CLINICAL APPROPRIATENESS GUIDELINES

ADVANCED IMAGING

Appropriate Use Criteria: Echocardiography Imaging

EFFECTIVE NOVEMBER 10, 2019

Proprietary

Approval and implementation dates for specific health plans may vary. Please consult the applicable health plan for more details.

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8600 West Bryn Mawr Avenue
South Tower – Suite 800 Chicago, IL 60631
www.aimspecialtyhealth.com

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2057-1119

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Description and Application of the Guidelines

The AIM Clinical Appropriateness Guidelines (hereinafter "the AIM Clinical Appropriateness Guidelines" or the "Guidelines") are designed to assist providers in making the most appropriate treatment decision for a specific clinical condition for an individual. As used by AIM, the Guidelines establish objective and evidence-based criteria for medical necessity determinations where possible. In the process, multiple functions are accomplished:

- To establish criteria for when services are medically necessary
- To assist the practitioner as an educational tool
- To encourage standardization of medical practice patterns
- To curtail the performance of inappropriate and/or duplicate services
- To advocate for patient safety concerns
- To enhance the quality of health care
- To promote the most efficient and cost-effective use of services

The AIM guideline development process complies with applicable accreditation standards, including the requirement that the Guidelines be developed with involvement from appropriate providers with current clinical expertise relevant to the Guidelines under review and be based on the most up-to-date clinical principles and best practices. Relevant citations are included in the References section attached to each Guideline. AIM reviews all of its Guidelines at least annually.

AIM makes its Guidelines publicly available on its website twenty-four hours a day, seven days a week. Copies of the AIM Clinical Appropriateness Guidelines are also available upon oral or written request. Although the Guidelines are publicly-available, AIM considers the Guidelines to be important, proprietary information of AIM, which cannot be sold, assigned, leased, licensed, reproduced or distributed without the written consent of AIM.

AIM applies objective and evidence-based criteria, and takes individual circumstances and the local delivery system into account when determining the medical appropriateness of health care services. The AIM Guidelines are just guidelines for the provision of specialty health services. These criteria are designed to guide both providers and reviewers to the most appropriate services based on a patient's unique circumstances. In all cases, clinical judgment consistent with the standards of good medical practice should be used when applying the Guidelines. Guideline determinations are made based on the information provided at the time of the request. It is expected that medical necessity decisions may change as new information is provided or based on unique aspects of the patient's condition. The treating clinician has final authority and responsibility for treatment decisions regarding the care of the patient and for justifying and demonstrating the existence of medical necessity for the requested service. The Guidelines are not a substitute for the experience and judgment of a physician or other health care professionals. Any clinician seeking to apply or consult the Guidelines is expected to use independent medical judgment in the context of individual clinical circumstances to determine any patient's care or treatment.

The Guidelines do not address coverage, benefit or other plan specific issues. Applicable federal and state coverage mandates take precedence over these clinical guidelines. If requested by a health plan, AIM will review requests based on health plan medical policy/guidelines in lieu of the AIM Guidelines.

The Guidelines may also be used by the health plan or by AIM for purposes of provider education, or to review the medical necessity of services by any provider who has been notified of the need for medical necessity review, due to billing practices or claims that are not consistent with other providers in terms of frequency or some other manner.

General Clinical Guideline

Clinical Appropriateness Framework

Critical to any finding of clinical appropriateness under the guidelines for a specific diagnostic or therapeutic intervention are the following elements:

- Prior to any intervention, it is essential that the clinician confirm the diagnosis or establish its pretest likelihood based on a complete evaluation of the patient. This includes a history and physical examination and, where applicable, a review of relevant laboratory studies, diagnostic testing, and response to prior therapeutic intervention.
- The anticipated benefit of the recommended intervention should outweigh any potential harms that may result (net benefit).
- Current literature and/or standards of medical practice should support that the recommended intervention offers the greatest net benefit among competing alternatives.
- Based on the clinical evaluation, current literature, and standards of medical practice, there exists a reasonable likelihood that the intervention will change management and/or lead to an improved outcome for the patient.

If these elements are not established with respect to a given request, the determination of appropriateness will most likely require a peer-to-peer conversation to understand the individual and unique facts that would supersede the requirements set forth above. During the peer-to-peer conversation, factors such as patient acuity and setting of service may also be taken into account.

Simultaneous Ordering of Multiple Diagnostic or Therapeutic Interventions

Requests for multiple diagnostic or therapeutic interventions at the same time will often require a peer-to-peer conversation to understand the individual circumstances that support the medical necessity of performing all interventions simultaneously. This is based on the fact that appropriateness of additional intervention is often dependent on the outcome of the initial intervention.

Additionally, either of the following may apply:

- Current literature and/or standards of medical practice support that one of the requested diagnostic or therapeutic interventions is more appropriate in the clinical situation presented; or
- One of the diagnostic or therapeutic interventions requested is more likely to improve patient outcomes based on current literature and/or standards of medical practice.

Repeat Diagnostic Intervention

In general, repeated testing of the same anatomic location for the same indication should be limited to evaluation following an intervention, or when there is a change in clinical status such that additional testing is required to determine next steps in management. At times, it may be necessary to repeat a test using different techniques or protocols to clarify a finding or result of the original study.

Repeated testing for the same indication using the same or similar technology may be subject to additional review or require peer-to-peer conversation in the following scenarios:

- Repeated diagnostic testing at the same facility due to technical issues
- Repeated diagnostic testing requested at a different facility due to provider preference or quality concerns
- Repeated diagnostic testing of the same anatomic area based on persistent symptoms with no clinical change, treatment, or intervention since the previous study
- Repeated diagnostic testing of the same anatomic area by different providers for the same member over a short period of time

Repeat Therapeutic Intervention

In general, repeated therapeutic intervention in the same anatomic area is considered appropriate when the prior intervention proved effective or beneficial and the expected duration of relief has lapsed. A repeat intervention requested prior to the expected duration of relief is not appropriate unless it can be confirmed that the prior intervention was never administered.

ECHOCARDIOGRAPHY

Resting Transthoracic Echocardiography (TTE)

CPT Codes

The following codes may be applicable to cardiac imaging and may not be all-inclusive. Specific CPT codes for services should be used when available. Nonspecific or not otherwise classified codes may be subject to additional documentation requirements and review.

