National Imaging Associates, Inc.*	
Clinical guideline **TRANSESOPHAGEAL (TEE) ECHO**	**Original Date: October 2009**
CPT codes: 93312, 93313, 93314, 93315, 93316, 93317, 93318, +93320, +93321, +93325	**Last Revised Date: ~~March~~ June 202~~1~~1**
Guideline Number: NIA_CG_066	**Implementation Date: January 202~~3~~2**

GENERAL INFORMATION

It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted

INDICATIONS FOR TRANSESOPHAGEAL ECHOCARDIOGRAPHY (TEE)

General Criteria[1-5]

~~(Doherty, 2017; Flachskampf, 2014; Hahn, 2013; Lancelotti, 2013; Ogbara, 2011)~~

- TEE may be performed after a nondiagnostic transthoracic echocardiogram (TTE) due to inadequate visualization of relevant structures, or if there is a high likelihood of a nondiagnostic TTE

Aortic Pathology

- Suspected acute aortic pathology, such as aortic dissection[1, 6] ~~(Bhave, 2018; Doherty, 2017)~~
- Dilated aortic sinuses or ascending aorta on TTE
- Evaluation of aortic sinuses, sinotubular junction, or ascending aorta in patients with bicuspid aortic valve when morphology cannot be assessed by TTE, and other imaging including CT or ~~MRI~~MRI (Magnetic Resonance Imaging) have not been done

Valvular Disease[1, 7]

~~(Doherty, 2017; Nishimura, 2014)~~

- Discordance between clinical assessment and TTE assessment of the severity of mitral regurgitation (MR)
- Evaluation of mitral stenosis, when there is a discrepancy between clinical signs or symptoms, and TTE is inadequate

* National Imaging Associates, Inc. (NIA) is a subsidiary of Magellan Healthcare, Inc.

- Discordance between clinical assessment and TTE assessment of the severity of aortic regurgitation (AR)
- Evaluation of native or prosthetic valves with clinical signs or symptoms suggesting valve dysfunction, when TTE is inadequate
- Re-evaluation of known prosthetic valve dysfunction when it would change management or guide therapy, (and TTE is inadequate)

Infective Endocarditis[1, 8, 9]
~~(Doherty, 2017; Douglas, 2011; Saric, 2016)~~

- Suspected infective endocarditis (IE) of native valve, prosthetic valve, or endocardial lead with positive blood culture or new murmur
- Moderate to high pretest probability of IE (i.e., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device) when TTE is negative
- Re-evaluation of IE in a patient with a change in clinical status or cardiac examination (e.g., new murmur, embolism, persistent fever, heart failure (HF), abscess, or atrioventricular block)
- Re-evaluation of IE if the patient is at ~~high risk~~**elevated risk** for progression/complications or when the ~~findings would~~**findings** alter therapy, when TTE is inadequate

Cardiac Mass or Source of Emboli

- ~~•~~ Initial evaluation of patient to exclude cardiac origin of TIA or ischemic stroke[1] ~~(Doherty, 2017)~~
- ~~•~~
- Evaluation of cardiac mass, suspected tumor, or thrombus[1, 9] ~~(Doherty, 2017; Saric, 2016)~~
- Re-evaluation of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation), when the findings would change therapy

Atrial Fibrillation/Flutter[1]
~~(Doherty, 2017)~~

- Evaluation for clinical decision-making regarding anticoagulation, cardioversion, and/or radiofrequency ablation

TAVR (Transcatheter Aortic Valve Replacement/Repair)[1, 10]
~~(Doherty, 2017; Otto, 2017)~~

- Pre-procedural assessment of annular size and shape, number of cusps, and degree of calcification, when computed tomography (CT) or ~~CMR~~**CMR (Cardiovascular Magnetic Resonance)** cannot be performed
- Post-procedural assessment of degree of aortic regurgitation (including valvular and paravalvular) with suspicion of valve dysfunction, if TTE is inadequate

