Clinical UM Guideline

Subject: Transesophageal and Transthoracic Echocardiography in the Outpatient Setting
Guideline #: CG-RAD-21
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Description

This document addresses the use of transesophageal (TEE) and transthoracic (TTE) echocardiography for the evaluation of individuals with suspected or established cardiovascular disorders in the outpatient setting. For the purposes of this document, the definition of echocardiography incorporates Doppler analysis, M-mode echocardiography, two-dimensional TTE, and, when indicated, TEE.

Note: Please see the following related documents for additional information:
• RAD.00002 Positron Emission Tomography and PET/CT Fusion
• RAD.00023 SPECT (Single Photon Emission Computed Tomography) Scans and Scintimammography
• CG-RAD-16 Myocardial Perfusion Imaging in the Outpatient Setting
• CG-RAD-22 Stress Echocardiography in the Outpatient Setting
• CG-RAD-23 Cardiac Blood Pool and Infarct Imaging in the Outpatient Setting

Clinical Indications

A. Transthoracic Echocardiography (TTE)

Medically Necessary:

I. Valvular Heart Disease

Transthoracic echocardiography is considered medically necessary for the evaluation of suspected or established valvular heart disease when any of the following conditions are present:

1. Heart murmurs, initial evaluation (Note: After valvular disease is established, follow criteria in Section 2. Valvular heart disease)
   • in the presence of cardiorespiratory symptoms; or
   • in asymptomatic individuals in whom the clinical features indicate at least a moderate probability of structural heart disease.

2. Valvular heart disease, suspected or established stenosis or regurgitation
   • initial diagnosis: assessment of hemodynamic severity, assessment of left ventricular (LV) and right ventricular (RV) size, function, and/or hemodynamics; or
   • re-evaluation of established valvular disease with changing signs or symptoms suggestive of worsening valvular disease or cardiac decompensation; or
   • re-evaluation in asymptomatic individuals with any of the following:
     o severe valvular stenosis (any valve), on an annual basis; or
     o severe valvular regurgitation (any valve), on an annual basis; or
     o moderate mitral regurgitation with structurally abnormal valve, on an annual basis.
• assessment of changes in hemodynamic severity and ventricular compensation in individuals with established valvular disease during pregnancy.

3. Mitral valve prolapse (MVP)
   • initial diagnosis: assessment of hemodynamic severity, leaflet morphology, and/or ventricular compensation in individuals with physical signs of MVP; or
   • re-evaluation of established MVP with changing signs or symptoms suggestive of worsening valvular disease or cardiac decompensation.

4. Prosthetic cardiac valves and in individuals who have undergone valve repair
   • post intervention baseline studies for valve function (early) and ventricular remodeling (late); or
   • re-evaluation of individuals with changing clinical signs and symptoms suggestive of worsening valvular disease or cardiac decompensation; or
   • re-evaluation after baseline studies of individuals with valve replacements or repair with mild to moderate ventricular dysfunction without changing clinical signs or symptoms; or
   • routine re-evaluation of asymptomatic individuals after bioprosthetic valve replacement, every five years; or
   • routine re-evaluation of asymptomatic individuals 18 years of age and younger (during growth and maturation) to evaluate effect of normal growth on prosthetic valve function, on an annual basis.

5. Infective endocarditis (native or prosthetic valves)
   • detection and characterization of valvular lesions or associated abnormalities (e.g. abscesses, shunts), their hemodynamic severity, and/or ventricular compensation in individuals with documented infective endocarditis; or
   • re-evaluation studies in complex endocarditis (e.g. virulent organism, severe hemodynamic lesion, aortic valve involvement, persistent fever or bacteremia, clinical change, or symptomatic deterioration); or
   • evaluation of individuals with high clinical suspicion of culture-negative endocarditis; or
   • evaluation of bacteremia (e.g. staphylococcus bacteremia, fungemia) without a known source.

