checked ● Statement, general Information section added bullet regarding guideline criteria ● Added a Summary of Evidence and Analysis of Evidence

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion.

Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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Evolent Clinical Guideline 7337 for Transthoracic Echocardiogram (TTE)

Guideline Number: Evolent_CG_7337	**Applicable Codes**	
"Evolent" refers to Evolent Health LLC and Evolent Specialty Services, Inc. 		
Original Date: January 2026	**Last Revised Date:** July 2025	**Implementation Date:** January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

Transthoracic echocardiography (TTE) uses ultrasound to image the structures of the heart providing 2-dimensional, cross-sectional images. The addition of Doppler ultrasound derives hemodynamic data from flow velocity versus time measurements, as well as from color-coded two-dimensional representations of flow velocities.

Clinical Reasoning

All criteria are substantiated by the latest evidence-based medical literature. To enhance transparency and reference, Appropriate Use (AUC) scores, when available, are diligently listed alongside the criteria.

This guideline first defaults to AUC scores established by published, evidence-based guidance endorsed by professional medical organizations. In the absence of those scores, we adhere to a standardized practice of assigning an AUC score of 6. This score is determined by considering variables that ensure the delivery of patient-centered care in line with current guidelines, with a focus on achieving benefits that outweigh associated risks. This approach aims to maintain a robust foundation for decision-making and underscores our commitment to upholding the highest standards of care. [1–5]

INDICATIONS FOR TRANSTHORACIC ECHOCARDIOGRAPHY (TTE) ADULT PATIENTS [6]

(Indications for **pediatric patients** follow this section)

Evaluation of Cardiac Structure and Function

- When initial evaluation including history, physical examination, electrocardiogram (ECG), remote monitor or other testing suggests a cardiac etiology for symptoms, including but not limited to: **(AUC Score 9)** [7]
  - Chest pain when another study is not planned to evaluate.
  - Shortness of breath
  - Palpitations
- Hypotension suggestive of cardiac etiology not due to other causes, such as medications, dehydration, or infection **(AUC Score 8)** [7]
- ECG Abnormalities
  - Previously unevaluated pathological Q waves (in two contiguous leads) defined as the following:
    - 40 ms (1 mm) wide
    - > 2 mm deep
    - > 25% of depth of QRS complex
  - New left bundle branch block **(AUC Score 7)** [7]
  - New second-degree Mobitz II atrioventricular block, high grade atrioventricular block or third-degree atrioventricular block [8]
  - Symptomatic or asymptomatic patients with previously unevaluated left ventricular hypertrophy (i.e., concern for hypertrophic cardiomyopathy). **(AUC Score 9)** [7]

Murmur or Click

- Initial evaluation when there is a reasonable suspicion for valvular or structural heart disease such as: **(AUC Score 9)** [9]
  - High grade ≥ 3/6

    Note that TTE can be approved for documented concern that murmur suggests a **specific valve pathology** (such as 'aortic valve sclerosis/stenosis' or 'mitral regurgitation') **regardless of grade of murmur**
  - Holosystolic
  - Continuous
  - Diastolic

Arrhythmias

- Frequent premature ventricular contractions (PVCs, greater than 30 per hour on remote monitoring or ≥ 1 PVC on 12 lead ECG) **(AUC Score 7)** [7]
  - Isolated premature atrial complexes (PACs) are **NOT** an indication for TTE [10]

- Sustained or nonsustained ventricular tachycardia (VT) or ventricular fibrillation (VF), or ventricular bigeminy **(AUC Score 9)** [7]
- New onset atrial fibrillation (as documented in MD notes and on ECG) which was not evaluated by a prior transthoracic echocardiogram (TTE) [11] **(AUC Score 8)** [7]
- Initial evaluation of SVT seen on ECG or remote monitoring without other evidence of heart disease **(AUC Score 6)** [7]
- Initial evaluation of inappropriate sinus tachycardia (defined as average heart rate ≥ 90 beats/minute on ambulatory monitoring, after other etiologies have been excluded (i.e., anemia, hyperthyroidism))

Syncope [7,12]

- History, physical examination, or electrocardiogram (ECG) consistent with a cardiac diagnosis known to cause presyncope or syncope, including but not limited to: **(AUC Score 9)** [7]
  - Structural heart disease (including but limited to):
    - Hypertrophic cardiomyopathy
    - Systolic heart failure
  - Exercise-induced syncope.
- And not due to other causes such as:
  - Vaso-vagal syncope, neurogenic orthostatic syncope
  - Orthostasis related to medication or dehydration.

Perioperative Evaluation [13,14]

- Preoperative left ventricular function assessment in patients who are candidates for solid organ transplantation (can be done yearly prior to transplant) **(AUC Score 7)** [13]

Pulmonary Hypertension

- Evaluation of suspected pulmonary hypertension including evaluation of right ventricular function and estimated pulmonary artery pressure **(AUC Score 9)** [7]
- Re-evaluation of known pulmonary hypertension if there is a change in clinical status or cardiac exam or a need to change medications, [15] such as: **(AUC Score 8)** [7]
  - New chest pain
  - Worsening shortness of breath
  - Syncope
  - Increased murmur
  - Worsening rales on lung examination
- Initial evaluation of patients with pulmonary embolism to risk stratify and initiate

appropriate therapy [16]

- Repeat TTE can be approved for persistent dyspnea 3-6 months after PE [17] to evaluate for possible chronic thromboembolic pulmonary hypertension (CTEPH)

- Annual screening can be performed for pulmonary hypertension in patients with [16,18]:
  - Scleroderma
  - Portal hypertension (including evaluation prior to TIPS procedure)
  - Carriers of Bone Morphogenic Protein Receptor 2 (BMPR2) mutation
  - Sickle cell disease

