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# Table of Contents

<table>
<thead>
<tr>
<th>CPT Code</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiology Imaging Guidelines</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75557</td>
<td>Cardiac MRI for Morphology and Function without Contrast</td>
<td>7</td>
</tr>
<tr>
<td>75561</td>
<td>Cardiac MRI for Morphology and Function without Contrast Followed by Contrast Material and Further Sequences</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>I. Cardiac MRI – Coding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II. Cardiac MRI – Indications (excluding Stress MRI)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III. Cardiac MRI – Aortic Root and Proximal Ascending Aorta</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV. Cardiac MRI – Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade</td>
<td></td>
</tr>
<tr>
<td>75559</td>
<td>Cardiac MRI for Morphology and Function without Contrast; with Stress Imaging</td>
<td>10</td>
</tr>
<tr>
<td>75563</td>
<td>Cardiac MRI for Morphology and Function without Contrast Followed by Contrast Material and Further Sequences; with Stress Imaging</td>
<td>10</td>
</tr>
<tr>
<td>78451</td>
<td>Myocardial Perfusion Imaging with SPECT – Single Study</td>
<td>10</td>
</tr>
<tr>
<td>78452</td>
<td>Myocardial Perfusion Imaging with SPECT – Multiple Studies</td>
<td>10</td>
</tr>
<tr>
<td>78453</td>
<td>Myocardial Perfusion Imaging, Planar Rest or Stress</td>
<td>10</td>
</tr>
<tr>
<td>78454</td>
<td>Myocardial Perfusion Imaging, Planar Rest and/or Stress</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>I. General Issues – Cardiac</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II. Stress Testing without Imaging – Procedures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III. Stress Testing with Imaging – Procedures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV. Stress Testing with Imaging – Indications</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V. Stress Testing with Imaging – Preoperative</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VI. Transplant Patients</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VII. Non-imaging Heart Function and Cardiac Shunt Imaging</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VIII. Genetic lab testing in the evaluation of CAD</td>
<td></td>
</tr>
<tr>
<td>78459</td>
<td>PET Myocardial – Metabolic</td>
<td>19</td>
</tr>
<tr>
<td>78491</td>
<td>PET Myocardial Perfusion Imaging, Rest or Stress</td>
<td>19</td>
</tr>
<tr>
<td>78492</td>
<td>PET Myocardial Perfusion Imaging, Rest and Stress</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>I. Cardiac PET – Perfusion – Indications (CPT® 78491 and CPT® 78492)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>II. Cardiac PET – Absolute Quantitation of Myocardial Blood Flow (CPT® 0482T)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>III. Cardiac PET – Metabolic – Indications (CPT® 78459)</td>
<td></td>
</tr>
<tr>
<td>75571</td>
<td>Coronary Artery Calcium Scoring</td>
<td>21</td>
</tr>
<tr>
<td>75572</td>
<td>CT Heart Structure and Morphology with Contrast</td>
<td>21</td>
</tr>
<tr>
<td>75573</td>
<td>CT Heart Structure and Morphology in Congenital Heart Disease with Contrast</td>
<td>21</td>
</tr>
<tr>
<td>75574</td>
<td>CTA Coronary Arteries and Structure and Morphology with Function and with Contrast</td>
<td>21</td>
</tr>
</tbody>
</table>
Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission, analysis of fluid dynamics and simulated maximal coronary hyperemia, generation of estimated FFR model, with anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report

Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission

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Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report

I. CT for Coronary Calcium Scoring (CPT® 75571)
II. CTA – Indications for CTA
III. CTA – Additional Indications
IV. Evaluation of left ventricular function following myocardial infarction or in chronic heart failure
V. Fractional Flow Reserve by Computed Tomography
VI. CT Heart – Indications
VII. Cardiac CT for congenital heart disease (CPT® 75573)
VIII. Transcatheter Aortic Valve Replacement (TAVR)

Echocardiography
93303 Transthoracic Echocardiography for Congenital Cardiac Anomalies; Complete
93304 Transthoracic Echocardiography for Congenital Cardiac Anomalies; Follow-up or Limited Study
93306 Echocardiography, Transthoracic, Real-time with Image Documentation (2D), Includes M-mode Recording, when Performed, Complete, with Spectral Doppler Echocardiography, and with Color Flow Doppler Echocardiography
93307 Echocardiography, Transthoracic, Real-time with Image Documentation (2D) with or without M-mode Recording; Complete
93308 Echocardiography, Transthoracic, Real-time with Image Documentation (2D) with or without M-mode Recording; Follow-up or Limited Study
93320 Doppler Echocardiography, Pulsed Wave and/or Continuous Wave with Spectral Display; Complete
93321 Doppler Echocardiography, Pulsed Wave and/or Continuous Wave with Spectral Display; Follow-up or Limited Study
93325 Doppler Echocardiography Color Flow Velocity Mapping
   I. Transthoracic Echocardiography (TTE)
   II. 3D Echocardiography

Stress Echocardiography
93350 Echocardiography, Transthoracic, Real-Time with Image Documentation (2D),
   Includes M-Mode Recording, when Performed, During Rest and Cardiovascular
   Stress Test Using Treadmill, Bicycle Exercise and/or Pharmacologically Induced
   Stress, with Interpretation and Report with or without M-Mode Recording, During
   Rest and Cardiovascular Stress Test, with Interpretation and Report
93351 Echocardiography, Transthoracic, Real-Time with Image Documentation (2D),
   Includes M-Mode Recording, when Performed, During Rest and Cardiovascular
   Stress Test Using Treadmill, Bicycle Exercise and/or Pharmacologically Induced
   Stress, with Interpretation and Report with or without M-Mode Recording, During
   Rest and Cardiovascular Stress Test, with Interpretation and Report; Including
   Performance of Continuous Electrocardiographic Monitoring, with Supervision by a
   Qualified Healthcare Professional
   I. Stress Echocardiography (Stress Echo)
   II. General Issues – Cardiac
   III. Stress Testing without Imaging – Procedures
   IV. Stress Testing with Imaging-Procedures
   V. Stress Testing with Imaging - Indications
   VI. Stress Testing with Imaging – Preoperative
   VII. Transplant Patients
   VIII. Non-imaging Heart Function and Cardiac Shunt Imaging
   IX. Genetic lab testing in the evaluation of CAD

Diagnostic Heart Catheterization
93452 Left heart catheterization including intraprocedural injection(s) for left
   ventriculography, imaging supervision and interpretation, when performed
93453 Combined right and left heart catheterization including intraprocedural injection(s)
   for left ventriculography, imaging supervision and interpretation, when
   performed
93454 Catheter placement in coronary artery(s) for coronary angiography, including
   intraprocedural injection(s) for coronary angiography, imaging supervision and
   interpretation
93455 Catheter placement in coronary artery(s) for coronary angiography, including
   intraprocedural injection(s) for coronary angiography, imaging supervision and
   interpretation; with catheter placement(s) in bypass graft(s) (internal mammary,
   free arterial venous grafts) including intraprocedural injection(s) for bypass graft
   angiography
93456 Catheter placement in coronary artery(s) for coronary angiography, including
   intraprocedural injection(s) for coronary angiography, imaging supervision and
   interpretation; with right heart catheterization
93457 Catheter placement in coronary artery(s) for coronary angiography, including
   intraprocedural injection(s) for coronary angiography, imaging supervision and
interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization

93458 Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed

93459 Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography

93460 Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed

93461 Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography

I. Diagnostic Left Heart Catheterization (LHC)
II. Right Heart Catheterization (RHC)
III. Combined Right and Left Heart Catheterization Indications
IV. Planned (Staged) Coronary Interventions
Cardiology Imaging Guidelines

75557 Cardiac MRI for Morphology and Function without Contrast
75661 Cardiac MRI for Morphology and Function without Contrast Followed by Contrast Material and Further Sequences

I. Cardiac MRI – Coding

<table>
<thead>
<tr>
<th>Cardiac Imaging Procedure Codes</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac MRI</td>
<td></td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast</td>
<td>75557</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast; with stress imaging</td>
<td>75559</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences</td>
<td>75561</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences; with stress imaging</td>
<td>75563</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for velocity flow mapping (List separately in addition to code for primary procedure)</td>
<td>+75565</td>
</tr>
</tbody>
</table>

A. Only one procedure code from the set (CPT® 75557- CPT® 75563) should be reported per session.
B. Only one flow velocity measurement (CPT® +75565) should be reported per session when indicated.
C. Requests for cardiac MRI that contain more than one cardiac/chest MRI CPT® Code must be forwarded for Medical Director review.

II. Cardiac MRI – Indications (excluding Stress MRI)

A. Assess myocardial viability (to differentiate hibernating myocardium from scar) when necessary to determine if revascularization should be performed (CPT® 75561)

Assessment of global ventricular function and mass if a specific clinical question is left unanswered by a recent echocardiogram and results will affect patient management (CPT® 75557 or CPT® 75561). Particularly useful in evaluating:
1. Cardiomyopathy (ischemic, diabetic, hypertrophic, or muscular dystrophy)
2. Noncompaction
3. Amyloid heart disease
4. Post cardiac transplant
5. Hemochromatosis
6. Post transfusion hemosiderosis
7. Hypertrophic heart disease
8. Myocarditis, cardiac aneurysm, trauma and contusions
9. Monitoring cancer chemotherapy effect on the heart (especially if accurate assessment of right ventricular function is documented as necessary).

