Cohere Medicare Advantage Policy - Cardiac Catheterization

Clinical Policy for Medical Necessity Review

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Important Notices

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Policy Information:

Specialty Area: Cardiovascular Disease
Policy Name: Cohere Medicare Advantage Policy - Cardiac Catheterization
Type: [**X**] Adult (18+ yo) | [**X**] Pediatric (0-17 yo)

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Medical Necessity Criteria

Service: Cardiac Catheterization

Related CMS Documents

Please refer to the CMS Medicare Coverage Database for the most current applicable CMS National Coverage.[1-4]

- Local Coverage Determination (LCD). Cardiac catheterization and coronary angiography (L33557)
  - Billing and Coding: Cardiac catheterization and coronary angiography (A52850)
- Local Coverage Determination (LCD). Cardiac catheterization and coronary angiography (L33959)
  - Billing and Coding: Cardiac catheterization and coronary angiography (A56500)

Description

Left and right heart catheterization is an invasive cardiac evaluation method. It allows for direct evaluation of hemodynamics, cardiac pressure, and cardiac output.[1,3] Left heart catheterization involves the insertion of a catheter into an artery in the arm, groin, or wrist. Generally, femoral artery access is more commonly used than radial artery access for left heart catheterization. The catheter is guided to the left ventricle of the heart to measure left ventricular pressures or to obtain an angiogram (left ventriculogram, ventriculography). Left heart catheterization is sometimes performed with coronary angiography to assess left ventricular pressure and function and for the presence of valvular heart disease. The addition of a right cardiac catheterization to a left cardiac catheterization is needed for a hemodynamic assessment when evaluating valvular heart disease, cardiomyopathies, or pericardial disease. 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.[1,3,5]

Medical Necessity Criteria

Indications

Cardiac catheterization is considered appropriate if **ALL** of the following are **TRUE**:

- **Coronary/bypass angiography with or without left heart catheterization,** and **ANY** of the following[1,3]:
  - This section is not applicable (service not requested); **OR**
  - **ALL** of the following:
    - **ANY** of the following:
      - Anginal syndrome with ischemia; **OR**
      - Atypical chest pain syndrome suggesting ischemia; **OR**
      - Known atherosclerotic or other coronary disease (not including coronary calcification); **AND**
    - **ANY** of the following[6]:
      - Nuclear perfusion (SPECT or PET) that demonstrates at least 10% ischemic myocardium; **OR**
      - Echocardiogram demonstrating at least 3/16 segments with **ANY** of the following:
        - Stress-induced severe hypokinesis; **OR**
        - Akinesis; **OR**
        - Wall motion index of greater than 1.1; **OR**
      - Cardiac magnetic resonance (CMR) perfusion demonstrating **ANY** of the following:
        - At least 12% ischemic myocardium and/or wall motion; **OR**
        - At least 3/16 segments with **ANY** of the following:
          - Stress-induced severe hypokinesis; **OR**
          - Akinesis; **OR**
          - Wall motion index of greater than 1.1; **OR**
      - Exercise test and **ALL** the following:
        - Clinical history of cardiac chest pain; **AND**
        - **ANY** of the following:
          - Absence of resting ST-segment depression at least 1.0 mm; **OR**
          - Confounders that render exercise ECG noninterpretable (e.g., left bundle branch block [LBBB], left ventricular

hypertrophy with repolarization, ventricular paced rhythm); **AND**

- **ALL** of the following:
  - Compared with the baseline tracing, additional exercise-induced horizontal/down-sloping ST-segment depression of **ANY** of the following:
    - At least 1.5 mm in 2 leads; **OR**
    - At least 2.0 mm in any lead; **AND**
  - ST-segment elevation greater than or equal to 1 mm in a noninfarct territory. (Both the J-point and the ST-segment depression at 80 ms need to meet criteria. When the HR is greater than 130 beats/min, the ST-segment depression at 60 ms may be used if the segment at 80 ms cannot be determined); **AND**
- **ANY** of the following:
  - Peak workload does not exceed completion of stage 2 of a standard Bruce protocol (or no more than 7 metabolic equivalents [METs] if a non-Bruce protocol is used); **OR**
  - ST-segment criteria are met at less than 75% of the maximum predicted heart rate; **OR**

