# PHYSICIAN GUIDELINES

## Current, Evidence-based Recommendations Regarding Cardiology

Effective: November 21, 2018

**Please note the following:**

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| 33212 | Insertion of pacemaker pulse generator only; with existing single lead |
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| 33214 | Upgrade of implanted pacemaker system, conversion of single chamber system to dual chamber system (includes removal of previously placed pulse generator, testing of existing lead, insertion of new lead, insertion of new generator) |
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| | |
|---|---|
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**of sensing or therapeutic parameters when performed**

## Abbreviations

| | |
|---|---|
| **ACE inhibitor** | angiotensin-converting enzyme inhibitor |
| **AMI** | acute myocardial infarction |
| **ARVC** | arrhythmogenic right ventricular cardiomyopathy |
| **CC** | complications/comorbid conditions |
| **CHF** | congestive heart failure |
| **CM** | cardiomyopathy |
| **CRT** | cardiac resynchronization therapy |
| **EP** | electrophysiology |
| **ICD** | implantable cardioverter defibrillator |
| **LV** | left ventricular |
| **LVEF** | left ventricular ejection fraction |
| **MCC** | major complications/comorbid conditions |
| **MI** | myocardial infarction |
| **NCCM** | non-compaction cardiomyopathy |
| **NYHA** | New York Heart Association functional classification |
| **VF** | ventricular fibrillation |
| **VT** | ventricular tachycardia |

# Glossary

| Class | NYHA Heart Failure Definitions |
|---|---|
| I | No symptoms and no limitation in ordinary physical activity, e.g. shortness of breath when walking, climbing stairs etc. |
| II | Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity. |
| III | Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g. walking short distances (20–100 m).<br>Comfortable only at rest. |
| IV | Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients |

**Abnormal blood pressure response to exercise:** Flat response/failure to augment; rise then fall during exercise; vasoactive cardiovascular drugs may result in an abnormal blood pressure response to exercise

**Non-Sustained Ventricular Tachycardia (NSVT):** Three or more consecutive ventricular beats at a rate of greater than 120 beats/min with a duration of less than 30 seconds

**Incessant VT:** Frequent recurrences of ongoing hemodynamically stable VT

**Long QT Syndrome (LQTS):** A congenital disorder characterized by a prolongation of the QT interval on ECG and a propensity to ventricular tachyarrhythmias, which may lead to syncope, cardiac arrest, or sudden death.
The QT interval on the ECG, measured from the beginning of the QRS complex to the end of the T wave, represents the duration of activation and recovery of the ventricular myocardium. QT intervals corrected for heart rate (QTc) longer than 0.44 seconds are generally considered abnormal, though a normal QTc can be more prolonged in females (up to 0.46 sec).The Bazett formula is the formula most commonly used to calculate the QTc, as follows: QTc = AT/square root of the R-R interval (in seconds).

**Optimal Medical Therapy:** Three months of heart failure medications in maximally titrated doses as tolerated. These include beta blockers, ACE inhibitors or ARBs, and diuretics.

**Structural Heart Disease:** A structural or functional abnormality of the heart, or of the blood vessels supplying the heart, that impairs its normal functioning.

**Non-Compaction Cardiomyopathy:** A rare congenital cardiomyopathy that affects children and adults. It results from the failure of myocardial development during embryogenesis. It is also called spongiform cardiomyopathy. Symptoms are often a result of a poor pumping performance by the heart. The disease can be associated with other problems with the heart and the body.