B. Pre and postoperative congenital heart disease assessment (e.g. Tetralogy of Fallot, patent ductus arteriosus, platypnea, atrial septal defects, restrictive VSD, anomalous pulmonary arteries or veins or anomalous coronary arteries) (CPT® 75557 or CPT® 75561)
   1. Chest MRA (CPT® 71555) may be added if the aorta or pulmonary artery need to be visualized beyond the root.
   2. Report CPT® +75565 in conjunction with CPT® 75557 or CPT® 75561, only if there is a need to clarify findings on a recent echocardiogram and cardiac Doppler study

C. Chest MRA alone (CPT® 71555) can be performed in certain situations (e.g. suspected dissection, coarctation, known or suspected aortic aneurysm)

D. Coarctation of the aorta
   1. Follow-up (surveillance) imaging after repair of coarctation:
      a. Adults: chest MRA (CPT® 71555) every 2 to 3 years and before and after any intervention for re-coarctation
      b. Infants and children: ECHO every month for several months, then ECHO every 6 months to one year thereafter

E. Arrhythmogenic right ventricular dysplasia or arrhythmogenic cardiomyopathy (ARVD/ARVC) suspicion (including presyncope or syncope, established criteria for ARVD (CPT® 75557 or CPT® 75561)

F. Differentiate constrictive pericarditis from restrictive cardiomyopathy (CPT® 75561).

G. Evaluate cardiac tumor or mass when echocardiogram is inconclusive

H. Initial evaluation for cardiac sarcoidosis

I. Anomalous coronary arteries: Cardiac MRI (CPT® 75561) or CCTA (CPT® 75574) is much better at detecting this than conventional angiography.

J. Assess coronary arteries in Kawasaki’s disease

K. Fabry disease
   1. Late enhancement MRI may predict the effect of enzyme replacement therapy on myocardial changes that occur with this disease (CPT® 75561)

L. Evaluate valvular heart disease when echocardiogram is inconclusive.
   Appropriate procedures include:
   1. CPT® 75557 or CPT® 75561 and
   2. CPT® 75565

M. Pulmonary vein anatomy for planned ablation procedures in patients with atrial fibrillation. Report cardiac MRI (CPT® 75557 or CPT® 75561) or chest MRV (CPT® 71555), but not both (see Pulmonary Artery and Vein Imaging in CPT® 75572 for guidelines on follow-up imaging after ablation procedure).

N. Suspected cardiac thrombus when echocardiogram is inconclusive (CPT® 75557)
O. Right ventricular function evaluation (CPT® 75557 in conjunction with CPT® +75565) if a recent ECHO has been done, and there is documented need to perform cardiac MRI in order to resolve an unanswered question

P. Shunting through a VSD (CPT® 75557 in conjunction with CPT® +75565) if a recent ECHO has been done, including a bubble study, and there is documented need to perform cardiac MRI in order to resolve an unanswered question

Q. Evaluate for iron overload due to conditions requiring frequent blood transfusions (i.e. sickle cell, thalassemia, hemochromatosis, etc.) (CPT® 75557)

III. Cardiac MRI – Aortic Root and Proximal Ascending Aorta
A. See Thoracic Aorta in the Chest Imaging Guidelines

IV. Cardiac MRI – Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade
A. Contrast enhanced cardiac MRI (CPT® 75561) is useful for evaluating pericarditis, neoplastic and other effusion, tamponade or myocardial infiltration if a specific clinical question is left unanswered by echocardiogram or another recent imaging study
   1. Cardiac MRI – Indications for Stress MRI
B. If a nuclear perfusion (MPI) stress test was performed and was equivocal, a stress MRI is appropriate.
C. For indications for Stress MRI, see Stress Testing with Imaging – Indications

75557, 75561 Cardiac MRI
I. General Issues – Cardiac

A. Cardiac imaging is not indicated if the results will not affect patient management decisions. If a decision to perform cardiac catheterization or other angiography has already been made, there is often no need for imaging stress testing.

B. A current clinical evaluation (within 60 days) is required prior to considering advanced imaging, which includes:

1. Relevant history and physical examination and appropriate laboratory studies and non-advanced imaging modalities, such as recent ECG (within 60 days), chest x-ray or ECHO/ultrasound, after symptoms started or worsened.
   a. Effort should be made to obtain copies of reported “abnormal” ECG studies in order to determine whether the ECG is uninterpretable.
   b. Most recent previous stress testing and its findings
   c. Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.

2. Vital signs, height and weight or BMI or description of general habitus is needed.

3. Advanced imaging should answer a clinical question which will affect management of the patient’s clinical condition.

4. Assessment of coronary artery disease can be determined by the following:
   a. Typical angina (definite):
      i. Substernal chest discomfort (generally described as pressure, heaviness, burning, or tightness)
      ii. Generally brought on by exertion or emotional stress and relieved by rest
iii. May radiate to the left arm or jaw
iv. When clinical information is received indicating that a patient is experiencing chest pain that is "exertional" or "due to emotional stress", this meets the typical angina definition under the Pre-Test Probability Grid. No further description of the chest pain is required (location within the chest is not required).

5. The Pre-Test Probability Grid (Table 1) is based on age, gender, and symptoms. All factors must be considered in order to approve for stress testing with imaging using the Pre-Test Probability Grid.
   a. **Atypical angina (probable)**: Chest pain or discomfort (arm or jaw pain) that lacks one of the characteristics of definite or typical angina.
   b. **Non-anginal chest pain**: Chest pain or discomfort that meets one or none of the typical angina characteristics.
   c. **Anginal variants or equivalents**: a manifestation of myocardial ischemia which is perceived by patients to be (otherwise unexplained) dyspnea, unusual fatigue, more often seen in women and may be unassociated with chest pain.

II. **Stress Testing without Imaging – Procedures**

   **The Exercise Treadmill Test (ETT) is without imaging**

   A. Necessary components of an ETT include:
      1. ECG that can be interpreted for ischemia.
      2. Patient capable of exercise on a treadmill or similar device (generally at 4METs or greater; see functional capacity below).
   B. An abnormal ETT (exercise treadmill test) includes any one of the following:
      1. ST segment depression (usually described as horizontal or downsloping, greater or equal to 1.0 mm below baseline)
      2. Development of chest pain
      3. Significant arrhythmia (especially ventricular arrhythmia)
      4. Hypotension
   C. Functional capacity greater than or equal to 4METs equates to the following:
      1. Can walk four blocks without stopping
      2. Can walk up a hill
      3. Can climb one flights of stairs without stopping
      4. Can perform heavy work around the house

   Practice Note: An observational study found that, compared with the Duke Activity Status Index, subjective assessment by clinicians generally underestimated exercise capacity (see reference 25).

III. **Stress Testing with Imaging – Procedures**

   A. Imaging Stress Tests include any one of the following:
      1. Stress Echocardiography (see Stress Echocardiography (Stress Echo) – Coding)
      2. MPI (see Myocardial Perfusion Imaging (MPI) – Coding)
      3. Stress perfusion MRI (see Cardiac MRI – Indications for Stress MRI)
B. Stress testing with imaging can be performed with maximal exercise or chemical stress (dipyridamole, dobutamine, adenosine, or regadenoson) and does not alter the CPT® codes used to report these studies.

IV. Stress Testing with Imaging – Indications

**Stress echo, MPI OR stress MRI, can be considered for the following:**

A. New, recurrent or worsening cardiac symptoms **AND** with any of the following:
   1. High pretest probability (greater than 90% probability of CAD)
   2. A history of CAD based on:
      a. A prior anatomic evaluation of the coronaries OR
      b. A history of CABG or PCI
   3. Evidence or high suspicion of ventricular tachycardia
   4. Age 40 years or greater and known diabetes mellitus
   5. Coronary calcium score ≥ 100
   6. ECG is uninterpretable for ischemia due to any one of the following:
      a. Complete Left Bundle Branch Block (bifascicular block involving right bundle branch and left anterior hemiblock does not render ECG uninterpretable for ischemia)
      b. Ventricular paced rhythm
      c. Pre-excitation pattern such as Wolff-Parkinson-White
      d. Greater or equal to 1.0 mm ST segment depression (NOT nonspecific ST/T wave changes. (T wave inversion isolated in lead III or T wave inversion in lead V1 and V2 are not included).
      e. LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria)
      f. T-wave inversion in the inferior and/or lateral leads. This includes leads II, AVF, V5, or V6)
      g. Patient on digitalis preparation
   7. Continuing symptoms in a patient who had a normal or submaximal exercise treadmill test and there is suspicion of a false negative result.
   8. Patients with recent equivocal, borderline, or abnormal stress testing where ischemia remains a concern.
   9. Heart rate less than 50 bpm in patients on beta blocker and/or calcium channel blocker medication where it is felt that the patient may not achieve an adequate workload for a diagnostic exercise study.
  10. Inadequate ETT:
      a. Physical inability to achieve target heart rate (85% MPHR or 220-age.) Target heart rate is calculated as 85% of the maximum age predicted heart rate (MPHR). MPHR is estimated as 220 minus the patient’s age.
      b. History of false positive exercise treadmill test: a false positive ETT is one that is abnormal however the abnormality does not appear to be due to macrovascular CAD.
B. Within 3 months of an acute coronary syndrome (e.g. ST segment elevation MI [STEMI], unstable angina, non-ST segment elevation MI [NSTEMI]), one MPI can be performed to evaluate for inducible ischemia if all of the following related to the most recent acute coronary event apply:
   1. Individual is hemodynamically stable
   2. No recurrent chest pain symptoms and no signs of heart failure
   3. No prior coronary angiography or imaging stress test in regards to the current episode of symptoms
C. Assessing myocardial viability in patients with significant ischemic ventricular dysfunction (suspected hibernating myocardium) and persistent symptoms or heart failure such that revascularization would be considered.
   1. **NOTE:** MRI, cardiac PET, MPI, or Dobutamine stress echo can be used to assess myocardial viability depending on physician preference
   2. PET and MPI perfusion studies are usually accompanied by PET metabolic examinations (CPT® 78459). TI-201 MPI perfusion studies may assess viability without accompanying PET metabolism information.
D. Unheralded syncope (not near syncope)
E. Asymptomatic patient with an uninterpretable ECG that has never been evaluated or is a new uninterpretable change.
F. Patient with an elevated cardiac troponin.
G. One routine study 2 years or more after a stent, except with a left main stent where it can be done at 1 year.
H. One routine study at 5 years or more after CABG, without cardiac symptoms.
I. Every 2 years if there was documentation of previous “silent ischemia” on the imaging portion of a stress test but not on the ECG portion.
J. To assess for CAD prior to starting a taking Class IC antiarrhythmic agent (flecainide or propafenone) and annually while taking the medication.
K. Prior anatomic imaging study (coronary angiogram or CCTA) demonstrating coronary stenosis in a major coronary branch which is of uncertain functional significance can have one stress test with imaging.
L. Evaluating new, recurrent or worsening left ventricular dysfunction/CHF.

