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Subject: Cardiac Nuclear Imaging (Myocardial Perfusion Imaging)

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DESCRIPTION:

Myocardial perfusion imaging (MPI), also known as a nuclear stress test is a non-invasive imaging test that shows how well blood flows through (perfuses) heart muscle. It can show areas of the heart muscle that aren't getting enough blood flow and how well the heart muscle is pumping.

POSITION STATEMENT:

Myocardial perfusion imaging (MPI) **meets the definition of medical necessity** for the following:

Suspected coronary artery disease (CAD)

Symptomatic members without known CAD for any of the following:

- Low or intermediate pretest probability and unable to exercise
- High pretest probability
- Repeat testing in member with new or worsening symptoms and negative result at least one year prior and meets one of the above criteria.

Asymptomatic members without known CAD for any of the following:

- Previously unevaluated ECG evidence of possible myocardial ischemia including substantial ischemic ST segment or T wave abnormalities
- Previously unevaluated pathologic Q waves

- Unevaluated complete left bundle branch block.

Inconclusive CAD evaluation within the past 2 years and obstructive CAD remains a concern for any of the following:

- Exercise stress ECG with low-risk Duke treadmill score ≥ 5 (member's current symptoms indicate an intermediate or high pretest probability)
- Exercise stress ECG with an intermediate Duke treadmill score
- Intermediate coronary computed tomography angiography (CCTA) (e.g., 30-70% lesions)
- Non-diagnostic exercise stress test with inability to achieve target heart rate (THR)
- An indeterminate (equivocal, borderline, or discordant) evaluation by prior stress imaging (SE or CMR) within the past 2 years.

Follow-up of members post coronary revascularization (PCI or CABG) for any of the following:

- Asymptomatic follow-up stress imaging (MPI or SE)

  Note: At a minimum of 2 years post coronary artery bypass grafting (CABG), or percutaneous coronary intervention (PCI), (whichever is later), is appropriate only for members with a history of silent ischemia, or a history of a prior left main stent.

- For members 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, firefighters)
- New, recurrent, or worsening symptoms post coronary revascularization, if stress imaging (MPI or SE) will alter management.

Follow-up of known CAD

Follow-up of asymptomatic or stable symptoms in member when last invasive or non-invasive assessment of coronary disease showed hemodynamically significant CAD (ischemia on stress test or FFR ≤ 0.80 or stenosis ≥ 70% of a major vessel), over two years ago, without intervening coronary revascularization is an appropriate indication for stress imaging (MPI or SE) if it will alter management.

Special diagnostic conditions requiring coronary evaluation for any of the following:

- Prior acute coronary syndrome without invasive or non-invasive coronary evaluation
- Newly diagnosed systolic heart failure (EF < 50%) with symptoms or signs of ischemia unless invasive coronary angiography immediately planned
- LVEF ≤ 50% requiring myocardial viability assessment to assist with decisions regarding coronary revascularization
- Ventricular arrhythmias
- Prior to Class IC antiarrhythmic drug initiation (propafenone or flecainide) and annually in intermediate and high global risk members

- Assessment of hemodynamic significance of one of the following documented conditions:
  - Anomalous coronary arteries
  - Myocardial bridging of coronary artery.
- Coronary aneurysms in Kawasaki's disease or due to atherosclerosis
- Following radiation therapy to the anterior or left chest, at 5 years post initiation and every 5 years thereafter.

Prior to elective noncardiac surgery

- The member has at least one of the following cardiac complication risk factors:
  - Ischemic heart disease
  - History of stroke or transient ischemic attack (TIA)
  - History of congestive heart failure or ejection fraction ≤ 35%
  - Diabetes mellitus requiring insulin
  - Creatinine ≥ 2.0 mg/dl

AND

- The member 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

AND

- There has not been a conclusive stress evaluation, CTA or heart catheterization within the past year; and the results of such a test would likely substantially alter therapy and/or preclude proceeding with the intended surgery.