II. Congenital Heart Disease

Transthoracic echocardiography is considered medically necessary for the evaluation of congenital heart disease when any of the following conditions are present:

1. Clinically suspected congenital heart disease, as evidenced by
   • signs and symptoms such as a murmur, cyanosis; or
   • unexplained arterial desaturation; or
   • exercise-induced precordial chest pain; or
   • exercise-induced syncope; or
   • an abnormal electrocardiogram (ECG) or radiograph suggesting congenital heart disease (e.g. dextrocardia, abnormal pulmonary or visceral situs); or
   • initial evaluation of an individual with a suspected chromosomal or genetically transmitted myocardial disease and dominant inherited abnormalities or syndromes affecting multiple family members (e.g. Marfan syndrome, Ehlers-Danlos syndrome, Turner syndrome); or
   • initial evaluation of an individual with suspected major extra cardiac abnormality associated with a high incidence of coexisting cardiac abnormality (e.g. Marfan syndrome, Ehlers-Danlos syndrome, Turner syndrome).

2. Known congenital heart disease
   • when there is a change in clinical findings; or
Clinical UM Guideline

Transesophageal and Transthoracic Echocardiography in the Outpatient Setting

- for which there is uncertainty as to the original diagnosis or when the precise nature of the structural abnormalities or hemodynamics is unclear; or
- on a periodic basis in individuals with known congenital heart lesions and for whom ventricular function and atrioventricular valve regurgitation must be followed, including but not limited to:
  - a functional single ventricle after Fontan procedure; or
  - transposition of the great vessels after Mustard procedure; or
  - L-transposition and ventricular inversion; or
  - palliative shunts; or
  - an annual basis for individuals with documented cardiac involvement from a systemic connective tissue disorder (e.g., Marfan syndrome or Ehlers-Danlos syndrome).
- individuals with known congenital heart disease at risk for secondary pulmonary artery disease, including but not limited to:
  - hemodynamically important, moderate, or large ventricular septal defects; or
  - atrial septal defects; or
  - a single ventricle.

3. In individuals with repaired (or palliated) congenital heart disease with any of the following:
- undergoing staged surgical correction, 18 years of age and younger; or
- re-evaluation in clinically stable individuals with established disease to facilitate clinical decision-making:
  - ages 6 to 18 years, with established complex disease, on a biannual basis (every two years); or
  - ages less than 6 years old, on a semiannual basis (every six months).
- change in clinical condition or clinical suspicion of residual defects; or
- suspected or confirmed obstruction of conduits and baffles; or
- LV or RV function that must be followed; or
- when at risk of pulmonary hypertension.

III. Evaluation of Ventricular Function

Transthoracic echocardiography is considered medically necessary for the evaluation of individuals with any of the following clinical presentations:

1. Suspected cardiomyopathy (e.g. hypertrophic, dilated, infiltrative, ischemic) or clinical diagnosis of heart failure based on any of the following, including but not limited to:
   - dyspnea with clinical signs of heart disease; or
   - abnormal physical examination, chest x-ray, elevated B-type natriuretic peptide (BNP); or
   - unexplained hypotension; or
   - abnormal resting ECG showing bundle branch block, hypertrophy, or possible prior infarction; or
   - family history of heritable cardiomyopathy; or
   - suspected hypertensive heart disease.

2. Diagnosed or suspected myocarditis.

3. Reassessment of LV size and function in individuals with known LV dysfunction (LV ejection fraction [EF] less than 55%):
   - after a change in clinical status suggestive of worsening or decompensation of cardiac status; or
   - when needed to guide ongoing medical therapy in an asymptomatic individual, on an annual basis; or
   - in individuals 18 years of age and younger with hypertension, on an annual basis.

4. Exposure to cardiotoxic agents (e.g. trastuzumab, mitoxantrone or anthracyclines):
   - to determine baseline function prior to exposure; or
• to determine the advisability of additional or increased dosages during exposure.
5. Prior to or periodically after implantation of pacemaker as part of cardiac resynchronization therapy (CRT).
6. Diseases likely to affect RV function, including but not limited to, chronic lung disease and sleep apnea syndrome.
7. Prior to or after heart transplantation.