Patent Foramen Ovale or Atrial Septal Defect[1, 11]
~~(Doherty, 2017; Sachdeva, 2020)~~

- Evaluation for anatomy, potential cardiac source of emboli, and suitability for percutaneous device closure
- Evaluation post device closure with clinical concern for infection, malposition, embolization, or persistent shunt

Left Atrial Appendage Occlusion[12~~1~~]
~~(Doherty, 2017)~~

- Evaluation ~~for~~of anatomy, potential cardiac source of emboli, and suitability for percutaneous occlusion device placement
- Surveillance at 45 days **and 1 year** or ~~FDA~~**FDA (U.S. Food and~~ederal~~ Drug Administration)** guidance/guidelines for follow-up to assess device stability and device leak, and exclude migration, displacement, or erosion[13, 14]
    - **Reassessment at 6 months if 45-day TEE shows incomplete closure of left atrial appendage[13, 14]**

Percutaneous Mitral Valve Repair[1]
~~(Doherty, 2017)~~

- Determination of patient eligibility for percutaneous mitral valve procedures
- Pre-procedural evaluation for percutaneous mitral valve procedures may be performed in addition to CT imaging[15] ~~(Wunderlich, 2018)~~
- To exclude the presence of intracardiac mass, thrombus, or vegetation prior to (within 3 days of) the procedure

Hypertrophic Cardiomyopathy[16]
~~(Ommen, 2020)~~

- When TTE is inconclusive in planning for myectomy,[17] to exclude subaortic membrane or mitral regurgitation, or to assess need for septal ablation

Adult Congenital Heart Disease[11, 18]
~~(Sachdeva, 2020; Stout, 2018)~~

- Imaging with provocative maneuvers (Valsalva, cough) to ~~assess for~~assess the presence of right-to-left cardiac shunt
- Evaluation prior to planned repair of the following lesions when TTE, CMR, or CT are not adequate:
    - Isolated secundum atrial septal defect
    - Sinus venosus defect and/or partial anomalous pulmonary venous connection
    - Congenital mitral stenosis or mitral regurgitation
    - Subvalvular aortic stenosis
    - Transposition of the Great Arteries
- Evaluation postoperative or post catheter-based repair due to change in clinical status and/or new concerning signs or symptoms when TTE, CMR, or CT are not adequate

Ventricular Assist Devices[1, 19]

~~(Doherty, 2017; Stainback, 2015)~~

- Preoperative evaluation of suitability for ventricular assist device (VAD)
- Re-evaluation ~~for~~of VAD-related complication or suspected infection

BACKGROUND

Transesophageal echocardiography (TEE) enables cardiac ultrasound imaging from within the esophagus, which provides a window for enhanced quality images as well as additional views, beyond that acquired by standard transthoracic echocardiography (TTE).

Abbreviations

AR	aortic regurgitation
CMR	cardiac magnetic resonance
CT(A)	computed tomography (angiography)
HF	**heart failure**
IE	infective endocarditis
MR	mitral regurgitation
MRI	magnetic resonance imaging
TAVR	**transcatheter aortic valve replacement/repair**
TEE	transesophageal echocardiography
TIA	**transient ischemia attack**
TTE	transthoracic echocardiography
VAD	ventricular assist device

POLICY HISTORY

Date	Summary
June 2022	• **Updated surveillance protocol of left atrial appendage occlusion device based on FDA guidance**
February 2022~~2~~	• ~~Added reference for Hypertrophic CM/ minor formatting changes~~No significant changes
March 2021	• Added indication and reference for hypertrophic cardiomyopathy
March 2020	• Added general information section as Introduction which outlines requirements for documentation of pertinent office notes by a licensed clinician, and inclusion of laboratory testing and relevant imaging results for case review. • Added specific indication for initial evaluation of patient to exclude cardiac origin of TIA or ischemic stroke • Updated indications for ~~Congenital Heart Disease~~**congenital heart ~~to~~disease to** include the following: ○ Evaluation prior to planned repair of the following lesions when TTE, CMR, or CT are not adequate: ▪ Isolated secundum atrial septal defect ▪ Sinus venosus defect and/or partial anomalous pulmonary venous connection ▪ Congenital mitral stenosis or mitral regurgitation ▪ Subvalvular aortic stenosis ▪ Transposition of the Great Arteries ○ Evaluation postoperative or post catheter-based repair due to change in clinical status and/or new concerning