Planning for solid organ transplantation

- Preoperative MPI for solid organ transplantation , if there has not been a conclusive stress evaluation, CTA or heart catherization within the past year and with ≥ 3 of the following risk factors:
  - Age > 60
  - Smoking
  - Hypertension
  - Dyslipidemia
  - Left ventricular hypertrophy
  - > 1 year on dialysis (for renal transplant members)
  - Diabetes mellitus

- Prior ischemic heart disease.

Post cardiac transplant for any of the following:

- Annually, for the first five years post cardiac transplantation, in a member not undergoing invasive coronary arteriography
- After the first five years post cardiac transplantation, members with documented transplant vasculopathy can be screened annually if the risk of annual invasive coronary arteriography is not acceptable (e.g., high risk of contrast nephropathy) or not desired.

Additional Information:

Global Risk of Cardiovascular Disease (coronary disease (CAD))

Global risk of CAD is defined as the probability of manifesting cardiovascular disease over the next 10 years and refers to asymptomatic members without known cardiovascular disease. It should be determined using one of the cardiac risk calculators below. A high risk is considered greater than 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 members requiring IC antiarrhythmic drugs, who might require coronary risk stratification prior to initiation of the drug, when global risk is moderate or high.

CAD Risk—Low:10-year absolute coronary or cardiovascular risk less than 10%.

CAD Risk—Moderate: 10-year absolutecoronary or cardiovascular risk between 10% and 20%.

CAD Risk—High: 10-year absolutecoronary or cardiovascular risk of greater than 20%.

Duke Treadmill Score

- 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.

Stable patients without known CAD fall into 2 categories (asymptomatic and symptomatic):

- Asymptomatic, for whom global risk of CAD events can be determined from coronary risk factors, using online cardiac risk calculator (see Reimbursement Information section).
- Symptomatic, for whom we estimate the pretest probability that their chest-related symptoms are due to clinically significant CAD.

Once the type of chest pain has been established from the medical record, the pretest probability of significant CAD is estimated from the Diamond Forrester score for pretest probability of coronary artery

disease (see below Table 1), recognizing that additional coronary risk factors could increase pretest probability.

Determination of Pretest Probability for Coronary Artery Disease (CAD)

Table 1: Determination of Pretest Probability for Coronary Artery Disease Based on Age, Sex, and Symptoms (Source: American College of Cardiology Criteria for Pretest Probability of Coronary Artery Disease (CAD).

The following risk assessment may be used to determine pre-test probability of coronary artery disease.

Age (years)	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Non-anginal Chest Pain	Asymptomatic
≤ 39	Men	Intermediate	Intermediate	Low	Very low
	Women	Intermediate	Very low	Very low	Very low
40 – 49	Men	High	Intermediate	Intermediate	Low
	Women	Intermediate	Low	Very low	Very low
50 – 59	Men	High	Intermediate	Intermediate	Low
	Women	Intermediate	Intermediate	Low	Very low
≥ 60	Men	High	Intermediate	Intermediate	Low
	Women	High	Intermediate	Intermediate	Low
Very low: Less than 5% pretest probability of CAD Low: Between 5% and 10% pretest probability of CAD Intermediate: Between 10% and 90% pretest probability of CAD High: Greater than 90% pretest probability of CAD					

Adapted from: Wolk MJ, Bailey SR, Doherty JU et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 Multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease. Journal of the American College of Cardiology 2014; 63(4): 380-406.

Taylor AJ, Cerqueira M, Hodgson JM, et al. ACCF/SCCT/ACR/AHA/ASE/ASNC/NASCI/SCAI/SCMR 2010 appropriate use criteria for cardiac computed tomography. Journal of the American College of Cardiology 2010;56(22):1864-1894.

