CLINICAL GUIDELINES

Cardiac Imaging Policy

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eviCore healthcare Clinical Decision Support Tool Diagnostic Strategies: This tool addresses common symptoms and symptom complexes. Imaging requests for individuals with atypical symptoms or clinical presentations that are not specifically addressed will require physician review. Consultation with the referring physician, specialist and/or individual's Primary Care Physician (PCP) may provide additional insight.

CARDIAC IMAGING GUIDELINES

ABBREVIATIONS for CARDIAC IMAGING GUIDELINES

ACC	American College of Cardiology
ACS	acute coronary syndrome
AHA	American Heart Association
ASCOT	Anglo-Scandinavian Cardiac Outcomes Trial
ASD	atrial septal defect
BMI	body mass index
CABG	coronary artery bypass grafting
CAD	coronary artery disease
CHF	congestive heart failure
COPD	chronic obstructive pulmonary disease
CT	computed tomography
CCTA	coronary computed tomography angiography
CTA	computed tomography angiography
EBCT	electron beam computed tomography
ECP	external counterpulsation (also known as EECP)
ECG	electrocardiogram
ECP	external counterpulsation
ETT	exercise treadmill stress test
FDG	fluorodeoxyglucose
HCM	hypertrophic cardiomyopathy
IV	intravenous
LAD	left anterior descending coronary artery
LDL-C	low density lipoprotein cholesterol
LHC	left heart catheterization
LV	left ventricle
LVEF	left ventricular ejection fraction
MI	myocardial infarction
MPI	myocardial perfusion imaging (SPECT study, nuclear cardiac study)
MRA	magnetic resonance angiography
MRI	magnetic resonance imaging
mSv	millisievert (a unit of radiation exposure)
MUGA	multi gated acquisition scan
PCI	percutaneous coronary intervention (includes percutaneous coronary angioplasty (PTCA) and coronary artery stenting)
PET	positron emission tomography
PTCA	percutaneous coronary angioplasty
RHC	right heart catheterization
SPECT	single photon emission computed tomography
TEE	transesophageal echocardiogram
TIA	Transient Ischemic Attack
VSD	ventricular septal defect

GLOSSARY for CARDIAC IMAGING GUIDELINES

Agatston Score: a nationally recognized calcium score for the coronary arteries
Angina: principally chest discomfort, exertional (or with emotional stress) and relieved by rest or nitroglycerine
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
ARVD/ARVC – Arrhythmogenic Right Ventricular Dysplasia/Cardiomyopathy: a potentially lethal inherited disease with syncope and rhythm disturbances, including sudden death, as presenting manifestations
BNP: B-type natriuretic peptide, blood test used to diagnose and track heart failure (n-T-pro-BNP is a variant of this test)
Brugada Syndrome: an electrocardiographic pattern that is unique and might be a marker for significant life threatening dysrhythmias
Double product: systolic blood pressure times heart rate, generally calculated at peak exercise; over 25000 means an adequate stress load was performed
Fabry's Disease: an infiltrative cardiomyopathy, can cause heart failure and arrhythmias
Hibernating myocardium: viable but poorly functioning or non-functioning myocardium which likely could benefit from intervention to improve myocardial blood supply
Moderate exercise: the ability of a patient to perform the equivalent of a trot
Optimized Medical Therapy should include (where tolerated): antiplatelet agents, calcium channel antagonists, partial fatty acid oxidase inhibitors (e.g. ranolazine), statins, short-acting nitrates as needed, long-acting nitrates up to 6 months after an acute coronary syndrome episode, beta blocker drugs (optional), angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blocking (ARB) agents (optional)
Platypnea: shortness of breath when upright or seated (the opposite of orthopnea) and can indicate cardiac malformations, shunt or tumor
Silent ischemia: cardiac ischemia discovered by testing only and not presenting as a syndrome or symptoms
Syncope: loss of consciousness; near-syncope is not syncope
Takotsubo cardiomyopathy: apical dyskinesis oftentimes associated with extreme stress and usually thought to be reversible
Troponin: a marker for ischemic injury, primarily cardiac
Volume Score: another type of calcium score under consideration for acceptance

Practice Note

IMAGING STUDY	Estimate of Effective Radiation Dose
Sestamibi myocardial perfusion study (MPI)	9-12 mSv
Thallium myocardial perfusion study (MPI)	22-31 mSv
Diagnostic conventional coronary angiogram (cath)	5-10 mSv
Computed tomography coronary angiography (CTCA)	5-15 mSv
CT of Abdomen and pelvis	8-14 mSv
Chest x-ray	<0.1 mSv

CD-1~GENERAL GUIDELINES

CD-1~GENERAL GUIDELINES

CD-1.1 General Issues – Cardiac

- ✓ 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.
- ✓ A current clinical evaluation (within 60 days) is required prior to considering advanced imaging, which includes:
  - 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.
    - Effort should be made to obtain copies of reported "abnormal" ECG studies in order to determine whether the ECG is uninterpretable.
    - Most recent previous stress testing and its findings
    - Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.
  - Vital signs, height and weight or BMI or description of general habitus is needed.
  - Advanced imaging should answer a clinical question which will affect management of the patient's clinical condition.
  - Assessment of coronary artery disease can be determined by the following:
    - **Typical angina (definite):**
      - Substernal chest discomfort (generally described as pressure, heaviness, burning, or tightness)
      - Generally brought on by exertion or emotional stress
      - May radiate to the left arm or jaw
      - 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).
      - 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.
    - **Atypical angina (probable):** Chest pain or discomfort (arm or jaw pain) 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.

- **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				

CD-1.2 Stress Testing without Imaging - Procedures

✓ The Exercise Treadmill Test (ETT) is without imaging.

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

✓ An abnormal ETT (exercise treadmill test) includes any one of the following:
- ST segment depression
- Development of chest pain
- Significant arrhythmia (especially ventricular arrhythmia)
- Hypotension

✓ Functional capacity greater than or equal to 4 METs equates to the following:
- Can walk four blocks without stopping
- Can climb two flights of stairs without stopping

CD-1.3 Stress Testing with Imaging- Procedures

- ✓ Imaging Stress Tests include any one of the following:
  - o Stress Echocardiography (see **CD-2.6**)
  - o MPI (see **CD-3.1**)
  - o Stress perfusion MRI (see **CD-6.3**)
- ✓ 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.