93303	Transthoracic echocardiography or congenital cardiac anomalies; complete
93304	Transthoracic echocardiography or 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	Transthoracic echocardiography; complete, without spectral Doppler echocardiography, or color flow Doppler echocardiography
93308	Transthoracic echocardiography; complete, without spectral Doppler echocardiography, or color flow Doppler echocardiography follow-up or limited study
93320	Add-on code used in conjunction with 93303, 93304 does not require separate review
93321	Add-on code used in conjunction with 93303, 93304, 93308 does not require separate review
93325	Add-on code used in conjunction with 93303, 93304, 93308 does not require separate review

General Information

Standard Anatomic Coverage

- Heart, proximal great vessels, pericardium

Imaging Considerations

Advantages of transthoracic echocardiography

- No risk to the patient
- Minimal patient discomfort
- Widely available
- Extremely portable
- No exposure to ionizing radiation

Disadvantages of transthoracic echocardiography

- Image quality suboptimal in some patients
- Less sensitive than transesophageal echocardiography in some clinical situations

Ordering issues

- Transthoracic echocardiography should only be acquired on equipment which has the capability to perform Doppler echocardiography (pulsed-wave and continuous wave with spectral display) and color flow velocity mapping.
- In interpretation of this document, the term “clinically stable” is taken to mean that the patient has no new or worsening cardiac symptoms and there are no changes on cardiovascular examination.

Clinical Indications

Suspected valvular heart disease

- Evaluation of cardiac murmurs when the diagnosis of valvular heart disease has not been established
  - After the diagnosis of valvular heart disease has been established, follow the guidelines for the specific valvular lesion (e.g., established aortic stenosis)
- Initial evaluation for mitral valve prolapse when signs or symptoms of mitral valve prolapse are present
- Initial evaluation for bicuspid aortic valve when there is a family history (established diagnosis in a first-degree relative)

Established native valvular stenosis (does not apply to congenital valvular stenosis)

- Changing signs or symptoms; **OR**
- Reevaluation of clinically stable patients with moderate or severe stenosis annually; **OR**
- Reevaluation of clinically stable patients with mild stenosis every 3 years; **OR**
- Assessment of changes in hemodynamic severity and left ventricular function in patients with known aortic stenosis during pregnancy

Established native valvular regurgitation

- Changing signs or symptoms; **OR**
- Reevaluation of clinically stable patients with moderate or severe regurgitation annually; **OR**
- Reevaluation of clinically stable patients with mild regurgitation every 3 years

Established bicuspid aortic valve

- Changing signs or symptoms suggesting the development of aortic valve dysfunction; **OR**
- Bicuspid aortic valve and dilated aortic root on prior echo (annual echocardiography is indicated); **OR**
- Bicuspid aortic valve and normal aortic root on prior echo (echo at 3 yearly intervals is indicated)

Established mitral valve prolapse

- Changing signs or symptoms

Prosthetic cardiac valves (mechanical or bioprosthetic) and patients who have undergone valve repair

*This guideline does not apply to valve replacement or repair for correction of congenital heart disease in childhood – see guideine **Evaluation of patients with congenital heart disease**.*

- Initial post-operative evaluation of valve function (baseline study); **OR**
- Signs and/or symptoms suggesting dysfunction of a repaired or replaced valve; **OR**
- Annual reevaluation of a patient with a prosthetic or repaired heart valve noted on prior imaging study to have moderate or severe dysfunction (stenosis or regurgitation); **OR**
- Evaluation at 3 yearly intervals of a patient with a prosthetic or repaired heart valve noted on prior imaging study to have mild dysfunction (stenosis or regurgitation); **OR**
- Annual reevaluation of clinically stable adults (age 19 years or older) who have undergone valve repair or implantation of a bioprosthetic valve more than 7 years previously (This guideline does not apply to patients with a mechanical valve prosthesis); **OR**

- Following transcatheter aortic valve implantation/replacement (TAVI or TAVR), TTE is appropriate in clinically stable patients on one (1) occasion within the first 3 months, at one (1) year, and annually thereafter; **OR**
- Following transcatheter mitral valve repair, TTE is appropriate on one occasion within the first 3 months, at one (1) year, and annually thereafter for patients with moderate or severe residual mitral regurgitation.

Evaluation of patients with congenital heart disease

- Evaluation of patients in whom congenital heart disease is suspected based on signs and symptoms (including murmur, cyanosis, unexplained arterial desaturation, abnormal arterial pulses) abnormal EKG, abnormal chest x-ray; **OR**
- Patients with chromosomal abnormalities or major extra cardiac abnormality associated with a high incidence of coexisting cardiac abnormality; **OR**
- Patients with established congenital heart disease (repaired or unrepaired) in whom there is a change in clinical status; **OR**
- Adult patients with a childhood history of congenital heart disease (with or without prior surgical repair) in whom the original diagnosis is uncertain or when the precise nature of the structural abnormalities or hemodynamics is unclear; **OR**
- Annual echocardiography is appropriate in clinically stable patients age 6 years or older with established complex congenital heart disease (with or without prior surgical repair) in whom surveillance for ventricular function, valvular function, or pulmonary artery pressure is important in clinical decision-making.
    - This does not include patients with successfully repaired patent ductus arteriosus, small atrial or ventricular septal defects, bicuspid aortic valve or mitral valve prolapse; **OR**
- Echocardiography is appropriate in clinically stable patients age 5 years or younger with established congenital heart disease (with or without prior surgical repair) in whom surveillance for ventricular function, AV valvular regurgitation or pulmonary artery pressure is important in clinical decision-making; **OR**
- Initial outpatient post-operative evaluation of patients who have undergone surgical or catheter-based procedures to correct congenital heart disease (within 60 days of the procedure); **OR**
- Transthoracic echocardiography is appropriate every 3 years in the follow-up of patients who have undergone catheter-based closure of atrial or ventricular septal defects; **OR**
- Non-adult patients (less than or equal to 18 years old) who are undergoing staged surgical correction of congenital heart disease; **OR**
- Patients in whom a decision to perform surgical or catheter based repair of congenital heart disease has been made and in whom echocardiography will be used to assist with procedural planning

Evaluation of ventricular function

Note: It is assumed that left ventricular function will be evaluated using a single imaging modality. Thus, if left ventricular function has been evaluated recently by blood pool imaging, reevaluation using echocardiography is not necessary.