Online cardiac risk calculator and assessment tools
Members who have already manifested cardiovascular disease are already at high global risk and are not applicable to the calculators.
The links for the online cardiac risk calculator and assessment tools are to an outside source and is provided for your convenience. Use of the links and related calculator and assessment tools are subject to the terms and conditions of the website and is not warranted, maintained or affiliated with Florida Blue.
Framingham Risk Score Calculator
http://www.medcalc.com/heartrisk.html

Reynolds Risk Score (Can use if no diabetes. Unique for use for family history.) http://www.reynoldsriskscore.org/ Pooled Cohort Risk Assessment Equations http://clincalc.com/Cardiology/ASCVD/PooledCohort.aspx ACC/AHA Risk Calculator http://tools.acc.org/ASCVD-Risk-Estimator-Plus/#!/calculate/estimate/ MESA Risk Calculator (With addition of coronary artery calcium score, for CAD-only risk.) https://www.mesa-nhlbi.org/MESACHDRisk/MesaRiskScore/RiskScore.aspx

Abbreviations:

AAD - Antiarrhythmic drug
ADLs - Activities of daily living
Bpm - Beats per minute
CAD - Coronary artery disease
CCTA - Coronary computed tomographic angiography
CTA - Computed tomographic angiography
DTS - Duke treadmill score
ECG- Electrocardiogram
FFR - Fractional flow reserve
IVUS - Intravascular ultrasound
LBBB - Left bundle-branch block
LVH - Left ventricular hypertrophy
MI Myocardial infarction
MESA - Multi-Ethnic Study of Atherosclerosis
MET - Metabolic equivalents (of exercise)/Estimated metabolic equivalent of exercise
MPI- Myocardial perfusion imaging
PFT - Pulmonary function test
PVCs - Premature ventricular contractions
SE- Stress echocardiography
TIA - Transient ischemic attack
VF - Ventricular fibrillation
VT - Ventricular tachycardia
WPW - Wolf Parkinson White

BILLING/CODING INFORMATION:

CPT Coding:

78451	Myocardial perfusion imaging, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78452	Myocardial perfusion imaging, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique,

	additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic and/or redistribution and/or rest reinjection
78453	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)
78454	Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and or redistribution and/or rest reinjection
78466	Myocardial imaging, infarct avid, planar; qualitative or quantitative
78468	Myocardial imaging, infarct avid, planar; with ejection fraction by first pass technique
78469	Myocardial perfusion imaging; tomographic SPECT with or without quantification
78481	Cardiac blood pool imaging, (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification
78483	Cardiac blood pool imaging, (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification

REIMBURSEMENT INFORMATION:

Re-imaging due to technically limited exam is the responsibility of the imaging provider.

LOINC Codes:

The following information may be required documentation to support medical necessity: physician history and physical, physician progress notes, plan of treatment and reason for cardiac nuclear imaging (myocardial perfusion imaging).

Documentation Table	LOINC Codes	LOINC Time Frame Modifier Code	LOINC Time Frame Modifier Codes Narrative
Physician history and physical	28626-0	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim
Attending physician progress note	18741-9	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim
Plan of treatment	18776-5	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim

Radiology reason for study	18785-6	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim
Radiology comparison study-date and time	18779-9	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim
Radiology comparison study observation	18834-2	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim
Radiology-study observation	18782-3	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim
Radiology-impression	19005-8	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim
Radiology study-recommendation (narrative)	18783-1	18805-2	Include all data of the selected type that represents observations made six months or fewer before starting date of service for the claim

PROGRAM EXCEPTIONS:

Federal Employee Plan (FEP): Follow FEP guidelines.

Medicare Advantage products:

The following Local Coverage Determination (LCD) was reviewed on the last guideline reviewed date: Cardiology Non-emergent Outpatient Stress Testing (L38396) is located at fcso.com

No National Coverage Determination (NCD) was found at the time of the last guideline reviewed date.

DEFINITIONS:

Ejection fraction (EF): the proportion, fraction or percentage of blood pumped out of the heart with each beat. An EF is 55 percent or higher.

Electrocardiogram (EKG, ECG): a test that records the electrical activity of the heart that is used in diagnosing some heart abnormalities.

Electrogradiogram (ECG)-uninterpretable: ECGs with resting ST-segment depression (less than or equal to 1.10 mV), complete left bundle-branch block (LBBB), pre-excitation Wolff-Parkinson-White syndrome (WPW) or paced rhythm.