V. **Stress Testing with Imaging – Preoperative**
A. There are 2 steps that determine the need for imaging stress testing in (stable) pre-operative patients:
   1. Would the patient qualify for imaging stress testing independent of planned surgery?
      a. If yes, proceed to stress testing guidelines above
      b. If no, go to step 2
   2. Is the surgery considered high, moderate or low risk? (see **Table 2**) If high or moderate-risk, proceed below. If low-risk, there is no evidence to determine a need for preoperative cardiac testing.
      a. **High Risk Surgery:** All patients in this category should receive an imaging stress test if there has not been an imaging stress test within 1 year*, unless the patient has developed new cardiac symptoms or a new change in the EKG since the last stress test.
b. **Intermediate Surgery**: One or more risk factors and unable to perform an ETT per guidelines if there has not been an imaging stress test within 1 year* unless the patient has developed new cardiac symptoms or a new change in the EKG since the last stress test.

c. **Low Risk**: Preoperative imaging stress testing is not supported.

3. Clinical Risk Factors (for cardiac death & non-fatal MI at time of non-cardiac surgery)
   a. Planned high risk surgery (open surgery on the aorta or open peripheral vascular surgery)
   b. History of ischemic heart disease (previous MI, previous positive stress test, use of nitroglycerin, typical angina, ECG Q waves, previous PCI or CABG)
   c. History of compensated previous congestive heart failure (history of heart failure, previous pulmonary edema, third heart sound, bilateral rales, chest x-ray showing heart failure)
   d. History of previous TIA or stroke
   e. Diabetes Mellitus
   f. Creatinine level > 2 mg/dL

*Time interval is based on consensus of eviCore executive cardiology panel.

### Table 2

<table>
<thead>
<tr>
<th>Cardiac Risk Stratification List</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Risk (&gt; 5%)</strong></td>
</tr>
<tr>
<td>Open aortic and other major open vascular surgery</td>
</tr>
<tr>
<td>Open peripheral vascular surgery</td>
</tr>
<tr>
<td><strong>Intermediate Risk (1-5%)</strong></td>
</tr>
<tr>
<td>Open intraperitoneal and/or intrathoracic surgery</td>
</tr>
<tr>
<td>Open carotid endarterectomy</td>
</tr>
<tr>
<td>Head and neck surgery</td>
</tr>
<tr>
<td>Open orthopedic surgery</td>
</tr>
<tr>
<td>Open prostate surgery</td>
</tr>
<tr>
<td><strong>Low Risk (&lt;1%)</strong></td>
</tr>
<tr>
<td>Endoscopic procedures</td>
</tr>
<tr>
<td>Superficial procedures</td>
</tr>
<tr>
<td>Cataract surgery</td>
</tr>
<tr>
<td>Breast surgery</td>
</tr>
<tr>
<td>Ambulatory surgery</td>
</tr>
<tr>
<td>Laparoscopic and endovascular procedures that are unlikely to require further extensive surgical intervention</td>
</tr>
</tbody>
</table>

### VI. Transplant Patients

A. Stress Testing in patients for **Non-Cardiac** Transplant

1. Individuals who are candidates for any type of organ bone marrow or stem cell transplant can undergo imaging stress testing every year (usually stress echo or MPI) prior to transplant.

2. Individuals who have undergone organ transplant are at increased risk for ischemic heart disease secondary to their medication. Risk of vasculopathy is 7% at one year, 32% at five years and 53% at ten years. An imaging stress test can be repeated annually after transplant for at least two years or within one year of a prior cardiac imaging study if there is evidence of progressive vasculopathy.
3. After two consecutive normal imaging stress tests, repeated testing is not supported more often than every other year without evidence for progressive vasculopathy or new symptoms.
4. Stress testing after five years may proceed according to normal patterns of consideration.

B. Post-Cardiac transplant assessment of transplant CAD: One of the following imaging studies may be performed annually:
   1. MPI
   2. Stress ECHO
   3. Stress MRI
   4. Cardiac PET perfusion with coronary flow quantitation (CPT® 78491 or CPT® 78492)

VII. Non-imaging Heart Function and Cardiac Shunt Imaging
   A. Procedures reported with CPT® 78414 and CPT® 78428 are essentially obsolete and should not be performed in lieu of other preferred modalities.
   B. Echocardiogram is the preferred method for cardiac shunt detection, rather than the cardiac shunt imaging study described by CPT® 78428.
   C. Ejection fraction can be obtained by echocardiogram, MPI, MUGA study, cardiac MRI, cardiac CT, or cardiac PET depending on the clinical situation, rather than by the non-imaging heart function study described by CPT® 78414.

VIII. Genetic lab testing in the evaluation of CAD
   A. Corus® CAD genetic expression score – refer to lab management program guidelines
**Rule 1: Determination of pretest probability for coronary disease based on chest pain**

<table>
<thead>
<tr>
<th>Pre-Test Probability of CAD by Age, Gender, and Symptoms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age-Years</strong></td>
<td><strong>Gender</strong></td>
</tr>
<tr>
<td>---------------</td>
<td>------------</td>
</tr>
<tr>
<td>30-39</td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td>Women</td>
</tr>
<tr>
<td>40-49</td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td>Women</td>
</tr>
<tr>
<td>50-59</td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td>Women</td>
</tr>
<tr>
<td>≥60</td>
<td>Men</td>
</tr>
<tr>
<td></td>
<td>Women</td>
</tr>
</tbody>
</table>

- **High:** Greater than 90% pre-test probability
- **Intermediate:** Between 10% and 90% pre-test probability
- **Low:** Between 5% and 10% pre-test probability
- **Very Low:** Less than 5% pre-test probability

Typical angina (definite): 1) Substernal chest pain or discomfort that is 2) provoked by exertion or emotional stress and 3) relieved by rest and/or nitroglycerin.

Atypical angina (probable): Chest pain or discomfort that lacks one of the characteristics of definite or typical angina.

Non-anginal chest pain: Chest pain or discomfort that meets one or none of the typical angina characteristics.

**Practice Estimate of Effective Radiation Dose chart for Selected Imaging Studies**

<table>
<thead>
<tr>
<th>IMAGING STUDY</th>
<th>Estimate of Effective Radiation Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sestamibi myocardial perfusion study (MPI)</td>
<td>9-12 mSv</td>
</tr>
<tr>
<td>PET myocardial perfusion study:</td>
<td></td>
</tr>
<tr>
<td>Rubidium-82</td>
<td>3 mSv</td>
</tr>
<tr>
<td>NH3</td>
<td>2 mSv</td>
</tr>
<tr>
<td>Thallium myocardial perfusion study (MPI)</td>
<td>22-31 mSv</td>
</tr>
<tr>
<td>Diagnostic conventional coronary angiogram (cath)</td>
<td>5-10 mSv</td>
</tr>
<tr>
<td>Computed tomography coronary angiography (CTCA)</td>
<td>5-15 mSv</td>
</tr>
<tr>
<td>(with prospective gating)</td>
<td>Less than 5 mSv</td>
</tr>
<tr>
<td>CT of Abdomen and pelvis</td>
<td>8-14 mSv</td>
</tr>
<tr>
<td>Chest x-ray</td>
<td>&lt;0.1 mSv</td>
</tr>
</tbody>
</table>
References:


75559, 75563 Cardiac MRI for Morphology
78451, 78452, 78453, 78454 Myocardial Perfusion Imaging
78459 PET Myocardial – Metabolic  
78491 PET Myocardial Perfusion Imaging, Rest or Stress  
78492 PET Myocardial Perfusion Imaging, Rest and Stress

### Cardiac Imaging Procedure Codes

<table>
<thead>
<tr>
<th>CARDIAC PET</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial imaging, PET, <em>metabolic</em> evaluation</td>
<td>78459</td>
</tr>
<tr>
<td>Myocardial imaging, PET, <em>perfusion</em>; single study at rest or stress</td>
<td>78491</td>
</tr>
<tr>
<td>Myocardial imaging, PET, <em>perfusion</em>; multiple studies at rest and/or stress</td>
<td>78492</td>
</tr>
<tr>
<td>Absolute quantitation of myocardial blood flow, PET, rest and stress</td>
<td>+0482T</td>
</tr>
</tbody>
</table>

- 78491 and 78492 are also referred to as a rubidium study stress test.  
- 3D rendering, (CPT® 76376/CPT® 76377), should not be billed in conjunction with PET.  
- Separate codes for such related services as treadmill testing (CPT® 93015-CPT® 93018) and radiopharmaceuticals should be assigned in addition to perfusion PET. These services are paid according to each individual payor.  
- 0482T is an add on code for CPT® 78491 or CPT® 78492 and is considered investigational