Abnormalities on other testing

- Evaluation of patients with resting EKG abnormalities (LBBB, RBBB with left anterior or posterior hemiblock, LVH, RVH, Q waves suggestive of prior infarction); **OR**
- When left ventricular dysfunction is suggested by other testing (chest imaging, elevated B-type natriuretic peptide [BNP]) and left ventricular function has not been evaluated by another modality since that testing was performed; **OR**
- Where a significant discrepancy (more than would be expected for the range of error of the methods) exists in the evaluation of left ventricular dysfunction by two other imaging modalities, echocardiography can be used as an arbiter

Hypertension

- Initial evaluation of patients with an established diagnosis of hypertension; **OR**
- Annual evaluation of non-adult patients (less than or equal to 18 years old) with an established diagnosis of hypertension

Heart Failure / Cardiomyopathy / Left Ventricular Dysfunction

- Initial evaluation of known or suspected heart failure; **OR**
- Reevaluation of patients with known heart failure (systolic or diastolic) in a patient with a deterioration in clinical status; **OR**
- Reevaluation of patients with known left ventricular dysfunction (systolic or diastolic) in a patient with a deterioration in clinical status; **OR**
- Reevaluation of clinically stable non-adult (age 18 years or younger) patients with left ventricular systolic dysfunction (left ventricular ejection fraction [LVEF] < 60%) at 6 monthly intervals; **OR**
- Screening study every 2 years in clinically stable first-degree relatives of patients with inherited cardiomyopathy (see specific indications for hypertrophic obstructive cardiomyopathy [HOCM] below); **OR**
- Evaluation of suspected restrictive, infiltrative or genetic cardiomyopathy; **OR**
- Initial evaluation of suspected hypertrophic obstructive cardiomyopathy (HOCM) ; **OR**
- Reevaluation of known hypertrophic obstructive cardiomyopathy (HOCM) in a patient with a change in clinical status to guide or evaluate therapy; **OR**
- Annual reevaluation non-adult (age 18 years or younger) first-degree relatives of patients with established hypertrophic obstructive cardiomyopathy (HOCM); **OR**
- Evaluation every 5 years of adult (age 19 years or older) first-degree relatives of patients with established hypertrophic obstructive cardiomyopathy (HOCM); **OR**
- Annual reevaluation of asymptomatic adult (age 19 years or older) patients with known hypertrophic obstructive cardiomyopathy (HOCM); **OR**
- Reevaluation of asymptomatic non-adult (age 18 years or younger) patients with known hypertrophic obstructive cardiomyopathy (HOCM) at 6 monthly intervals

Implantable devices

- Evaluation of left ventricular function in a patient with known cardiomyopathy being considered for cardiac resynchronization therapy (CRT), implantable defibrillator (AICD) or ventricular assist device (VAD); **OR**
- Initial evaluation for cardiac resynchronization therapy (CRT) device optimization following implantation; **OR**
- Evaluation of a patient being treated with cardiac resynchronization therapy (CRT) with new or persistent signs or symptoms of heart failure for device optimization; **OR**
- Echocardiography is indicated for optimization of device settings in patients with ventricular assist device (VAD); **OR**
- Echocardiography is indicated for evaluation of signs and/or symptoms suggestive of device related complications in patients with ventricular assist device (VAD)

Other

- Precardiac transplant evaluation; **OR**
- Post cardiac transplant evaluation when **ANY** of the following applies:
    - Evaluation of new or worsening cardiac signs, symptoms or new EKG abnormalities
    - Surveillance of a stable patient (no new or worsening cardiac signs or symptoms) within the first 6 months of transplant
    - Surveillance of a stable patient (no new or worsening cardiac signs or symptoms) at 3 monthly intervals at 6 to 24 months post-transplant

  - Annual surveillance of a stable patient (no new or worsening cardiac signs or symptoms) more than 24 months post-transplant
- Evaluation of known or suspected myocarditis; **OR**
- Echocardiography to evaluate right ventricular function in patients with disease likely to affect right ventricular function including but not limited to chronic lung diseases and sleep apnea syndrome; **OR**
- Evaluation of ventricular function prompted by treatment with cardiotoxic agents (examples including but not limited to some chemotherapeutic agents for cancer, Novantrone [mitoxantrone] for multiple sclerosis, etc.)
  - Baseline evaluation prior to starting treatment
  - Serial evaluation during or within 6 months of completion of treatment
  - Surveillance annually thereafter

Evaluation of patients with cardiac arrhythmias

- In patients who have sustained (lasting more than 30 seconds) or nonsustained (more than 3 beats but terminating within 30 seconds) ventricular tachycardia
- In patients who have sustained (lasting more than 30 seconds) or non-sustained (more than 3 beats but terminating within 30 seconds) supraventricular tachycardia (including but not limited to atrial fibrillation, atrial flutter, atrial tachycardia, AV node reentrant tachycardia, etc.
- In patients who have frequent premature ventricular contractions (PVC) defined as more than 30 PVCs per hour on ambulatory EKG (Holter) monitoring
  - It is not clinically indicated to perform echocardiography for evaluation of infrequent premature atrial or ventricular depolarizations

Evaluation of infective endocarditis (native or prosthetic valves)

- Patients with suspected endocarditis (positive blood cultures and/or a new murmur on physical examination)
- Reevaluation of patients with established endocarditis who have **ANY** of the following:
  - Virulent organism; **OR**
  - Severe hemodynamic lesion; **OR**
  - Aortic involvement; **OR**
  - Persistent bacteremia; **OR**
  - Clinical deterioration

Evaluation of patients with suspected coronary artery disease

- Chest pain
  - Resting echocardiography may suggest a cause for the chest pain other than myocardial ischemia (mitral valve prolapse) and is therefore a reasonable imaging procedure in patients with chest pain
  - If coronary artery disease is a likely diagnosis and if a resting echocardiogram cannot be performed while the patient is experiencing the pain, a provocative test (exercise or pharmacological stress test with or without imaging as appropriate) is preferable
  - Resting echocardiography has no role in screening for coronary artery disease in asymptomatic patients; **OR**
- Echocardiography is appropriate in the evaluation of patients with suspected aberrant or anomalous coronary origins or coronary artery fistula