# I. Definite Indications for Permanent Pacemaker Implantation

A. Symptomatic Bradycardia
   1. Permanent pacemaker implantation is indicated for symptomatic bradycardia including:
      a. Frequent sinus pauses that produce symptoms and any degree of AV block producing symptoms
      b. Required drug therapy for medical conditions (for example, beta blocker therapy in patients with prior myocardial infarction)

B. Symptomatic Chronotropic Incompetence
   1. Permanent pacemaker implantation is indicated for symptomatic chronotropic incompetence defined as limitations due to the inability to achieve 80 percent of the predicted maximum heart rate (220-age)

C. Indications for Asymptomatic Patients
   1. Permanent pacemaker implantation is indicated for asymptomatic patients with third degree AV block
   2. Permanent pacemaker implantation is indicated for asymptomatic patients with advanced second degree AV block (Mobitz type II) and intermittent third Degree AV Block
   3. Permanent pacemaker implantation is indicated for asymptomatic patients with second degree AV block and documented periods of asystole greater than or equal to 3.0 seconds
   4. Permanent pacemaker implantation is indicated for second degree AV block in awake, symptom-free patients with atrial fibrillation and a documented pause of 5 seconds or longer
   5. Permanent pacemaker implantation is indicated for an alternating bundle-branch block in asymptomatic patients.
   6. Permanent pacemaker implantation is indicated for asymptomatic patients with second degree AV block at any anatomic level associated with neuromuscular diseases known to involve the heart

D. Prior to Planned Catheter Ablation
   1. Permanent pacemaker implantation is indicated prior to a planned catheter ablation of the AV junction intended for a rate control strategy for management of atrial fibrillation

E. Persistent Second Degree AV Block
   1. Permanent pacemaker implantation is indicated for persistent second degree AV block in the His-Purkinje system with alternatingbundle branch block or third degree AV block within or below the His-Purkinje system after myocardial infarction

F. Syncope
   1. Permanent pacemaker implantation is indicated for syncope caused by spontaneously occurring carotid sinus stimulation and carotid sinus pressure that induces ventricular asystole of more than 3 seconds

## II. Reasonable Indications for Permanent Pacemaker Implantation

A. General Considerations
   1. For the “reasonable” or “considered” indications listed in this guideline, consensus opinion is less clear about permanent pacing in these settings, with evidence suggesting that device placement may be reasonable or may be considered

B. Sinus Node dysfunction
   1. Permanent pacemaker implantation is reasonable for individuals with sinus node dysfunction with a resting heart rate less than 40 beats per minute when periodic symptomatic bradycardia is suspected

C. Syncope
   1. Permanent pacemaker implantation may be reasonable or may be considered for individuals with syncope in the following settings:
      a. Syncope of unexplained origin when clinically significant abnormalities of sinus node function are discovered or provoked in electrophysiological studies
      b. Syncope without clear, provocative events and with a hypersensitive cardioinhibitory response of 3 seconds or longer
      c. Significantly symptomatic neurocardiogenic syncope associated with Bradycardia documented spontaneously or at the time of tilt table testing

D. Asymptomatic Second Degree AV Block
   1. Permanent pacemaker implantation is reasonable for individuals with asymptomatic second degree AV block at intra- or infra- His levels found at electrophysiological study

E. First or Second AV Block
   1. Permanent pacemaker implantation is reasonable for individuals with first or second degree AV block with symptoms similar to those of pacemaker syndrome

F. Symptomatic Recurrent SVT
   1. Permanent pacemaker implantation is reasonable for individuals with symptomatic, recurrent SVT that is reproducibly terminated by pacing when catheter ablation and/or drugs fail to control the arrhythmia or produce intolerable side effects

G. Relative Bradycardia – Postoperative Cardiac Transplant
   1. Permanent pacemaker implantation may be considered for individuals when relative bradycardia is prolonged or recurrent, which limits rehabilitation or discharge after postoperative recovery from cardiac transplantation

H. Incidental Finding at Electrophysiology (EP) Study
   1. Permanent pacemaker implantation may be reasonable for an incidental finding at electrophysiology study of a markedly prolonged HVinterval (greater than or equal to 100 milliseconds) or non-physiological intra- or infra- Hisian block in asymptomatic patients