IV. Evaluation of Individuals with Cardiac Arrhythmias

Transthoracic echocardiography is considered **medically necessary** for the evaluation of cardiac arrhythmias and palpitations when **any** of the following conditions are present:

1. Arrhythmias with clinical suspicion of structural heart disease or arrhythmia requiring treatment
   - sustained (lasting more than 30 seconds) or nonsustained (more than three beats but lasting less than 30 seconds) ventricular arrhythmia; **or**
   - sustained or nonsustained supraventricular tachycardia, including but not limited to, atrial fibrillation, atrial flutter, or AV node reentrant tachycardia.

V. Evaluation of Individuals with Known or Suspected Coronary Artery Disease (CAD)

Transthoracic echocardiography is considered **medically necessary** for the evaluation of acute myocardial ischemic syndromes when **any** of the following conditions are present:

1. Diagnosis of acute myocardial syndromes
   - suspected acute ischemia or infarction not evident by standard means; **or**
   - for initial assessment of LV function (this study is usually done prior to discharge or within three weeks of discharge); **or**
   - evaluation of individuals with inferior myocardial infarction and clinical evidence suggesting possible RV infarction; **or**
   - assessment of mechanical complications (e.g. valvular dysfunction, septal rupture, mural thrombus).

2. Risk assessment, prognosis, and assessment of therapy in acute myocardial syndromes
   - assessment of infarct size and/or extent of jeopardized myocardium; **or**
   - for re-evaluation of ventricular function during recovery phase (up to three months following myocardial infarction) to assess remodeling or when prompted by a change in symptoms; **or**
   - assessment of ventricular function after revascularization, on one occasion.

3. Aberrant or anomalous origin of coronary artery or coronary artery fistula
   - initial evaluation, suspected disease; **or**
   - periodic re-evaluation in individuals 18 years of age and younger (during growth and maturation) with an established diagnosis of aberrant or anomalous coronary origins or coronary artery fistula if the findings on echocardiography will impact clinical decision making.

4. Kawasaki disease
   - initial evaluation, suspected disease; **or**
   - evaluation of an individual with established Kawasaki disease at 6-8 weeks after diagnosis to assess for coronary artery involvement; **or**
   - re-evaluation of an individual with small or medium-sized coronary artery aneurysms from Kawasaki disease on an annual basis; **or**
VI. Pulmonary Embolus and Pulmonary Hypertension

Transthoracic echocardiography is considered medically necessary for the evaluation of pulmonary and pulmonary vascular disease when any of the following conditions are present:

1. Pulmonary emboli and suspected clots in the right atrium or ventricle or main pulmonary artery branches.
2. Initial evaluation of suspected pulmonary hypertension.
3. Periodic re-evaluation of established disease, follow-up of pulmonary artery pressures to evaluate response to treatment.
4. Dyspnea, for distinguishing cardiac versus noncardiac etiology when other clinical and laboratory findings are ambiguous.
5. Diseases likely to affect RV function, including but not limited to, chronic lung disease, sleep apnea, or other causes of cor pulmonale.
6. For measurement of exercise pulmonary artery pressure.
7. Advanced lung disease, prior to lung transplantation or other surgical procedures.

VII. Aortic Disease

Transthoracic echocardiography is considered medically necessary for the evaluation of suspected thoracic aortic disease for any of the following conditions, including but not limited to:

1. Aortic aneurysm.
2. Aortic dissection
   - initial diagnosis, location and extent; or
   - follow-up, suspected complication or progression, or
   - follow-up, postsurgical repair.
3. Aortic intramural hematoma.
4. Aortic root dilation in an individual with known or suspected (e.g. first-degree relative) Marfan syndrome or other connective tissue disease (e.g. Ehlers-Danlos syndrome).
5. Aortic rupture.
6. Degenerative or traumatic aortic disease with clinical atheroembolism.