Known Valvular Heart Disease

Symptomatic

- **New** clinical signs and symptoms (SOB/fatigue) with known **mild** valvular heart disease or known **moderate to severe** valvular heart disease. **(AUC Score 9)** [9]

Native Valvular Stenosis [9]

Asymptomatic (Routine re-evaluation)

- Routine surveillance of bicuspid aortic valve, aortic valve sclerosis or mild valvular stenosis, every ≥ 3 years **(AUC Score 9)** [9]
- Re-evaluation moderate stenosis, every ≥ 1 year **(AUC Score 7)** [9]
- Re-evaluation of severe aortic stenosis (AS) every ≥ 6 months **(AUC Score 6)** [9]
- Re-evaluation after control of hypertension in patients with low flow/low gradient severe aortic stenosis **(AUC Score 7)** [9]

Native Valvular Regurgitation [9,19]

Asymptomatic (Routine re-evaluation)

- Every 3 yrs. of mild valvular regurgitation **(AUC Score 8)** [9]
- Annually of moderate valvular regurgitation **(AUC Score 7)** [9]
- Asymptomatic patient every 6 months with severe valvular regurgitation **(AUC Score 7)** [9]

Prosthetic Valves/Native Valve Repair [19]

- Initial evaluation of prosthetic valve or native valve repair, for establishment of baseline, typically 6 weeks to 3 months postoperative and: **(AUC Score 9)** [9]
  - **Routine surveillance (Asymptomatic)**
    - Surgical bioprosthetic valve
      - Every 3 years post implantation **(AUC Score 7)** [9]

        - 10 years postoperatively and annually thereafter [19]
    - Surgical mechanical valve
        - Every 3 years post implantation **(AUC 7)** [9]
    - Surgical mitral valve repair
        - Every 3 years post repair **(AUC 8)** [9]
- Evaluation of prosthetic valve or native valve repair with suspected dysfunction, with symptoms including but not limited to: **(AUC Score 9)** [9]
    - Chest pain
    - Shortness of breath
    - New or Increased murmur on heart examination
    - New rales on lung examination
    - Elevated jugular venous pressure on exam

Transcatheter Heart Interventions

Transcatheter Aortic Valve Replacement (TAVR) [9,20]

- Pre TAVR evaluation
- Post TAVR at 30 days (6 weeks to 3 months also acceptable) and annually **(AUC Score 8)** [9]
- Assessment post TAVR when there is suspicion of valvular dysfunction, including but not limited to: **(AUC Score 8)** [9]
    - Chest pain
    - Shortness of breath
    - New or increased murmur on heart examination
    - CVA post TAVR **(AUC Score 7)**
- Assessment of stroke post TAVR **(AUC Score 7)** [9]

Transcatheter Mitral Valve Repair (TMVR) [9,21]

- Pre-procedure evaluation **(AUC Score 8)** [9]
- Reassessment for degree of MR and left ventricular function (1, 6 months, and annually) **(AUC Score 9)** [9]
- Assessment post Transmitral Valve Repair (TMVR) when there is suspicion of valvular dysfunction, including but not limited to: **(AUC Score 9)** [9]
    - Chest pain
    - Shortness of breath
    - New or increased murmur on heart examination

- CVA post TMVR

Closure of PFO or ASD [22]

- Pre-procedure evaluation **(AUC 9)** [22]
- Routine follow-up post procedure for device position and integrity (see **Table 2: Adult and Pediatric Congenital Heart Disease Follow-Up**) **(AUC Score 9)** [22]
- Evaluation for clinical concern for infection, malposition, embolization, or persistent shunt **(AUC Score 9)** [22]
- Routine surveillance of an asymptomatic patient with a PFO is **not** indicated [22]

Left Atrial Appendage (LAA) Occlusion [7]

- Pre-procedure evaluation **(AUC Score 8)** [7]

Pericardial Disease [7,17,23]

- Suspected pericarditis or pericardial effusion **(AUC Score 9)** [7]
- Re-evaluation of a significant known pericardial effusion when findings would lead to change in management **(AUC Score 7)** [7]
- Suspected pericardial constriction or reevaluation of status when management would be changed

Evaluation of Cardiac Source of Emboli or Cardiac Mass [7]

- Embolic source in patients with recent transient ischemic attack (TIA), stroke, or peripheral vascular emboli **(AUC Score 9)** [7]
- Evaluation of intracardiac mass or re-evaluation of known mass. No echo performed within the last three months [24] **(AUC Score 8)** [7]

Infective Endocarditis (Native or Prosthetic Valves) [9,19]

- Initial evaluation of suspected infective endocarditis with positive blood cultures or a new murmur **(AUC 9)** [9]
- Re-evaluation
  - Infective endocarditis with, but not limited to: **(AUC Score 9)** [9]
    - Changing cardiac murmur
    - Evidence of embolic phenomena such as TIA or CVA
    - New chest pain, shortness of breath, or syncope
    - A need to change medications due to ongoing fever, positive blood cultures, or evidence of new AV block on ECG
  - Infective endocarditis at high risk of progression or complication (extensive infective

tissue/large vegetation, or staphylococcal, enterococcal, or fungal infections) **(AUC 7)** [9]

- At completion of antimicrobial therapy and serial examinations at 1, 3, 6, and 12 months during the subsequent year [25]

Thoracic Aortic Disease [26,27]

In the absence of recent computed tomography (CT) or cardiovascular magnetic resonance (CMR), which are preferred for imaging beyond the proximal ascending aorta.

