Cohere Medical Policy - Myocardial Perfusion Imaging Single Photon Emission Computed Tomography (MPI-SPECT)

Clinical Guidelines for Medical Necessity Review

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Important Notices

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Guideline Information:

Specialty Area: Diagnostic Imaging
Guideline Name: Cohere Medical Policy - Myocardial Perfusion Imaging Single Photon Emission Computed Tomography (MPI-SPECT)

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Service: Myocardial Perfusion Imaging Single Photon Emission Computed Tomography (MPI-SPECT)

Recommended Clinical Approach

Myocardial perfusion imaging single photon emission computed tomography (MPI-SPECT) is typically appropriate for patients with chest pain (or an ischemic equivalent) and an intermediate (16 to 50%) or high (greater than 50%) pretest probability (PTP) of coronary artery disease (CAD). (See the Pre-Test Probability of CAD published by the CAD Consortium). An exercise stress test is appropriate if the patient can exercise to a satisfactory workload. If the patient cannot exercise or has ECG abnormalities that interfere with the ECG interpretation during exercise, a pharmacologic MPI-SPECT or cost-effective alternatives such as stress echocardiography or coronary computed tomographic angiography (CCTA) should be considered. Limitations of MPI-SPECT include cost and radiation. Interpretation of MPI-SPECT can be affected by attenuation artifacts related to soft tissue overlying the heart or extracardiac radioisotope (e.g., liver or gastrointestinal uptake adjacent to the heart).[1-2] In patients with known CAD, guideline-directed medical therapy (GDMT) for angina includes beta blockers, calcium channel blockers, long-acting nitrates, and ranolazine.

Medical Necessity Criteria

Indications

- ➔ **Myocardial perfusion imaging single-photon emission computed tomography (MPI-SPECT)** is considered appropriate if **ANY** of the following is **TRUE**[3-4]:
  - ◆ **ALL** of the following are **TRUE**:
    - The patient has chest pain (or an ischemic equivalent) with **ANY** of the following[4]:
      - No known CAD with an intermediate or higher pre-test probability (use the CAD Consortium Calculator); **OR**

    - No known CAD with a low (less than equal to 15%) pre-test probability of CAD with a coronary calcium score of greater than or equal to 100 Agatston; **AND**
- The patient has **ANY** of the following:
    - ECG abnormalities that interfere with the ECG diagnosis of ischemia, including **ANY** of the following[5]:
        - An inability to achieve the target heart rate with a standard exercise treadmill test (greater than or equal to 85% of age-predicted maximal heart rate); **OR**
        - Ventricular preexcitation (Wolff-Parkinson-White pattern); **OR**
        - Ventricular-paced rhythm; **OR**
        - Left bundle branch block (LBBB); **OR**
        - Greater than 1 mm ST depression at rest; **OR**
        - Left ventricular hypertrophy with ST-T abnormalities; **OR**
        - The patient takes digoxin; **OR**
    - Prior indeterminate stress testing (e.g., heart rate did not reach 85% of age-predicted maximum heart rate, previous stress echocardiography had poor echocardiographic windows); **OR**
    - **ANY** of the following conditions where MPI may be preferential to stress echocardiography:
        - Evidence of ventricular tachycardia; **OR**
        - Severe aortic valve dysfunction; **OR**
        - Severe chronic obstructive pulmonary disease (COPD) defined as a forced expiratory volume (FEV1) less than 30% predicted or FEV1 less than 50% predicted plus respiratory failure or clinical signs of right heart failure (use caution when using a vasodilator stress agent); **OR**
        - Congestive heart failure (CHF) with current ejection fraction (EF) less than or equal to 40%; **OR**
        - Inability to get an echo window for imaging
        - Prior thoracotomy (coronary revascularization [CABG] or other surgery); **OR**