**I. Cardiac PET – Perfusion – Indications (CPT® 78491 and CPT® 78492)**  
A. Meets all of the criteria for an imaging stress test (see Stress Testing with Imaging – Indications) and additionally any one of the following:  
   1. Individual is obese (for example BMI>35 kg/m²) or  
   2. Individual has large breasts or implants  
B. Equivocal nuclear perfusion (MPI) stress test  
   1. Routine use in post heart transplant assessment of transplant CAD  
C. CMS (Medicare) does not cover reporting for wall motion and ejection fraction performed in conjunction with cardiac perfusion PET. There is not a separate CPT® or HCPCS code associated with these specific services. eviCore and their partner health plans adhere to the CMS policy, unless explicitly stated in the health plan’s coverage policy.
II. Cardiac PET – Absolute Quantitation of Myocardial Blood Flow (CPT® 0482T)
   A. Performance of quantitation of myocardial blood flow by Cardiac PET is currently non-standardized between different vendor products.
   B. Absolute quantitation of myocardial blood flow (CPT 0482T) is considered experimental, investigational and/or unproven (EIU)

III. Cardiac PET – Metabolic – Indications (CPT® 78459)
   A. To determine myocardial viability when a previous study has shown significant left ventricular dysfunction when under consideration for revascularization or
   B. To identify and monitor response to therapy for established or strongly suspected cardiac sarcoid. This study may be performed in conjunction with a Cardiac PET perfusion examination, single study, CPT® 78491 or MPI SPECT CPT® 78451

References

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>75571</td>
<td>Coronary Artery Calcium Scoring</td>
</tr>
<tr>
<td>75572</td>
<td>CT Heart Structure and Morphology with Contrast</td>
</tr>
<tr>
<td>75573</td>
<td>CT Heart Structure and Morphology in Congenital Heart Disease with Contrast</td>
</tr>
<tr>
<td>75574</td>
<td>CTA Coronary Arteries and Structure and Morphology with Function and with Contrast</td>
</tr>
<tr>
<td>0501T</td>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission, analysis of fluid dynamics and simulated maximal coronary hyperemia, generation of estimated FFR model, with anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report</td>
</tr>
<tr>
<td>0502T</td>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission</td>
</tr>
<tr>
<td>0503T</td>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; analysis of fluid dynamics and simulated maximal coronary hyperemia, and generation of estimated FFR model</td>
</tr>
</tbody>
</table>
**0504T Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report**

### Cardiac Imaging Procedure Codes

<table>
<thead>
<tr>
<th>Cardiac CT</th>
<th>CPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT, heart, without contrast, with quantitative evaluation of coronary calcium</td>
<td>75571</td>
</tr>
<tr>
<td>The code set for Cardiac CT and CCTA (CPT® 75572-CPT® 75574), include quantitative and functional assessment (for example, calcium scoring), if performed</td>
<td></td>
</tr>
<tr>
<td>CPT® 75571 describes a non-contrast CT of the heart with calcium scoring and should be reported only when calcium scoring is performed as a stand-alone procedure.</td>
<td></td>
</tr>
<tr>
<td>Can be used to report a preliminary non-contrast scan which indicates an excessive amount of calcium such that the original scheduled study must be discontinued.</td>
<td></td>
</tr>
<tr>
<td>CPT® 75571 should not be reported in conjunction with any of the contrast CT/CTA codes (CPT® 75572- CPT® 75574).</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cardiac CT and CCTA</th>
<th>CPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT, heart, with contrast, for evaluation of cardiac structure and morphology (including 3D image post-processing, assessment of cardiac function, and evaluation of venous structures, if performed).</td>
<td>75572</td>
</tr>
<tr>
<td>CT, heart, with contrast, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3D image post-processing, assessment of cardiac function, and evaluation of venous structures, if performed).</td>
<td>75573</td>
</tr>
<tr>
<td>CTA, heart, coronary arteries and bypass grafts (when present), with contrast, including 3D image post-processing (including 3D image post-processing, assessment of cardiac function, and evaluation of venous structures, if performed).</td>
<td>75574</td>
</tr>
<tr>
<td>&quot;Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission, analysis of fluid dynamics and simulated maximal coronary hyperemia, generation of estimated FFR model, with anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report</td>
<td></td>
</tr>
<tr>
<td>Data preparation and transmission</td>
<td>0501T</td>
</tr>
<tr>
<td>Analysis of fluid dynamics and simulated maximal coronary hyperemia, and generation of estimated FFR model</td>
<td>0502T</td>
</tr>
<tr>
<td>Anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report</td>
<td></td>
</tr>
<tr>
<td>• (Report 0501T, 0502T, 0503T, 0504T one time per coronary CT angiogram)</td>
<td></td>
</tr>
<tr>
<td>• (Do not report 0501T in conjunction with 0502T, 0503T, 0504T)</td>
<td>0504T</td>
</tr>
</tbody>
</table>
3D rendering, (CPT® 76376/CPT® 76377), should not be billed in conjunction with Cardiac CT and CCTA.
- Only one code from the set: CPT® 75572 - CPT® 75574 can be reported per encounter.
- CPT® 75574 includes evaluation of cardiac structure and morphology, when performed; therefore, additional code/s should not be assigned.

I. CT for Coronary Calcium Scoring (CPT® 75571)
- CT Calcium Scoring for asymptomatic CAD Screening
  - Coronary calcium scoring as a standalone test is considered investigational in asymptomatic patients with any degree of CAD risk.
  - Medicare policies consider that there is insufficient evidence based data to support performance of Coronary Calcium Scoring.
  - Texas Heart Attack Preventive Screening Law (HR 1290) mandates that insurers in Texas cover either a calcium scoring study (CPT® 75571 or HCPCS S8092) or a carotid intima-media thickness study (ultrasound—Category III code 0126T) every five years for certain populations. To qualify, the following must apply:
    a. Must be a Texas resident.
    b. Must be a member of a fully-insured Texas health plan.
    c. Must be a man age 45 to 75 or a woman age 55 to 75.
    d. Must have either diabetes or a Framingham cardiac risk score of intermediate or higher.
    e. Must not have had a calcium scoring study or a carotid intima-media thickness study within the past 5 years.
- Symptomatic individuals with a ‘very low’, or ‘low’ pretest probability of CAD*, (see Table 1 in General Issues – Cardiac)

II. CTA – Indications for CTA
- Symptomatic individuals who have a ‘low’ or ‘intermediate’ pretest probability of CAD*, (see Table 1 in General Issues – Cardiac):
- ‘Low’ or ‘intermediate’ pre-test probability of coronary disease with persistent symptoms after a stress test.
- Replace performance of invasive coronary angiogram in individuals with low risk of CAD (i.e. Pre-op non-coronary surgery).
- For symptomatic individuals, evaluate post-CABG graft patency when only graft patency is a concern and imaging of the native coronary artery anatomy is not needed, such as in early graft failure.
- For symptomatic individuals with unsuccessful conventional coronary angiography (i.e. locate a coronary artery, graft, identify the course of an anomalous coronary artery).
III. CTA – Additional Indications

A. Re-do CABG
   1. To identify whether bypass grafts are located directly beneath the sternum, so that alternative ways to enter the chest can be planned.

B. Evaluate coronary artery anomalies and other complex congenital heart disease of cardiac chambers or great vessels.
      a. To evaluate the great vessels, Chest CTA (CPT® 71275) can be performed instead of CCTA or in addition to CCTA. For anomalous pulmonary venous return, can add CT abdomen and pelvis with contrast (CPT® 74177).

C. Anomalous coronary artery(ies) suspected for diagnosis or to plan treatment and less than age 40 with a history that includes one or more of the following:
   1. Persistent exertional chest pain and normal stress test,
   2. Full sibling(s) with history of sudden death syndrome before age 30 or with documented anomalous coronary artery,
   3. Resuscitated sudden death and contraindications for conventional coronary angiography.

D. Unexplained new onset of heart failure.

E. Evaluation of newly diagnosed congestive heart failure or cardiomyopathy.
   1. No prior history of coronary artery disease, the ejection fraction is less than 50 percent, and low or intermediate risk on the pre-test probability assessment, and
   2. No exclusions to cardiac CT angiography.
   3. No cardiac catheterization, SPECT, cardiac PET, or stress echocardiogram has been performed since the diagnosis of congestive heart failure or cardiomyopathy.

F. Ventricular tachycardia (6 beat runs or greater) if CCTA will replace conventional invasive coronary angiography.

G. Equivocal coronary artery anatomy on conventional cardiac catheterization.

H. Newly diagnosed dilated cardiomyopathy.

I. Preoperative assessment of the coronary arteries in patients who are going to undergo surgery for aortic dissection, aortic aneurysm, or valvular surgery if CCTA will replace conventional invasive coronary angiography.

J. Vasculitis/Takayasu's/Kawasaki's disease

K. Cardiac Trauma: Chest CTA (CPT® 71275) and CCTA (CPT® 75574) are useful in detecting aortic and coronary injury and can help in the evaluation of myocardial and pericardial injury (see Cardiac Trauma – Imaging).