- Screening of first-degree relatives of individuals with:
  - Thoracic aortic aneurysm (defined as ≥ 50% above normal) or dissection
  - Bicuspid aortic valve
  - Presence of an aortopathic syndrome (i.e., Marfan's, Ehlers-Danlos, Loeys-Dietz, or Turner's)
- If one or more first-degree relatives of a patient with a known thoracic aortic aneurysm or dissection, have thoracic aortic dilatation, aneurysm, or dissection; then imaging of 2nd degree relatives is reasonable
- Six-month follow-up after initial finding of a dilated thoracic aorta
- Annual follow-up of enlarged thoracic aorta that is above top normal for age, gender, and body surface area
- Biannual (twice/year) follow-up of enlarged aortic root ≥ 4.5 cm or showing growth rate ≥ 0.5 cm in one year or ≥ 0.3cm per year in 2 consecutive years for sporadic aneurysms and ≥ 0.3cm in 1 year for heritable thoracic aortic disease or bicuspid aortic valve [27]
- Evaluation of the ascending aorta in known or suspected connective tissue disease or genetic conditions that predispose to aortic aneurysm or dissection (e.g., Marfan syndrome, Ehlers-Danlos or Loeys-Dietz syndromes) at time of diagnosis and 6 months thereafter for growth rate assessment, followed by annual imaging, or biannual (twice yearly) if diameter ≥ 4.5 or expanding ≥ 0.3 cm/yr **(AUC Score 8)** [7]
- Turner's Syndrome:
  - Baseline evaluation at the time of diagnosis to assess for bicuspid aortic valve, coarctation of the aorta, aortic root and ascending aortic dilatation and other congenital defects
  - Surveillance imaging (initial imaging normal and no additional risk factors for dissection such as HTN or bicuspid aortic valve):
    - Children: every 5 years
    - Adults: every 10 years
    - Prior to planned pregnancy
    - Annual imaging can be approved if an abnormality is found (such as bicuspid aortic valve)

- Re-evaluation of known ascending aortic dilation or history of aortic dissection with one of the following:
  - New chest pain
  - Shortness of breath
  - Syncope
  - TIA or CVA
  - New or increased aortic valve murmur on clinical examination.
  - New rales on lung examination or increased jugular venous pressure
  - When findings would lead to referral to a procedure or surgery
- Follow-up of aortic disease when there has been no surgical intervention:
  - Acute dissection: 1 month, 6 months, 12 months, then annually
  - Chronic dissection: annually
- Follow-up thoracic aortic aneurysm repair: chest CTA or chest MRA are the recommended surveillance imaging modalities
- Follow-up post either: Root repair or AVR plus ascending aortic root/arch repair: baseline post-op, then annually
- Evaluation of sinus of Valsalva aneurysms and associated shunting secondary to rupture [26]

Hypertension (HTN) (Adult) [7,27]

- Initial evaluation of suspected hypertensive heart disease including but not limited to the following **(AUC Score 8)** [7]:
  - Left ventricular hypertrophy on ECG
  - Cardiomegaly
  - Evidence of clinical heart failure
- Initial evaluation of uncontrolled, resistant HTN without symptoms on three or more anti-hypertensive drugs

Hypertension (HTN) (Pediatric) [28]

(AUC 9) [29]

- Initial evaluation at time of consideration of pharmacologic treatment of HTN
- Re-evaluation at 6–12-month intervals for:
  - Persistent HTN despite treatment
  - Concentric LVH on prior study
  - Reduced LVEF on prior study

- Re-evaluation of patients without LVH on initial evaluation can have TTE annually for:
  - Stage 2 HTN (BP ≥140/90 mmHg)
  - Secondary HTN
  - Chronic stage 1 HTN (BP between 130/80 mmHg and 139/89 mmHg) incompletely treated, including drug resistance and noncompliance

Heart Failure [7,30,31]

- Initial evaluation of suspected HF (systolic or diastolic) based on symptoms, signs, or abnormal test result, including but not limited to: **(AUC Score 9)** [7]
  - Dyspnea
  - Orthopnea
  - Paroxysmal nocturnal dyspnea
  - Worsening edema
  - Elevated BNP
- Re-evaluation
  - Known HF (systolic or diastolic)
    - With a change in clinical status or cardiac exam (as listed above)
    - Asymptomatic patient with change in GDMT

Cardiomyopathy

- Initial evaluation of suspected inherited or acquired cardiomyopathy, including but not limited to: **(AUC Score 9)** [7]
  - Restrictive
  - Infiltrative/Depositional (i.e., hemochromatosis/iron overload, mucopolysaccharidoses, mitochondrial or metabolic storage disease (e.g., Danone disease, Fabry disease))
    - Fabry disease: annual surveillance TTE may be approved for patients receiving enzyme replacement [24]
  - Dilated
  - Hypertrophic
  - Re-evaluation of known cardiomyopathy if there is a need to monitor a change in medications or new symptoms, including but not limited to:
    - Chest pain
    - Shortness of breath
    - Palpitations
    - Syncope

- Heart failure (including Takotsubo cardiomyopathy) [24] with recovered left ventricular ejection fraction defined as (must meet all 3 criteria):
  - Documentation of a decreased LVEF <40% at baseline
  - ≥10% absolute improvement in LVEF
  - A second measurement of LVEF >40% [32]:
    - Repeat echocardiogram every 6 months until 12-18 months after recovery of EF, then annually for 2 years, then every 3-5 years
    - Higher risk patient (persistent left bundle branch block, genetic cardiomyopathy, higher biomarker profiles) may have annual follow-up.
- Screening evaluation in first-degree relatives of a patient with an inherited cardiomyopathy **(AUC Score 9)** [7]
- Suspected cardiac sarcoidosis, including as a screening study in patients with biopsy proven extracardiac sarcoidosis [33]
- Suspected cardiac amyloid and to monitor disease progression and/or response to therapy, and to guide initiation and management of anticoagulation (TEE may be preferred) [34]
  - Light chain amyloidosis (AL): TTE may be repeated every 3-6 months.
  - Transthyretin amyloidosis (ATTR): TTE may be repeated every 6-12 months [24]