VIII. Pericardial Diseases

Transthoracic echocardiography is considered medically necessary for the evaluation of any of the following:

1. Pericardial effusion
   - initial evaluation of suspected disease; or
   - re-evaluation of symptomatic and asymptomatic individuals with clinically significant pericardial effusion to guide medical and surgical decision making.
2. Cardiac tamponade.
3. Pericardial tumors and cysts.
5. Post open-heart surgery.
IX. Cardiac Masses or Cardiac Source of Embolus

Transthoracic echocardiography is considered **medically necessary** for the evaluation of **any** of the following:

1. Cardiac mass, suspected tumor or thrombus
   - to diagnose or exclude underlying cardiac disease known to predispose to mass formation (i.e. to assist in a therapeutic decision regarding surgery or anticoagulation); **or**
   - follow-up or surveillance after surgical removal of masses known to have a high likelihood of recurrence (i.e. myxoma); **or**
   - as part of disease staging for known primary malignancies with cardiac involvement.
2. Neurological events or other vascular occlusive events when cardioembolic source is suspected and there is no evidence of other obvious cause.

X. Syncope

Transthoracic echocardiography is considered **medically necessary** for the evaluation of **either** of the following:

1. Syncope in an individual with clinically suspected heart disease as indicated by abnormal EKG or abnormal cardiovascular examination; **or**
2. Periexertional syncope.

**Not Medically Necessary:**

Transthoracic echocardiography is considered **not medically necessary** when the above criteria are not met and for all other indications, including but not limited to the following:

1. Screening in the general population, including asymptomatic athletes.
2. Evaluation of systemic hypertension without suspected hypertensive heart disease or re-evaluation of established hypertensive heart disease without a change in clinical status.
3. Native or prosthetic valves in the presence of transient fever but without evidence of bacteremia or new murmur.
4. To evaluate LV function when:
   - prior ventricular function evaluation (e.g. echocardiogram, LV gram, single-photon emission computed tomography [SPECT], cardiac MRI) was normal within the past year; **and**
   - there has been no change in clinical status.
5. Isolated atrial premature contraction (APC) or premature ventricular contraction (PVC) without other evidence of heart disease.
6. Initial evaluation of suspected pulmonary embolism in order to establish diagnosis.
7. Routine re-evaluation of individuals with Kawasaki disease if echocardiogram within the first 8 weeks following initial diagnosis shows no evidence of coronary artery abnormalities.

Transthoracic echocardiography repeated within a 12 month time period is considered **not medically necessary** when the above medically necessary criteria are not met, and for all other indications, including but not limited to:

1. Routine evaluation of the following conditions:
• Asymptomatic individuals with corrected atrial septal defect (ASD), ventricular septal defect (VSD), or patent ductus arteriosis (PDA) more than one year after successful correction; or
• prosthetic valve with no suspicion of valvular dysfunction and no change in clinical status; or
• hypertrophic cardiomyopathy with no change in clinical status.

2. Routine re-evaluation of the following conditions when there has been no change in the individual’s clinical status:
• mitral valve prolapse with no or mild mitral regurgitation (MR); or
• mild native aortic stenosis or mild-moderate native mitral stenosis, asymptomatic; or
• native valvular regurgitation with mild regurgitation and normal LV size, asymptomatic; or
• heart failure (systolic or diastolic).

B. Transesophageal Echocardiography (TEE)

Medically Necessary:

Transesophageal echocardiography is considered medically necessary as an adjunct or subsequent test to transthoracic echocardiography when suboptimal TTE images preclude obtaining a diagnostic study.

Transesophageal echocardiography is considered medically necessary in an individual who has, or is likely to have suboptimal TTE imaging for any of the following:

1. When TTE image quality is suboptimal such that the clinical question(s) prompting the TEE has/have not been adequately answered.
2. When it is likely that TTE will be suboptimal in the following situations:
   • previous TTE was of suboptimal quality; or
   • the individual has characteristics or severe abnormalities that preclude obtaining a diagnostic TTE, including but not limited to, severe abnormalities of thoracic contour, recent thoracic surgery, severe chest wall abnormalities, or following severe chest trauma or extensive burns to the thorax.