CD-1.4 Stress Testing with Imaging - Indications

STRESS TESTING with IMAGING - INDICATIONS	
Stress echo, MPI **OR** stress MRI, can be considered for the following:	
1.	New, recurrent or worsening cardiac symptoms **AND** with any of the following: o High pretest probability (greater than 90% probability of CAD) per **Table 1** o A history of CAD based on: • A prior anatomic evaluation of the coronaries OR • A history of CABG or PCI o Evidence or high suspicion of ventricular tachycardia o Age 50 years or greater and known diabetes mellitus o Coronary calcium score >/= 400 o New or previously unrecognized uninterpretable ECG o 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. o ECG is uninterpretable for ischemia due to any one of the following: • Complete Left Bundle Branch Block (bifasicular block involving right bundle branch and left anterior hemiblock does not render ECG uninterpretable for ischemia) • Ventricular paced rhythm • Pre-excitation pattern such as Wolff-Parkinson-White • >0.5 mm ST segment depression (NOT nonspecific ST/T wave changes) • LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria) • T-wave inversion in the inferior and/or lateral leads. (leads II, AVF, V5, or V6) • Patient on digitalis preparation o Continuing symptoms in a patient who had a normal or submaximal exercise treadmill test and there is suspicion of a false negative result. o Patients with recent equivocal, borderline, or abnormal stress testing where ischemia remains a concern. o 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. o Inadequate ETT:

	• Physical inability to perform a maximum exercise workload. • 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: o Individual is hemodynamically stable o No recurrent chest pain symptoms and no signs of heart failure 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. **NOTE:** MRI, cardiac PET, **or** MPI can be used to assess myocardial viability depending on physician preference
Regardless of symptoms, imaging can be approved for the following clinical scenarios:	
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 in a patient taking flecainide or propafenone
11.	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.
12.	Evaluating new, recurrent or worsening left ventricular dysfunction/CHF (see **CD-12.1 Congestive Heart Failure** for additional indications).

CD-1.5 Stress Testing with Imaging - Preoperative

- ✓ There are **2** steps that determine the need for imaging stress testing in (stable) pre-operative patients:
  - o Would the patient qualify for imaging stress testing independent of planned surgery?
    - If yes, proceed to stress testing guidelines;
    - If no, go to question #2
  - o 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.

Table 2

Cardiac Risk Stratification List		
High Risk (>5%)	**Intermediate Risk (1-5%)**	**Low Risk (<1%)**
• Open aortic and other major open vascular surgery • Open peripheral vascular surgery	• Open intraperitoneal and/or intrathoracic surgery • Open carotid endarterectomy • Head and neck surgery • Open orthopedic surgery • Open prostate surgery	• Endoscopic procedures • Superficial procedures • Cataract surgery • Breast surgery • Ambulatory surgery • Laparoscopic and endovascular procedures that are unlikely to require further extensive surgical intervention
Proceed with Imaging Stress Testing if:		
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.		
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.		
Low Risk: Preoperative imaging stress testing is not supported.		
*****Time interval is based on consensus of eviCore executive cardiology panel.		

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

CD-1.6 Non-Cardiac Transplant Patients

Stress Testing in Non-Cardiac Transplant Patients	
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.

CD-1.7 Cardiac Transplant Patients

- ✓ Post-cardiac transplant assessment of transplant CAD:
  - o One of the following imaging studies may be performed annually:
    - MPI
    - Stress ECHO
    - Stress MRI
    - Cardiac PET perfusion **with** coronary flow quantitation (CPT® 78491 or CPT® 78492)

CD-1.8 Non-imaging Heart Function and Cardiac Shunt Imaging

- ✓ Procedures reported with CPT® 78414 and CPT® 78428 are essentially obsolete and should not be performed in lieu of other preferred modalities.
- ✓ Echocardiogram is the preferred method for cardiac shunt detection, rather than the cardiac shunt imaging study described by CPT® 78428.
- ✓ 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.

CD-1.9 External Counter Pulsation (ECP)

- ✓ ECP (sometimes referred to as Enhanced External Counterpulsation® or EECP®) is a therapy aimed at stimulating the formation of collateral circulation to the myocardium in patients with chronic stable angina who are not candidates for invasive methods of revascularization, such as coronary bypass surgery or angioplasty/stenting.
- ✓ A course of ECP generally consists of 35 sessions (1 to 2 hour sessions, five days a week for 7 weeks).

- ✓ Since the therapeutic benefit of ECP is enhanced at six months and sustained at 24 months post-treatment, a repeat course of ECP earlier than 1 to 2 years from the last course of
- ✓ ECP is generally not indicated.
- ✓ The procedure code most often used to report ECP is G0166, which is an all-inclusive.
  - o External cardiac assistance (CPT® 92971), ECG rhythm strip and report (CPT® 93040 or CPT® 93041), pulse oximetry (CPT® 94760 or CPT® 94761), and plethysmography (CPT® 93922 or CPT® 93923) should not be separately requested or billed with G0166.
  - o Currently, eviCore does not prior authorize procedure code G0166.

CD-1.10 Minimally Invasive or Robotic Surgery

There is insufficient data to support the routine use of CTA for the routine evaluation of peripheral arteries, iliac arteries, and/or aorta prior to minimally invasive or robotic surgery.

CD-1.11 Transcatheter Aortic Valve Replacement (TAVR)

- ✓ TAVR:
  - o CTA of chest (CPT® 71275), abdomen and pelvis (combination code CPT® 74174) is considered appropriate, ***and***
  - o Cardiac CT (CPT® 75572) may be considered to measure the aortic annulus (2) ***or***
  - o Coronary CTA (CCTA CPT® 75574) may be considered to both measure the aortic annulus and assess the coronary arteries in lieu of heart catheterization. A Transthoracic ECHO (TTE) can be considered within 3 months of post-valve replacement or repair including TAVR.

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CD-2~Echocardiography (ECHO)

CD-2~Echocardiography (ECHO)

CD-2.1 Transthoracic Echocardiography (TTE) - 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	

- ✓ The most commonly performed study is a complete transthoracic echocardiogram with spectral and color flow Doppler (CPT® 93306).
  - o CPT® 93306 includes the Doppler exams, so CPT® codes 93320-93325 should **not** be assigned together with CPT® 93306.
  - o 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.
- ✓ For a 2D transthoracic echocardiogram without Doppler, report CPT® 93307.
- ✓ Limited transthoracic echocardiogram should be billed if the report does not "evaluate or document the attempt to evaluate" all of the required structures.
  - o A limited transthoracic echocardiogram is reported with CPT® 93308.
  - o 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.
  - o A limited congenital transthoracic echocardiogram is reported with CPT® 93304.
- ✓ Doppler echo may be used for evaluation of the following:
  - o Shortness of breath
  - o Known or suspected valvular disease
  - o Known or suspected hypertrophic obstructive cardiomyopathy shunt detection
  - o **NOTE:** Providers performing echo on a pediatric patient, may not know what procedure codes they will be reporting until the initial study is completed.

- 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.
- If no congenital issue is discovered, then CPT® 93306 is reported alone and includes 2-D, Doppler and color flow mapping.
- 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).
- Depending upon individual health plan payer contracts, post-service audits may be completed to ensure proper claims submission.

✓ **Please Note:** CPT® 76376 and CPT® 76377 are not unique to 3D Echo. These codes also apply to 3D rendering of MRI and CT studies.

