



Right Heart Catheterization and/or Left Ventriculogram – Single Service

Clinical Guidelines for Medical Necessity Review

Version: 3
Effective Date: March 15, 2024

Important Notices

Notices & Disclaimers:

GUIDELINES SOLELY FOR COHERE'S USE IN PERFORMING MEDICAL NECESSITY REVIEWS AND ARE NOT INTENDED TO INFORM OR ALTER CLINICAL DECISION MAKING OF END USERS.

Cohere Health, Inc. ("**Cohere**") has published these clinical guidelines to determine medical necessity of services (the "**Guidelines**") for informational purposes only, and solely for use by Cohere's authorized "**End Users**". These Guidelines (and any attachments or linked third party content) are not intended to be a substitute for medical advice, diagnosis, or treatment directed by an appropriately licensed healthcare professional. These Guidelines are not in any way intended to support clinical decision making of any kind; their sole purpose and intended use is to summarize certain criteria Cohere may use when reviewing the medical necessity of any service requests submitted to Cohere by End Users. Always seek the advice of a qualified healthcare professional regarding any medical questions, treatment decisions, or other clinical guidance. The Guidelines, including any attachments or linked content, are subject to change at any time without notice.

©2024 Cohere Health, Inc. All Rights Reserved.

Other Notices:

HCPCS® and CPT® copyright 2024 American Medical Association. All rights reserved.

Fee schedules, relative value units, conversion factors and/or related components are not assigned by the AMA, are not part of CPT, and the AMA is not recommending their use. The AMA does not directly or indirectly practice medicine or dispense medical services. The AMA assumes no liability for data contained or not contained herein.

HCPCS and CPT are registered trademarks of the American Medical Association.

Guideline Information:

Specialty Area: Cardiovascular Disease

Guideline Name: Right Heart Catheterization and/or Left Ventriculogram (Single Service)

Literature review current through: 11/17/2023

Document last updated: 3/15/2024

Type: Adult (18+ yo) | Pediatric (0-17yo)

Table of Contents

Important Notices	2
Care Path Services & Medical Necessity Criteria	4
Service: Right Heart Catheterization and/or Left Ventriculogram	4
General Guidelines	4
Medical Necessity Criteria	4
Indications	4
Non-Indications	5
Level of Care Criteria	5
Procedure Codes (CPT/HCPCS)	5
Medical Evidence	6
References	8
Clinical Guideline Revision History/Information	11

Care Path Services & Medical Necessity Criteria

Service: Right Heart Catheterization and/or Left Ventriculogram

General Guidelines

- **Units, Frequency, & Duration:** None.
- **Criteria for Subsequent Requests:** None.
- **Recommended Clinical Approach:** Cardiac catheterization is invasive, with more risks than other tests. Thus, it should be used to provide important information that may change the treatment plan. In some clinical situations, the performance of a right cardiac catheterization (hemodynamics and cardiac output) or a left heart catheterization/left ventricular angiogram alone may be needed.
- **Exclusions:** None.

Medical Necessity Criteria

Indications

- **Other cardiac catheterization** is considered appropriate if **ANY** of the following is **TRUE**¹⁻¹⁸:
- ◆ The procedure is a **right cardiac catheterization**, and **ANY** of the following is **TRUE**:
 - Valvular heart disease; **OR**
 - CHF; **OR**
 - Congenital heart disease; **OR**
 - Cor pulmonale; **OR**
 - Pulmonary hypertension; **OR**
 - Known or suspected intracardiac shunt with indeterminate shunt anatomy or shunt fraction; **OR**
 - Suspected cardiomyopathy or myocarditis; **OR**
 - Endocarditis requiring valvular surgery; **OR**
 - The patient is being considered for or has received a heart transplant; **OR**
 - Suspected pericardial tamponade or constriction; **OR**
 - Indeterminate intravascular volume status; **OR**
 - ◆ The procedure is a **left heart catheterization/left ventricular angiogram**¹⁻², and **ANY** of the following is **TRUE**:
 - Assessment of left ventricular systolic function; **OR**
 - Assessment of the degree of mitral regurgitation; **OR**

- Assessment for a ventricular septal defect, other intracardiac shunts, or other congenital heart abnormalities; **OR**
- Pericardial tamponade; **OR**
- Hemodynamic assessment of the aortic valve; **OR**
- Measurement of the left ventricular end-diastolic pressure.

Non-Indications

→ **Other cardiac catheterization** is not considered appropriate if **ANY** of the following is **TRUE**:

- ◆ Acute or chronic kidney disease; **OR**
- ◆ Coagulopathy; **OR**
- ◆ Fever; **OR**
- ◆ Systemic infection; **OR**
- ◆ Uncontrolled arrhythmia; **OR**
- ◆ Uncontrolled hypertension; **OR**
- ◆ Uncompensated heart failure; **OR**
- ◆ Radiopaque contrast agent allergies in patients who have not been appropriately premedicated; **OR**
- ◆ Pregnancy.