Hypertrophic Cardiomyopathy (HCM) [35]

- Initial evaluation of suspected HCM
- Re-evaluation of patients with HCM with a change in clinical status or a new clinical event
- Re-evaluation in patients with no change in clinical status or events or annually to assess degree of myocardial hypertrophy, dynamic obstruction, MR, and myocardial function
- Evaluation of the result of surgical myomectomy or alcohol septal ablation
- Evaluation of patients with HCM who have undergone septal reduction therapy within 3-6 months after the procedure
- Screening for patients who are clinically unaffected or (genotype-positive and phenotype-negative):
  - Children and adolescents: annually
  - Adults: every 3 years
- Screening of first-degree relatives is recommended at the time HCM is diagnosed in the family member and serial follow-up as below:
  - Children and adolescents from genotype-positive families and families with early onset disease: annually

- All other children and adolescents: every 2 years
- Adults: every 3 years

- To guide therapy
  - Camzyos (mevacamten): baseline TTE prior to initiation. Repeat TTE during therapy at the discretion of the ordering specialist [36]

Imaging Surveillance for Cardiotoxic Exposures [37,38]

- TTE is the method of choice for the evaluation of patients who will receive or have received cardiotoxic medication. TTE may be approved for:
  - Baseline assessment prior to initiation of therapy **(AUC Score 9)** [7]
  - Monitoring during therapy. The frequency of testing should be left to the discretion of the ordering physician, but in the absence of new abnormal findings, generally no more often than every 6 weeks while on active therapy. **(AUC Score 7)** [7]
  - Long term surveillance after completion of therapy may be required, especially for those who have been exposed to anthracycline medication. The frequency of testing is generally every 6-12 months, or at the discretion of the provider. (**AUC Score 7)** [7]

Imaging Surveillance for Previous Radiation Therapy with Cardiac Exposure [38]

- TTE is indicated for long term surveillance, generally at 5 years and at 10 years following radiation exposure. More frequent surveillance may be indicated at the discretion of the provider.

Device Candidacy or Optimization (Pacemaker, ICD, or CRT) [7]

- Initial evaluation or re-evaluation after revascularization (≥ 90 days) and/or myocardial infarction (≥ 40 days) and/or 3 months of guideline-directed medical therapy when ICD is planned **(AUC Score 9)** [7]
- Initial evaluation for CRT device optimization after implantation **(AUC Score 7)** [7]
- Re-evaluation for CRT device optimization in a patient with worsening heart failure **(AUC Score 8)** [7]
- Known implanted pacing device with symptoms possibly due to device complication or suboptimal pacing device settings **(AUC Score 8)** [7]

Ventricular Assist Devices (VADs) and Cardiac Transplantation [7,39]

- To determine candidacy for VAD **(AUC Score 9)** [7]
- Optimization of VAD settings and assessment of response post device **(AUC Score 8)** [7]

- Re-evaluation for signs/symptoms suggestive of VAD-related complications, including but not limited to: **(AUC Score 8)** [7]
  - TIA or stroke
  - Infection
  - Murmur suggestive of aortic insufficiency
  - Worsening heart failure

Post Heart Failure Transplant Surveillance Imaging [40]

- Monitoring at the discretion of the transplant center for rejection in a cardiac transplant recipient **(AUC Score 8)** [7]

Cardiovascular Disease in Pregnancy [41]

- Valvular stenosis
  - Mild can be evaluated each trimester and prior to delivery.
  - Moderate-severe can be evaluated monthly.
- Valvular regurgitation
  - Mild-moderate regurgitation can be evaluated each trimester and prior to delivery
  - Severe regurgitation can be evaluated monthly
- Pre-pregnancy evaluation with mechanical or bioprosthetic heart valves (if not done within the previous year) [19] **(AUC Score 9)** [9]
- Peripartum Cardiomyopathy: can be repeated at the end of the 1st and 2nd trimesters, 1 month prior to delivery, 1 month postpartum, and serially including up to 6 months after normalization of ejection fraction [42]
- Aortopathic syndromes (i.e., Marfan's, Ehlers-Danlos, Loeys-Dietz Syndrome, or Turner's Syndrome) or known dilated aortic root or ascending aorta: may be approved for pre-pregnancy planning and for monitoring each trimester during pregnancy and again several weeks post-partum. More frequent imaging may be approved depending on aortic diameter, aortic growth rate and comorbidities predisposing to dissection (i.e., presence of an aortopathic syndrome, HTN). [27]

Adult Congenital Heart Disease [22,43]

- Initial evaluation including history, physical examination, electrocardiogram (ECG), or other imaging modality suggest adult congenital heart disease
- Screening of first-degree relatives of patients with a bicuspid aortic valve **(AUC Score 8)** [9]
- Known adult congenital heart disease with a change in clinical status or cardiac exam, including but not limited to:
  - Chest Pain

- Shortness of breath
- New or increased murmur on physical exam

- Evaluation prior to surgical or transcatheter procedure
- For follow-up of specific lesions, see **Table 1** and **Table 2**: **Adult and Pediatric Congenital Heart Disease Follow-up**