        - Poorly controlled hypertension (e.g., above 180 mm Hg systolic; both physical stress and dobutamine stress may exacerbate hypertension during stress echo); **OR**
        - Poorly controlled atrial fibrillation (e.g., resting heart rate greater than 100 BPM while the patient is on a medication to control the rate); **OR**
        - Segmental wall motion abnormalities at rest (e.g., due to cardiomyopathy, recent MI, or pulmonary hypertension); **OR**
- No known CAD with no prior testing and **ANY** of the following[3]:
    - Likely (typical) anginal symptoms[A] with **ALL** of the following:
        - Age less than 50 years old; **AND**
        - 0 or 1 cardiovascular (CV) risk factor[B]; **OR**
    - Likely (typical) anginal symptoms[A] with **ANY** of the following:
        - Age 50 years old or above; **OR**
        - Greater than or equal to 2 CV risk factors[B]; **OR**
- No known CAD with prior testing and **ALL** of the following:
    - Symptoms of chest pain (or an ischemic equivalent); **AND**
    - **ANY** of the following:
        - Inconclusive routine stress ECG; **OR**
        - Abnormal routine stress ECG; **OR**
        - CCTA with moderate stenosis 50 to 69%; **OR**
        - Inconclusive CCTA; **OR**
        - High pre-test probability of CAD; **OR**
        - Invasive coronary angiography with intermediate severity (maximal coronary diameter stenosis is 40% to 69%) and/or invasive physiological testing not done; **OR**
- Newly diagnosed heart failure without previous evaluation for CAD; **OR**
- Screening for transplant vasculopathy without a prior MPI in the previous year; **OR**
- Evaluation of ventricular arrhythmias without prior cardiac evaluation for ischemia as indicated by **ANY** of the following:
    - Frequent PVCs greater than 30 per hour (5% of total heartbeats); **OR**

- Nonsustained ventricular tachycardia (greater than or equal to 3 consecutive beats at greater than 100 beats per minute); **OR**
- Exercised-induced ventricular tachycardia; **OR**
- Sustained ventricular tachycardia; **OR**
- Ventricular fibrillation; **OR**

◆ Before initiation of antiarrhythmic therapy in patients with intermediate or high pretest probability as indicated by the CAD Consortium Calculator; **OR**

◆ Syncope without an ischemic equivalent and the initial evaluation suggests a CV abnormality (e.g., abnormal EKG or echo); **OR**

◆ Known CAD with a history of prior myocardial infarction (MI) or coronary revascularization and **ALL** of the following:

- No prior MPI and **ANY** of the following is **TRUE**:
  - The patient had a percutaneous coronary intervention (PCI) in the last 2 years; **OR**
  - The patient had a bypass in the last 5 years; **AND**
- **ANY** of the following:
  - Symptoms of ischemia with a change in clinical or functional status on GDMT (or documented intolerance to GDMT); **OR**
  - The patient is asymptomatic and at high-risk for silent ischemia as indicated by **ANY** of the following:
    - ◆ Diabetes mellitus with accelerated progression of CAD; **OR**
    - ◆ Chronic kidney disease (CKD Stage 3 or above - eGFR 15-59 mL/min/1.73 m2 with or without albuminuria that is not treated with dialysis or kidney transplantation); **OR**
    - ◆ Peripheral artery disease; **OR**
    - ◆ Prior brachytherapy; **OR**
    - ◆ In-stent restenosis; **OR**
    - ◆ Saphenous vein graft intervention; **OR**
    - ◆ The patient has a history of silent ischemia; **OR**

◆ Non-cardiac surgery and **ALL** of the following are **TRUE**[6]:

- Intermediate to high-risk non-cardiac surgery planned; **AND**

- Functional capacity unknown or poor (less than 4 METS of activity, 4 METS equal to walking up two flights of stairs or a hill, or walking on level ground at 4 mph)[5]; **AND**
- **ANY** of the following clinical factors:
  - Age greater than or equal to 65 years; **OR**
  - Presence of a CV risk factor as indicated by **ANY** of the following:
    - Diabetes mellitus; **OR**
    - Smoking; **OR**
    - Family history of premature CAD (first degree relative: male less than 55 years old or female less than 65 yo); **OR**
    - Hypertension; **OR**
    - Dyslipidemia; **OR**
  - Established atherosclerotic cardiovascular disease (ASCVD)[C] or other cardiovascular disease (CVD) listed[7-8 D]; **AND**
- Further testing will impact decision-making or perioperative care; **OR**