CD-2.2 Transthoracic Echocardiography (TTE) - Indications

TTE can be performed for the following:	
1.	New or worsening cardiac signs or symptoms, such as: o Dyspnea o Chest pain o Palpitations o Syncope o Symptoms of heart failure o Murmur
2.	Valve function and structure: o Valvular stenosis or regurgitation o Valvular structure o If valve surgery is being considered can have TTE twice a year o One routine study (surveillance) 3 years or more after valve surgery (repair or prosthetic valve implantation)
3.	Ventricular function including global and segmental wall motion for evaluating ejection fraction (EF) and coronary artery disease. o Dyspnea o Symptoms of Heart Failure o Cardiomyopathy o Chemotherapy (see: **CD-3.5 MUGA Study – Oncologic Indications**) o Arrhythmias
4.	Ventricular structure including but not limited to: o Infiltrative diseases (e.g. sarcoid, amyloid) o Thoracic aneurysm with/without thrombus o Ventricular septal defect (VSD) o Papillary muscle rupture/dysfunction o Hypertrophy (including asymmetric septal hypertrophy, spade heart, hypertensive concentric hypertrophy, infiltrative hypertrophy)
5.	Evaluation of right ventricular systolic pressure/pulmonary hypertension. Evaluation of atrial or ventricular chamber size (e.g. patients with atrial fibrillation,

	tachyarrhythmias, or left ventricular dilatation). o Yearly TTE may be indicated depending on the clinical circumstance.
6.	Cardiac Defects or Masses o Embolic source in patients with recent Transient Ischemic Attack (TIA), stroke, or peripheral vascular emboli as an initial study before TEE. o ASD repair or VSD repair: within the first year of surgery or if become newly symptomatic o Tumor evaluation including myxomas o Clot detection o Evaluation of congenital heart disease
7.	Inflammatory o Pericardial effusion/pericardial disease including pericardial cysts o Congenital heart disease o Endocarditis (including fever, positive blood cultures indicating bacteremia, or a new murmur)
8.	Pacemaker insertion complication
9.	Screening for first-degree relatives of patients with hypertrophic cardiomyopathy (HCM) o First-degree relatives who are 12 to 18 years old should be screened yearly for HCM by 2D- echocardiography and ECG. o 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. o 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. o Affected individuals identified through family screening or otherwise should be evaluated every 12 to18 months with 2D-echo, Holter monitor, and blood pressure response during maximal upright exercise.
10	If an adult or pediatric patient has a new abnormality on a recent EKG, whether interpretable or uninterpretable, ECHO imaging is appropriate.

CD-2.3 Frequency of Echocardiography Testing

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 there a history of: o Significant valve dysfunction o Cardiac chamber size in cardiomyopathy and atrial dysrhythmias o Chronic pericardial effusions o Left ventricular contractility/diastolic function prior to planned medical therapy for heart failure or to evaluate the effectiveness of on-going therapy o Aortic root dilatation
3.	Twice a year for the following assessments: o New or changing (not chronic stable) pericardial effusions o New/changed medical therapy for congestive heart failure o New/changed medical therapy for hypertension if left ventricular hypertrophy was present o Hypertrophic cardiomyopathy when the results of the echo will potentially change patient management o Critical valvular heart disease when the results of the echo will potentially change patient management
4.	Anytime without regard for the number of previous ECHO studies based on new acute, worsening or suspicion of: o Cardiac murmurs o Myocardial infarction or acute coronary syndrome o Congestive heart failure (or new symptoms of dyspnea, orthopnea, paroxysmal nocturnal dyspnea, edema, elevated BNP) o Pericardial disease o Stroke/transient ischemic attack o Decompression illness o Prosthetic valve dysfunction or thrombosis
5.	A Transthoracic ECHO (TTE) can be considered within 3 months of post valve replacement or repair including TAVR.

CD-2.4 Transesophageal Echocardiography (TEE) - Coding

TEE PROCEDURE CODES	
Transesophageal Echocardiography	**CPT®**
TEE with 2-D, M-mode, probe placement, image acquisition, interpretation and report	**93312**
TEE probe placement only	**93313**
TEE image acquisition, interpretation, and report only	**93314**
TEE for congenital anomalies with 2-D, M-mode, probe placement, image acquisition, interpretation and report	**93315**
TEE for congenital anomalies, probe placement only	**93316**
TEE for congenital anomalies, image acquisition, interpretation and report only	**93317**
TEE for monitoring purposes, ongoing assessment of cardiac pumping function on an immediate time basis	**93318**
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**
*Doppler echo, if performed, may be reported separately in addition to the primary TEE codes: CPT® 93312, CPT® 93314, CPT® 93315, and CPT® 93317.	

- ✓ **The complete transesophageal echocardiogram** service, including both (1) probe (transducer) placement and (2) image acquisition/interpretation, is reported with CPT® 93312.
  - o Probe placement only is reported with CPT® 93313.
  - o The image acquisition/interpretation only is reported with CPT® 93314.
- ✓ Physicians assign codes CPT® 93312, CPT® 93313, and/or CPT® 93314 to report professional services if the test is performed in a hospital or other facility where the physician cannot bill globally.
  - o Modifier -26 (professional component) is appended to the appropriate code
  - o CPT® 93313 and CPT® 93314 should never be used together. If both services are provided, CPT® 93312 is reported.
- ✓ Hospitals should report TEE procedures using CPT® 93312 (the complete service). CPT® 93313 and CPT® 93314 are not used for hospital billing.
- ✓ Monitoring of patients undergoing cardiac surgery is CPT® 93318.

CD-2.5 Transesophageal Echocardiography (TEE)

TEE INDICATIONS:	
1.	Limited transthoracic echo window
2.	Assessing valvular dysfunction, especially mitral regurgitation, when TTE is inadequate.
3.	Embolic source or intracardiac shunting when TTE is inconclusive o **Examples:** atrial septal defect, ventricular septal defect, patent foramen ovale, aortic cholesterol plaques, thrombus in cardiac chambers, valve vegetations, tumor
4.	Embolic events when there is an abnormal TTE or a history of atrial fibrillation o Clarify atria/atrial appendage, aorta, mitral/aortic valve beyond the information that other imaging studies have provided o Cardiac valve dysfunction • Differentiation of tricuspid from bicuspid aortic valve • Congenital abnormalities
5.	Assessing for left atrial thrombus prior to cardioversion of atrial fibrillation.
6.	Prior to planned atrial fibrillation ablation/pulmonary vein isolation procedure.
7.	Repeat TEE studies are based upon findings in the original study and documentation of the way in which repeat studies will affect patient management

CD-2.6 Stress Echocardiography (Stress Echo) - 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.	

✓ In general, stress echo (SE) and nuclear myocardial perfusion imaging (MPI) are considered equivalent diagnostic tests. However, in addition to myocardial ischemia, SE by its nature can provide additional information that is not obtainable with MPI such as valve function, assessment of pulmonary pressure, and assessment of dynamic obstruction and may be preferable if abnormalities in these parameters are known or

suspected.