Transesophageal echocardiography is considered medically necessary as the initial test for any of the following indications, including but not limited to:

1. Evaluation of acute aortic pathology, suspected, including dissection/transsection.
2. To determine the mechanism of regurgitation and suitability of valve repair.
3. To diagnose/manage endocarditis with a moderate or high pre-test probability (e.g., bacteremia, especially staph bacteremia or fungemia).
4. Evaluation of persistent fever in individuals with intracardiac device.
5. Evaluation of atrial fibrillation or atrial flutter to facilitate clinical decision-making regarding anticoagulation, cardioversion, radiofrequency ablation or any combination of these interventions.
6. Evaluation of individuals who have undergone surgical correction of complex congenital heart disease when there is a suspicion of intracardiac thrombus.

Not Medically Necessary:

Transesophageal echocardiography is considered not medically necessary for evaluation of individuals with any of the following:
1. Cardiovascular source of embolic event, as initial test, when all of the following are present:
   - normal TTE; and
   - normal ECG; and
   - no history of atrial fibrillation or atrial flutter.
2. Atrial fibrillation or atrial flutter for left atrial thrombus when a decision has been made to anticoagulate and not to perform cardioversion.

**Coding**

The following codes for treatments and procedures applicable to this document are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement policy. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

**CPT**

*Transthoracic echocardiography (TTE)*

93303 Transthoracic echocardiography for congenital cardiac anomalies; complete
93304 Transthoracic echocardiography for congenital cardiac anomalies; follow-up or limited study
93306 Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, with spectral Doppler echocardiography, and with color flow Doppler echocardiography
93307 Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, without spectral or color Doppler echocardiography
93308 Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study

*Transesophageal echocardiography (TEE)*

93312 Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report
93313 Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); placement of transesophageal probe only
93314 Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); image acquisition, interpretation and report only
93315 Transesophageal echocardiography for congenital cardiac anomalies; including probe placement, image acquisition, interpretation and report
93316 Transesophageal echocardiography for congenital cardiac anomalies; placement of transesophageal probe only
93317 Transesophageal echocardiography for congenital cardiac anomalies; image acquisition, interpretation and report only
93320 Doppler echocardiography, pulsed wave and/or continuous wave with spectral display; complete [in addition to 93303, 93304, 93312, 93314, 93315, 93317]
**Clinical UM Guideline**

**Transesophageal and Transthoracic Echocardiography in the Outpatient Setting**

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<th>Description</th>
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<tr>
<td>93321</td>
<td>Doppler echocardiography, pulsed wave and/or continuous wave with spectral display; follow-up or limited study [in addition to 93303, 93304, 93308, 93312, 93314, 93315, 93317]</td>
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<td>93325</td>
<td>Doppler echocardiography color flow velocity mapping [in addition to 93303, 93304, 93308, 93312, 93314, 93315, 93317]</td>
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**HCPCS**

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<tr>
<td>C8921</td>
<td>Transthoracic echocardiography with contrast, or without contrast followed by with contrast, for congenital cardiac anomalies; complete</td>
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<tr>
<td>C8922</td>
<td>Transthoracic echocardiography with contrast, or without contrast followed by with contrast, for congenital cardiac anomalies; follow-up or limited study</td>
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<tr>
<td>C8923</td>
<td>Transthoracic echocardiography with contrast, or without contrast followed by with contrast, real-time with image documentation (2D) with or without M-mode recording; complete</td>
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<td>C8924</td>
<td>Transthoracic echocardiography with contrast, or without contrast followed by with contrast, real-time with image documentation (2D) with or without M-mode recording; follow-up or limited study</td>
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<td>Transesophageal echocardiography (TEE) with contrast, or without contrast followed by with contrast, real time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report</td>
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<tr>
<td>C8926</td>
<td>Transesophageal echocardiography (TEE) with contrast, or without contrast followed by with contrast, for congenital cardiac anomalies; including probe placement, image acquisition, interpretation and report</td>
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<tr>
<td>C8929</td>
<td>Transthoracic echocardiography with contrast, or without contrast followed by with contrast, real-time with image documentation (2D), includes M-mode recording, when performed, complete, with spectral Doppler echocardiography, and with color flow Doppler echocardiography</td>
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**ICD-9 Diagnosis**