I. Neuromuscular Diseases Known to Involve the Heart
   1. Permanent pacemaker implantation may be considered for progressive neuromuscular diseases known to involve the heart with any degree of AV block (including first degree AV block) or any fascicular block, with or without symptoms, because there may be unpredictable progression of AV conduction disease. Progressive neuromuscular diseases known to involve the heart include:
      a. Myotonic muscular dystrophy
      b. Kearns-Sayre syndrome
      c. Erb dystrophy (limb-girdle muscular dystrophy)
      d. Peroneal muscular atrophy

## III. Non-Indications

A. Permanent pacemaker implantation is not indicated in any of the following settings:
   1. Sinus node dysfunction in asymptomatic patients
   2. Sinus node dysfunction in patients for whom the symptoms, suggestive of bradycardia, have been clearly documented to occur in the absence of bradycardia
   3. Fascicular block without AV block or symptoms concerning for AV block
   4. Incidentally noted hypersensitive cardioinhibitory response to carotid sinus stimulation without symptoms or with vague symptoms
   5. Asymptomatic first degree AV block
   6. Asymptomatic type I second degree AV block at the supra-His (AV node) level or that which is not known to be intra- or infra-Hisian
   7. Permanent ventricular pacing not indicated for asymptomatic transient AV block in the absence of intraventricular conduction defects or in isolated single fascicular block
   8. Permanent pacing not indicated for situational vasovagal syncope in which avoidance behavior is effective

## IV. Indications for CRT-P

A. High grade AV block and NYHA Class I, II or III Congestive Heart Failure
   1. CRT-P implantation is indicated in individuals who have all of the following:
      a. LV ejection fraction less than 50% **and**
      b. NYHA Class I, II, or III heart failure **and**
      c. High grade AV block, including AV nodal ablation, requiring more than 40% ventricular pacing

## V. Indications for Cardiac Resynchronization Therapy (CRT)-D Implantation

A. Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF)
   1. CRT-D implantation is indicated in individuals with ischemic or nonischemic dilated cardiomyopathy who have **all** of the following:
      a. Left bundle branch block with QRS greater than or equal to 150 msec**and**
      b. LV ejection fraction less than or equal to 35% **and**
      c. Are NYHA functional Class II, III, or ambulatory class IV on stable optimal medical therapy
   2. Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic

B. Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF) and QRS duration 120-149 ms
   1. CRT-D or CRT-P implantation is indicated in individuals with ischemic or nonischemic dilated cardiomyopathy who have all of the following:
      a. Left bundle branch block with QRS duration 120 to 149 msec**and**
      b. LV ejection fraction less than or equal to 35% **and**
      c. Are NYHA functional Class II, III, or ambulatory class IV on stable optimal medical therapy
         i. Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic

C. Sinus Rhythm, Dilated Cardiomyopathy with non-LBBB and NYHA Class III or IV Congestive Heart Failure (CHF)
   1. CRT-D Implantation is indicated in individuals who have all of the following:
      a. NYHA Class III, or IV Congestive Heart Failure **and**
      b. Non-LBBB with QRS duration greater or equal to 150 ms, and LV ejection fraction less than or equal to 35%

D. Atrial Fibrillation and NYHA Class I, II, or III Congestive Heart Failure
   1. CRT is indicated in patients with AF and the following:
      a. A left ventricular ejection fraction (LVEF) ≤35 percent on guideline-directed medical therapy and **all** of the following:
         i. The patient requires ventricular pacing or otherwise meets CRT criteria "Meets CRT criteria" means either:
            01. Has left bundle branch block (LBBB) and a QRS duration ≥ 120 ms and New York Heart Association (NYHA) functional class II, III, or ambulatory class IV HF symptoms on stable optimal medical therapy

            or

            02. Has a non-LBBB pattern with a QRS duration ≥150 and NYHA class III or ambulatory class IV HF symptoms
         ii. Atrioventricular nodal ablation or pharmacologic rate control will allow near 100 percent ventricular pacing with CRT