- ✓ Doppler echo with a stress echo may be used for evaluation of the following:
  - o Shortness of breath
  - o Known or suspected valvular disease
  - o Known or suspected hypertrophic obstructive cardiomyopathy such as idiopathic hypertrophic subaortic stenosis (IHSS) or asymmetric septal hypertrophy
  - o Assessment of pulmonary pressures

CD-2.7 Stress Echocardiography–Indications, other than ruling out CAD

- ✓ See: **CD-1.4 Stress Testing *with* Imaging – Indications**

Stress ECHO Indications
In addition to the evaluation of CAD, stress echo can effectively be used in the following conditions: o Dyspnea on exertion (specifically to evaluate pulmonary hypertension) o Right heart dysfunction o Valvular heart disease o Exercise-induced pulmonary hypertension o Cardiomyopathy, including hypertrophic cardiomyopathy • 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).

CD-2.8 3D Echocardiography - Coding

- ✓ The procedure codes used to report 3D rendering for echocardiography are the same codes used to report the 3D post processing work for CT, MRI, ultrasound and other tomographic modalities.
  - o **CPT® 76376**, not requiring image post-processing on an independent workstation, is the most common code used for 3D rendering done with echocardiography
  - o **CPT® 76377** requires the use of an independent workstation
  - o In addition to the clinical indications, proper reporting of the codes requires concurrent supervision of image post-processing 3D manipulation of volumetric data set and image rendering.

CD-2.9 3D Echocardiography - Indications

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

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CD-3~Nuclear Cardiac Imaging

CD-3~Nuclear Cardiac Imaging

CD-3.1 Myocardial Perfusion Imaging (MPI) - Coding

Nuclear Cardiac Imaging Procedure Codes	
Myocardial Perfusion Imaging (MPI)	**CPT®**
MPI, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)	**78451**
MPI, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection	**78452**

- ✓ The most commonly performed myocardial perfusion imaging are single (at rest or stress, CPT® 78451) and multiple (at rest and stress, CPT® 78452) tomographic SPECT studies.
  - o Evaluation of the individual's left ventricular wall motion and ejection fraction are routinely performed during MPI and are included in the code's definition.
  - o First pass studies, (CPT® 78481 and CPT® 78483), MUGA, (CPT® 78472 and CPT® 78473) and SPECT MUGA (CPT® 78494) should not be reported in conjunction with MPI codes.
  - o Attenuation correction, when performed, is included in the MPI service by code definition. No additional code should be assigned for the billing of attenuation correction.
- ✓ **Multi-day Studies:** In the absence of written payer guidelines to the contrary, it is not appropriate to bill separately for the rest and stress segments of MPI even if performed on separate calendar dates. A single code is assigned to define the entire procedure on the date all portions of the study are completed.
- ✓ 3D rendering, (CPT® 76376/CPT® 76377), should not be billed in conjunction with MPI.
- ✓ Separate codes for such related services as treadmill testing (CPT® 93015 - CPT® 93018) and radiopharmaceuticals should be assigned in addition to MPI. These services are reimbursed according to each individual payer policy.

CD-3.2 MPI – Indications

- ✓ **(**See: **CD-1.4 Stress Testing *with* Imaging-Indications)**

CD-3.3 MUGA - Coding

Nuclear Cardiac Imaging Procedure Codes	
MUGA (Multi Gated Acquisition) – Blood Pool Imaging	**CPT®**
Cardiac blood pool imaging, gated equilibrium; planar, single study at rest *or* stress, wall motion study plus ejection fraction, with or without quantitative processing	**78472**
Cardiac blood pool imaging, gated equilibrium; planar, multiple studies, wall motion study plus ejection fraction, at rest *and* stress, with or without additional quantification	**78473**
Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing	**78494**
Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure) [Use in conjunction with CPT® 78472]	**+78496**

- ✓ The technique employed for a MUGA service guides the code assignment. CPT® 78472 is used for a planar MUGA scan at rest *or* stress, and CPT® 78473 for planar MUGA scans, multiple studies at rest *and* stress.
- ✓ The two most commonly performed MUGA scans are the studies defined by CPT® 78472 and SPECT MUGA, CPT® 78494.
- ✓ Planar MUGA studies (CPT® 78472 and CPT® 78473) should not be reported in conjunction with:
  - o MPI (CPT® 78451 - CPT® 78454)
  - o First pass studies (CPT® 78481- CPT® 78483), and/or
  - o SPECT MUGA (CPT® 78494).
- ✓ CPT® +78496 is assigned only in conjunction with CPT® 78472.
  - o (See: **CD-3.4 MUGA Study – Cardiac Indications**)
  - o This add-on code should not be performed and assigned as a routine protocol.

CD-3.4 MUGA Study – Cardiac Indications

NOTE: Indications below refer to scenarios in which MUGA is being performed *rather than* ECHO.	
MUGA (Multi Gated Acquisition) – Blood Pool Imaging Indications	
1.	Prior ECHO demonstrates impaired systolic function (EF<50%).
2.	Pre-existing left ventricular wall motion abnormalities from ischemic heart disease or ischemic or non-ischemic cardiomyopathies.
3.	ECHO is technically limited and prevents accurate assessment of LV function.
4.	AICD placement: MUGA to assess LV ejection fraction when there is conflicting results between other forms of testing and the issue is clinically relevant (ex. MPI EF is 80% and an echo EF is 30%, the MUGA would be appropriate. However, if the MPI EF is 80% and the echo EF is 50%, this would not be appropriate even though the difference is significant since the echo EF is still normal).
5.	Congestive heart failure MUGA to measure response to cardiac medications for CHF if echocardiogram was performed and was technically difficult
6.	Previous low LV ejection fraction determination was < 50% and receiving potentially cardiotoxic chemotherapy
7.	Documentation of other need for information given by MUGA that cannot be obtained by ECHO
MUGA is NOT indicated for the following:	
1.	A prior MUGA is not a reason to approve another MUGA (it is not necessary to compare LVEF by the same modality)
2.	To resolve differences in ejection fraction measurements between ECHO and MPI *unless* there is clear documentation as to how quantitative measurement of LVEF will affect patient management (e.g. implantation of an AICD).
3.	**NOTE:** o LV ejection fraction measurement is variable and can vary by $^{+/-}$5-10% without any accompanying change in clinical status. Normal physiologic changes in intravascular volume, catecholamine levels, fever, and medications are among the many factors which cause variation in LVEF in the absence of myocardial pathology. o Right ventricular first pass study, (CPT® +78496), may be indicated if there is clear documentation of a concern regarding right ventricular dysfunction or overload.

CD-3.5 MUGA Study - Oncologic Indications

- ✓ LV ejection fraction and wall motion analysis are appropriate for any of the following chemotherapy-related indications:
  - Agents such as Adriamycin®, Herceptin®, mitoxantrone (Novantrone®) and others are considered cardiotoxic and can result in myocardial dysfunction and cardiomyopathy*****. The time frame should be determined by the provider.
- ✓ Echocardiography vs. MUGA for Determining Left Ventricular Ejection Fraction (LVEF) in Patients on Cardiotoxic Chemotherapy Drugs:
  - eviCore guidelines support using **echocardiography rather than MUGA** for the determination of LVEF and/or wall motion EXCEPT in one of the circumstances described previously in **CD-3.4**.
- ✓ eviCore has reviewed the chemotherapy package inserts and study protocols which support unspecified "ejection fraction measurement", or measurement by "echocardiogram or MUGA scan". According to the Herceptin® study protocol, there is no evidence to support that MUGA is a better imaging study than echo or should be used preferentially in determining LVEF in oncology patients.