	signs or symptoms when TTE, CMR, or CT are not adequate • Updated and added new references
July 2019	• For ventricular assist devices added indication for re-evaluation for VAD-related complication or suspected infection • Aortic Pathology section rewritten as follows: ○ Suspected acute aortic pathology such as aortic dissection (Bhave 2018, Doherty 2019) ○ Dilated aortic sinuses or ascending aorta on transthoracic echocardiogram (TTE) ○ Evaluation of aortic sinuses, ~~sinotubular~~**Sino tubular** junction, or ascending aorta in patients with bicuspid aortic valve when morphology cannot be assessed by TTE, and other imaging including CT or MRI have not been done • Added infective endocarditis indication for moderate to high pretest probability of IE (~~i.e.~~**i.e.,** staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device) when TTE is negative • For cardiac mass or source of emboli added indication for re-evaluation of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation) when the findings would change therapy • Added indications for Patent Foramen Ovale or Atrial Septal Defect as follows: ○ Evaluation for anatomy, potential cardiac source of emboli, and suitability for percutaneous device closure ○ Evaluation post device closure with clinical concern for infection, malposition, embolization, or persistent shunt • Added indications for Left Atrial Appendage Occlusion ~~as~~**are as** follows: ○ Evaluation ~~for~~**of** anatomy, potential cardiac source of emboli, and suitability for percutaneous occlusion device placement ○ Surveillance at 45 days or FDA guidance/guidelines for follow-up to assess device stability and device leak, and exclude migration, displacement, or erosion • Added indications for Adult Congenital Heart Disease as follows: ○ Imaging with provocative maneuvers (Valsalva, cough) to ~~assess for~~**assess** the presence of right-to-left cardiac shunt

	○ Evaluation when TTE, CMR, or CTA are not adequate in the setting of: ▪ Pulmonary venous connections with ASD ▪ Aortic imaging in Williams syndrome or patient suspected of having supravalvular stenosis ▪ Surgical planning for Ebstein's anomaly ▪ Evaluation of baffle leak after atrial switch repair for d-Transposition of the Great Arteries ▪ Removed section on "Frequency of Echo Studies"

REFERENCES

Bhave NM, Nienaber CA, Clough RE, et al. Multimodality imaging of thoracic aortic diseases in adults. *J Am Coll Cardiol Cardiovascular Imaging*. 2018; 11(6): 903-919.

Doherty JU, Kort S, Mehran R. et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate use criteria for multimodality imaging in valvular heart disease. A report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol.* 2017; 70(13):1647-1672.

Douglas PS, Garcia MJ, Haines DE, et al. ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR 2011 Appropriate use criteria for echocardiography: A report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Society of Echocardiography, American Heart Association, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Critical Care Medicine, Society of Cardiovascular Computed Tomography, and Society for Cardiovascular Magnetic Resonance. *J Am Coll Cardiol.* 2011; 57(9):1126-66.

Flachskampf FA, Wouter PF, Edvardsen T, et al. Recommendations for transoesophageal echocardiography: EACVI update 2014. *Eur Heart J Cardiovascular Imaging*. 2014; 15:353-365.

Hahn TR, Abraham T, Adams MS, et al. Guidelines for performing a comprehensive transesophageal echocardiographic examination: Recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists. *J Am Soc Echocardiogr*. 2013; 26(9):921-964.