All diagnoses

**Discussion/General Information**

According to the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Cherlin, 2003), the use of echocardiography in establishing cardiac diagnoses and making therapeutic decisions, at times without further diagnostic studies, is well established. Echocardiography is a painless test that uses sound waves to create images of the heart, specifically, showing the size, structure, and movement of the different parts of the heart, including the valves, the septum (the wall separating the chambers on the right and left sides of the heart), and the walls of the heart chambers. Echocardiography can be used to diagnose heart problems, guide or determine next steps for treatment, monitor changes and improvement, and determine the need for additional tests.

Some of these heart problems identified by echocardiography may pose no risk to the individual. Others may be signs of serious heart disease or other heart problems. An echocardiogram can provide information on the following:
• **Size of the heart.** An enlarged heart can be the result of high blood pressure, leaky heart valves, or heart failure. Weakened areas of heart muscle can be due to damage from a heart attack. Or weakening could mean that the area isn’t getting enough blood supply, which can be due to coronary artery disease.

• **Heart valve abnormality.** Echocardiography can identify whether any of the heart valves do not open normally or fail to form a complete seal when closed.

• **Abnormalities in the structure of the heart.** Echocardiography can detect a variety of heart abnormalities, such as a hole in the septum (the wall that separates the two chambers on the left side of the heart from the two chambers on the right side) and other congenital heart defects (structural problems present at birth).

• **Condition of the aorta.** Echocardiography is commonly used to assess and detect problems with the aorta such as aneurysm (abnormal bulge or “ballooning” in the wall of an artery).

• **Blood clots or tumors.** Echocardiography may be performed to check if a blood clot or tumor has been the cause of a stroke or related condition.

Congenital structural heart disease is the most common type of cardiovascular disease in the pediatric population. According to Cheitlin and colleagues (2008), acquired heart disease also contributes to the cardiovascular morbidity of this population. Acquired pediatric heart disease historically was identified with rheumatic fever and endocarditis, but now includes Kawasaki disease (Newburger, 2004) and other coronary arterial diseases, human immunodeficiency virus (HIV) and other viral-related cardiac disease, dilated cardiomyopathy with or without acute-onset congestive heart failure, hypertrophic cardiomyopathy, and an increasing population with clinical cardiovascular issues related to surgical palliation/correction of structural heart disease and cardiac transplantation. Two-dimensional Doppler echocardiography has become the definitive diagnostic method for the recognition and assessment of congenital and acquired heart disease in the pediatric population. Re-evaluation echocardiographic examinations are frequently used to monitor cardiovascular adaptation to surgical repair or palliation and identify reoccurrence of abnormalities. Longitudinal follow-up studies facilitate proactive surgical and/or medical interventions that improve outcomes by guiding management decisions, and providing early education and support for the families of pediatric and adolescent individuals (Cheitlin, 2008).

A transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) are different imaging studies that allow for initial evaluation and screening of suspected heart disease, or re-evaluation of known heart disease and related conditions. TTE is considered a standard test, while TEE is used if a TTE or other standard tests fail to produce clear results (AHA, 2009; NHLBI, 2009).

### Description of Transthoracic Echocardiography

Echocardiography, particularly transthoracic two-dimensional and Doppler echocardiography, is one of the most important and frequently performed diagnostic procedures for individuals with cardiovascular disease. TTE involves the use of ultra-high frequency sound waves (ultrasound) directed through the chest wall to produce an image of the motion of the heart chambers, valves, major vessels, and pericardium in a noninvasive and instantaneous manner. The widely accepted cardiovascular indications for the procedure include, but are not limited to the diagnosis of and guiding treatment for: coronary artery disease, valvular heart disease, heart failure, hypertensive heart disease, congenital abnormalities, complications of pulmonary disease, and others (Quiñones, 2003).