Level of Care Criteria

Inpatient or Outpatient

Procedure Codes (CPT/HCPCS)

CPT/HCPCS Code	Code Description
93451	Right heart catheterization
93452	Left heart catheterization with intraprocedural injection for left ventriculography
93593	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; normal native connections
93594	Right heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone; abnormal native connections

Medical Evidence

Cochran et al. (2022) performed a review on the role of right heart catheterization in patients (RHC) with heart failure. The procedure is a fundamental diagnostic tool for patients experiencing refractory heart failure or cardiogenic shock. The procedure is also crucial for evaluating eligibility for heart replacement therapies and for managing patients post-implantation of mechanical circulatory assist devices and heart transplantation. Guidelines published by the American College of Cardiology Foundation (ACCF), American Heart Association (AHA), and European Society of Cardiology (ESC) specify situations when RHC may be indicated. While RHC is not typically suggested for patients with decompensated heart failure, it may benefit those whose condition does not improve with initial therapy as well as those with uncertain volume status and persistent hypoperfusion, or those being evaluated for advanced treatments.¹⁹

Otto et al. (2021) reviewed published guidelines from the American College of Cardiology (ACC) and the American Heart Association (AHA) on the management of patients with valvular heart disease. When noninvasive testing results are inconclusive, especially in symptomatic patients, or when there's a discrepancy between noninvasive tests and clinical findings, cardiac catheterization with direct intracardiac measurements becomes crucial. Catheterization provides valuable information, particularly in assessing transvalvular pressure gradients and cardiac output. Imaging difficulties or misalignment of the Doppler beam can lead to underestimation of stenosis severity, while suboptimal image or Doppler data quality can cause overestimation or underestimation of valve regurgitation severity. In such cases, contrast angiography may be helpful for semiquantitative assessment, especially when noninvasive results conflict with physical examination findings. Cardiac catheterization offers the advantage of measuring intracardiac pressures and pulmonary vascular resistance, aiding in decision-making regarding valve intervention.²⁰

Shellenberger et al. (2021) conducted a systematic review on the role of physical examination and RHC in the diagnosis of pulmonary hypertension (PH). Data from four studies (including calculated pooled diagnostic odds ratios [DOR]) were analyzed for several indicators, including right ventricular heave, a loud pulmonic component of the second heart sound (P2), jugular venous pressure (JVP) greater than 3 cm above sternal angle, and a palpable P2. Of these, three findings supported the diagnosis of PH: JVP greater than 3 cm above the sternal angle (DOR 5.90, 95% CI 2.57,

13.57), a loud P2 (DOR 2.91, 95% CI 1.38, 6.10), and a right ventricular heave (DOR 2.78, 95% CI 1.12, 6.89). Limitations of the review include a small sample size and a lack of control groups. Also, the studies were unable to correlate patient physical examination results with the NYHA functional class or stage of PH. Larger cohort studies employing a combination of tests may provide further insights into the role of physical examination in PH diagnosis and early detection.²¹

References

1. Patel MR, Bailey SR, Bonow RO, et al. ACCF/SCAI/AATS/AHA/ASE/ASNC/HFSA/HRS/SCCM/SCCT/SCMR/STS 2012 Appropriate Use Criteria for Diagnostic Catheterization. *Journal of the American College of Cardiology*. 2012;59(22):1995–2027. doi:10.1016/j.jacc.2012.03.003
2. Medicare Coverage Database Local Coverage Determination documents. [Internet] Centers for Medicare and Medicaid Services. Accessed at: <https://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=33959&ver=34&>.
3. Bangalor S and Bhatt D. Right Heart Catheterization, Coronary Angiography, and Percutaneous Coronary Intervention. *Circulation*. 2011;124:e428–e433.
4. Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/ASE/Chest/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: A report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2021 Nov 30;78(22):e187–e285. doi: 10.1016/j.jacc.2021.07.053. PMID: 34756653.
5. Blankenship JC, Moussa ID, Society for Cardiovascular Angiography and Interventions, et al. Staging of multivessel percutaneous coronary interventions: An expert consensus statement from the Society for Cardiovascular Angiography and Interventions. *Catheter Cardiovasc Interv*. 2012 Jun 1;79(7):1138–52. doi: 10.1002/ccd.23353. PMID: 22072562.
6. Gonzalez-Hermosillo LM, Cueto-Robledo G, Roldan-Valadez E, et al. Right heart catheterization (RHC): A comprehensive review of provocation tests and hepatic hemodynamics in patients with pulmonary hypertension (PH). *Curr Probl Cardiol*. 2022 Dec;47(12):101351. doi: 10.1016/j.cpcardiol.2022.101351. PMID: 35948196.
7. Del Rio-Pertuz G, Nugent K, Argueta-Sosa E, et al. Right heart catheterization in clinical practice: A review of basic physiology and important issues relevant to interpretation. *Am J Cardiovasc Dis*. 2023 Jun 25;13(3):122–137. eCollection 2023. PMID: 37469534; PMCID: PMC10352814.
8. Stout KK, Daniels CJ, Aboulhosn JA, et al. 2018 AHA/ACC guideline for the management of adults with congenital heart disease: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019 Apr 2;139(14):e698–e800. doi: 10.1161/CIR.0000000000000603. PMID: 30586767.
9. Lim HS, Hsich E, Shah KB. International Society of Heart and Lung Transplantation position statement on the role of right heart catheterization in the management of heart transplant recipients. *J*