- ✓ **Practice Note**
  - Advantages of Echocardiography to MUGA in patients on cardiotoxic chemotherapy:
    - No ionizing radiation
    - No IV access required when echo contrast is not used
    - Allows view of the pericardium to look for effusion
    - Allows estimate of pulmonary pressure
    - May allow visualization of a clot or tumor in the Inferior Vena Cava (IVC) and/or the right heart

CD-3.6 Myocardial Sympathetic Innervation Imaging

- ✓ In heart failure, the sympathetic nervous system is activated in order to compensate for the decreased myocardial function. Initially this is beneficial however, long term this compensatory mechanism is detrimental and causes further damage.
- ✓ Markers have been developed, using radioactive iodine, in an attempt to image this increased myocardial sympathetic activity. Currently, AdreView™ (iobenguane I-123), is the only FDA-approved imaging agent available for this purpose. These nuclear techniques are promising; however, currently they remain investigational and are used mainly for research purposes.

- ✓ The AMA has established the following set of Category III codes to report these studies:
  - o **0331T** - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment
  - o **0332T** - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT.

    - ECHO

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CD-4~Ultrafast CT, EBCT, or Multidetector CT for Coronary Calcium Scoring (CCS)

Coronary Calcium Scoring – Coding Notes
The code set for Cardiac CT and CCTA (CPT® 75572- CPT® 75574), include quantitative and functional assessment (for example, calcium scoring), if performed.
CPT® 75571 should not be reported in conjunction with CPT® 75572- CPT® 75574.

- ✓ There is insufficient evidence-based data to support performing coronary calcium scoring as a standalone test in symptomatic or asymptomatic patients with any degree of CAD risk.
- ✓ Certain payers consider coronary calcium scoring investigational, and their coverage policies will take precedence over eviCore's guidelines.
- ✓ Texas Heart Attack Preventive Screening Bill (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) once every five years for certain populations. To qualify, the following must apply:
  - o Must be a Texas resident.
  - o Must be a member of a fully-insured Texas health plan.
  - o Must be a man age 45-75 or a woman age 55-75.
  - o Must have either diabetes or a Framingham cardiac risk score of intermediate or higher.
  - o Must not have had a calcium scoring study or a carotid intima-media thickness study within the past 5 years.

References

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CD-5~Cardiac Imaging Based on Coronary Calcium Score

- ✓ Stress testing in individuals who have undergone coronary calcium scoring should proceed based on the following guideline:
  - o See **CD-1.4 Stress Testing *with* Imaging-Indications**

CD-6~CARDIAC MRI

CD-6~CARDIAC MRI

CD-6.1 Cardiac MRI - Coding

Cardiac Imaging Procedure Codes	
CARDIAC MRI	**CPT®**
Cardiac magnetic resonance imaging for morphology and function without contrast	**75557**
Cardiac magnetic resonance imaging for morphology and function without contrast; with stress imaging	**75559**
Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences	**75561**
Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences; with stress imaging	**75563**
Cardiac magnetic resonance imaging for velocity flow mapping (List separately in addition to code for primary procedure)	**+75565**

- ✓ Only one procedure code from the set (CPT® 75557- CPT® 75563) should be reported per session.
- ✓ Only one flow velocity measurement (CPT® +75565) should be reported per session.
- ✓ MRA of the coronary arteries should be reported with unlisted procedure code (CPT® 76498) rather than with the cardiac MRI codes.
- ✓ MRA of the coronary arteries is comparatively less accurate than CCTA or invasive coronary angiography in evaluating coronary disease and, generally, will not be authorized.
  - o *EXCEPTIONS*: Coronary artery anomalies and Kawasaki's disease are conditions in which coronary MRA could be considered useful.
  - o Requests will be forwarded to Medical Director review.
  - o Certain payers may consider coronary artery MRA investigational, and their coverage policies will take precedence over eviCore's guidelines.
  - o Requests for cardiac MRI that contain more than one cardiac/chest MRI CPT® Code must be forwarded for Medical Director review.

CD-6.2 Cardiac MRI – Indications (excluding Stress MRI)

Cardiac MRI Indications (excluding stress perfusion MRI)	
1.	Assess myocardial viability (to differentiate hibernating myocardium from scar) when necessary to determine if revascularization should be performed (CPT® 75561)
2.	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: o Cardiomyopathy (ischemic, diabetic, hypertrophic, or muscular dystrophy)

	o Noncompaction o Amyloid heart disease o Post cardiac transplant o Hemochromatosis o Post transfusion hemosiderosis o Hypertrophic heart disease o Myocarditis, cardiac aneurysm, trauma and contusions o Monitoring cancer chemotherapy effect on the heart (especially if accurate assessment of right ventricular function is documented as necessary).
3.	o 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). o Chest MRA (CPT® 71555) may be added if the aorta or pulmonary artery need to be visualized beyond the root. o 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.
4.	Chest MRA alone (CPT® 71555) can be performed in certain situations (e.g. suspected dissection, coarctation, known or suspected aortic aneurysm).
5.	Coarctation of the aorta o Follow-up (surveillance) imaging after repair of coarctation: • Adults: chest MRA (CPT® 71555) every 2 to 3 years and before and after any intervention for re-coarctation • Infants and children: ECHO every month for several months, then ECHO every 6 months to one year thereafter
6.	Arrhythmogenic right ventricular dysplasia or arrhythmogenic cardiomyopathy (ARVD/ARVC) suspicion (including presyncope or syncope, established criteria for ARVD (CPT® 75557 or CPT® 75561).
7.	Differentiate constrictive pericarditis from restrictive cardiomyopathy (CPT® 75561).
8.	Evaluate cardiac tumor or mass (e.g. in sarcoidosis or tuberous sclerosis) when echocardiogram is inconclusive.
9.	Anomalous coronary arteries: Cardiac MRI (CPT® 75561) or CCTA (CPT® 75574) is much better at detecting this than conventional angiography.
10.	Fabry disease o Late enhancement MRI may predict the effect of enzyme replacement therapy on myocardial changes that occur with this disease (CPT® 75561).
11.	Evaluate valvular heart disease when echocardiogram is inconclusive. Appropriate procedures include: o CPT® 75557 **or** CPT® 75561 ***and*** o CPT® 75565
12.	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 **CD-10~Pulmonary Artery and Vein Imaging**, for guidelines on follow-up imaging after ablation procedure).
13.	Suspected cardiac thrombus when echocardiogram is inconclusive (CPT® 75557).
14.	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.
15.	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.
16.	Evaluate for iron overload due to conditions requiring frequent blood transfusions (i.e. sickle cell, thalassemia, hemochromatosis, etc) (CPT® 75557).