January CT, Wann LS, Calkins H, et al. 2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the management of patients with atrial fibrillation: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol.* 2019 Jan 21; pii: S0735-1097(19)30209-8. doi: 10.1016/j.jacc.2019.01.011.

Lancellotti P, Tribouilloy C, Hagendorff A, et al. Recommendations for the echocardiographic assessment of native valvular regurgitation: An executive summary from the European Association of Cardiovascular Imaging. *Eur Heart J Cardiovasc Imaging*. 2013; 14 (7):611-644.

Nishimura RA, Otto CM, Bonow RO, et al. 2014 AHA/ACC Guideline for the management of patients with valvular heart disease: Executive summary: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol.*

2014; 63(22):2438-2488.

Ogbara J, Logani S, Ky B, et al. The utility of prescreening transesophageal echocardiograms: A prospective study. *Echocardiography*. 28(7):767-773. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1540-8175.2011.01421.x/abstract

Ommen SR, Mital S, Burke MA, et al. 2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2020;76(25):3022-3055. doi:10.1016/j.jacc.2020.08.044

Otto CM, Kumbhani DJ., Alexander KP., et al, ACC Expert Consensus Decision Pathway for transcatheter aortic valve replacement in the management of adults with aortic stenosis. A Report of the American College of Cardiology Task Force on Clinical Expert Consensus Document. *J Am Coll Cardiol*. 2017;69(10):1313-1346.

Sachdeva R, Valente AM, Armstrong AK, et al. ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients with Congenital Heart Disease. *J Am Coll Cardiol*. 2020 Jan 06. Epub. DOI:10.1016/j.jacc.2019.10.002.

Saric M, Armour AC, Arnaout MS, et al. Guidelines for the use of echocardiography in the evaluation of a cardiac source of embolism. *J Am Soc Echocardiogr*. 2016; 29:1-42. Available at: http://asecho.org/wordpress/wp-content/uploads/2016/01/2016_Cardiac-Source-of-Embolism.pdf.

Stainback RF, Estep JD, Agler DA, et al. Echocardiography in the management of patients with left ventricular assist devices: Recommendations from the American Society of Echocardiography. *Am Soc Echocardiogr*. 2015; 28:853-909. Av. ailable at: http://www.ncbi.nlm.nih.gov/pubmed/26239899.

Stout KK, Daniels CJ, Aboulhosn JA, et al. 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2019; 73(12):1494-1563.

Wunderlich NC, Beigel R, Ho SY, et al. Imaging for mitral interventions, methods and efficacy. *J Am Coll Cardiol Cardiovascular Imaging*. 2018; 11(6): 872-901.

Reviewed / Approved by NIA Clinical Guideline Committee

1. Doherty JU, Kort S, Mehran R, Schoenhagen P, Soman P. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2017 Appropriate Use Criteria for Multimodality Imaging in Valvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. Sep 26 2017;70(13):1647-1672. doi:10.1016/j.jacc.2017.07.732
2. Flachskampf FA, Wouters PF, Edvardsen T, et al. Recommendations for transoesophageal echocardiography: EACVI update 2014. *Eur Heart J Cardiovasc Imaging*. Apr 2014;15(4):353-65. doi:10.1093/ehjci/jeu015
3. Hahn RT, Abraham T, Adams MS, et al. Guidelines for performing a comprehensive transesophageal echocardiographic examination: recommendations from the American Society of Echocardiography and the Society of Cardiovascular Anesthesiologists. *J Am Soc Echocardiogr*. Sep 2013;26(9):921-64. doi:10.1016/j.echo.2013.07.009
4. Lancellotti P, Tribouilloy C, Hagendorff A, et al. Recommendations for the echocardiographic assessment of native valvular regurgitation: an executive summary from the European Association of Cardiovascular Imaging. *Eur Heart J Cardiovasc Imaging*. Jul 2013;14(7):611-44. doi:10.1093/ehjci/jet105
5. Ogbara J, Logani S, Ky B, et al. The utility of prescreening transesophageal echocardiograms: a prospective study. *Echocardiography*. Aug 2011;28(7):767-73. doi:10.1111/j.1540-8175.2011.01421.x
6. Bhave NM, Nienaber CA, Clough RE, Eagle KA. Multimodality Imaging of Thoracic Aortic Diseases in Adults. *JACC Cardiovasc Imaging*. Jun 2018;11(6):902-919. doi:10.1016/j.jcmg.2018.03.009
7. Nishimura RA, Otto CM, Bonow RO, et al. 2014 AHA/ACC guideline for the management of patients with valvular heart disease: executive summary: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. Jun 10 2014;63(22):2438-88. doi:10.1016/j.jacc.2014.02.537