Practice Note: Relative contraindications for Cardiac/Coronary CT
   • Irregular heart rhythms (e.g., atrial fibrillation/flutter, frequent irregular premature ventricular contractions or premature atrial contractions, and high grade heart block)
   • Multifocal Atrial Tachycardia (MAT)
   • Inability to lie flat
   • Body mass index of 40 or more
- Inability to obtain a heart rate less than 65 beats per minute after beta-blockers
- Inability to hold breath for at least 8 seconds
- Renal Insufficiency
- Asymptomatic patients and routine use in the evaluation of the coronary arteries following heart transplantation
- CCTA should not be performed if there is extensive coronary calcification (calcium score >1000).
- Evaluation of coronary stent patency (metal artifact limits accuracy) - <3.0 mm

IV. Evaluation of left ventricular function following myocardial infarction or in chronic heart failure

V. Fractional Flow Reserve by Computed Tomography
   A. Fractional flow reserve (FFR) is typically measured using invasive techniques. FFR can be obtained noninvasively from coronary computed tomography angiography data (FFR-CT).
   B. Indications for FFR-CT
      1. To further assess CAD seen on a recent CCTA that is of uncertain physiologic significance

VI. CT Heart – Indications
   A. If echocardiogram is inconclusive for:
      1. Cardiac or pericardial tumor or mass
      2. Cardiac thrombus
      3. Pericarditis/constrictive pericarditis
      4. Complications of cardiac surgery
   B. Cardiac vein identification for lead placement in patients needing left ventricular pacing.
   C. Pulmonary vein isolation procedure (ablation) for atrial fibrillation
   D. Cardiac MRI (CPT® 75557 or CPT® 75561), chest MRV (CPT® 71555), chest CTV (CPT® 71275), or cardiac CT (CPT® 75572) can be performed to evaluate anatomy of the pulmonary veins prior to an ablation procedure performed for atrial fibrillation
      1. Repeated post-procedure between 3-6 months after ablation because of a 1%-2% incidence of asymptomatic pulmonary vein stenosis.
      2. If pulmonary vein stenosis is present on imaging following ablation and symptoms of pulmonary vein stenosis (usually shortness of breath) are present, can be imaged at 1, 3, 6, and 12 months.
   E. Recurrent laryngeal nerve palsy due to cardiac chamber enlargement.
   F. Clinical suspicion of arrhythmogenic right ventricular dysplasia or arrhythmogenic cardiomyopathy (ARVD/ARVC), especially if patient has presyncope or syncope if the clinical suspicion is supported by established criteria for ARVD.
G. Coronary imaging is not included in the code definition for CPT® 71275.
   1. The AMA definition for CPT® 71275 reads: “CTA Chest (non-coronary),
      with contrast material(s), including non-contrast images, if performed, and
      image post-processing.”

VII. Cardiac CT for congenital heart disease (CPT® 75573)
   A. Coronary artery anomaly evaluation
      1. A cardiac catheterization was performed and not all coronary arteries were
         identified
   B. Thoracic arteriovenous anomaly evaluation
      1. A cardiac MRI or chest CT angiogram was performed and suggested
         congenital heart disease
   C. Complex adult congenital heart disease evaluation [One of the following]
      1. No cardiac CT or cardiac MRI has been performed and there is a
         contraindication to cardiac MRI

VIII. Transcatheter Aortic Valve Replacement (TAVR)
   A. Once the decision has been made for aortic valve replacement, the following
      may be used to determine if a patient is a candidate for TAVR:
      1. CTA of chest (CPT® 71275), abdomen and pelvis (combination code CPT®
         74174) are considered appropriate, and
      2. Cardiac CT (CPT® 75572) may be considered to measure the aortic
         annulus 2 or
      3. Coronary CTA (CCTA CPT® 75574) may be considered to both measure
         the aortic annulus and assess the coronary arteries in lieu of heart
         catheterization.
   B. Post TAVR:
      1. TAVR follow-up may be approved at 3 months, at one year post-
         procedure, and annually thereafter
**Rule 1: Determination of pretest probability for coronary disease based on chest pain**

<table>
<thead>
<tr>
<th>Age-Years</th>
<th>Gender</th>
<th>Typical/Definite Angina Pectoris</th>
<th>Atypical/Probable Angina Pectoris</th>
<th>Non-anginal Chest Pain</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>Men</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Very low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>40-49</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>50-59</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>≥60</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>High</td>
<td>Intermediate</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

**High:** Greater than 90% pre-test probability  
**Intermediate:** Between 10% and 90% pre-test probability  
**Low:** Between 5% and 10% pre-test probability  
**Very Low:** Less than 5% pre-test probability

Typical angina (definite): 1) Substernal chest pain or discomfort that is 2) provoked by exertion or emotional stress and 3) relieved by rest and/or nitroglycerin.

Atypical angina (probable): Chest pain or discomfort that lacks one of the characteristics of definite or typical angina.

Non-anginal chest pain: Chest pain or discomfort that meets one or none of the typical angina characteristics.

**References:**


**0501T, 0502T, 0503T, 0504T** Coronary Fractional Flow Reserve (FFR) Computed Tomography
### Echocardiography

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>93303</td>
<td>Transthoracic Echocardiography for Congenital Cardiac Anomalies; Complete</td>
</tr>
<tr>
<td>93304</td>
<td>Transthoracic Echocardiography for Congenital Cardiac Anomalies; Follow-up or Limited Study</td>
</tr>
<tr>
<td>93306</td>
<td>Echocardiography, Transthoracic, Real-time with Image Documentation (2D), Includes M-mode Recording, when Performed, Complete, with Spectral Doppler Echocardiography, and with Color Flow Doppler Echocardiography</td>
</tr>
<tr>
<td>93307</td>
<td>Echocardiography, Transthoracic, Real-time with Image Documentation (2D) with or without M-mode Recording; Complete</td>
</tr>
<tr>
<td>93308</td>
<td>Echocardiography, Transthoracic, Real-time with Image Documentation (2D) with or without M-mode Recording; Follow-up or Limited Study</td>
</tr>
<tr>
<td>93320</td>
<td>Doppler Echocardiography, Pulsed Wave and/or Continuous Wave with Spectral Display; Complete</td>
</tr>
<tr>
<td>93321</td>
<td>Doppler Echocardiography, Pulsed Wave and/or Continuous Wave with Spectral Display; Follow-up or Limited Study</td>
</tr>
<tr>
<td>93325</td>
<td>Doppler Echocardiography Color Flow Velocity Mapping</td>
</tr>
</tbody>
</table>
I. Transthoracic Echocardiography (TTE)

A. Coding

<table>
<thead>
<tr>
<th>Transthoracic Echocardiography</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTE for congenital cardiac anomalies, complete</td>
<td>93303</td>
</tr>
<tr>
<td>TTE for congenital cardiac anomalies, follow-up or limited</td>
<td>93304</td>
</tr>
<tr>
<td>TTE with 2-D, M-mode, Doppler and color flow, complete</td>
<td>93306</td>
</tr>
<tr>
<td>TTE with 2-D, M-mode, without Doppler or color flow</td>
<td>93307</td>
</tr>
<tr>
<td>TTE with 2-D, M-mode, follow-up or limited</td>
<td>93308</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Doppler Echocardiography</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display</td>
<td>+93320*</td>
</tr>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display, follow-up or limited study</td>
<td>+93321*</td>
</tr>
<tr>
<td>Doppler echo, color flow velocity mapping</td>
<td>+93325</td>
</tr>
</tbody>
</table>

*CPT® 93320 and CPT® 93321 should not be requested or billed together

<table>
<thead>
<tr>
<th>Transthoracic Echocardiography</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>C8921 TTE for congenital cardiac anomalies, complete</td>
<td>93303</td>
</tr>
<tr>
<td>C8922 TTE for congenital cardiac anomalies, follow-up or limited</td>
<td>93304</td>
</tr>
<tr>
<td>C8929 TTE with 2-D, M-mode, Doppler and color flow, complete</td>
<td>93306</td>
</tr>
<tr>
<td>C8923 TTE with 2-D, M-mode, without Doppler or color flow</td>
<td>93307</td>
</tr>
<tr>
<td>C8924 TTE with 2-D, M-mode, follow-up or limited</td>
<td>93308</td>
</tr>
</tbody>
</table>

C codes are unique temporary codes established by CMS. C codes were established for contrast echocardiography. Each echocardiography C code corresponds to a standard echo code (Class I CPT code). The C code and the matching CPT code should not both be approved.

<table>
<thead>
<tr>
<th>Investigational Codes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0399T Myocardial strain imaging (quantitative assessment of myocardial mechanics using image-based analysis of local myocardial dynamics) (List separately in addition to code for primary procedure)</td>
<td>Investigational</td>
</tr>
<tr>
<td>0439T Myocardial contrast perfusion echocardiography, at rest or with stress, for assessment of myocardial ischemia or viability</td>
<td>Investigational</td>
</tr>
</tbody>
</table>

B. The most commonly performed study is a complete transthoracic echocardiogram with spectral and color flow Doppler (CPT® 93306).

1. CPT® 93306 includes the Doppler exams, so CPT® codes 93320-93325 should not be assigned together with CPT® 93306

2. Doppler codes (CPT® 93320, CPT® 93321, and CPT® 93325) are ‘add-on codes’ (as denoted by the + sign) and are assigned in addition to code for the primary procedure.
3. For a 2D transthoracic echocardiogram without Doppler, report CPT® 93307.

4. Limited transthoracic echocardiogram should be billed if the report does not “evaluate or document the attempt to evaluate” all of the required structures.
   a. A limited transthoracic echocardiogram is reported with CPT® 93308.
   b. CPT® 93321 (not CPT® 93320) should be reported with CPT® 93308 if Doppler is included in the study. CPT® 93325 can be reported with CPT® 93308 if color flow Doppler is included in the study.
   c. A limited congenital transthoracic echocardiogram is reported with CPT® 93304.