Inflammatory and Autoimmune

- Including any one of the following:
  - Suspected rheumatic fever [44]
  - Systemic lupus erythematosus [45]
  - Takayasu arteritis [46]
  - Multisystem Inflammatory Syndrome in children (MIS-C): at baseline and for surveillance when there is documented concern for coronary involvement or other late sequelae [47]
  - Kawasaki disease [48]
    - Upon diagnosis, 1-2 weeks later, and 4 to 6 weeks after diagnosis
    - For patients with important and evolving coronary artery abnormalities during the acute illness, echocardiograms may need to be more frequent. In the setting of increasing size of coronary aneurysms, echocardiogram can be performed up to twice per week until dimensions have stopped progressing, then at least once per week in the first 45 days of illness, and then monthly until the third month after onset.
    - For persistent coronary aneurysm after the acute illness, echocardiogram surveillance intervals are based on the size of the aneurysm:
      - Small: at 6 months. and then yearly
      - Medium: at 3, 6 and 12 months and then every 6-12 months
      - Large/Giant: at 3, 6, 9 and 12 months and then every 3-6 months

COVID-19 [49]

- Acute infection
  - Cardiopulmonary signs or symptoms (ECG abnormalities, elevated biomarkers, chest pain, dyspnea, syncope, palpitations)
- Post-Acute Sequelae (PASC) defined as new or returning cardiopulmonary symptoms 4 or more weeks and persisting more than 2 months following confirmed COVID infection, not explained by an alternative diagnosis (World Health Organization definition)
- Post Vaccination
  - Symptoms or signs of myocarditis (ECG abnormalities, chest pain, elevated

biomarkers)

Surveillance for Neuromuscular Disorders [50]

Asymptomatic surveillance intervals (genetically affected individuals with no signs or symptoms of cardiac involvement). Development of signs or symptoms of cardiac involvement necessitates more frequent assessment.

- Duchenne muscular dystrophy (DMD) and Becker muscular dystrophy (BMD)
  - Age <10 years, TTE every 2 years
  - Age 10 years or older, TTE annually
- Emery-Dreifuss muscular dystrophy (EDMD)
  - X-linked form: at least annual TTE
  - Autosomal form: TTE at initial diagnosis, surveillance TTE only if initial TTE abnormal
- Myofibrillar myopathy (MFM)
  - Annual TTE
- Barth (BTHS)-X linked recessive (only males develop disease)
  - Infant males TTE every 6 months
  - Age 1 year or older, annual TTE
- Limb-Girdle muscular dystrophy (LGMD)
  - TTE may be performed annually
- Friedrich's ataxia (FA)
  - TTE can be performed at least annually
- Myotonic dystrophy (DM)
  - TTE every 2-4 years

Indications for Transthoracic Echocardiography (TTE) Pediatric Patients (Patients Under the Age of 18) [29]

- Hypertension (see section: **Hypertension (Pediatric)**) **(AUC Score 9)** [29]
  - Initial evaluation (one time only)
  - Persistent hypertension despite two or more medications can be performed annually [28]
- Initial evaluation of Renal failure **(AUC Score 7)** [29]
- Palpitations, if one:
  - Family history at age < 50 of either: **(AUC Score 7)** [29]

        - Sudden cardiac death/arrest **OR**
        - Pacemaker or ICD
    - History or family history of cardiomyopathy **(AUC Score 9)** [29]
- Chest pain, if one or more of the following:
    - Exertional chest pain **(AUC Score 8)** [29]
    - Abnormal ECG **(AUC Score 7)** [29]
    - Family history with unexplained sudden death or cardiomyopathy **(AUC 8)** [29]
- Syncope, if any of the following:
    - Abnormal ECG **(AUC Score 7)** [29]
    - Exertional syncope **(AUC Score 9)** [29]
    - Family history of one of the following before the age of 50: **(AUC Score 9)** [29]
        - Sudden cardiac death/arrest
        - Pacemaker or ICD
    - Family history of cardiomyopathy
- Signs and/or symptoms of heart failure, including, but not limited to: **(AUC Score 9)** [29]
    - Respiratory distress
    - Poor peripheral pulses
    - Feeding difficulty
    - Decreased urine output
    - Edema
    - Hepatomegaly
- Abnormal physical findings, including any one of the following:
    - Clicks, snaps, or gallops
    - Fixed and/or abnormally split S2
    - Decreased pulses
    - Central cyanosis **(AUC Score 8)** [29]
- Arrhythmia, if one of the following:
    - Supraventricular tachycardia **(AUC Score 7)** [29]
    - Ventricular tachycardia **(AUC Score 9)** [29]
- Murmur
    - Pathologic sounding or harsh murmur, diastolic murmur, holosystolic or continuous murmur, late systolic murmur, grade 3/6 systolic murmur or louder, or murmurs that are provoked and become louder with changes in position **(AUC Score 9)** [29]

- Presumptively innocent murmur, but in the presence of signs, symptoms, or findings of cardiovascular disease **(AUC Score 7)** [29]

- Abnormal basic data, including any one of the following:
  - Abnormal ECG **(AUC Score 7)** [29]
  - Abnormal cardiac biomarkers **(AUC Score 9)** [29]
  - Desaturation on pulse oximetry **(AUC Score 9)** [29]
  - Abnormal chest x-ray **(AUC Score 9)** [29]
- Sickle cell **(AUC Score 8)** [29]
  - One time screening for risk stratification for pulmonary hypertension in children ≥ 8 years of age [51]
- Suspicion of Structural Disease, including any one of the following:
  - Premature birth where there is suspicion of a Patent Ductus Arteriosus
  - Vascular Ring, based upon either one:
    - Difficulty breathing with stridor and eating solid foods that might suggest a vascular ring.
    - Abnormal barium swallow or bronchoscopy suggesting a vascular ring **(AUC Score 7)** [29]
- Genetic & Syndrome Related, including any one of the following: **(AUC Score 7)** [29]
  - Genotype positive for cardiomyopathy, family history of hypertrophic cardiomyopathy or heritable pulmonary arterial hypertension
  - Patient with a known syndrome associated with congenital or acquired heart disease (Down's syndrome, Noonan's syndrome, DiGeorge syndrome, William's syndrome, Trisomy Thirteen, Trisomy Eighteen, Alagille syndrome, chromosomal abnormality associated with cardiovascular disease)
  - Abnormalities of visceral or cardiac situs
  - Known or suspected connective tissue diseases that are associated with congenital or acquired heart disease. (e.g., Marfan's, Loeys-Dietz)
  - Patients with a first-degree relative with a genetic abnormality, such as cardiomyopathies (hypertrophic, dilated, arrhythmogenic right ventricular dysplasia, restrictive, left ventricular noncompaction).
- Maternal-Fetal related, including any one of the following:
  - Maternal infection during pregnancy or delivery with potential fetal/neonatal cardiac sequelae **(AUC Score 7)** [29]
  - Maternal phenylketonuria **(AUC Score 7)** [29]
  - Suspected cardiovascular abnormality on fetal echocardiogram **(AUC Score 9)** [29]