CD-6.3 Cardiac MRI – Indications for Stress MRI

- ✓ For indications for Stress MRI, see **CD-1.4 Stress Testing with Imaging-Indications**
- ✓ If a nuclear perfusion (MPI) stress test was performed and was equivocal, a stress MRI is appropriate.

CD-6.4 Cardiac MRI - Aortic Root and Proximal Ascending Aorta

- ✓ See **CH-30~Thoracic Aorta** in the Chest Imaging Guidelines

CD-6.5 Cardiac MRI - Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade

- ✓ 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.

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CD-7~CARDIAC PET

CD-7.1 Cardiac PET - Coding

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**

- ✓ 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 payer.

CD-7.2 Cardiac PET – Perfusion - Indications

Perfusion - Indications (CPT® 78491 and CPT® 78492)

- ✓ Meets all of the criteria for an imaging stress test and additionally any *one* of the following:
  - Individual is morbidly obese (for example BMI>35 kg/m^2) *or*
  - Individual has large breasts or implants
- o Equivocal nuclear perfusion (MPI) stress test
  - Routine use in post heart transplant assessment of transplant CAD

- ✓ CMS 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.

CD-7.3 Cardiac PET – Metabolic - Indications

Metabolic - Indications (CPT® 78459)

- o To determine myocardial viability when a previous study has shown significant left ventricular dysfunction when under consideration for revascularization, *or*
- o To identify and monitor response to therapy for established or strongly suspected cardiac sarcoid.

References

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3. Sharkey RM, Goldenberg DM. Perspectives on cancer therapy with radiolabeled monoclonal antibodies. *J Nucl Med* 2005 Jan; 46 (Suppl 1):115S-127S.
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CD-8~CT HEART and CCTA

CD-8~CT HEART and CCTA

CD-8.1 Cardiac CT and CCTA – General Information and Coding

- ✓ Certain payers consider coronary calcium scoring and/or cardiac CT and Coronary Computed Tomography Angiography (CCTA) investigational and/or have separate and distinct coverage policies. These coverage policies will take precedence over eviCore's guidelines.
- ✓ HeartFlow® FFRCT Analysis is a post-processing software program/algorithm run following a coronary computed tomography angiography (CCTA) that calculates fractional flow reserve (FFR) noninvasively. It is proposed to improve patient selection for invasive coronary angiography (ICA) by differentiating individuals who will or will not benefit from revascularization. It should be considered investigational at this time.
- ✓ The high negative predictive value (98%-99%) of CCTA in ruling out significant coronary artery disease has been confirmed on multiple studies.

Cardiac Imaging Procedure Codes	
CARDIAC CT	**CPT®**
CT, heart, without contrast, with quantitative evaluation of coronary calcium	**75571**
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. o 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. o CPT® 75571 should not be reported in conjunction with any of the contrast CT/CTA codes (CPT® 75572- CPT® 75574).	
CARDIAC CT and CCTA	**CPT®**
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).	**75572**
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).	**75573**
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).	**75574**
o 3D rendering, (CPT® 76376/CPT® 76377), should not be billed in conjunction with Cardiac CT and CCTA. o Only one code from the set: CPT® 75572-CPT® 75574 can be reported per encounter. o CPT® 75574 includes evaluation of cardiac structure and morphology, when performed; therefore, additional code/s should not be assigned.	

CD-8.2 CCTA – Indications for CCTA

CCTA for Symptomatic Individuals - Indications	
1.	For symptomatic individuals who have a 'very low', 'low', or 'intermediate' pretest probability of CAD*, CCTA may be used in the following situations (see **Table 1 in CD-1.1**): o Unable to perform either an exercise or pharmacologic imaging stress test. o Stress test (treadmill or imaging stress test) is uninterpretable, equivocal, or a false positive is suspected. o Replace performance of invasive coronary angiogram.
2.	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.
3.	For symptomatic individuals with unsuccessful conventional coronary angiography.

CD-8.3 CCTA – Additional Indications

CCTA - Additional Indications	
1.	**Re-do CABG** o To identify whether bypass grafts are located directly beneath the sternum, so that alternative ways to enter the chest can be planned.
2.	**Evaluate coronary artery anomalies** and other complex congenital heart disease of cardiac chambers or great vessels. o Report CPT® 75574 for evaluating coronary artery anomalies. o Report CPT® 75573 for congenital heart disease. • 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).
3.	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 : o Persistent exertional chest pain and normal stress test, o Full sibling(s) with history of sudden death syndrome before age 30 or with documented anomalous coronary artery, o Resuscitated sudden death and contraindications for conventional coronary angiography.
4.	Unexplained new onset of heart failure.
5.	Evaluation of newly diagnosed congestive heart failure or cardiomyopathy. o 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* o No exclusions to cardiac CT angiography. o No cardiac catheterization, SPECT, cardiac PET, or stress echocardiogram has been performed since the diagnosis of congestive heart failure or cardiomyopathy.
6.	Ventricular tachycardia (6 beat runs or greater) if CCTA will replace conventional invasive coronary angiography.
7.	Equivocal coronary artery anatomy on conventional cardiac catheterization.

8.	Newly diagnosed dilated cardiomyopathy.
9.	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.
10.	Vasculitis/Takayasu's/Kawasaki's disease
11.	**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 **CD-13~Cardiac Trauma**).

CD-8.4 CCTA – Exclusion Criteria for CCTA

Exclusion Criteria for CCTA	
1.	Irregular heart rhythms (e.g., atrial fibrillation/flutter, frequent irregular premature ventricular contractions or premature atrial contractions, and high grade heart block)
2.	Multifocal Atrial Tachycardia (MAT)
3.	Inability to lie flat
4.	Body mass index of 40 or more
5.	Inability to obtain a heart rate less than 65 beats per minute after beta-blockers
6.	Inability to hold breath for at least 8 seconds
7.	Renal Insufficiency
8.	Asymptomatic patients and routine use in the evaluation of the coronary arteries following heart transplantation
9.	CCTA should not be performed if there is extensive coronary calcification (calcium score >1000).
10.	Evaluation of coronary stent patency (metal artifact limits accuracy)
11.	Evaluation of left ventricular function following myocardial infarction or in chronic heart failure
12.	Evaluation of patients with postoperative native or prosthetic cardiac valves who have technically limited echocardiograms, MRI or TEE. Patients with indeterminate echocardiogram should undergo MUGA (CPT® 78472 or CPT® 78494) or cardiac MRI.
13.	First test in evaluating symptomatic patients (e.g., chest pain)
14.	Irregular heart rhythms (e.g., atrial fibrillation/flutter, frequent irregular premature ventricular contractions or premature atrial contractions, and high grade heart block)
15.	High pre-test probability for CAD – rather, these patients should undergo conventional coronary angiography, especially if an interventional procedure (e.g., PCI) is anticipated.
16.	Identification of plaque composition and morphology
17.	Myocardial perfusion and viability studies
18.	Preoperative assessment for non-cardiac, nonvascular surgery
19.	Repeat or routine follow-up of CAD with CCTA
20.	There is insufficient evidence to support routine use of Coronary Computed Tomography Angiography (CCTA) in the evaluation of the coronary arteries following heart transplantation.