◆ Repeat imaging of a specific area or structure using the same imaging modality (in the absence of an existing follow-up guideline) is considered appropriate when **ALL** of the following is **TRUE**:

- There is documented clinical necessity; **AND**
- Prior imaging results of the specific area or structure, obtained using the same imaging modality, must be documented and available for comparison; **AND**
- **ANY** of the following is **TRUE**:
  - A change in clinical status, such as worsening symptoms or the emergence of new symptoms, that may influence the treatment approach; **OR**
  - The requirement for interval reassessment, which may alter the treatment plan; **OR**
  - One-time follow-up of a prior indeterminate finding to assess for interval change; **OR**
  - The need for re-imaging either before or after performing an invasive procedure.

[A] Chest/epigastric/shoulder/arm/jaw pain, chest pressure/discomfort, when occurring with exertion or emotional stress and relieved by rest, nitroglycerin, or both.
[B] Diabetes mellitus, smoking, family history of premature CAD (first degree relative: male less than 55 years old or female less than 65 years old), hypertension, dyslipidemia.

[C] Established ASCVD includes documented CAD [history of MI, history of coronary revascularization (CABG or PCI), or known obstructive (greater than or equal to 50%) or non-obstructive (less than 50%) CAD on invasive angiogram or CCTA], peripheral arterial disease (PAD), or cerebrovascular disease (TIA, stroke, carotid endarterectomy, or carotid stenting).

[D] Other CVD includes chronic heart failure (HF) without previous evaluation for ischemia or with recent clinical deterioration or stable heart failure with one of the clinical factors listed above (age greater than or equal to 65 years old, a CV risk factor, or established ASCVD), or chronic kidney disease (CKD): Stage 3 or above, GFR less than 60 ml/ml/1.73 m^2).

Non-Indications

- ➔ **Myocardial perfusion imaging single-photon emission computed tomography (MPI-SPECT)** is not considered appropriate if **ANY** of the following is **TRUE**[3-4,9]:
  - ◆ The patient has undergone advanced imaging of the same body part and for the same indication within 3 months, without being on treatment; **OR**
  - ◆ The patient is pregnant; **OR**
  - ◆ Vasodilators (e.g., adenosine, regadenoson, and dipyridamole) are contraindicated in patients with hypotension, sinus node dysfunction, high-degree atrioventricular (AV) block (in the absence of back up pacemaker capability), and reactive airway disease; **OR**
  - ◆ An active cardiac condition that has not been stabilized (e.g., uncontrolled hypertension, uncontrolled arrhythmias, undiagnosed chest pain, unstable angina); **OR**
  - ◆ An active pulmonary condition that has not been stabilized (e.g., difficulty breathing, the possibility of pulmonary embolism); **OR**
  - ◆ Normal coronary angiogram or CCTA with no stenosis or plaque within the last two years and the patient has not had significant symptoms including no stenosis or plaque[4]; **OR**

- Normal stress test (given adequate stress) without significant symptoms within the last year.[4]

Disclaimer on Radiation Exposure in Pediatric Population

Due to the heightened sensitivity of pediatric patients to ionizing radiation, minimizing exposure is paramount. At Cohere, we are dedicated to ensuring that every patient, including the pediatric population, has access to appropriate imaging following accepted guidelines. Radiation risk is dependent mainly on the patient's age at exposure, the organs exposed, and the patient's sex, though there are other variables. The following technical guidelines are provided to ensure safe and effective imaging practices:

Radiation Dose Optimization: Adhere to the lowest effective dose principle for pediatric imaging. Ensure that imaging protocols are specifically tailored for pediatric patients to limit radiation exposure.[10-11]

Alternative Modalities: Prioritize non-ionizing imaging options such as ultrasound or MRI when clinically feasible, as they are less likely to expose the patient to ionizing radiation. For instance, MRI or ultrasound should be considered if they are more likely to provide an accurate diagnosis than CT, fluoroscopy, or radiography.[10-11]

Cumulative Dose Monitoring: Implement systems to track cumulative radiation exposure in pediatric patients, particularly for those requiring multiple imaging studies. Regularly reassess the necessity of repeat imaging based on clinical evaluation.[10-11]

CT Imaging Considerations: When CT is deemed the best method for achieving a correct diagnosis, use the lowest possible radiation dose that still yields reliable diagnostic images.[10-11]

Cohere Imaging Gently Guideline

The purpose of this guideline is to act as a potential override when clinically indicated to adhere to Imaging Gently and Imaging Wisely guidelines and As Low As Reasonably Possible (ALARA) principles.