Congenital Heart Disease Follow-Up‡* (22)

Adult and Pediatric

[‡All surgical or catheter-based repairs allow evaluation PRIOR to the procedure and POSTPROCEDURAL evaluation (within 30 days)]

- For all lesions, TTE is indicated for change in clinical status and/or development of new signs or symptoms
- Infant with any degree of unrepaired valvular AS/AR may have surveillance TTE every 1 – 4 weeks as needed
- Surveillance interval for patients with subvalvular stenosis **plus** aortic regurgitation will be dictated by the magnitude of the more significant abnormality (e.g., mild stenosis with moderate regurgitation would have surveillance interval as though stenosis were also moderate)
- Infant with any degree of unrepaired MS may have surveillance TTE every 1 – 4 weeks as needed
- After any surgical or catheter-based repair, evaluation (3-12 months) for a patient with heart failure symptoms
- Annual surveillance in a child with normal prosthetic mitral valve function and no LV dysfunction
- Surveillance (3-12 months) in a child with prosthetic mitral valve and ventricular dysfunction and/or arrhythmia
- Annual surveillance for incomplete or palliative repair (including but not limited to Glenn shunt, Fontan procedure and RV-PA conduit)
- TTE may be unnecessary in a year when cardiac MRI is performed unless clinical indication warrants otherwise.

[***Note**: See tables below for specific surveillance intervals]

Infancy is defined as between birth and 2 years of age; childhood from 2-12 years of age; and adolescence from 12 to 21 years of age (52)

Table 1: Unrepaired Lesion Follow-Up‡ (22)

‡Gray shading indicates lifetime surveillance interval

Unrepaired Lesion	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
Aortic Stenosis (AS) and/or aortic			Child Asymptomatic	Child Asymptomatic mild AS/AR	

Unrepaired Lesion	Surveillance Intervals				
	1-3 months	**3-6 months**	**6-12 months**	**1-2 years**	**3-5 years**
regurgitation (AR) (See **section above** for surveillance intervals for infants)			≥ moderate AS/AR		
Bicuspid aortic valve with ≤ mild AS/AR and no aortic dilation in a child				For adolescent	**3 Years**
Atrial septal defect				**Moderate size (6-12mm)**	**Small size (3-6mm)**
Double outlet right ventricular (DORV): with balanced systemic and pulmonary circulation	Infant	Child			
Mitral regurgitation (MR)	Infant with ≥ moderate MR		Infant with mild MR. Child with ≥ moderate MR.		Child with mild MR (2-5 years)
Mitral Stenosis (MS) (See **section above** for surveillance intervals for infants)		Child with ≥ moderate MS		Child with mild MS	
Congenitally corrected transposition of		Infant	**Moderate or greater A-V**	**< Moderate**	

Unrepaired Lesion	Surveillance Intervals				
	1-3 months	**3-6 months**	**6-12 months**	**1-2 years**	**3-5 years**
the Great Arteries (ccTGA)			**valve regurgitation**	**A-V valve regurgitation**	
Tricuspid regurgitation (TR)		Infant with ≥ moderate TR	Child with ≥ moderate TR	Child with mild TR	
Patent Ductus Arteriosus		Infant		Child	**Adult**
Pulmonary stenosis (PS)		Infant		Child	
				Adult	
Coarctation		Infant		Child	
				Adult	
Ventricular septal defect (VSD)	Infant with ≥ moderate VSD			Child with non-muscular VSD	Child with small muscular VSD
					Adult with any VSD
Anomalous coronary arteries				**Moderate to large coronary fistula**	**Small coronary fistula or RCA arising from left coronary sinus (2-5 years)**
Subvalvular AS See **section above** for	Infant with any degree of stenosis		Child with ≥ moderate stenosis	Child with mild stenosis	

Unrepaired Lesion	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
information on surveillance intervals for stenosis **plus** regurgitation			**Adult with ≥ moderate stenosis**	**Adult with mild stenosis**	
Supravalvular AS		Infant with any degree of stenosis	Child with ≥ moderate stenosis	Child with mild stenosis	**2-5 years** **Adult with ≥ moderate stenosis**
			Adult with ≥ moderate stenosis	**Adult with mild stenosis**	
Total anomalous pulmonary venous connection (TAPVC)	Prior to planned repair or for change in clinical status and/or development of new signs and symptoms				

Note: Despite surgical or catheter-based procedures, most patients with congenital heart disease are left with disorders or **sequelae** that are known consequences of the reparative intervention. These disorders can include arrhythmias, valvular and myocardial dysfunction, and vascular and non-cardiovascular abnormalities. These sequelae can be categorized as mild, moderate, or severe. Use clinical judgement to assess the nature of the sequelae when adjudicating cases based on the follow-up criteria below.