## VI. Definite Indications for ICD Implantation

A. Survivors of Cardiac Arrest
   1. ICD implantation is indicated in individuals who are survivors of known cardiac arrest due toventricular tachycardia (VT) or ventricular fibrillation (VF) after evaluation has excluded any completely reversible cause

B. Structural Heart Disease with Sustained VT
   1. ICD implantation is indicated in individuals with structural heart disease (such as prior myocardial infarction (MI), congenital heart disease, and/orventricular dysfunction) and spontaneous, sustained VT (greater than 30 seconds), whether hemodynamically stable or unstable

C. Syncope of Undetermined Origin and Positive EP Study
   1. ICD implantation is indicated in individuals with syncope of undetermined origin who have clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiology (EP) study

D. Unexplained Syncope
   1. ICD implantation is indicated in individuals with unexplained syncope **and:**
      a. Significant left ventricular (LV) dysfunction (LV ejection fraction less than 50%), **and**
      b. Structural heart disease such as prior myocardial infarction (MI),
      c. Congenital heart disease, **and/or**
      d. Ventricular dysfunction

E. Ischemic Cardiomyopathy
   1. ICD implantation is indicated in individuals with the following:
      a. Left ventricular dysfunction due to prior myocardial infarction (MI), **and**
      b. LV ejection fraction less than or equal to 35%, **and**
      c. At least 40 days post-MI, **and**
      d. Are NYHA functional Class II or III, **and**
      e. Are on optimal medical therapy, defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor, beta-blocker, and diuretic

      or

      f. LV dysfunction due to prior MI, **and**
      g. LV ejection fraction less than or equal to 30%, **and**
      h. At least 40 days post-MI, and
      i. Are NYHA functional Class I

      or

      j. Have non-sustained VT due to prior MI, **and**
      k. LV ejection fraction less than or equal to 40%, **and**
      l. Have inducible VF or sustained VT at EP study performed at least 96 hours after revascularization or MI

F. Nonischemic Dilated cardiomyopathy (DCM)
   1. ICD implantation is indicated in individuals with nonischemic dilated cardiomyopathy, who have LV ejection fraction less than or equal to 35%, NYHA Class II or III congestive heart failure and who are on optimal medical therapy. Trials assessing ICD therapy in primary prophylaxis of DCM have not generally included asymptomatic, NYHA functional Class I patients
   2. Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor, beta-blocker, and diuretic

## VII. Reasonable Indications for ICD Implantation

A. General Considerations
   1. For the “reasonable” or “considered” indications listed in this guideline, consensus opinion is less clear about the use of ICD implantation in these settings. Limited evidence suggests that ICD placement may be reasonable or may be considered; this category includes VF or hypotensive VT events where pharmaceutical or ablative techniques are indicated but the results of treatment are too unpredictable to withhold ICD implantation

B. Sustained Ventricular Tachycardia with Normal LV Function
   1. ICD implantation is reasonable for individuals with sustained VT and normal or near-normal ventricular function

C. Cardiomyopathy
   1. Cardiomyopathy due to Hypertrophic cardiomyopathy who have one or more risk factors for sudden cardiac death
      a. Unheralded syncope
      b. Nonsustained VT (< 30 seconds)
      c. Family history of sudden cardiac death
      d. Septal wall thickness of greater than or equal to 30 mm
      e. Abnormal blood pressure response to exercise
   2. Cardiomyopathy due to Arrhythmogenic Right VentricularCardiomyopathy (ARVC):
      a. ICD implantation is reasonable for individuals with ARVC who have one or more risk factors for sudden cardiac death
         i. Unheralded syncope
         ii. Family history of sudden death
         iii. Nonsustained VT (< 30 seconds)
         iv. Clinical signs of RV failure

D. LV non compaction
   1. ICD implantation should be considered for the primary prevention of sudden cardiac death due to malignant ventricular arrhythmias in individuals with non-compaction cardiomyopathy and impaired LV function (LV ejection fraction less than 50%)
      a. ICD implantation is also indicated for normal LV function (LVEF greater than 50%), primary prevention cases with positive family history of sudden cardiac death. This exception is due to the presence of sarcomeric gene mutations reported in non-compaction cardiomyopathy.