- Congenital heart disease; **OR**
- Following cardiac arrest suspected to be due to ischemia or infarction; **OR**
- Myocardial infarction (including NSTEMI); **OR**
- Suspected closure of graft or stent/percutaneous transluminal coronary angioplasty; **OR**
- Prinzmetal's angina; **OR**
- Coronary shunt or fistula; **OR**
- Cardiac trauma; **OR**
- The patient is undergoing a non-coronary cardiac surgical procedure (e.g., aortic valve or mitral valve surgery, including TAVR); **OR**
- The patient is undergoing a renal or liver transplant; **OR**
- The patient is undergoing a high-risk non-cardiac surgical procedure (arterial or aortic surgery, or surgery with large fluid shift) and has evidence of ischemic heart disease; **AND**

- The procedure is a **left heart catheterization with left ventricular angiogram (ventriculogram)**, and **ANY** of the following is **TRUE**[1,3]:
  - This section is not applicable (service not requested); **OR**

    - Assessment of mitral or tricuspid valve function; **OR**
    - Constrictive or restrictive pericarditis; **OR**
    - Assessment of ventricular function or morphology (including tumors and clots); **OR**
    - Suspected ventricular aneurysm; **OR**
    - Intracardiac shunt; **OR**
    - Congenital heart disease; **OR**
    - Cardiac trauma; **OR**
    - In the setting of severe aortic stenosis, assessment of the aortic valve only if noninvasive imaging is inadequate[5]; **AND**
- The procedure is a **right cardiac catheterization,** and **ANY** of the following is **TRUE**[1,3]:
    - This section is not applicable (service not requested); **OR**
    - Valvular heart disease; **OR**
    - Congestive heart failure (CHF); **OR**
    - Congenital heart disease; **OR**
    - Cor pulmonale; **OR**
    - Echocardiography suggests pulmonary hypertension (i.e., a mean pulmonary arterial pressure of at least 20 mm Hg at rest)[7]; **OR**
    - Intracardiac shunts (including septal rupture) and extracardiac vascular shunts; **OR**
    - Suspected cardiomyopathy or myocarditis; **OR**
    - Endocarditis that is anticipated to require valvular surgery; **OR**
    - Suspected rejection of a transplanted heart; **OR**
    - The patient is being considered for or has received a heart transplant; **OR**
    - Suspected pericardial tamponade or constriction.

Non-Indications

Cardiac catheterization is not considered appropriate if **ANY** of the following is **TRUE**[1,3]:

- Right heart catheterization billed for "bedside placement" of flow-directed (Swan-Ganz type) catheter; **OR**
- Right heart catheterization for atherosclerotic heart disease without heart failure**; OR**
- Right heart catheterization for angioplasty, electrophysiologic studies, or other interventional procedures; **OR**

- Right heart catheterization solely for the purpose of inserting a temporary pacemaker, performing endomyocardial biopsy, or performing electrophysiologic studies; **OR**
- When left heart catheterization is performed for reasons other than hemodynamic evaluation or LV angiography required for patient management (i.e., when routinely performed with coronary/bypass angiography, electrophysiologic or pacing studies, or endomyocardial biopsies).

Definitions

- Anginal syndrome is defined as having **ALL** of the following characteristics[5,8]:
  - **ANY** of the following:
    - Substernal location of chest discomfort (burning, dull, heaviness, pressure, squeezing, tightness); **OR**
    - Anginal equivalent (discomfort in the shoulders, arms, neck, back, upper abdomen, or jaw, as well as shortness of breath and fatigue); **AND**
  - Precipitated by exertion or emotional stress; **AND**
  - Prompt relief with rest or sublingual nitroglycerin ("prompt" defined as between approximately 30 seconds to 1 minute).

- Atypical chest pain syndrome suggesting ischemia is defined as having **AT LEAST 2** of the following characteristics[5,8]:
  - **ANY** of the following:
    - Substernal location of chest discomfort (burning, dull, heaviness, pressure, squeezing, tightness); **OR**
    - Anginal equivalent (discomfort in the shoulders, arms, neck, back, upper abdomen, or jaw, as well as shortness of breath and fatigue); **OR**
  - Precipitated by exertion or emotional stress; **OR**
  - Prompt relief with rest or sublingual nitroglycerin ("prompt" defined as between approximately 30 seconds to 1 minute).

- Known atherosclerotic coronary artery disease is defined as having **ANY** of the following[5,8]:
  - History of documented myocardial infarction; **OR**
  - Known coronary artery revascularization; **OR**

- Documented coronary artery disease or coronary anomaly by coronary angiogram or CCTA.