- Heart Lung Transplant. 2019 Mar;38(3):235-238. doi: 10.1016/j.healun.2018.12.009. PMID: 30638836; PMCID: PMC6816339.
10. Cochran JM, Alam A, Guerrero-Miranda CY. Importance of right heart catheterization in advanced heart failure management. *Rev Cardiovasc Med.* 2022 Jan 13;23(1):12. doi: 10.31083/j.rcm2301012. PMID: 35092204.
 11. Rodés-Cabau J, Bernier M, Amat-Santos IJ, et al. Interatrial shunting for heart failure: Early and late results from the first-in-human experience with the V-wave system. *JACC Cardiovasc Interv.* 2018 Nov 26;11(22):2300-2310. doi: 10.1016/j.jcin.2018.07.001. PMID: 30391390.
 12. Saxena A, Garan AR, Kapur NK, et al. Value of hemodynamic monitoring in patients with cardiogenic shock undergoing mechanical circulatory support. *Circulation.* 2020 Apr 7;141(14):1184-1197. doi: 10.1161/CIRCULATIONAHA.119.043080. PMID: 32250695.
 13. Kang SL, Benson L. Recent advances in cardiac catheterization for congenital heart disease. *F1000Res.* 2018 Mar 26;7:370. doi: 10.12688/f1000research.13021.1. eCollection 2018. PMID: 29636905; PMCID: PMC5871969.
 14. Woodard PK, Ho VB, Expert Panel on Cardiac Imaging, et al. ACR appropriateness criteria® known or suspected congenital heart disease in the adult. *J Am Coll Radiol.* 2017 May;14(5S):S166-S176. doi: 10.1016/j.jacr.2017.02.036. PMID: 28473073.
 15. Roggi S, Testa J, Gasparetto A, et al. The criterion of proportionality in the activation of left ventricular assist device implants: The method of "four boxes" to analyze the pre-implant phase. *Clin Ter.* 2019 Jan-Feb;170(1):e61-e67. doi: 10.7417/CT.2019.2109. PMID: 30789199.
 16. Imamura T, Narang N. Implication of hemodynamic assessment during durable left ventricular assist device support. *Medicina (Kaunas).* 2020 Aug 15;56(8):413. doi: 10.3390/medicina56080413. PMID: 32824131; PMCID: PMC7466331.
 17. Sorajja P, Borlaug BA, Dimas VV, et al. SCAI/HFSA clinical expert consensus document on the use of invasive hemodynamics for the diagnosis and management of cardiovascular disease. *Catheter Cardiovasc Interv.* 2017 Jun 1;89(7):E233-E247. doi: 10.1002/ccd.26888. PMID: 28489331.
 18. Knuuti J, Wijns W, ESC Scientific Document Group, et al. 2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes. *Eur Heart J.* 2020 Jan 14;41(3):407-477. doi: 10.1093/eurheartj/ehz425. PMID: 31504439.
 19. Cochran JM, Alam A, Guerrero-Miranda CY. Importance of right heart catheterization in advanced heart failure management. *Rev Cardiovasc Med.* 2022 Jan 13;23(1):12. doi: 10.31083/j.rcm2301012. PMID: 35092204.
 20. Otto CM, Nishimura RA, Bonow RO, et al. 2020 ACC/AHA guideline for the management of patients with valvular heart disease: A report of the American College of Cardiology/American Heart Association Joint

- Committee on Clinical Practice Guidelines. *Circulation*. 2021 Feb 2;143(5):e72–e227. doi: 10.1161/CIR.0000000000000923. PMID: 33332150.
21. Shellenberger RA, Imtiaz K, Chellappa N, et al. Physical examination for the detection of pulmonary hypertension: A systematic review. *Cureus*. 2021 Sep 16;13(9):e18020. doi: 10.7759/cureus.18020. PMID: 34692270; PMCID: PMC8523183.

Clinical Guideline Revision History/Information

Original Date: March 5, 2021	
Review History	
Version 2	11/17/2023
Version 3	3/15/2024