ST segment: on an electrocardiogram, the interval from the end of ventricular depolarization (QRS complex) to the onset of ventricular repolarization (T wave).

ST segment elevation myocardial infarction (STEMI): subcategories of acute coronary syndrome (ACS).

Stress test: a heart monitoring test to discover how well the heart works usually performed via physical exercise, and sometimes via pharmaceuticals.

Wolff-Parkinson-White syndrome: the association of paroxysmal tachycardia or atrial fibrillation with pre-excitations; used synonymously with pre-excitation, also, called WPWs.

RELATED GUIDELINES:

Computed Tomography to Detect Coronary Artery Calcification, 04-70450-02
Multiple-Gated Acquisition (MUGA) Scan, 04-78000-21

OTHER:

None applicable.

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COMMITTEE APPROVAL:

This Medical Coverage Guideline (MCG) was approved by the Florida Blue Medical Policy and Coverage Committee on 07/25/24.

GUIDELINE UPDATE INFORMATION:

07/01/07	New Medical Coverage Guideline.
12/15/07	2008 ICD-9 CM update. Added ICD-9 diagnosis 414.2 for CPT codes 78460, 78461, 78464, 78465, 78469, 78472, 78473, 78481, 78483, 78494, and 78496. Added 440.4 for CPT codes 78460, 78461, 78464, 78465, and 78469. Medicare Advantage, added ICD-9 diagnosis 414.2 and 440.4 for CPT codes 78460, 78461, 78464, and 78465; and added ICD-9 diagnosis 414.2 for CPT codes 78472, 78473, 78481, 78483, 78494, and 78496.
01/21/08	Updated Program Exceptions.
05/15/08	Scheduled review. No change in position statements. Deleted ICD-9 diagnosis codes that support medical necessity. Updated references.
05/21/09	Removed Federal Employee Plan (FEP) from Florida Blue Radiology Management program exception statement. Added FEP program exception statement: FEP is excluded from the National Imaging Associates (NIA) review; follow FEP guidelines.
07/01/09	Updated Florida Blue Radiology Management program exception; added BlueSelect.
01/01/10	Annual HCPCS coding update: deleted 78460, 78461, 78464, 78465, 78478, and 78480; added 78451, 78452, 78453, and 78454. Revised Florida Blue Radiology Management program exception, and updated the references.
05/15/10	Revised position statement. Added Medicare Advantage program exception. Updated references.
09/15/11	Scheduled review; revised guideline name, deleted “radionuclide” and added “nuclear”. Revised position statements. Revised reimbursement information. Updated Medicare Advantage products program exception. Updated definitions. Updated references.
10/01/11	Revision; formatting changes.
01/15/13	Annual review; revised position statements, added criteria for: evaluation for suspected CAD, detection of CAD, evaluation for known CAD and risk assessment (acute coronary syndrome, post revascularization, viability/ischemia-ischemic cardiomyopathy). Revised Medicare Advantage products program exception (format changes). Updated references.
01/01/14	Review. Updated program exception.
07/08/15	Updated program exception.
10/15/16	Revision; Removed cardiac blood pool imaging from subject. Revised position statement. Deleted codes (78472, 78473, 78494 and 78496). Revised reimbursement information and program exceptions. Updated related guidelines and references.
12/15/17	Revision; format changes.

05/15/18	Revision; revised position statement. Revised suspected coronary artery disease (CAD): asymptomatic high global risk. Deleted syncope; coronary artery disease (CAD) in the presence of other new cardiac concerns. Updated references.
03/15/20	Review/revision. Revised and expanded indications and criteria. Revised: description, format, position statement, definitions and abbreviations. Updated references.
05/15/22	Review/revision. Revised description. Revised and expanded indications and criteria. Updated references.
07/01/22	Revision to Program Exceptions section.
07/08/23	Review: Position statements and references updated.
08/15/24	Review; no change in position statement. Updated references.