TTE is usually performed in the cardiology department at a hospital, but may also be performed in a cardiologist's office or an outpatient imaging center. Because the ultrasound scanners used to perform echocardiography may be
portable (handheld) or mobile, echocardiography can be performed in the hospital's emergency department or at the individual’s bedside when the individual cannot be transported to the cardiology department.

The standard TTE examination generally takes less than 30 minutes and does not require any special preparation. The individual lies bare-chested on an examination table. A special gel is spread over the chest to help a wand-like device, called a transducer, make contact and slide smoothly over the skin. The transducer is a small handheld device at the end of a flexible cable that functions essentially as a modified microphone. When placed against the chest, it directs ultrasound waves into the chest. Some of the waves get echoed (or reflected) back to the transducer. Since different tissues and blood reflect ultrasound waves differently, these sound waves can be translated into a meaningful image of the heart that can be displayed on a monitor or recorded on paper or tape. TTE is associated with little discomfort, and no risks have been identified with this procedure. The individual usually resumes normal activities immediately after TTE.

Occasionally, variations of the echocardiography test are used. For example, Doppler echocardiography employs a special microphone that allows technicians to measure and analyze the direction and speed of blood flow through blood vessels and heart valves. This makes it especially useful for detecting and evaluating regurgitation through the heart valves. By assessing the speed of blood flow at different locations around an obstruction, it can also help to precisely locate the obstruction.

**Description of Transesophageal Echocardiography**

A TEE is particularly useful for examining the heart and great vessels and identifying posterior structures, such as the pulmonary vein, left atrium, and mitral valve. Its clinical applications include, but are not limited to, detection and assessment of endocarditis and its complications, aortic dissection and other aortic pathologies, intracardiac thrombi and other masses, evaluation of valvular disorders including prosthetic valve function, and evaluation of a variety of chronic heart diseases in both children and adults. TEE is also used in individuals with suspected cardiac trauma, in critically ill medical or surgical individuals with unstable hemodynamics, and in individuals whose clinical status necessitates echocardiographic assessment but in whom TTE studies are technically inadequate or non-diagnostic (Quiñones, 2003). A TEE requires the insertion of a transducer (probe) attached to a fiberoptic endoscope that is guided down the anesthetized throat into the esophagus and stomach. The transducer transmits the ultrasound waves capable of producing clear images of the heart structures without interference of the lungs and chest. Because placement of the probe is invasive it may require conscious sedation. Associated risks include a serious reaction to the sedation or local anesthetic administered prior to and during the procedure, difficulty breathing, or nausea. The procedure involves some discomfort and minimal but definite risk of pharyngeal and esophageal trauma and even rarely esophageal perforation. Rare instances of infective endocarditis have been associated with the use of TEE (Chetlin, 2003).

**Definitions**

**Contrast echocardiography**: echocardiography used to demonstrated abnormalities in blood flow; the ultrasonic beam tracks microbubbles produced by intravenous injection of a liquid or a small amount of carbon dioxide gas as the contrast medium

**Doppler echocardiography**: a technique for recording the flow of red blood cells through the cardiovascular system by means of Doppler ultrasononography, either continuous wave or pulsed wave
Echocardiography: also called ultrasound cardiography; the use of ultrasound to map and take “moving pictures” of the heart with sound waves; the recording of the size, motion, and structure of various cardiac structures to aid in the diagnosis of cardiovascular disease

M-mode echocardiography: echocardiography that records the amplitude and rate of motion (M) in real time, yielding a mono-dimensional (“icepick”) view of the heart

Transesophageal echocardiography (TEE): an ultrasound of the heart that uses a special echocardiography transducer (ultrasound camera) inserted through the mouth, down the back of the throat, and into the esophagus to provide cardiographic images or Doppler information

Transthoracic echocardiography (TTE): a non-invasive test that uses beams of ultrasound waves directed through the chest wall to record the position and motion of the heart walls or internal structures of the heart

References

Peer Reviewed Publications:

Government Agency, Medical Society, and Other Authoritative Publications:
   - Shortness of Breath - Suspected Cardiac Origin (2006).
   - Suspected Congenital Heart Disease in the Adult (2007).
Clinical UM Guideline

Transesophageal and Transthoracic Echocardiography in the Outpatient Setting


17. Strickberger SA, Benson DW, Biaggioni I, et al. 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. J Am Coll Cardiol. 2006; 47(2):473-484.