Table 2: Postprocedural Follow-Up‡ (22)

‡Gray shading indicates lifetime surveillance interval

Post-procedure: Surgical or Catheter-Based	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
Post-procedural treatment of AS or AR with repair or replacement	Infant with ≥ moderate AS or AR or LV dysfunction	Infant with ≤ mild AS or AR and no LV dysfunction	Child with ≥ moderate AS or AR	Child with ≤ mild AS or AR	

Post-procedure: Surgical or Catheter-Based	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
ASD device closure: **no or mild sequelae**	Within 1st year	Within 1st year	At 1 year		**2-5 years**
ASD surgical repair: no or mild sequelae			Within 1st year		**2-5 years**
ASD: **device closure or surgical repair with residual shunt, valvular or ventricular dysfunction, arrhythmias, or pulmonary hypertension**		**3-12 months**			
DORV: no or mild sequelae			Within 1st year	**1-2 Years**	
DORV: valvular or ventricular dysfunction, outflow obstruction, arrythmias, branch pulmonary artery stenosis, presence of **RV-PA conduit**		**3-12 months**			
Tricuspid valve surgery or catheter-based procedure: **no or mild sequelae**				**1-2 years**	
Tricuspid valve surgery or catheter-based procedure: valvular or ventricular dysfunction or arrhythmias			Child	**Adult**	

Post-procedure: Surgical or Catheter-Based	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
Pulmonary Stenosis: **no or mild sequelae**			Child with moderate or severe sequelae	Child with no or mild sequelae	**Adult**
Coarctation: **no or mild sequelae**		Within 1st year		**After 1st year**	
PDA: **no or mild sequelae**				Annually within 1st two years	**Five years after 1st two years***
PDA: **post-procedural left PA stenosis or aortic obstruction**				**1-2 years**	
Tetralogy of Fallot (ToF): after transcatheter pulmonary valve replacement, with no or mild sequelae	1 month	6 months		**Annually**	
ToF: **patient with conduit dysfunction valvular or ventricular dysfunction, pulmonary artery stenosis, or arrhythmias**			**6-12 months**		
Congenitally corrected transposition on the Great Arteries (ccTGA): **no or mild sequelae**		Within 1st year		**1-2 years**	
ccTGA: **valvular or ventricular dysfunction, outflow**		**3-12 months**			

Post-procedure: Surgical or Catheter-Based	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
obstruction, ventricular - PA conduit					
d-TGA: **no or mild sequelae**	Infant with moderate sequelae	Within 1st year		**1-2 years**	
d-TGA: moderate or greater valvular or ventricular dysfunction, outflow obstruction, branch pulmonary artery stenosis or arrhythmias, presence of **RV-PA conduit**		**3-12 months**			
d-TGA: **dilated neoaortic root and increasing Z-Score or neoaortic regurgitation**				**1-2 years**	
Truncus Arteriosus (TA): no or mild sequelae	Within 1st year		**After 1st year**		
TA: **moderate or greater truncal stenosis / regurgitation**		**3-6 months**			
TA: **residual VSD, RV-PA conduit, branch pulmonary artery obstruction**		**3-12 months**			
VSD:			Within 1st year		**2-3 years**

Post-procedure: Surgical or Catheter-Based	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
no or mild sequelae or small residual shunt					
VSD: **significant residual shunt, valvular or ventricular dysfunction, arrhythmias, or pulmonary hypertension**		**3-12 months**			
Anomalous coronary arteries	Within 1st year	Infant with or without ventricular or valvular dysfunction Child or adult with ventricular or valvular dysfunction		**Annually**	
Subvalvular AS See **section above** for information on surveillance intervals **plus** regurgitation	Infant with ≥ moderate stenosis	Infant with ≤ mild stenosis		Child with ≤ mild stenosis and/or AR **Adult with ≤ mild stenosis and/or AR**	
Subvalvular AS *continued*		3-12 months Child ≥ moderate stenosis **3-12 months** **Adult ≥ moderate stenosis**			

Post-procedure: Surgical or Catheter-Based	Surveillance Intervals				
	1-3 months	3-6 months	6-12 months	1-2 years	3-5 years
Supravalvular AS			**Patient with ≥ moderate stenosis**		**2-5 years** **Patient with ≤ mild stenosis**
Total anomalous pulmonary venous connection		Infant with mild or no sequelae		Child with mild or no sequelae	**Adult with mild or no sequelae**

***PDA lifetime surveillance applies only to device closure; PDA lifetime surveillance is not indicated for surgical closure.**

CODING AND STANDARDS

Codes

93303, 93304, 93306, 93307, 93308, +93320, +93321, +93325, +93356, 96374

Applicable Lines of Business

☒	CHIP (Children's Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

AUC Score

A reasonable diagnostic or therapeutic procedure can be defined as that for which the expected clinical benefits outweigh the associated risks, enhancing patient care and health outcomes in a cost-effective manner. [(3)]

- Appropriate Care - Median Score 7-9
- May be Appropriate Care - Median Score 4-6
- Rarely Appropriate Care - Median Score 1-3