5. Providers performing echo on a patient, may not know what procedure codes they will be reporting until the initial study is completed.
   a. If a congenital issue is found on the initial echo, a complete echo is reported with codes CPT® 93303, CPT® 93320, and CPT® 93325 because CPT® 93303 does NOT include Doppler and color flow mapping.
   b. If no congenital issue is discovered, then CPT® 93306 is reported alone and includes 2-D, Doppler and color flow mapping.
   c. Since providers may not know the appropriate code/s that will be reported at the time of the pre-authorization request, they may request all 4 codes (CPT® 93303, CPT® 93320, CPT® 93325, and CPT® 93306).
   d. Depending upon individual health plan payer contracts, post-service audits may be completed to ensure proper claims submission.
   e. CPT® 76376 and CPT® 76377 are not unique to 3D Echo. These codes also apply to 3D rendering of MRI and CT studies. (See Echocardiography – Coding)
   f. CPT® 93325 may also be used with fetal echocardiography.

6. Doppler echo may be used for evaluation of the following:
   a. Shortness of breath
   b. Known or suspected valvular disease
   c. Known or suspected hypertrophic obstructive cardiomyopathy
   d. Shunt detection

C. Transthoracic Echocardiography (TTE) – Indications
   1. New or worsening cardiac signs or symptoms, such as:
      a. Dyspnea
      b. Chest pain
      c. Palpitations
      d. Syncope
      e. Symptoms of heart failure
      f. Murmur
2. Valve function and structure:
   a. Valvular stenosis or regurgitation
   b. Valvular structure
   c. Valve Surgery
      i. If valve surgery is being considered can have TTE twice a year
      ii. One routine study (surveillance) 3 years or more after valve surgery (repair or prosthetic valve implantation).
      iii. TAVR follow-up may be approved at, 3 months, and at one year post-procedure and annually thereafter.
          01. A baseline post-op TTE is usually performed within one week after surgery. This baseline study may also be approved as an outpatient if not performed in the hospital prior to discharge.

3. Ventricular function including global and segmental wall motion for evaluating ejection fraction (EF) and coronary artery disease
   a. Dyspnea
   b. Symptoms of Heart Failure
   c. Cardiomyopathy
   d. Chemotherapy
      i. See also: **MUGA Study – Assessment of cardiac function for cardiotoxic chemotherapy**
      ii. Determine LV function in patients on cardiotoxic chemotherapeutic drugs.
          01. The time frame should be determined by the provider, but no more often than baseline and at every 6 weeks.
          02. May repeat every 4 weeks if cardiotoxic chemotherapeutic drug is withheld for significant left ventricular cardiac dysfunction
      iii. If the LVEF is <50% on echocardiogram than follow up can be done with MUGA at appropriate intervals.
   e. Arrhythmias

4. Ventricular structure including but not limited to:
   a. Infiltrative diseases (e.g. sarcoid, amyloid)
   b. Ventricular septal defect (VSD)
   c. Papillary muscle rupture/dysfunction
   d. Hypertrophy including:
      i. asymmetric septal hypertrophy
      ii. spade heart
      iii. Hypertensive concentric hypertrophy
      iv. Infiltrative hypertrophy

5. Evaluation of right ventricular systolic pressure/pulmonary hypertension

6. Evaluation of atrial or ventricular chamber size (e.g. patients with atrial fibrillation, tachyarrhythmias, or left ventricular dilatation)
   a. Yearly TTE may be indicated depending on the clinical circumstance.

7. Cardiac Defects or Masses
   a. Embolic source in patients with recent Transient Ischemic Attack (TIA), stroke, or peripheral vascular emboli as an initial study before TEE
   b. ASD repair or VSD repair:
i. Within the first year of surgery or
ii. If newly symptomatic
c. Tumor evaluation including myxomas
d. Clot detection
e. Evaluation of congenital heart disease

8. Inflammatory
   a. Pericardial effusion/pericardial disease including pericardial cysts
   b. Congenital heart disease
c. Endocarditis including:
   i. Fever
   ii. Positive blood cultures indicating bacteremia or
   iii. A new murmur

9. Pacemaker insertion complication

10. Screening for first-degree relatives of patients with hypertrophic cardiomyopathy (HCM)
   a. First-degree relatives who are 12 to 18 years old should be screened yearly for HCM by 2D- echocardiography and ECG
   b. First-degree relatives who are older than age 18 should have 2D-echo and ECG every five years to screen for delayed adult-onset LVH
   c. Systematic screening is usually not indicated for first-degree relatives who are younger than age 12 unless there is a high-risk family history or the child is involved in particularly intense competitive sports
   d. Affected individuals identified through family screening or otherwise should be evaluated every 12 to 18 months with 2D-echo, Holter monitor, and blood pressure response during maximal upright exercise

11. New abnormality on an EKG that has not been evaluated

12. Assess aortic root and proximal ascending aorta

D. Frequency of Echocardiography Testing
1. Repeat routine echocardiograms are not supported (annually or otherwise) for evaluation of clinically stable syndromes
2. Once a year (when no change in clinical status), when there a history of:
   a. Significant valve dysfunction
   b. Hypertrophic cardiomyopathy (see Stress Echocardiography – Indications, other than ruling out CAD)
   c. Chronic pericardial effusions
   d. Left ventricular contractility/diastolic function prior to planned medical therapy for heart failure or to evaluate the effectiveness of on-going therapy
   e. Aortic root dilatation
   f. Pulmonary hypertension
3. Prior TAVR (see Transthoracic Echocardiography (TTE) – Indications)
4. Twice a year for the following assessments:
   a. New or changing (not chronic stable) pericardial effusions
   b. New/changed medical therapy for congestive heart failure
   c. Hypertrophic cardiomyopathy when the results of the echo will potentially change patient management
d. Critical valvular heart disease when the results of the echo will potentially change patient management

5. Anytime, without regard for the number or timing of previous ECHO studies, if there are new signs or symptoms such as:
   a. Cardiac murmurs
   b. Myocardial infarction or acute coronary syndrome
   c. Congestive heart failure (new or worsening)
      i. New symptoms of dyspnea
      ii. Orthopnea
      iii. Paroxysmal nocturnal dyspnea
      iv. Edema
      v. Elevated BNP
   d. Pericardial disease
   e. Stroke/transient ischemic attack
   f. Decompression illness
   g. Prosthetic valve dysfunction or thrombosis

II. 3D Echocardiography

A. Coding
   1. The procedure codes used to report 3D rendering for echocardiography are not unique to echocardiography and are the same codes used to report the 3D post processing work for CT, MRI, ultrasound and other tomographic modalities
      a. CPT® 76376, not requiring image post-processing on an independent workstation, is the most common code used for 3D rendering done with echocardiography
      b. CPT® 76377 requires the use of an independent workstation

B. 3D Echocardiography – Indications
   1. 3D Echo Indications
      a. Echocardiography with 3-dimensional (3D) rendering is becoming universally available, yet its utility remains limited based on the current literature. Current indications include:
         i. Left ventricular volume and ejection fraction assessment
         ii. Mitral valve anatomy specifically related to mitral valve stenosis
         iii. Guidance of transcatheter procedures

References


### Stress Echocardiography

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>93350</td>
<td>Echocardiography, Transthoracic, Real-Time with Image Documentation (2D), Includes M-Mode Recording, when Performed, During Rest and Cardiovascular Stress Test Using Treadmill, Bicycle Exercise and/or Pharmacologically Induced Stress, with Interpretation and Report with or without M-Mode Recording, During Rest and Cardiovascular Stress Test, with Interpretation and Report</td>
</tr>
<tr>
<td>93351</td>
<td>Echocardiography, Transthoracic, Real-Time with Image Documentation (2D), Includes M-Mode Recording, when Performed, During Rest and Cardiovascular Stress Test Using Treadmill, Bicycle Exercise and/or Pharmacologically Induced Stress, with Interpretation and Report with or without M-Mode Recording, During Rest and Cardiovascular Stress Test, with Interpretation and Report; Including Performance of Continuous Electrocardiographic Monitoring, with Supervision by a Qualified Healthcare Professional</td>
</tr>
</tbody>
</table>
I. Stress Echocardiography (Stress Echo)

A. Coding

<table>
<thead>
<tr>
<th>Stress Echocardiography</th>
<th>CPT®</th>
<th>Doppler Echocardiography:</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;*</td>
<td>93350</td>
<td>Doppler echo, pulsed wave and/or spectral display**</td>
<td>+93320</td>
</tr>
<tr>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: <em>including performance of continuous electrocardiographic monitoring, with physician supervision</em></td>
<td>93351</td>
<td>Doppler echo, pulsed wave and/or spectral display, follow-up/limited study</td>
<td>+93321</td>
</tr>
<tr>
<td>Doppler echo, color flow velocity mapping **</td>
<td>+93325</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>CPT®</th>
<th>Stress Echocardiography</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>93350</td>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;*</td>
<td>C8928</td>
</tr>
<tr>
<td>93351</td>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: <em>including performance of continuous electrocardiographic monitoring, with physician supervision</em></td>
<td>C8930</td>
</tr>
</tbody>
</table>

B. Stress Echocardiography–Indications, other than ruling out CAD

1. In addition to the evaluation of CAD, stress echo can be used to evaluate the following conditions:
   a. Dyspnea on exertion (specifically to evaluate pulmonary hypertension)
   b. Right heart dysfunction
   c. Valvular heart disease
   d. Exercise-induced pulmonary hypertension
   e. Hypertrophic cardiomyopathy
      i. In a patient with a history of hypertrophic cardiomyopathy who has been previously evaluated with a stress echo, another stress echo may be appropriate if there are worsening symptoms or if there has been a therapeutic change (for example: change in medication, surgical procedure performed).
      ii. In general spectral Doppler (CPT® 93320 or 93321) and color-flow Doppler (CPT® 93325) are necessary in the evaluation of the above conditions and can be added to the stress echo code.
II. General Issues – Cardiac

A. Cardiac imaging is not indicated if the results will not affect patient management decisions. If a decision to perform cardiac catheterization or other angiography has already been made, there is often no need for imaging stress testing.