Level of Care Criteria

Outpatient

Procedure Codes (CPT/HCPCS)

CPT/HCPCS Code	Code Description
78451	Single-photon emission computed tomography (SPECT) myocardial perfusion imaging study with stress
78452	Multiple single-photon emission computed tomography (SPECT) myocardial perfusion imaging studies with stress
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

Definitions

Symptomatic/Ischemic Equivalent: Chest pain syndrome, anginal equivalent, or ischemic electrocardiogram (ECG) abnormalities are any constellation of clinical findings the physician believes is consistent with CAD manifestations. Examples of such findings include but are not limited to, pain, pressure, tightness, or discomfort in the chest, shoulders, arms, neck, back, upper abdomen, or jaw, new ECG abnormalities, or other symptoms/findings suggestive of CAD. Clinical presentations in the absence of chest pain (e.g., dyspnea with exertion, fatigue, or reduced/worsening effort tolerance) consistent with CAD may also be considered an ischemic equivalent.[12]

Pretest Probability (of Obstructive CAD): Pretest probability of CAD is the likelihood that the patient has CAD, calculated before the test result is known. These guidelines reference the 2019 European Society of Cardiology (ESC) Guidelines for the diagnosis and management of chronic coronary syndromes model to calculate the pretest probability based on age, sex, and type of chest pain.[4,13-15] Additional information such as a coronary artery

calcium (CAC) score or risk factors for CAD (such as diabetes mellitus, smoking, family history of premature CAD [first degree relative: male less than 55 years old or female less than 65 years old, hypertension, or dyslipidemia) can be used to improve the identification of obstructive CAD. (Use the CAD Consortium Calculator).

Medical Evidence

Huck et al. (2024) conducted a retrospective study to evaluate patients post-kidney transplant due to the risk of major adverse cardiovascular events (MACEs). The population is also at higher risk of developing cardiovascular disease. Single-photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI) and pretransplant positron emission tomography (PET) were utilized in the study of 393 patients. Results were taken from a follow-up period of 5.9 years. Overall PET MPI was more effective than SPECT-MPI to predict MACEs in patients post-kidney transplant. Future research should include the effectiveness of normal PET vs SPECT when evaluating low-risk patients.[16]

Kelderman et al. (2022) performed a systematic review on using MPI SPECT to diagnose cardiovascular disease in patients assessed for kidney transplantation. Thirteen studies that focused on MPI SPECT were identified and included in the meta-analysis of 1245 MPI SPECT scans. The pooled sensitivity was 0.66 (95% CI 0.53 to 0.77), pooled specificity was 0.75 (95% CI 0.63 to 0.84) and the area under the curve (AUC) was 0.76. The authors note that while the accuracy is not high with MPI SPECT for the diagnosis of CAD, it is recommended to screen patients at-risk.[17]

Patel et al. (2019) conducted a single-center randomized control trial (RCT) to determine the clinical efficacy of pharmacological MPI-SPECT and PET MPI in patients with coronary artery disease (CAD) and ischemia. A total of 322 symptomatic patients were included. The following pharmacologic agents were given to patients: aspirin therapy (88.8%), beta-blockers (76.7%), and statin therapy (77.3%). Seven patients (2.2%) had a diagnostic failure at 60 days, however, no major differences in diagnostic failure rates were observed overall. Decreased utilization of coronary angiography or revascularization was noted. (ClinicalTrials.gov Identifier NCT00976053).[18]

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Clinical Guideline Revision History/Information

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