8. Douglas PS, Garcia MJ, Haines DE, et al. ACCF/ASE/AHA/ASNC/HFSA/HRS/SCAI/SCCM/SCCT/SCMR 2011 Appropriate Use Criteria for Echocardiography. A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Society of Echocardiography, American Heart Association, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Critical Care Medicine, Society of Cardiovascular Computed Tomography, and Society for Cardiovascular Magnetic Resonance Endorsed by the American College of Chest Physicians. *J Am Coll Cardiol*. Mar 1 2011;57(9):1126-66. doi:10.1016/j.jacc.2010.11.002
9. Saric M, Armour AC, Arnaout MS, et al. Guidelines for the Use of Echocardiography in the Evaluation of a Cardiac Source of Embolism. *J Am Soc Echocardiogr*. Jan 2016;29(1):1-42. doi:10.1016/j.echo.2015.09.011
10. Otto CM, Kumbhani DJ, Alexander KP, et al. 2017 ACC Expert Consensus Decision Pathway for Transcatheter Aortic Valve Replacement in the Management of Adults With Aortic Stenosis: A Report of the American College of Cardiology Task Force on Clinical Expert Consensus Documents. *J Am Coll Cardiol*. Mar 14 2017;69(10):1313-1346. doi:10.1016/j.jacc.2016.12.006
11. Sachdeva R, Valente AM, Armstrong AK, et al. ACC/AHA/ASE/HRS/ISACHD/SCAI/SCCT/SCMR/SOPE 2020 Appropriate Use Criteria for Multimodality Imaging During the Follow-Up Care of Patients With Congenital Heart Disease: A Report of the American College of Cardiology Solution Set Oversight Committee and Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, Heart Rhythm Society, International Society for Adult Congenital Heart Disease, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Pediatric Echocardiography. *J Am Coll Cardiol*. Feb 18 2020;75(6):657-703. doi:10.1016/j.jacc.2019.10.002
12. Doherty JU, Kort S, Mehran R, et al. ACC/AATS/AHA/ASE/ASNC/HRS/SCAI/SCCT/SCMR/STS 2019 Appropriate Use Criteria for Multimodality Imaging in the Assessment of Cardiac Structure and Function in Nonvalvular Heart Disease: A Report of the American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and the Society of Thoracic Surgeons. *J Am Coll Cardiol*. Feb 5 2019;73(4):488-516. doi:10.1016/j.jacc.2018.10.038
13. Watchman(tm) Left Atral Appendage Closure Device Patient Information Guide. U.S. Food and Drug Administration (FDA). Accessed June 27, 2022. https://www.accessdata.fda.gov/cdrh_docs/pdf13/P130013C.pdf
14. P130013 Watchman Left Atrial Appendage (LAA) Closure Technology. U.S. Food and Drug Administration (FDA). Accessed June 27, 2022. https://www.accessdata.fda.gov/scripts/cdrh/devicesatfda/index.cfm?db=pma&id=320552
15. Wunderlich NC, Beigel R, Ho SY, et al. Imaging for Mitral Interventions: Methods and Efficacy. *JACC Cardiovasc Imaging*. Jun 2018;11(6):872-901. doi:10.1016/j.jcmg.2018.02.024