E. Catecholaminergic Polymorphic Ventricular Tachycardia
   1. ICD implantation is reasonable for individuals with catecholaminergic polymorphic VT who have
      a. Syncope while receiving B-blockers **and/or**
      b. Documented sustained ventricular tachycardia while receivingB-blockers

F. ICD implantation is reasonable, regardless of LV ejection fraction measurement, for individuals with:
   1. Cardiac sarcoidosis
   2. Giant cell myocarditis **or**
   3. Chagas disease,

G. ICD implantation is reasonable for individuals with Brugada syndrome who have hadthe following
   1. Syncope
   2. Documented or inducible VT or VF

H. Long QT Syndrome
   1. ICD implantation is reasonable in Long QT syndrome in the following settings:
      a. Syncope while on B-blockers
      b. Ventricular tachycardia or fibrillation while on B-blockers **or**
      c. If beta-blockers are contraindicated **or**
      d. Asymptomatic with other risk factors for sudden cardiac death. Risk factors for sudden cardiac death include the following:
         i. Family history of sudden cardiac death
         ii. QTc interval > 500 milliseconds
         iii. LQT 2 or 3

I. Other Indications
   1. ICD implantation may be considered in affected individuals with a familial cardiomyopathy associated with sudden death

## VIII. ICD Implantation—Non-Indications

A. Ischemic Cardiomyopathy
   1. ICD implantation is not indicated in individuals who have had a myocardial infarction within the past 40 days or who have had coronary revascularization within the past 90 days **unless** the following applies:
      a. A separate indication for permanent pacemaker implantation exists (thus preventing a likely repeat procedure for an upgraded device in the near future)

B. NYHA Class IV CHF
   1. ICD implantation is not indicated for individuals with NYHA functional class IV symptoms **unless** one of the following applies:
      a. It is a CRT-D device meeting the indications for CRT-D implantation listed in this guideline. Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF)Dilated Cardiomyopathy with NYHA Class III or IV Congestive Heart Failure (CHF) or
      b. The individual is awaiting heart transplantation or
      c. Left ventricular assist device (LVAD) is being used as destination therapy

C. Limited Life Expectancy
   1. ICD implantation is not indicated for individuals who do not have a reasonable expectation of survival with an acceptable functional status for at least one year, even if they meet ICD implantation criteria listed in:
      a. Definite Indications for ICD Implantation or
      b. Reasonable Indications for ICD Implantation

D. Incessant VT or VF
   1. ICD implantation is not indicated for individuals with incessant VT or VF defined as hemodynamically stable VT or VF continuing for hours

E. Psychiatric Conditions
   1. ICD implantation is not indicated in individuals with significant psychiatric illnesses that may be aggravated by device implantation or that may preclude systematic follow-up

F. Reversible Cause of VT/VF
   1. ICD implantation is not indicated when VF or VT is due to a reversible cause
      a. Sudden death can occur secondary to reversible derangements such as severe electrolyte disturbance or acute, reperfused myocardial infarction with preserved ejection fraction

G. Ablation Candidate, No Structural Heart Disease
   1. ICD implantation is not indicated if the individual has no structural heart disease and is a candidate for ablation. Surgical or catheter ablation can be curative in this setting

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**33206, 33207, 33208, 33212, 33213, 33214, 33221, 33224, 33225, 33227, 33228, 33229, 33230, 33231, 33240, 33249, 33262, 33263, 33264, 33270: Cardiac Rhythm Implantable Device (CRID)**