**Web Sites for Additional Information**

Federal and State law, as well as contract language, including definitions and specific contract provisions/exclusions, and Medical Policy take precedence over Clinical UM Guidelines and must be considered first in determining eligibility for coverage. The member’s contract benefits in effect on the date that services are rendered must be used. Clinical UM Guidelines, which addresses medical efficacy, should be considered before utilizing medical opinion in adjudication. Medical technology is constantly evolving, and we reserve the right to review and update Clinical UM Guidelines periodically.

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### Status Date Action

<table>
<thead>
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<th>Status</th>
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<th>Action</th>
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<td>Revised</td>
<td>05/13/2010</td>
<td>Revised medically necessary criteria for TTE for annual monitoring of severe valvular stenosis and aortic regurgitation in asymptomatic individuals, to include (any valve), on an annual basis. Revised medically necessary criteria for monitoring valve replacement or repair in asymptomatic individuals, 18 years of age and younger (during growth and maturation) to evaluate effect of normal growth on prosthetic valve function, on an annual basis. Revised indications for evaluation of ventricular function, adding: “including but not limited to” (Suspected cardiomyopathy…), chest x-ray and elevated B-type natriuretic peptide (BNP) to specific criteria in item 1; criterion for diagnosed or suspected myocarditis; criterion for reassessment of LV size and function in individuals with known LV dysfunction (LV ejection fraction [EF] less than 55%), including limiting asymptomatic re-evaluation of clinically stable LV dysfunction to no more often than an annual TTE. Addition of specific medically necessary criteria for TTE for reassessment of LV size and function in individuals 18 years of age and younger (during growth and maturation) with hypertension, on an annual basis. Revised criteria for TTE for exposure to cardiotoxic agents, adding mitoxantrone to list of agents and statements for when testing is medically necessary; clarified criterion for TTE testing prior to or after heart transplantation. For TTE for the diagnosis of acute myocardial syndromes, revised medically necessary statement for initial assessment of LV function (done prior to discharge or within three weeks of discharge); for risk assessment, prognosis, and assessment of therapy in acute myocardial syndromes, revised statement for re-evaluation of ventricular function during recovery phase (up to three months following myocardial infarction) to assess remodeling or when prompted by a change in symptoms. For pulmonary embolus and pulmonary hypertension, expanded TTE criterion to diseases likely to affect RV function, including but not limited to, chronic lung disease, sleep apnea, or other causes of cor pulmonale. Updated Coding and References.</td>
</tr>
<tr>
<td>Revised</td>
<td>08/27/2009</td>
<td>MPTAC review. Revised medically necessary clinical indications: 1) added indications for TTE for syncope in Section X. 2) added TTE criteria for asymptomatic follow-up of clinically significant pericardial effusion in Section VIII; 3) removed TTE for assessment of pericardial thickness from Section VIII. Updated Discussion/General information and References.</td>
</tr>
<tr>
<td>New</td>
<td>05/21/2009</td>
<td>MPTAC review. Initial document development.</td>
</tr>
</tbody>
</table>

Federal and State law, as well as contract language, including definitions and specific contract provisions/exclusions, and Medical Policy take precedence over Clinical UM Guidelines and must be considered first in determining eligibility for coverage. The member’s contract benefits in effect on the date that services are rendered must be used. Clinical UM Guidelines, which addresses medical efficacy, should be considered before utilizing medical opinion in adjudication. Medical technology is constantly evolving, and we reserve the right to review and update Clinical UM Guidelines periodically.

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