Acronyms / Abbreviations

AS: Aortic stenosis

AR: Aortic regurgitation

ASD: Atrial septal defect

BNP: B-type natriuretic peptide or brain natriuretic peptide

CABG: Coronary artery bypass grafting surgery

CAD: Coronary artery disease

ccTGA: Congenitally corrected transposition of the Great Arteries

CMR: Cardiovascular magnetic resonance

CRT: Cardiac resynchronization therapy

CT: Computed tomography

CVA: Cerebrovascular accident

DORV: Double outlet right ventricle

d-TGA: D-Transposition of the Great Arteries

ECG: Electrocardiogram

EF: Ejection fraction

HCM: Hypertrophic cardiomyopathy

HTN: Hypertension

HF: Heart failure

ICD: Implantable cardioverter-defibrillator

LAA: Left atrial appendage

LV: Left ventricular/ventricle

LVEF: Left ventricular ejection fraction

LVH: Left ventricular hypertrophy

MI: Myocardial infarction

MR: Mitral regurgitation

MS: Mitral stenosis

PA: Pulmonary artery

PAC: Premature atrial complex

PDA: Patent ductus arteriosus

PFO: Patent foramen ovale

PMVR: Percutaneous Mitral Valve Repair

PS: Pulmonary stenosis

PVC: Premature ventricular contraction

RV: Right ventricular/ventricle

TA: Truncus arteriosus

TAVR: Transcatheter aortic valve replacement

TEE: Transesophageal echocardiogram

TIA: Transient ischemic attack

ToF: Tetralogy of Fallot

TR: Tricuspid regurgitation

TTE: Transthoracic echocardiogram

VAD: Ventricular assist device

VF: Ventricular fibrillation

VSD: Ventricular septal defect

VT: Ventricular tachycardia

SUMMARY OF EVIDENCE

ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR 2011 Appropriate Use Criteria for Echocardiography [6]

Study Design: The study is a comprehensive report by the American College of Cardiology Appropriate Use Criteria Task Force, along with several other cardiovascular societies. It focuses on multimodality imaging in valvular heart disease, providing appropriate use criteria (AUC) for various imaging modalities.

Target Population: The target population includes patients with valvular heart disease, ranging from asymptomatic individuals at risk to those with severe symptomatic conditions. The study covers initial evaluations, follow-up testing, and imaging for surgical and transcatheter interventions.

Key Factors: The study outlines criteria for using imaging modalities like transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiac computed tomography (CCT), and cardiovascular magnetic resonance imaging (CMR) for initial evaluations of valvular heart disease. It provides guidelines for sequential or follow-up testing in asymptomatic or stable patients, as well as those with new or worsening symptoms. The study includes criteria for imaging before, during, and after procedures like transcatheter aortic valve replacement (TAVR) and percutaneous mitral valve repair.

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease [7]

Study Design: This document is the second of two companion AUC documents, focusing on multimodality imaging in the assessment of cardiac structure and function in nonvalvular heart disease.

Target Population: The target population includes patients with structural heart disease, excluding valvular diseases. This encompasses conditions like heart failure, diseases of the aorta and pericardium, and congenital heart disease.

Key Factors: Initial Evaluation: Criteria for using imaging modalities like TTE, TEE, CMR, and CT for initial evaluations of cardiac structure and function. Guidelines for sequential or follow-up testing to clarify initial diagnostic testing, assess stability in asymptomatic patients, and evaluate new or worsening symptoms. Criteria for imaging support in procedures like patent foramen ovale closure and left atrial appendage occlusion.

ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease [9]

Study Design: This document presents the 2017 Appropriate Use Criteria (AUC) for multimodality imaging in valvular heart disease. It was developed by the American College of Cardiology and other related societies.

Target Population: Patients with valvular heart disease, including those undergoing initial evaluation, follow-up, and pre- and post-procedural assessments.

Key Factors: The document outlines various clinical scenarios and provides recommendations for the use of different imaging modalities such as transthoracic echocardiography (TTE), transesophageal echocardiography (TEE), cardiac computed tomography (CCT), and cardiovascular magnetic resonance imaging (CMR). The primary objective is to standardize physician decision-making and improve patient care by providing a comprehensive resource for multimodality imaging.

ANALYSIS OF EVIDENCE

Analysis [6,7,9]:

In summary, while all three articles highlight the importance of TTE in the evaluation and management of cardiac conditions, they differ in their specific focus and scope. "Doherty et al 2017" focuses on valvular heart disease, "Doherty et al 2019" expands to nonvalvular heart disease, and "Douglas et al 2011" provides a comprehensive overview of the appropriate use of echocardiography. Each article provides valuable insights into the role of TTE in different clinical scenarios, emphasizing its importance in initial evaluation, guiding therapy, and ongoing management.

Shared Conclusions

- **Importance of TTE in Initial Evaluation**: All three articles emphasize the critical role of TTE in the initial evaluation of various cardiac conditions. TTE is considered appropriate for assessing symptoms potentially related to cardiac etiology, such as chest pain, shortness of breath, and palpitations. It is also used for evaluating suspected valvular heart disease, heart failure, and cardiomyopathies.
- **Guidance for Therapy and Management**: TTE is consistently highlighted as a valuable tool for guiding therapy and management decisions. This includes evaluating ventricular function, assessing the severity of valvular disease, and monitoring the effectiveness of treatments.
- **Follow-Up and Surveillance**: The articles agree on the importance of TTE for follow-up and surveillance in patients with known cardiac conditions. Regular TTE assessments are recommended to monitor disease progression and guide ongoing management.

POLICY HISTORY

Date	Summary

July 2025	• This guideline merges and replaces two Evolent guidelines with identical clinical criteria: ECG 7337-01 for Transthoracic Echocardiogram and ECG 067 for Transthoracic Echocardiogram into Evolent Clinical Guideline 7337 for Transthoracic Echocardiogram (TTE)
	  ○ This guideline also merges Procedure Codes from these two Evolent guidelines
	• Added in general information statement regarding guideline criteria development by reputable sources, standard of care, and best practices
	• Updated/added AUC scores
	• Arrythmias: added isolated PAC not indicated for TTE
	• Prosthetic/Native Valves Repair:
	  ○ Surgical mechanical valve: changed to every three years post implantation
	  ○ Surgical mitral valve repair: changed to every three years post repair
	• Applicable Line of Business adjusted – Medicare checked
	• Added a Summary of Evidence and Analysis of Evidence

LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. . Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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