Evaluation of patients with known coronary artery disease

- Recent (< 3 weeks) acute coronary syndrome (myocardial infarction or unstable angina) and hemodynamic instability or signs or symptoms suggesting a complication of myocardial infarction including but not limited to acute mitral regurgitation, hypoxemia, abnormal chest x-ray, acute ventricular septal rupture, free wall rupture / tamponade, shock, right ventricular involvement, heart failure, or thrombus
    - This study is usually requested on an inpatient; **OR**
- Recent (< 3 weeks) acute coronary syndrome (myocardial infarction or unstable angina) for initial assessment of left ventricular function
    - This study is usually done prior to discharge
    - Not required if left ventricular function has been assessed using a different imaging modality; **OR**
- Prior acute coronary syndrome (myocardial infarction or unstable angina) for reevaluation of ventricular function during recovery phase (up to 6 months following acute coronary syndrome); **OR**
- Prior acute coronary syndrome (myocardial infarction or unstable angina) for reevaluation of ventricular function after the recovery phase (more than 6 months) in patients who develop new symptoms or signs suggestive of heart failure; **OR**
- Prior myocardial infarction for reevaluation of left ventricular function in patients being considered for AICD or cardiac resynchronization therapy (CRT); **OR**
- Annual echocardiography is appropriate in non-adult patients (less than or equal to 18 years old) with an established diagnosis of aberrant or anomalous coronary origins or coronary artery fistula if the findings on echocardiography will impact clinical decision making

Evaluation of Kawasaki disease

- Echocardiography is appropriate in the evaluation of patients with suspected Kawasaki disease; **OR**
- Echocardiography is appropriate in patients with an established diagnosis of Kawasaki disease at 2 to 4 weeks and again at 6 to 8 weeks following diagnosis whether or not there was coronary artery involvement; **OR**
- Echocardiography is appropriate for periodic surveillance up to one year following diagnosis of Kawasaki disease in patients with persistent fever; **OR**
- Echocardiography is appropriate for periodic surveillance up to one year following diagnosis of Kawasaki disease when previous echocardiograms reveal any of the following:
    - Coronary abnormalities
    - Left ventricular dysfunction
    - Pericardial effusion
    - Valvular regurgitation (other than trace or trivial regurgitation)
    - Aortic dilation; **OR**
- Annual echocardiography is appropriate in patients with an established diagnosis of Kawasaki disease who have small or medium sized coronary artery aneurysms; **OR**
- Semiannual (every 6 months) echocardiography is appropriate in patients with an established diagnosis of Kawasaki disease who have large or giant coronary artery aneurysms or coronary artery obstruction

Evaluation of signs, symptoms, or abnormal testing

- Echocardiography is appropriate in the evaluation of the following newly recognized symptoms (dyspnea, lightheadedness, syncope, palpitations, reduced functional capacity, orthopnea, paroxysmal nocturnal dyspnea, transient ischemic attack [TIA] or cerebrovascular attack [CVA]); **OR**
- Echocardiography is appropriate in the evaluation of chest pain not thought to be due to myocardial ischemia or infarction. If myocardial ischemia or infarction is thought to be the cause, resting outpatient echocardiography is not appropriate; **OR**

- Echocardiography is appropriate in the evaluation of the following newly recognized signs suggesting structural heart disease (murmur, cyanosis, ankle edema, ascites, elevation of jugular venous pressure, unexplained weight gain, tachycardia, tachypnea, audible third heart sound, lung crackles suggestive of pulmonary edema); **OR**
- Echocardiography is appropriate in the evaluation of patients who are hemodynamically unstable or hypotensive for unknown reasons; **OR**
- Echocardiography is appropriate in further evaluation of abnormal results from other testing which suggests underlying cardiac disease (abnormal chest imaging suggesting cardiac chamber enlargement, valvular or congenital heart disease or congestive heart failure, abnormal EKG suggesting chamber hypertrophy, valvular or congenital heart disease [LBBB, RBBB with anterior or posterior hemiblock, left or right ventricular hypertrophy or Q waves suggestive of prior infarction] or abnormal laboratory results suggesting congestive heart failure such as elevated B-type natriuretic peptide [BNP])
    - When other cardiac testing raises concerns of underlying coronary artery disease, provocative testing is recommended over resting echocardiography; **OR**
- Echocardiography is appropriate in the evaluation of respiratory failure of unknown cause; **OR**
- Echocardiography is appropriate annually in the evaluation of patients with syndromes which place them at increased risk for the development of acquired myocardial or aortic diseases (e.g., Marfan syndrome, Ehlers-Danlos syndrome, Turner syndrome, etc.); **OR**
- Echocardiography is appropriate in the evaluation of suspected acute rheumatic fever

Evaluation of patients with pulmonary embolus

- In patients with known acute pulmonary embolus, echocardiography may be performed as it is useful in guiding initial decision making (thrombectomy, thrombolysis)
    - Echocardiography is not indicated in the initial evaluation of a patient with suspected pulmonary embolism in order to establish the diagnosis; **OR**
- In patients who have had a pulmonary embolus, echocardiography may be performed to evaluate right ventricular function and pulmonary artery pressure. If right ventricular function and pulmonary artery pressure are normal, repeated studies are not necessary

Evaluation of patients with pulmonary hypertension

- Echocardiography is indicated for evaluation of suspected pulmonary hypertension; **OR**
- Echocardiography is indicated in follow-up of pulmonary arterial pressures in patients with pulmonary hypertension to evaluate response to treatment; **OR**
- Echocardiography may be performed annually in clinically stable patients with an established diagnosis of pulmonary hypertension; **OR**
- Echocardiography may be performed to evaluate signs or symptoms which may be attributable to worsened pulmonary hypertension

Evaluation of aortic disease

- Echocardiography is appropriate on one occasion when ascending aortic aneurysm / dilation or dissection is suspected based on symptoms of chest pain or shortness of breath or abnormal physical findings suggesting these diagnoses
    - Although some providers will use transthoracic echocardiography in evaluation of diseases of the thoracic aorta, transesophageal echocardiography (TEE) is often preferable in this situation
- Echocardiography is indicated annually when pathology of the ascending aorta (aneurysm / dilation or dissection) is suspected because the patient has an established diagnosis of a connective tissue disease or genetic condition which predisposes to ascending aortic pathology including but not limited to Marfan syndrome, Ehlers-Danlos syndrome and familial aortic dilation. (This guideline does not apply to surveillance of patients with bicuspid aortic valve – see above guideline **Established bicuspid aortic valve**)

- Echocardiography is appropriate for evaluation of the ascending aorta in patients with a suspected connective tissue disease or genetic condition which predisposes to ascending aortic pathology including but not limited to Marfan syndrome, Ehlers-Danlos syndrome and familial aortic dilation
- Annual echocardiography is appropriate in patients with an established diagnosis of ascending aortic aneurysm or dissection
    - Annual echocardiographic evaluation is usually sufficient in clinically stable patients but more frequent testing may be appropriate in some situations (e.g., in longitudinal follow-up of large or enlarging thoracic aneurysms, in follow-up of recently diagnosed thoracic aneurysms until stability is established)
- Echocardiography is appropriate in patients with an established diagnosis of ascending aortic aneurysm or dissection who develop new symptoms or signs of aortic aneurysm or dissection.