B. A current clinical evaluation (within 60 days) is required prior to considering advanced imaging, which includes:
   1. Relevant history and physical examination and appropriate laboratory studies and non-advanced imaging modalities, such as recent ECG (within 60 days), chest x-ray or ECHO/ultrasound, after symptoms started or worsened.
      a. Effort should be made to obtain copies of reported “abnormal” ECG studies in order to determine whether the ECG is uninterpretable.
      b. Most recent previous stress testing and its findings
      c. Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.
   2. Vital signs, height and weight or BMI or description of general habitus is needed.
   3. Advanced imaging should answer a clinical question which will affect management of the patient’s clinical condition.
   4. Assessment of coronary artery disease can be determined by the following:
      a. Typical angina (definite):
         i. Substernal chest discomfort (generally described as pressure, heaviness, burning, or tightness)
         ii. Generally brought on by exertion or emotional stress and relieved by rest
         iii. May radiate to the left arm or jaw
      iv. When clinical information is received indicating that a patient is experiencing chest pain that is "exertional" or "due to emotional stress", this meets the typical angina definition under the Pre-Test Probability Grid. No further description of the chest pain is required (location within the chest is not required).
      b. The Pre-Test Probability Grid (Table 1) is based on age, gender, and symptoms. All factors must be considered in order to approve for stress testing with imaging using the Pre-Test Probability Grid.
      c. Atypical angina (probable): Chest pain or discomfort (arm or jaw pain) that lacks one of the characteristics of definite or typical angina.
      d. Non-anginal chest pain: Chest pain or discomfort that meets one or none of the typical angina characteristics.
      e. Anginal variants or equivalents: a manifestation of myocardial ischemia which is perceived by patients to be (otherwise unexplained) dyspnea, unusual fatigue, more often seen in women and may be unassociated with chest pain.
Table 1

Pre-Test Probability of CAD by Age, Gender, and Symptoms

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Gender</th>
<th>Typical / Definite Angina Pectoris</th>
<th>Atypical / Probable Angina Pectoris</th>
<th>Non-anginal Chest Pain</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>39 and younger</td>
<td>Men</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Very low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>40 - 49</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>50 - 59</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td>60 and over</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Greater than 90% pre-test probability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>Between 10% and 90% pre-test probability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Between 5% and 10% pre-test probability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Low</td>
<td>Less than 5% pre-test probability</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

III. Stress Testing without Imaging – Procedures

The Exercise Treadmill Test (ETT) is without imaging

A. Necessary components of an ETT include:
   1. ECG that can be interpreted for ischemia
   2. Patient capable of exercise on a treadmill or similar device (generally at 4 METs or greater; see functional capacity below)

B. An abnormal ETT (exercise treadmill test) includes any one of the following:
   1. ST segment depression (usually described as horizontal or downsloping, greater or equal to 1.0 mm below baseline)
   2. Development of chest pain
   3. Significant arrhythmia (especially ventricular arrhythmia)
   4. Hypotension

C. Functional capacity greater than or equal to 4METs equates to the following:
   1. Can walk four blocks without stopping
   2. Can walk up a hill
   3. Can climb one flights of stairs without stopping
   4. Can perform heavy work around the house
IV. Stress Testing with Imaging-Procedures

A. Imaging Stress Tests include any one of the following:
   1. Stress Echocardiography see Stress Echocardiography (Stress Echo) – Coding
   2. MPI see Myocardial Perfusion Imaging (MPI) – Coding
   3. Stress perfusion MRI see Cardiac MRI – Indications for Stress MRI

B. Stress testing with imaging can be performed with maximal exercise or chemical stress (dipyridamole, dobutamine, adenosine, or regadenoson) and does not alter the CPT® codes used to report these studies

V. Stress Testing with Imaging - Indications

A. Stress echo, MPI OR stress MRI, can be considered for the following:
   1. New, recurrent or worsening cardiac symptoms AND any of the following:
      a. High pretest probability (greater than 90% probability of CAD)
      b. A history of CAD based on:
         i. A prior anatomic evaluation of the coronaries OR
         ii. A history of CABG or PCI
      c. Evidence or high suspicion of ventricular tachycardia
      d. Age 40 years or greater and known diabetes mellitus
      e. Coronary calcium score ≥ 100
      f. Poorly controlled hypertension defined as systolic BP greater than or equal to 180mmhg, if provider feels strongly that CAD needs evaluation prior to BP being controlled
      g. ECG is uninterpretable for ischemia due to any one of the following:
         i. Complete Left Bundle Branch Block (bifasicular block, involving right bundle branch and left anterior hemiblock, does not render ECG uninterpretable for ischemia)
         ii. Ventricular paced rhythm
         iii. Pre-excitation pattern such as Wolff-Parkinson-White
         iv. Greater or equal to 1.0 mm ST segment depression (NOT nonspecific ST/T wave changes)
         v. LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria)
         vi. T-wave inversion in the inferior and/or lateral leads. This includes leads II, AVF, V5, or V6 (T wave inversion isolated in lead III or T wave inversion in lead V1 and V2 are not included)
         vii. Patient on digitalis preparation
      h. Continuing symptoms in a patient who had a normal or submaximal exercise treadmill test and there is suspicion of a false negative result
      i. Patients with recent equivocal, borderline, or abnormal stress testing where ischemia remains a concern
      j. Heart rate less than 50 bpm in patients on beta blocker and/or calcium channel blocker medication where it is felt that the patient may not achieve an adequate workload for a diagnostic exercise study
      k. Inadequate ETT:
         i. Physical inability to achieve target heart rate (85% MPHR or 220-age)
01. Target heart rate is calculated as 85% of the maximum age predicted heart rate (MPHR). MPHR is estimated as 220 minus the patient's age.

ii. History of false positive exercise treadmill test: a false positive ETT is one that is abnormal however the abnormality does not appear to be due to macrovascular CAD.

2. Within 3 months of an acute coronary syndrome (e.g. ST segment elevation MI [STEMI], unstable angina, non-ST segment elevation MI [NSTEMI]), one MPI can be performed to evaluate for inducible ischemia if all of the following related to the most recent acute coronary event apply:
   a. Individual is hemodynamically stable
   b. No recurrent chest pain symptoms and no signs of heart failure
   c. No prior coronary angiography or imaging stress test in regards to the current episode of symptoms

3. Assessing myocardial viability in patients with significant ischemic ventricular dysfunction (suspected hibernating myocardium) and persistent symptoms or heart failure such that revascularization would be considered
   a. NOTE: MRI, cardiac PET, MPI, or Dobutamine stress echo can be used to assess myocardial viability depending on physician preference
   b. PET and MPI perfusion studies are usually accompanied by PET metabolic examinations (CPT® 78459). TI-201 MPI perfusion studies may assess viability without accompanying PET metabolism information.

4. Unheralded syncope (not near syncope)

5. Asymptomatic patient with an uninterpretable ECG that has never been evaluated or is a new uninterpretable change.

6. Patient with an elevated cardiac troponin.

7. One routine study 2 years or more after a stent, except with a left main stent where it can be done at 1 year

8. One routine study at 5 years or more after CABG, without cardiac symptoms

9. Every 2 years if there was documentation of previous “silent ischemia” on the imaging portion of a stress test but not on the ECG portion

10. To assess for CAD prior to starting a Class IC antiarrhythmic agent (flecainide or propafenone) and annually while taking the medication

   Prior anatomic imaging study (coronary angiogram or CCTA) demonstrating coronary stenosis in a major coronary branch which is of uncertain functional significance can have one stress test with imaging

B. Evaluating new, recurrent or worsening left ventricular dysfunction/CHF.
VI. Stress Testing with Imaging – Preoperative

A. There are 2 steps that determine the need for imaging stress testing in (stable) pre-operative patients:
   1. Would the patient qualify for imaging stress testing independent of planned surgery?
      a. If yes, proceed to stress testing guidelines;
      b. If no, go to step 2 (C)

B. Is the surgery considered high, moderate or low risk? (see Table 2) If high or moderate-risk, proceed below. If low-risk, there is no evidence to determine a need for preoperative cardiac testing.
   1. High Risk Surgery: All patients in this category should receive an imaging stress test if there has not been an imaging stress test within 1 year*, unless the patient has developed new cardiac symptoms or a new change in the EKG since the last stress test.
   2. Intermediate Surgery: One or more risk factors and unable to perform an ETT per guidelines if there has not been an imaging stress test within 1 year* unless the patient has developed new cardiac symptoms or a new change in the EKG since the last stress test.
   3. Low Risk: Preoperative imaging stress testing is not supported.

C. Clinical Risk Factors (for cardiac death & non-fatal MI at time of non-cardiac surgery)
   1. Planned high risk surgery (open surgery on the aorta or open peripheral vascular surgery)
   2. History of ischemic heart disease (previous MI, previous positive stress test, use of nitroglycerin, typical angina, ECG Q waves, previous PCI or CABG)
   3. History of compensated previous congestive heart failure (history of heart failure, previous pulmonary edema, third heart sound, bilateral rales, chest x-ray showing heart failure)
   4. History of previous TIA or stroke
   5. Diabetes Mellitus
   6. Creatinine level > 2 mg/dL

*Time interval is based on consensus of eviCore executive cardiology panel.