# PET Myocardial

## 78459 PET Myocardial – Metabolic
## 78491 PET Myocardial Perfusion Imaging, Rest or Stress
## 78492 PET Myocardial Perfusion Imaging, Rest and Stress[1]

| Cardiac Imaging Procedure Codes | |
|---|---|
| **CARDIAC PET** | **CPT®** |
| Myocardial imaging, PET, *metabolic* evaluation | **78459** |
| Myocardial imaging, PET, *perfusion*; single study at rest or stress | **78491** |
| Myocardial imaging, PET, *perfusion*; multiple studies at rest and/or stress | **78492** |
| Absolute quantitation of myocardial blood flow, PET, rest and stress | **+0482T** |

- 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/m$^2$) **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

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## 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)

A. Coding

| TTE CODES | |
|---|---|
| **Transthoracic Echocardiography** | **CPT®** |
| TTE for congenital cardiac anomalies, complete | **93303** |
| TTE for congenital cardiac anomalies, follow-up or limited | **93304** |
| TTE with 2-D, M-mode, Doppler and color flow, complete | **93306** |
| TTE with 2-D, M-mode, without Doppler or color flow | **93307** |
| TTE with 2-D, M-mode, follow-up or limited | **93308** |
| **Doppler Echocardiography** | **CPT®** |
| Doppler echo, pulsed wave and/or spectral display | **+93320*** |
| Doppler echo, pulsed wave and/or spectral display, follow-up or limited study | **+93321*** |
| Doppler echo, color flow velocity mapping | **+93325** |
| *CPT® 93320 and CPT® 93321 should not be requested or billed together | |

| Transthoracic Echocardiography | | CPT® |
|---|---|---|
| C8921 | TTE for congenital cardiac anomalies, complete | **93303** |
| C8922 | TTE for congenital cardiac anomalies, follow-up or limited | **93304** |
| C8929 | TTE with 2-D, M-mode, Doppler and color flow, complete | **93306** |
| C8923 | TTE with 2-D, M-mode, without Doppler or color flow | **93307** |
| C8924 | TTE with 2-D, M-mode, follow-up or limited | **93308** |

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.

| Investigational Codes | | |
|---|---|---|
| 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) | Investigational |
| 0439T | Myocardial contrast perfusion echocardiography, at rest or with stress, for assessment of myocardial ischemia or viability | Investigational |

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 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

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| 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)

A. Coding

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

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

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 | | | | | |
|---|---|---|---|---|---|
| **Age (years)** | **Gender** | **Typical / Definite Angina Pectoris** | **Atypical / Probable Angina Pectoris** | **Non-anginal Chest Pain** | **Asymptomatic** |
| **39 and younger** | Men | Intermediate | Intermediate | Low | Very low |
| | Women | Intermediate | Very low | Very low | Very low |
| **40 - 49** | Men | High | Intermediate | Intermediate | Low |
| | Women | Intermediate | Low | Very low | Very low |
| **50 - 59** | Men | High | Intermediate | Intermediate | Low |
| | Women | Intermediate | Intermediate | Low | Very low |
| **60 and over** | Men | High | Intermediate | Intermediate | Low |
| | Women | High | Intermediate | Intermediate | Low |
| **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 | | | | |

## 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). MPHRis 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 MPIcan 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). Tl-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 medicationPrior 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**

| Cardiac Risk Stratification List | | |
|---|---|---|
| **High Risk (> 5%)** | **Intermediate Risk (1-5%)** | **Low Risk (<1%)** |
| • Open aortic and other major open vascular surgery<br>• Open peripheral vascular surgery | • Open intraperitoneal and/or intrathoracic surgery<br>• Open carotid endarterectomy<br>• Head and neck surgery<br>• Open orthopedic surgery<br>• Open prostate surgery | • Endoscopic procedures<br>• Superficial procedures<br>• Cataract surgery<br>• Breast surgery<br>• Ambulatory surgery<br>• Laparoscopic and endovascular procedures that are unlikely to require further extensive surgical intervention |

## 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

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| 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 |

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

## 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/guidewireis 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

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**93452, 93453, 93454, 93455, 93456, 93457, 93458, 93459, 93460, 93461: Diagnostic Heart**