Evaluation of pericardial diseases

- Echocardiography is indicated in the evaluation of suspected pericardial conditions including but not limited to pericardial effusion, pericardial mass, constrictive pericarditis, effusive-constrictive conditions, patients post cardiac surgery or suspected pericardial tamponade
- Echocardiography is indicated in the evaluation of established pericardial conditions including but not limited to moderate and large pericardial effusion, pericardial mass, constrictive pericarditis, effusive-constrictive conditions, patients post cardiac surgery or suspected pericardial tamponade Routine surveillance of known small pericardial effusions with no change in clinical status is not appropriate

Evaluation of cardiac masses or cardiac source of embolus

- Echocardiography is indicated in the diagnosis or exclusion of a cardiac source of embolus in a patient who has had or appears to have had a systemic embolic event (although transesophageal echocardiography (TEE) is often preferable in this situation)
- Echocardiography is indicated in the pre- and post-treatment evaluation of cardiac masses (tumor or thrombus) Annual echocardiographic evaluation is usually sufficient in clinically stable patients with cardiac masses (tumors or thrombus) but more frequent testing may be appropriate in some situations (e.g., in longitudinal follow-up of enlarging masses or in follow-up of recently diagnosed masses until stability is established)

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Transesophageal Echocardiography (TEE)

CPT Codes

The following codes may be applicable to cardiac imaging and may not be all-inclusive. Specific CPT codes for services should be used when available. Nonspecific or not otherwise classified codes may be subject to additional documentation requirements and review.

93312 Echocardiography, transesophageal, real-time with image documentation (2-D) (with or without M-mode recording)

93313 Echocardiography, transesophageal, probe placement only

93314 Echocardiography, transesophageal, image acquisition, interpretation and report only

93315 Echocardiography, transesophageal for congenital cardiac anomalies

93316 Echocardiography, transesophageal, probe placement only (congenital cardiac anomalies)

93317 Echocardiography, transesophageal, image acquisition, interpretation and report only (congenital cardiac anomalies)

93320 Add-on code to be used in conjunction with 93312, 93314, 93315, 93317 does not require separate review

93321 Add-on code to be used in conjunction with 93312, 93314, 93315, 93317 does not require separate review

93325 Add-on code to be used in conjunction with 93312, 93314, 93315, 93317 does not require separate review

General Information

Standard Anatomic Coverage

- Heart, proximal great vessels, pericardium

Imaging Considerations

- In general, it is assumed that transesophageal echocardiography (TEE) is appropriately used as an adjunct or subsequent test to transthoracic echocardiography (TTE) when suboptimal TTE images preclude obtaining a diagnostic study.
- There are some clinical situations for which TEE is a more appropriate initial imaging test than TTE. These situations are outlined below under Clinical Indications for TEE.
- Since TEE requires conscious sedation, it should only be performed at locations where cardiac monitoring and appropriate equipment for cardiopulmonary resuscitation are readily available.
- Patients with oropharyngeal or esophageal pathology which contraindicates intubation of the esophagus are not suitable candidates for TEE.
- Intraoperative TEE (93318) is beyond the scope of AIMs diagnostic imaging management program and will not be addressed in this document.

Clinical Indications

In patients who have had, or are likely to have, suboptimal transthoracic imaging

- When image quality is suboptimal such that the clinical question(s) prompting the TEE has/have not been adequately answered; **OR**
- When it is likely that transthoracic imaging will be suboptimal in the following situations:
  - Previous transthoracic echocardiograms were of suboptimal quality
  - In patients with severe abnormalities of thoracic contour (pectus deformities, severe kyphoscoliosis)
  - In patients who have recently had thoracic surgery where post-operative tenderness or the location of dressings or incisions would preclude imaging from the usual transthoracic locations
  - Following severe chest trauma

- Following extensive burns to the thorax
- In patients with a cardiac diagnosis made by TEE who require reevaluation, the results of which would lead to a change in therapy (e.g., resolution of an intracardiac thrombus following anticoagulation)

In patients whose clinical situation suggests that TEE may be preferable to transthoracic echocardiography

- In evaluation of suspected acute aortic pathology; **OR**
- In evaluation of valvular structure and function to assess suitability for and assist in planning of surgical or catheter based valvular intervention; **OR**
- To diagnose/manage endocarditis with a moderate or high pretest probability (e.g., bacteremia, especially staph bacteremia or fungemia); **OR**
- To diagnose/manage endocarditis involving prosthetic heart valves; **OR**
- In evaluation of persistent fever in a patient with an intracardiac device to exclude endocarditis; **OR**
- In evaluation of a patient with atrial fibrillation/flutter to facilitate clinical decision-making with regards to anticoagulation and/or cardioversion and/or ablation
  - TEE is not required when the decision has been made to anticoagulate the patient and not perform cardioversion; **OR**
- In evaluation of a patient who has undergone surgical correction of complex congenital heart disease for the exclusion of intracardiac thrombus; **OR**
- In evaluation for cardiovascular source of embolic event when no non-cardiac source has been identified

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Stress Echocardiography

CPT Codes

The following codes may be applicable to cardiac imaging and may not be all-inclusive. Specific CPT codes for services should be used when available. Nonspecific or not otherwise classified codes may be subject to additional documentation requirements and review.

93350 Echocardiography, transthoracic during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report

93351 Echocardiography, transthoracic during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring with physician supervision

93320 Add-on code used in conjunction with 93350, 93351 does not require separate review

93321 Add-on code used in conjunction with 93350, 93351 does not require separate review

93325 Add-on code used in conjunction with 93350, 93351 does not require separate review

93352 Add-on code used in conjunction with 93350, 93351 does not require separate review

General Information

Uses of Stress Echocardiography

- The primary use of stress echocardiography (stress echo) is in the diagnosis or exclusion of obstructive coronary artery disease.
- Stress echo is also used for management of established coronary artery disease.
- Stress echo may be used for assessment of myocardial viability in patients who have had myocardial infarction.
- Stress echo is occasionally used in the evaluation of valvular heart disease, and for the detection and management of occult pulmonary hypertension.