CD-8.5 CT Heart – Indications

CT Heart - Indications	
1.	Cardiac vein identification for lead placement in patients needing left ventricular pacing.
2.	Pulmonary vein isolation procedure (ablation) for atrial fibrillation o 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. o Repeated post-procedure between 3-6 months after ablation because of a 1%-2% incidence of asymptomatic pulmonary vein stenosis. o See **CD-10~Pulmonary Artery and Vein Imaging**
3.	If echocardiogram is inconclusive for: o Cardiac or pericardial tumor or mass o Cardiac thrombus o Pericarditis/constrictive pericarditis o Complications of cardiac surgery
4.	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.
5.	Recurrent laryngeal nerve palsy due to cardiac chamber enlargement.
6.	Coronary imaging is **not** included in the code definition for CPT® 71275. o 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."

CD-8.6 CT Heart for Congenital Heart Disease

CT Heart – Congenital Heart Disease	
1.	Coronary artery anomaly evaluation o A cardiac catheterization was performed, and not all coronary arteries were identified.
2.	Thoracic arteriovenous anomaly evaluation o A cardiac MRI or chest CT angiogram was performed and suggested congenital heart disease.
3.	Complex adult congenital heart disease evaluation o No cardiac CT or cardiac MRI has been performed, and there is a contraindication to cardiac MRI. o A cardiac CT or cardiac MRI was performed one year ago or more.

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1. Andreini D, Pontone G, Pepi M, et al. Diagnostic accuracy of multidetector computed tomography coronary angiography in patients with dilated cardiomyopathy. *J Am Coll Cardiol* 2007 May; 49:2044-2050.
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9. Ko BS, Cameron JD, Munnur RK, Wong DTL, et al. Journal of the American College of Cardiology, 2016.
10. NICE Guidelines. HeartFlow FFRCT for estimating factional flow reserve from coronary CT angiography, 2017.

CD-9~Diagnostic Heart Catheterization

CD-9~Diagnostic Heart Catheterization

CD-9.1 Diagnostic Heart Catheterization - Code Sets

Cardiac Catheterization Procedure Codes	
CARDIAC CATH PROCEDURES	**CPT®**
Congenital Heart Disease Code "Set"	93530-93533
Congenital "Set" with Contrast Injections	93563-93568
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
Right Ventricular or Right Atrial Angiography	93566
Aortography	93567
Pulmonary Angiography	93568
Angiography of noncoronary arteries and veins, performed as a distinct service	Select appropriate codes from the Radiology and Vascular Injection Procedures sections.

CD-9.2 Diagnostic Heart Catheterization – Coding Notes

Diagnostic Heart Catheterization Coding Notes
Cardiac catheterization (CPT® 93451- CPT® 93461) includes all "road mapping" angiography necessary to place the catheters, including any injections and imaging supervision, interpretation, and report.
Cardiac catheterization (CPT® 93452- CPT® 93461) (for all conditions other than congenital heart disease) includes contrast injections, imaging supervision, interpretation, and report for imaging typically performed.
Catheter placements in native coronaries or bypass grafts (CPT® 93454- CPT® 93461) include intraprocedural injections for bypass graft angiography, imaging supervision, and interpretation.
Injection codes CPT® 93563- CPT® 93565 should not be used in conjunction with CPT® 93452- CPT® 93461.
Codes CPT® 93451- CPT® 93461 do not include contrast injections and imaging supervision, interpretation, and report for imaging that is separately identified by the following specific procedure codes: CPT® 93566, CPT® 93567 and CPT® 93568.
Separate diagnostic cardiac catheterization codes should only be assigned in conjunction with interventional procedures in the following circumstances: o No prior or recent diagnostic catheterization is available to guide therapy o Individual's condition has significantly changed since the last diagnostic cath o The treatment plan may be affected o Other vessels may be identified for treatment o Further establishment of a diagnosis from a non-invasive study is necessary

CD-9.3 Diagnostic Left Heart Catheterization (LHC)

- ✓ 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.
- ✓ Incidental angiography can be performed:
  - o IIliac/femoral artery angiography when dissection or obstruction to the passage of the catheter/guidewire is encountered.
  - o Renal arteriography if criteria outlined in the **Abdomen Imaging Guidelines** are met (see **AB-37~Renovascular Hypertension**).

Diagnostic Left Heart Catheterization - Indications	
1.	Identifying disease for which invasive procedures have been shown to prolong survival: o Left main coronary artery disease plus right coronary artery disease plus left ventricular dysfunction. o Triple vessel coronary artery disease plus left ventricular dysfunction.
2.	Unstable angina (new, accelerating, or worsening symptoms that are suggestive of unstable angina), even in the absence of noninvasive cardiac testing.
3.	Symptomatic patients with a high pretest probability of CAD.
4.	Angina that is unresponsive to optimized medical therapy (see **CD-1**) and for which invasive procedures are needed to provide pain relief.
5.	Left ventricular dysfunction (congestive heart failure) in patients suspected of having coronary artery disease.
6.	Ventricular fibrillation or ventricular tachycardia where the etiology is unclear.
7.	Unheralded syncope (not near syncope).
8.	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**:** o Suspicion of cardiomyopathy, endocarditis, or myocarditis o Significant/serious ventricular arrhythmia o Evaluating progression of known CAD when symptoms are persistent or worsening o An intermediate or large amount of myocardium (>5%) may be in jeopardy o Evaluation of coronary grafts o Evaluation of previously placed coronary artery stents o Evaluation of structural disease
9.	Ruling out coronary artery disease prior to planned non-coronary cardiac or great vessel surgery (cardiac valve surgery, aortic dissection, aortic aneurysm, congenital disease repair such as atrial septal defect, etc.).
10.	Assessment for accelerated coronary artery disease associated with cardiac transplantation.
11.	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.
12.	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.
13.	Suspected pericardial disease.

CD-9.4 Diagnostic Right Heart Catheterization (RHC)

✓ General information RHC

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

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 o For routine endomyocardial biopsy o Assess for rejection o Assess pulmonary artery pressure o 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.

CD-9.5 Combined Right and Left Heart Catheterization

Combined Right and Left Heart Catheterization - Indications	
1.	Preoperative evaluation for valve surgery
2.	Newly diagnosed or worsening cardiomyopathy
3.	If the major component of the patient symptoms is dyspnea
4.	If indications are met according to **CD-9.3** and **CD-9.4**, then a combination heart catheterization may be appropriate.

CD-9.6 Planned (Staged) Coronary Interventions

- ✓ The CPT® codes for percutaneous coronary interventions (PCI) include the following imaging services necessary for the procedure(s):
  - o Contrast injection, angiography, 'roadmapping', and fluoroscopic guidance
  - o Vessel measurement
  - o Angiography following coronary angioplasty, stent placement, and atherectomy
- ✓ Separate codes for these services should not be assigned in addition to the PCI code/s because the services are already included.
- ✓ A repeat diagnostic left heart catheterization is not medically necessary when the patient is undergoing a planned staged percutaneous coronary intervention.
- ✓ eviCore does not preauthorize PCI procedures, but diagnostic heart catheterization requests, for studies being performed together with PCI, will be reviewed by these guidelines (See last note on table, in: **CD-9.1 Diagnostic Heart Catheterization – Coding Notes**).