- Evidence of ischemic heart disease is defined as having **ANY** of the following[5,8]:
  - History of documented myocardial infarction; **OR**
  - Known coronary artery revascularization; **OR**
  - Documented coronary artery disease or coronary anomaly by coronary angiogram or CCTA.

- Prinzmetal's angina ("variant angina", "vasospastic angina") is defined as having **ALL** of the following[9]:
  - Nitrate-responsive angina; **AND**
  - Transient ischemic electrocardiogram changes; **AND**
  - Documented coronary artery spasm.

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
93453	Combined right and left heart catheterization with intraprocedural injection for left ventriculography
93454	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation
93455	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with catheter placement in bypass graft, with intraprocedural injections for bypass graft

	angiography
93456	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with right heart catheterization
93457	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with catheter placement in bypass graft, with intraprocedural injection for bypass graft angiography and right heart catheterization
93458	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with left heart catheterization, with intraprocedural injection for left ventriculography
93459	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision and interpretation, with left heart catheterization, catheter placement in bypass graft, with bypass graft angiography
93460	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with right and left heart catheterization
93461	Catheter placement in coronary artery for coronary angiography, with intraprocedural injection for coronary angiography, imaging supervision, and interpretation, with right and left heart catheterization, catheter placement in bypass graft, with bypass graft angiography
93462	Left heart catheterization by transseptal puncture through intact septum or by transapical puncture
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
93595	Left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone, normal or abnormal native connections
93596	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); normal native connections
93597	Right and left heart catheterization for congenital heart defect(s) including imaging guidance by the proceduralist to advance the catheter to the target zone(s); abnormal native connections

Disclaimer: S Codes are non-covered per CMS guidelines due to their experimental or investigational nature.

Evaluation of Clinical Harms and Benefits

Clinical determinations for Medicare Advantage beneficiaries are made in accordance with 42 CFR 422.101 guidance outlining CMS's required approach to decision hierarchy in the setting of NCDs/LCDs identified as being "not fully established". When clinical coverage criteria are "not fully established," Medicare Advantage organizations are instructed to create publicly accessible clinical coverage criteria based on widely accepted clinical guidelines and/or scientific studies backed by a robust clinical evidence base. Clinical coverage criteria provided by Cohere Health in this manner include coverage rationale and risk/benefit analysis.

The potential clinical harms of using these criteria for **cardiac catheterization** may include:

- Adverse effects from delayed or denied treatment for patients with anginal syndrome, atypical chest syndrome, atherosclerotic heart disease, or ischemic heart disease that is not captured by the American College of Cardiology's definitions, which were added to provide decisionable interpretations of the terms mentioned in the LCDs. Consequences could include increased symptoms and cardiovascular complications (e.g., stroke, myocardial infarction), especially in patients with a high likelihood of coronary artery disease (CAD) or those requiring hemodynamic assessment for conditions like valvular heart disease.[5,8]

The clinical benefits of using these criteria for **cardiac catheterization** may include:

- Improved patient selection for left heart catheterization, resulting in better long-term outcomes. Proper patient selection - such as the identification of appropriate patients through evidence-based, professional society guidance - helps to avoid unnecessary, high-risk interventions, such as open-chest coronary bypass (CABG), thus safeguarding patient health.[10,11]
- Appropriate allocation of healthcare resources at the individual beneficiary and population levels.

The clinical harms of using these criteria for **left heart catheterization with or without left ventriculogram** may include:

- Adverse effects from delayed or denied treatment for patients with aortic stenosis, as invasive evaluation is reserved for patients in whom noninvasive imaging is inadequate. Consequences could include increased symptoms and cardiovascular complications (e.g., stroke, myocardial infarction), especially in patients with a high likelihood of coronary artery disease (CAD) or those requiring hemodynamic assessment for conditions like valvular heart disease.[5,8]

The clinical benefits of using these criteria for **left heart catheterization with or without left ventriculogram** may include:

- Reduced risk of catheter-induced embolization. The Society for Cardiovascular Angiography and Interventions (SCAI) recommends caution when utilizing cardiac catheterization for patients with severe aortic stenosis due to the risk of catheter-induced embolization and neurologic deficit. Retrograde catheterization of the aortic valve has been associated with silent and clinically apparent neurologic deficits in 22% and 3% of patients, respectively. Crossing the aortic valve may result in catheter-induced embolization of valve vegetation. Therefore, SCAI recommends that left heart catheterization and left ventriculography should be performed in these patients only if noninvasive imaging is inadequate.[5]