Imaging Considerations

- A recent EKG is strongly recommended, preferably within 7 days of request for stress echocardiogram. The findings on the resting EKG may help to determine the need for imaging and may also show evidence of ischemia at rest or interval myocardial infarction.
- Unlike MPI, stress echocardiography does not expose the patient to ionizing radiation.
- Age, gender, and the character of the chest pain provide useful predictors of coronary artery disease, as stratified in **Table 1** below.

Table 1. Pre-test Probability of Coronary Artery Disease by Age, Gender, and Symptoms

Very Low < 5%; Low < 10%; Intermediate 10%-90%; High > 90%

Age, yrs	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Non-Anginal Chest Pain	Asymptomatic
30-39	Men	Intermediate	Intermediate	Low	Very Low
	Women	Intermediate	Very Low	Very Low	Very Low
40-49	Men	High	Intermediate	Intermediate	Low
	Women	Intermediate	Low	Very Low	Very Low
50-59	Men	High	Intermediate	Intermediate	Low

Age, yrs	Gender	Typical/Definite Angina Pectoris	Atypical/Probable Angina Pectoris	Non-Anginal Chest Pain	Asymptomatic
	Women	Intermediate	Intermediate	Low	Very Low
60-69	Men	High	Intermediate	Intermediate	Low
	Women	High	Intermediate	Intermediate	Low

Gibbons RJ, Balady GJ, Beasley JW, et al. ACC/AHA Guidelines for Exercise Testing: Executive Summary. Circulation. 1997;96:345-354.

Myocardial perfusion imaging and stress echo may provide useful information on coronary artery disease. Comparison data on sensitivity and specificity are provided in **Table 2** below. Due to regional variation in technical expertise and interpretive proficiency, the clinician should use the diagnostic imaging modality that has been proven most accurate in clinical practice.

Table 2. Comparison of Non-invasive Diagnostic Imaging

Non-invasive imaging (# studies)	Nuclear Imaging sensitivity (%)	Stress Echo sensitivity (%)	Nuclear Imaging specificity (%)	Stress Echo specificity (%)
Exercise (7)	83%	78%	83%	91%
Dobutamine (8)	86%	80%	73%	86%
Adenosine (3)	89%	63%	73%	86%
Dipyridamole (4)	83%	68%	88%	89%

Zaret BL, Bellar GA. Clinical Nuclear Cardiology. 3rd Edition. Philadelphia: Elsevier Mosby Publishers; 2005, page 539.

Several clinical indications listed for myocardial perfusion imaging include standard methods of risk assessment, such as the SCORE (Systematic Coronary Risk Evaluation) or the Framingham risk score calculation. These risk calculation systems include consideration of the following factors.

Factors included in standard methods of risk assessment					
Age	Sex	Abnormal lipid profile	Hypertension	Diabetes mellitus (always = high risk)	Cigarette smoking

Conroy RM, Pyorala K, Fitzgerald AP, et al. Estimation of ten-year risk of fatal cardiovascular disease in Europe: the SCORE project. Eur Heart J. 2003;24(11):987-1003.

Other coronary risk factors such as family history of premature coronary artery disease, coronary artery calcification, C-reactive protein levels, obesity, etc., are not included in the standard methods of risk assessment but are thought to contribute to coronary artery disease risk.

- Selection of the optimal diagnostic work-up for evaluation or exclusion of coronary artery disease should be made within the context of available studies (which include treadmill stress test, stress myocardial perfusion imaging, stress echocardiography, cardiac PET imaging and invasive cardiac/coronary angiography), so that the resulting information facilitates patient management decisions and does not merely add a new layer of testing.
- Occasionally, it may be appropriate to do a second non-invasive test for diagnosis or exclusion of coronary artery disease when the initially selected test is technically suboptimal and the diagnosis of coronary artery disease cannot be established or excluded.
- Stress echocardiography may be performed using either physical or pharmacologic stress. If physical stress is used, the choice rests between treadmill exercise test and bicycle exercise test. While it is possible to acquire images during exercise in patients undergoing bicycle exercise testing, image quality during treadmill exercise is suboptimal. In this situation, the “stress” images are actually acquired immediately following peak exercise. Thus, the laboratory must be set up in a manner that allows imaging to be completed within 45 to 60 seconds after peak exercise.

- Some patients may not be suitable candidates for stress echocardiography. Image quality is frequently suboptimal in morbidly obese patients and in those with advanced lung disease. If image quality at rest is inadequate, the test should be canceled and consideration given to an alternative imaging modality.
- For patients who are unable to walk on a treadmill for non-cardiac reasons (orthopedic limitations, claudication, neurological conditions, advanced lung disease, etc.), exercise stress testing is not an option. These patients will require pharmacological testing with echo or nuclear imaging.
- It is anticipated that the evaluation of patients with acute chest pain will occur in the emergency room or in an inpatient setting and stress echo performed in these locations is not included in the AIM preauthorization program.

Clinical Indications

Suspected coronary artery disease in asymptomatic patients

- Patients with high-risk of coronary artery disease (SCORE) who have not had evaluation of coronary artery disease (MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization) within the preceding 3 years; **OR**
- Patients with moderate or high risk of coronary artery disease (SCORE) who have a high risk occupation that would endanger others in the event of a myocardial infarction (e.g., airline pilot, law-enforcement officer, firefighter, mass transit operator, bus driver) who have not had evaluation of coronary artery disease (MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization) within the preceding 3 years; **OR**
- Patients with diseases/conditions with which coronary artery disease commonly coexists and who have not had evaluation of coronary artery disease (MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization) within the preceding 3 years:
  - Diabetes mellitus; **OR**
  - Abdominal aortic aneurysm; **OR**
  - Established and symptomatic peripheral vascular disease; **OR**
  - Prior history of cerebrovascular accident (CVA), transient ischemic attack (TIA) or carotid endarterectomy (CEA) or high grade carotid stenosis (> 70%); **OR**
  - Chronic renal insufficiency; **OR**
- Patients who have undergone cardiac transplantation and have had no evaluation for coronary artery disease within the preceding one (1) year; **OR**
- Patients in whom a decision has been made to treat with Interleukin 2; **OR**
- Patients awaiting solid organ transplantation who have not undergone evaluation for coronary artery disease within the preceding one (1) year