References

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CD-10~Pulmonary Artery and Vein Imaging

CD-10.1 Pulmonary Artery Hypertension (PAH)

Pulmonary Artery Hypertension (PAH) - Indications	
1.	CT or CTA or MRA of the pulmonary arteries (CPT® 71260 or CPT® 71275 or CPT® 71555) is useful in the assessment of PAH, especially if there is suspicion for recurrent pulmonary emboli.
2.	In the absence of a clinical change, follow-up imaging for PAH is not indicated.
3.	Also see: o **PVD-5~Pulmonary Artery Hypertension** in the Peripheral Vascular Disease Imaging Guidelines. o **CH-27~Pulmonary Embolism** in the Chest Imaging Guidelines.

CD-10.2 Pulmonary Vein Imaging

Pulmonary Vein Imaging - Indications	
1.	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: o Prior to an ablation procedure performed for atrial fibrillation. o Post-procedure between 3-6 months after ablation because of a 1%-2% incidence of asymptomatic pulmonary vein stenosis. o If no pulmonary vein stenosis is present, no further follow-up imaging is required. o 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. o The majority (81%) of pulmonary vein stenosis remain stable over1 year. Progression occurs in 8.8% and regression occurs in a small percentage.

References

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2. Lang IM, Plank C, Sadushi-Kolici R, Jakowitsch J, et al. Imaging in pulmonary hypertension. *J Am Coll Cardiol Img*, 2010; 3:1287-1295.
3. Kato R, Lickfett L, Meininger G, Dickfeld T, et al. Pulmonary vein anatomy in patients undergoing catheter ablation of atrial fibrillation. *Circulation*, 2003; 107:2004-2010.

CD-11~SYNCOPE

Also see **HD-23~Dizziness, Vertigo and Syncope** in the Head Imaging Guidelines.

CD-11.1 Syncope

- ✓ Initial Evaluation for "heralded" syncope includes:
  - o Orthostatic postural BP and rhythm (low heart rate, or serious dysrhythmias) examination
  - o TTE (CPT® 93306) for valvular dysfunction or cardiomyopathy
  - o Stress testing should proceed based on the following guideline: See **CD-1.4 Stress Testing *with* Imaging-Indications**
- ✓ Unheralded syncope may be associated with ventricular tachycardia.
- ✓ Left heart cath and/or imaging stress in a patient with a high likelihood of CAD.
- ✓ For anomalous coronary arteries, infiltrative heart disease or certain types of cardiomyopathy, suspected or known, the following may be used:
  - o Cardiac MRI (CPT® 75561) or CCTA
  - o See **CD-6.2**, for pre-syncope or syncope ARVD/ARVC (#6).

Reference

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2. Strickberger SA, Benson DW, Biaggioni I, Callans DJ. AHA/ACCF Scientific Statement on the evaluation of syncope: from the American Heart Association Councils on Clinical Cardiology, Cardiovascular Nursing, Cardiovascular Disease in the Young, and Stroke, and the Quality of Care and Outcomes Research Interdisciplinary Working Group; and the American College of Cardiology Foundation: in collaboration with the Heart Rhythm Society: endorsed by the American Autonomic Society. *Circulation*, 2006; 113: 316.
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CD-12~Congestive Heart Failure

CD-12.1 CHF – Imaging

- ✓ Congestive heart failure, including post-cardiac transplant failure:
  - o An echocardiogram is generally the first study to be done after the clinical evaluation of the patient who is suspected of having heart failure.
  - o If the ECHO is limited or does not completely answer the question, then further evaluation with MUGA, cardiac MRI or cardiac CT may be appropriate.
  - o A stress test to assess for CAD may be appropriate. Follow stress testing guideline: **CD-1.4 Stress Testing *with* Imaging-Indications**
  - o Cardiac CT should NOT be used for evaluation of left ventricular function following myocardial infarction or in chronic heart failure mostly out of concern for radiation exposure.

- ✓ Arteriovenous fistula with "high output" heart failure:
  - o CT Chest with contrast (CPT® 71260) and/or CT Abdomen and/or CT Pelvis with contrast (CPT® 74160 or CPT® 72193 or CPT® 74177) **OR**
  - o CTA Chest (CPT® 71275) and/or CTA Abdomen and/or CTA Pelvis (CPT® 74175 or CPT® 72191 or CPT® 74174) **OR**
  - o MRI Chest and/or MRI Abdomen and/or MRI Pelvis without and with contrast (CPT® 71552 and/or CPT® 74183 and/or CPT® 72197) **OR**
  - o MRA Chest and/or MRI Abdomen and/or MRI Pelvis (CPT® 71555 and/or CPT® 74185 and/or CPT® 72198)

- ✓ Right-sided congestive heart failure can be a manifestation of pulmonary hypertension or serious lung disease.
  - o Chest CT (CPT® 71260) or chest CTA (CPT® 71275) to evaluate for recurrent pulmonary embolism

CD-12.2 Myocardial Sympathetic Innervation Imaging

- ✓ In heart failure, the sympathetic nervous system is activated in order to compensate for the decreased myocardial function. Initially this is beneficial, however, long term this compensatory mechanism is detrimental and causes further damage.

- ✓ Markers have been developed, using radioactive iodine, in an attempt to image this increased myocardial sympathetic activity. Currently AdreView™ (iobenguane I-123), is the only FDA-approved imaging agent available for this purpose. These nuclear techniques are promising; however, currently they remain investigational and are used mainly for research purposes.

- ✓ The AMA has established the following set of Category III codes to report these studies:
  - ✓ **0331T** - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment.
  - ✓ **0332T** - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT.

References

1. Yancy CW, Jessup M, Bozkurt B, Butler J, et al. 2013 ACCF/AHA guideline for the management of heart failure: executive summary: a report of the American College of Cardiology Foundation/American Heart Association Task Force on practice guidelines. *Circulation*. 2013;128(16):1810
2. Lindenfeld J, Albert NM, Boehmer JP, et al, for the Heart Failure Society of America. Executive summary: HFSA 2010 comprehensive heart failure practice guideline. *J Card Fail*. Jun 2010;16(6):e1-194.

CD-13~CARDIAC TRAUMA

CD-13.1 Cardiac Trauma - Imaging

- ✓ Any of the following can be used to evaluate cardiac or aortic trauma:
  - Echocardiogram (TTE, TEE)
  - Cardiac MRI (CPT® 75557, CPT® 75561, and CPT® 75565)
  - Cardiac CT (CPT® 75572)
  - CCTA (CPT® 75574)
  - Chest CTA (CPT® 71275)

References

1. Elie MC. Blunt cardiac injury. *Mt Sinai J Med*, 2006; 73:542.
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