16. Ommen SR, Mital S, Burke MA, et al. 2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy: Executive Summary: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. Dec 22 2020;76(25):3022-3055. doi:10.1016/j.jacc.2020.08.044
17. Ommen Steve R, Mital S, Burke Michael A, et al. 2020 AHA/ACC Guideline for the Diagnosis and Treatment of Patients With Hypertrophic Cardiomyopathy. *Journal of the American College of Cardiology*. 2020/12/22 2020;76(25):e159-e240. doi:10.1016/j.jacc.2020.08.045
18. Stout KK, Daniels CJ, Aboulhosn JA, et al. 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. Apr 2 2019;73(12):1494-1563. doi:10.1016/j.jacc.2018.08.1028
19. Stainback RF, Estep JD, Agler DA, et al. Echocardiography in the Management of Patients with Left Ventricular Assist Devices: Recommendations from the American Society of Echocardiography. *J Am Soc Echocardiogr*. Aug 2015;28(8):853-909. doi:10.1016/j.echo.2015.05.008

ADDITIONAL RESOURCES

1. Galea R, De Marco F, Meneveau N, et al. Amulet or Watchman Device for Percutaneous Left Atrial Appendage Closure: Primary Results of the SWISS-APERO Randomized Clinical Trial. *Circulation*. Mar 8 2022;145(10):724-738. doi:10.1161/circulationaha.121.057859
2. Hui RW, Leung CM. Incidence of Gastrointestinal Bleeding after Transesophageal Echocardiography in Patients with Gastroesophageal Varices: A Systematic Review and Meta-Analysis. *J Am Soc Echocardiogr*. Apr 2022;35(4):387-394. doi:10.1016/j.echo.2021.11.014
3. January CT, Wann LS, Calkins H, et al. 2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. Jul 9 2019;74(1):104-132. doi:10.1016/j.jacc.2019.01.011
4. Odewole M, Sen A, Okoruwa E, et al. Systematic review with meta-analysis: incidence of variceal hemorrhage in patients with cirrhosis undergoing transesophageal echocardiography. *Aliment Pharmacol Ther*. May 2022;55(9):1088-1098. doi:10.1111/apt.16860
5. Sattar Y, Kompella R, Ahmad B, et al. Comparison of left atrial appendage parameters using computed tomography vs. transesophageal echocardiography for watchman device implantation: a systematic review & meta-analysis. *Expert Rev Cardiovasc Ther*. Feb 2022;20(2):151-160. doi:10.1080/14779072.2022.2043745
6. Yu S, Zhang H, Li H. Cardiac Computed Tomography Versus Transesophageal Echocardiography for the Detection of Left Atrial Appendage Thrombus: A Systemic Review and Meta-Analysis. *J Am Heart Assoc*. Dec 7 2021;10(23):e022505. doi:10.1161/jaha.121.022505

~~1. January CT, Wann LS, Calkins H, et al. 2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society. *J Am Coll Cardiol*. Jul 9 2019;74(1):104-132. doi:10.1016/j.jacc.2019.01.011~~

Reviewed / Approved by NIA Clinical Guideline Committee

Disclaimer: Magellan Healthcare service authorization policies do not constitute medical advice and are not intended to govern or otherwise influence the practice of medicine. These policies are not meant to supplant your normal procedures, evaluation, diagnosis, treatment and/or care plans for your patients. Your professional judgement must be exercised and followed in all respects with regard to the treatment and care of your patients. These policies apply to all Magellan Healthcare subsidiaries including, but not limited to, National Imaging Associates ("Magellan"). The policies constitute only the reimbursement and coverage guidelines of Magellan. Coverage for services varies for individual members in accordance with the terms and conditions of applicable Certificates of Coverage, Summary Plan Descriptions, or contracts with governing regulatory agencies. Magellan reserves the right to review and update the guidelines at its sole discretion. Notice of such changes, if necessary, shall be provided in accordance with the terms and conditions of provider agreements and any applicable laws or regulations.