Suspected coronary artery disease in symptomatic patients who have not had evaluation of coronary artery disease (MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization) within the preceding 60 days

- Chest pain
  - With intermediate or high pretest probability of coronary artery disease (Table 1); **OR**
  - With low or very low pretest probability of coronary artery disease (Table 1) and high risk of coronary artery disease (SCORE)
- Atypical symptoms: shortness of breath (dyspnea), neck, jaw, arm, epigastric or back pain, sweating (diaphoresis) or exercise-induced syncope
  - With moderate or high risk of coronary artery disease (SCORE)
- Other symptoms: palpitation, nausea, vomiting, anxiety, weakness, fatigue, or any of the following symptoms when induced by exercise: dizziness, lightheadedness, or near syncope

  - With high risk of coronary artery disease (SCORE)
- Patients with any cardiac symptom who have diseases/conditions with which coronary artery disease commonly coexists such as:
  - Diabetes mellitus; **OR**
  - Abdominal aortic aneurysm; **OR**
  - Established and symptomatic peripheral vascular disease; **OR**
  - Prior history of cerebrovascular accident (CVA), transient ischemic attack (TIA) or carotid endarterectomy (CEA) or high grade carotid stenosis (> 70%); **OR**
  - Chronic renal insufficiency or renal failure; **OR**
- Patients who have undergone cardiac transplantation; **OR**
- Patients in whom a decision has been made to treat with Interleukin 2; **OR**
- Patients awaiting solid organ transplantation

Established coronary artery disease in asymptomatic patients

- Patients awaiting solid organ transplantation who have not undergone evaluation for coronary artery disease within the preceding one (1) year; **OR**
- Patients who have undergone cardiac transplantation and have had no evaluation for coronary artery disease within the preceding one (1) year

Established flow-limiting coronary artery disease* in patients who have new or worsening symptoms

***diagnosed by MPI, cardiac PET, stress echo, or coronary angiography (CCTA or invasive) demonstrating coronary stenosis greater than 70% or FFR less than or equal to 0.8**

Note: If symptoms are typical of myocardial ischemia, cardiac catheterization may be more appropriate than stress echo.

Established flow-limiting coronary artery disease* in patients who have not undergone revascularization and have no symptoms or stable symptoms

***diagnosed by MPI, cardiac PET, stress echo, or coronary angiography (CCTA or invasive) demonstrating coronary stenosis greater than 70% or FFR less than or equal to 0.8**

- No evaluation of coronary artery disease (MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization) within the preceding 3 years
- No evaluation of coronary artery disease (MPI, cardiac PET, stress echo, coronary CTA or cardiac catheterization) within the preceding one (1) year in a patient who has undergone cardiac transplantation and has been found to have coronary artery disease since transplantation

Established coronary artery disease in patients who have undergone revascularization

- For evaluation of new or worsening cardiac symptoms
  - If symptoms are typical of myocardial ischemia cardiac catheterization may be more appropriate than stress echo; **OR**
- For evaluation of stable patients who have undergone coronary artery bypass grafting more than 5 years previously and who have not had an evaluation for coronary artery disease (MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization) within the past 2 years
  - Stable patients whose revascularization has been incomplete may undergo stress echo 3 years following the procedure and every 3 years thereafter; **OR**

- For evaluation of stable patients who have undergone percutaneous coronary intervention (PCI) more than 3 years previously and who have not had an evaluation for coronary artery disease (MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization) within the past 3 years when **ANY** of the following applies
    - The patient has undergone PCI of the left main (LM) coronary artery or the proximal left anterior descending (LAD) coronary artery
    - The patient has undergone PCI of more than one coronary artery
    - The patient has chronic total occlusion of a coronary artery and the vessel on which PCI was performed is supplying collateral flow to the occluded vessel
    - The patient is known to have only one patent coronary artery.
    - Left ventricular ejection fraction (LVEF) is < 35%

Established coronary artery disease in patients who have had myocardial infarction (ST elevation or non-ST elevation) or unstable angina within the preceding 90 days provided that

- The patient did not undergo coronary angiography at the time of the acute event; **AND**
- The patient is currently clinically stable

Established Kawasaki disease with coronary artery involvement

- Every 2-year evaluation for confirmed small to medium coronary artery aneurysm
- Annual evaluation for confirmed large (giant) coronary artery aneurysm, multiple or complex aneurysms or coronary artery obstruction confirmed by angiography

Patients with new onset arrhythmias (patient can be symptomatic or asymptomatic)

This guideline applies to patients with suspected or established coronary artery disease.

- Patients with sustained (lasting more than 30 seconds) or non-sustained (more than 3 beats but terminating within 30 seconds) ventricular tachycardia; **OR**
- Patients with atrial fibrillation or flutter and high or moderate risk of coronary artery disease (SCORE); **OR**
- Patients with atrial fibrillation or flutter and established coronary artery disease; **OR**
- Patients who have frequent premature ventricular contractions (PVC) defined as more than 30 PVCs per hour on ambulatory EKG (Holter) monitoring
    - It is not appropriate to perform stress echocardiography for evaluation of infrequent premature atrial or ventricular depolarizations

Patients with new onset congestive heart failure or recently recognized left ventricular systolic dysfunction (patient can be symptomatic or asymptomatic)

This guideline applies to patients with suspected or established coronary artery disease.

- For patients in this category whose coronary artery disease risk (SCORE) is high, cardiac catheterization may be more appropriate than non-invasive evaluation
- Provided that new or worsening coronary artery disease has not been excluded as the cause of left ventricular dysfunction / congestive heart failure by any of the following tests: MPI, stress echo, cardiac PET, coronary CTA or cardiac catheterization

Patients with abnormal exercise treadmill test (performed without imaging)

This guideline applies to patients with suspected or established coronary artery disease.