Table 2

<table>
<thead>
<tr>
<th>Cardiac Risk Stratification List</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Risk (&gt; 5%)</strong></td>
</tr>
<tr>
<td>Open aortic and other major open vascular surgery</td>
</tr>
<tr>
<td>Open peripheral vascular surgery</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>
VII. Transplant Patients
A. Post-cardiac transplant assessment of transplant CAD:
   1. One of the following imaging studies may be performed annually
      a. MPI
      b. Stress Echocardiogram
      c. Stress MRI
      d. Cardiac PET perfusion with coronary flow quantitation (CPT® 78491 or CPT® 78492)
B. Non-Cardiac Transplant Patients
   1. Individuals who are awaiting an organ, bone marrow or stem cell transplant can undergo imaging stress testing every year (usually stress echo or MPI) prior to the transplant
   2. Individuals who have undergone organ transplant are at increased risk for ischemic heart disease secondary to their medication. An imaging stress test can be repeated annually after transplant for at least two years or within one year of a prior cardiac imaging study if there is evidence of progressive vasculopathy
   3. After two consecutive normal imaging stress tests, repeated testing is supported every two years unless there is evidence of progressive vasculopathy or new symptoms Stress testing after five years may proceed according to normal patterns of consideration.

VIII. Non-imaging Heart Function and Cardiac Shunt Imaging
A. Procedures reported with CPT® 78414 and CPT® 78428 are essentially obsolete and should not be performed in lieu of other preferred modalities.
B. Echocardiogram is the preferred method for cardiac shunt detection, rather than the cardiac shunt imaging study described by CPT® 78428.
C. Ejection fraction can be obtained by echocardiogram, MPI, MUGA study, cardiac MRI, cardiac CT, or cardiac PET depending on the clinical situation, rather than by the non-imaging heart function study described by CPT® 78414.

IX. Genetic lab testing in the evaluation of CAD
A. Corus® CAD genetic expression score – refer to lab management program guidelines

References


### Diagnostic Heart Catheterization

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>93452</td>
<td>Left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed</td>
</tr>
<tr>
<td>93453</td>
<td>Combined right and left heart catheterization including intraprocedural injection(s) for left ventriculography, imaging supervision and interpretation, when performed</td>
</tr>
<tr>
<td>93454</td>
<td>Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation</td>
</tr>
<tr>
<td>93455</td>
<td>Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial venous grafts) including intraprocedural injection(s) for bypass graft angiography</td>
</tr>
<tr>
<td>93456</td>
<td>Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization</td>
</tr>
<tr>
<td>93457</td>
<td>Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization</td>
</tr>
<tr>
<td>93458</td>
<td>Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization</td>
</tr>
</tbody>
</table>
injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed

93459 Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography

93460 Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed

93461 Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
### Cardiac Catheterization Procedure Codes

<table>
<thead>
<tr>
<th>Cardiac Cath Procedures</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital Heart Disease Code “Set”</td>
<td>93530-93533</td>
</tr>
<tr>
<td>Right Heart Catheterization (CHD)</td>
<td>93530</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CHD)</td>
<td>93531</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CHD-TS)</td>
<td>93532</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CAD-ASD)</td>
<td>93533</td>
</tr>
<tr>
<td>Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve</td>
<td>93451-93464, 93566-93568</td>
</tr>
<tr>
<td>RHC without LHC or coronaries</td>
<td>93451</td>
</tr>
<tr>
<td>LHC without RHC or coronaries</td>
<td>93452</td>
</tr>
<tr>
<td>RHC and retrograde LHC without coronaries</td>
<td>93453</td>
</tr>
<tr>
<td>Native coronary artery catheterization;</td>
<td>93454</td>
</tr>
<tr>
<td>with bypass grafts</td>
<td>93455</td>
</tr>
<tr>
<td>with RHC</td>
<td>93456</td>
</tr>
<tr>
<td>with RHC and bypass grafts</td>
<td>93457</td>
</tr>
<tr>
<td>with LHC</td>
<td>93458</td>
</tr>
<tr>
<td>with LHC and bypass grafts</td>
<td>93459</td>
</tr>
<tr>
<td>with RHC and LHC</td>
<td>93460</td>
</tr>
<tr>
<td>with RHC and LHC and bypass grafts</td>
<td>93461</td>
</tr>
<tr>
<td>LHC by transseptal or apical puncture</td>
<td>+93462</td>
</tr>
<tr>
<td>Angiography of noncoronary arteries and veins, performed as a distinct service</td>
<td>Select appropriate codes from the Radiology and Vascular Injection Procedures sections.</td>
</tr>
</tbody>
</table>

## I. Diagnostic Left Heart Catheterization (LHC)

A. These guidelines apply to individuals with stable conditions and who are not in the acute setting (acute coronary syndrome) or patients with unstable angina. Individuals in acute settings or with unstable angina should be handled as medical emergencies.

B. Incidental angiography can be performed:
   1. Iliac/femoral artery angiography when dissection or obstruction to the passage of the catheter/guidewire is encountered.
   2. Renal arteriography if criteria outlined in the Abdomen Imaging Guidelines are met (see Renovascular Hypertension).

C. Identifying disease for which invasive procedures have been shown to prolong survival:
   1. Left main coronary artery disease plus right coronary artery disease plus left ventricular dysfunction.
   2. Triple vessel coronary artery disease plus left ventricular dysfunction.

D. Unstable angina (new, accelerating, or worsening symptoms that are suggestive of unstable angina), even in the absence of noninvasive cardiac testing.

E. Symptomatic patients with a high pretest probability of CAD.
F. Angina that is unresponsive to optimized medical therapy (see General Issues – Cardiac) and for which invasive procedures are needed to provide pain relief.

G. Left ventricular dysfunction (congestive heart failure) in patients suspected of having coronary artery disease.

H. Ventricular fibrillation or ventricular tachycardia where the etiology is unclear.

I. Unheralded syncope (not near syncope).

J. Recent noninvasive cardiac testing was equivocal, unsuccessful in delineating the clinical problem, or led to a conclusion that intervention is indicated for the following conditions:
   1. Suspicion of cardiomyopathy, endocarditis, or myocarditis
   2. Significant/serious ventricular arrhythmia
   3. Evaluating progression of known CAD when symptoms are persistent or worsening
   4. An intermediate or large amount of myocardium (>5%) may be in jeopardy
   5. Evaluation of coronary grafts
   6. Evaluation of previously placed coronary artery stents
   7. Evaluation of structural disease

K. Ruling out coronary artery disease prior to planned non-coronary cardiac or great vessel surgery (i.e. cardiac valve surgery, aortic dissection, aortic aneurysm, congenital disease repair such as atrial septal defect, etc.).

L. Assessment for accelerated coronary artery disease associated with cardiac transplantation.

M. Pre-organ transplant (non-cardiac). Some institutions perform a heart cath as part of their initial evaluation protocol. Others use an imaging stress test for evaluation. Either is appropriate and can be approved but NOT both.

N. Valvular heart disease when there is a discrepancy between the clinical findings (history, physical exam, and non-invasive test results) or valvular surgery is being considered.

O. Suspected pericardial disease.

II. Right Heart Catheterization (RHC)

A. General Information RHC
   1. It is performed most commonly from the femoral vein, less often through the subclavian or internal jugular veins and interatrial septal puncture approach.
   2. It includes a full oximetry for detection and quantification of shunts.
   3. Pressure measurements are made and are done simultaneously with aortic and left ventricular pressures.
   4. Cardiac outputs are calculated by several techniques including thermodilution.

B. Diagnostic Right Heart Catheterization – Indications
   1. Atrial septal defect (ASD) including shunt detection and quantification
   2. Ventricular septal defect (VSD) including shunt detection and quantification
   3. Patent foramen ovale (PFO)
   4. Anomalous pulmonary venous return
5. Congenital defects including persistent left vena cava  
6. Pulmonary hypertension  
7. Pericardial diseases (constrictive or restrictive pericarditis)  
8. Valvular disease  
9. Right heart failure  
10. Left heart failure  
11. Preoperative evaluation for valve surgery  
12. Newly diagnosed or worsening cardiomyopathy  
13. During a left heart cath where the etiology of the symptoms remains unclear.  
14. Pre-lung transplant to assess pulmonary pressures  
15. Uncertain intravascular volume status with an unclear etiology  
16. Assessment post cardiac transplant  
   a. For routine endomyocardial biopsy  
   b. Assess for rejection  
   c. Assess pulmonary artery pressure  
   d. Can be done per the institution protocol or anytime organ rejection is suspected and biopsy is needed for assessment  
17. Evaluation of right ventricular morphology  
18. Suspected arrhythmogenic right ventricular dysplasia  

III. Combined Right and Left Heart Catheterization Indications  
A. Preoperative evaluation for valve surgery  
B. Newly diagnosed or worsening cardiomyopathy  
C. If the major component of the patient symptoms is dyspnea, and the indications for Diagnostic Left Heart Catheterization are also met  
D. If indications are met according to Diagnostic Left Heart Catheterization (LHC) and Right Heart Catheterization, then a combination heart catheterization may be appropriate.  

IV. Planned (Staged) Coronary Interventions  
A. The CPT® codes for percutaneous coronary interventions (PCI) include the following imaging services necessary for the procedure(s):  
   1. Contrast injection, angiography, ‘roadmapping’, and fluoroscopic guidance  
   2. Vessel measurement  
   3. Angiography following coronary angioplasty, stent placement, and atherectomy  
B. Separate codes for these services should not be assigned in addition to the PCI code/s because the services are already included.  
C. A repeat diagnostic left heart catheterization is not medically necessary when the patient is undergoing a planned staged percutaneous coronary intervention.  
D. CPT® 93530 to 93533 are appropriate for invasive evaluation of congenital heart disease.
References


93452, 93453, 93454, 93455, 93456, 93457, 93458, 93459, 93460, 93461: Diagnostic Hearth Catheterization