- Abnormal findings on an exercise treadmill test include (chest pain, ST segment change, abnormal blood pressure response or complex ventricular arrhythmias)

Patients who have undergone recent (within the past 60 days) myocardial perfusion imaging (MPI)

- When the MPI is technically suboptimal, technically limited, inconclusive, indeterminate, or equivocal, such that myocardial ischemia cannot be adequately excluded
    - It is not appropriate to perform stress echo on patients who have had a recent normal or abnormal MPI
    - An MPI is deemed to be abnormal when there are abnormalities on the nuclear imaging portion of the test. Electrocardiographic abnormalities without evidence of ischemia on the nuclear imaging portion of the test are considered to be normal studies

Patients with abnormal findings on cardiac CT / coronary CTA

Symptomatic patients:

- With coronary artery calcium score > 400 Agatston units; **OR**
- Intermediate severity coronary stenosis on coronary CTA

Note: *If symptoms are typical of myocardial ischemia, cardiac catheterization may be more appropriate than stress echo.*

Asymptomatic patients who have not had MPI, stress echo, cardiac PET or cardiac catheterization within the preceding 3 years:

- With coronary artery calcium score > 400 Agatston units; **OR**
- Intermediate severity coronary stenosis coronary CTA

Patients with abnormal findings on cardiac catheterization

- To determine flow limiting significance of intermediate coronary stenosis

Myocardial viability evaluation

Stress echo may be used to evaluate myocardial viability in patients who

- Have established coronary artery disease; **AND**
- Have left ventricular systolic dysfunction (left ventricular ejection fraction [LVEF] < 55%); **AND**
- Are candidates for revascularization

Note: *Pharmacologic stress echocardiography with a drug such as dobutamine that increases myocardial contractility is the preferred protocol.*

Preoperative cardiac evaluation of patients undergoing non-cardiac surgery

This guideline applies to patients undergoing non-emergency surgery.

It is assumed that those who require emergency surgery will undergo inpatient preoperative evaluation

- Patients with active cardiac conditions such as unstable coronary syndromes (unstable angina), decompensated heart failure (NYHA function of class IV, worsening or new onset heart failure), significant arrhythmias (third degree AV block Mobitz II AV block, uncontrolled supraventricular arrhythmia, symptomatic ventricular arrhythmias, ventricular tachycardia), symptomatic bradycardia or severe stenotic valvular lesions. It is recommended that these conditions be evaluated and managed per ACC/AHA guidelines prior to considering elective surgery. That evaluation may include stress echo.

Low-risk surgery (endoscopic procedures, superficial procedures, cataract surgery, breast surgery, ambulatory surgery)

- Provided that there are no active cardiac conditions (as outlined above), stress echo prior to low-risk surgery is considered not medically necessary

Intermediate-risk surgery (including but not limited to intraperitoneal and intrathoracic surgery, carotid endarterectomy, head and neck surgery, orthopedic surgery, prostate surgery, gastric bypass surgery) or **High-risk surgery** (including but not limited to aortic and other major vascular surgery, peripheral vascular surgery) when

- The patient has not had a normal coronary angiogram, stress echo, MPI, CCTA, cardiac PET perfusion study or revascularization procedure within the previous one (1) year; **AND**
- At least **ONE** of the following applies:
    - Patient has established coronary artery disease (prior MI, prior PTCA, stent, or CABG) or presumed coronary artery disease (Q waves on EKG, abnormal MPI, stress echo, or cardiac PET); **OR**
    - Patient has compensated heart failure or prior history of congestive heart failure; **OR**
    - Patient has diabetes mellitus; **OR**
    - Patient has chronic renal insufficiency or renal failure; **OR**
    - Patient has a history of cerebrovascular disease (TIA, CVA or documented carotid stenosis requiring carotid endarterectomy); **OR**
    - Patient is unable to walk on a treadmill for reasons other than obesity

Valvular heart disease

- Stress echocardiography may be used in evaluation of asymptomatic patients with any of the following valvular lesions:
    - Severe aortic stenosis
    - Severe aortic regurgitation with normal left ventricular size and function
    - Severe mitral stenosis
    - Severe mitral regurgitation with normal left ventricular size and function; **OR**
- Stress echocardiography may be used in evaluation of symptomatic patients with any of the following valvular lesions
    - Aortic stenosis of uncertain degree (due to the presence of co-existent severe left ventricular systolic dysfunction). Pharmacologic stress echocardiography with a drug such as dobutamine that increases myocardial contractility is the preferred protocol
    - Moderate mitral stenosis
    - Moderate mitral regurgitation

Pulmonary hypertension

- For evaluation of patients with suspected pulmonary hypertension whose resting echocardiogram fails to confirm that diagnosis, such that exercise induced pulmonary hypertension needs to be excluded; **OR**
- For evaluation of right and/or left ventricular function during exercise in patients with established exercise-induced pulmonary hypertension

Hypertrophic obstructive cardiomyopathy

- For the evaluation of dynamic changes during exercise in patients with an established diagnosis of hypertrophic obstructive cardiomyopathy who do not have a resting outflow tract gradient of 50 mm Hg or more

Abnormal EKG findings

Some patients have resting EKG findings which would render the interpretation of an exercise EKG test difficult or impossible. In these situations patients who, in the absence of the EKG abnormality, would not meet approval criteria for stress echo, may be approved for stress echo because exercise EKG testing without imaging would

provide little clinically useful data. Patients with the following resting EKG abnormalities are included in this category:

- Left bundle branch block; **OR**
- Ventricular paced rhythm; **OR**
- Left ventricular hypertrophy with repolarization abnormality; **OR**
- Digoxin effect; **OR**
- 1 mm ST depression or more on a recent EKG (within the past 30 days); **OR**
- Pre-excitation syndromes (e.g., Wolff-Parkinson-White syndrome)

Unable to walk on a treadmill for reasons other than obesity

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History

Status	Review Date	Effective Date	Action
Revised	05/01/2018	06/29/2019	Independent Multispecialty Physician Panel (IMPP) review. Revised criteria for resting TTE to address evaluation and surveillance of left ventricular function for cardio-oncology and frequency of surveillance following transcatheter mitral valve repair. Added clarifications to address exercise-induced syncope, dizziness, lightheadedness, or near syncope in symptomatic patients with suspected coronary artery disease (CAD) for stress echo. Clarified established CAD as flow limiting when diagnosed by CCTA for stress echo. Added references.
Revised	07/11/2018	03/09/2019	IMPP review. Added the General Clinical Guideline.
Revised	05/01/2018	01/27/2019	IMPP review. Revised criteria for stress echo to allow annual surveillance of CAD in patients with established CAD post-cardiac transplant and revised definition of established CAD when diagnosed by CCTA. Added new criteria for resting TTE to address evaluation of ventricular function in patients who have undergone cardiac transplantation. Added references.
Created	-	01/01/2010	Date of origin