Medical Evidence

A study of more than 96,000 patients undergoing left heart catheterization examined the concomitant use of left ventriculography. Approximately 82% (78,705) of patients underwent left ventriculography in addition to left heart catheterization. Use was pronounced among younger patients. Upon cohort analysis of a subgroup comprised of patients who had a very recent ejection fraction assessment (within the last 30 days) and who had no intervening diagnosis (i.e., no new heart failure, no myocardial infarction, no hypotension, no shock), nearly 88% underwent left ventriculography, a total of 32,798 patients that was also higher than the rate observed in the overall cohort. The authors noted that this pattern constituted overuse of left ventriculography, particularly for subgroup patients for whom new information was very unlikely to be obtained. They stated that the reputation of left ventriculography as an "add-on" procedure to cardiac catheterization may confer risks ranging from increased patient morbidity to excess care cost.[12]

A 2016 study compared invasive left ventriculography with two other modalities: 2D echocardiography and quantitative gated single-photon emission computed tomography. All patients underwent each of the three imaging techniques within three months of each other to evaluate chest pain of unclear etiology. The authors concluded that, although invasive left ventriculography is considered the gold standard for the evaluation of symptomology thought to be of cardiac origin, noninvasive imaging may be an adequate substitution due to the strongly positive correlation associated with each of the three imaging modalities for measuring left ventricular ejection fraction. Therefore, invasive left ventriculography may be better utilized among patients who can accept the medical risk of radiation exposure and contrast-induced kidney injury.[13]

A review was published in 2022 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 - and managing patients post-implantation of - mechanical circulatory assist devices or heart transplantation. 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 cardiac support. It serves an important role in the early, accurate detection of primary graft dysfunction among heart transplant recipients, which is also the leading cause of death among this cohort.[14]

Choi et al. (2023) conducted a retrospective, single-center, observational study to evaluate the discriminatory and prognostic significance of invasively measured left ventricular end-diastolic pressure in patients suspected of having heart failure with preserved ejection fraction (HFpEF). The authors focused on patients with intermediate scores on the Heart Failure Association Pre-test Assessment, Echocardiography and Natriuretic Peptide, Functional Testing, Final Etiology (HFA-PEFF) scale. A total of 404 patients were included; all patients exhibited symptoms of heart failure and had a left ventricular ejection fraction of greater than or equal to 50%. Patients underwent left heart catheterization (LHC). Exclusion criteria included patients who presented without definitive HF symptoms or with acute coronary syndrome (ACS), primary cardiomyopathies, significant valvular heart disease (beyond mild stenosis or moderate left-sided regurgitation), pulmonary arterial hypertension, heart transplantation, constrictive pericarditis, or stress-induced cardiomyopathy. Elevated left ventricular end-diastolic pressure (LVEDP) was linked to a significantly higher 10-year risk of all-cause death or HF readmission in patients suspected of having HFpEF, especially among those with intermediate HFA-PEFF scores. This association remained even after adjusting for multiple variables, including the HFA-PEFF score. (Clinicaltrial.gov, NCT04505449).[15]

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 is a discrepancy between noninvasive tests and clinical findings, cardiac catheterization with direct intracardiac measurements is recommended. Cardiac catheterization provides valuable direct measurements of transvalvular pressure gradients and cardiac output. 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.[8]

A 2020 study examined 289 donor hearts with invasive coronary angiography with the aim of determining the prevalence of post-transplant CAD and cardiac allograft vasculopathy (CAV). Invasive coronary angiography was successfully completed in all donor hearts. Donor hearts that were diagnosed with moderate CAD did not affect transplant recipient survival and did not accelerate the development of CAV. The authors concluded that there is an application for invasive coronary angiography in the routine evaluation of donor hearts.[16]

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Clinical Guideline Revision History/Information

Original Date: June 12, 2025		
Review History		
Version 1	6/12/2025	Combined three cardiac catheterization policies (left heart catheterization with coronary angiography/bypass angiography, right heart catheterization with left ventriculogram, combined right-left heart catheterization) into one cardiac catheterization policy, titled “cardiac catheterization”. Left ventriculogram indications replaced with verbatim current CMS language - prior version of criteria was more restrictive than CMS. One indication not addressed by CMS was retained from prior versions and supported by SCAI guidelines: “In the setting of severe aortic stenosis, assessment of the aortic valve only if noninvasive imaging is inadequate” (due to the risk of catheter-induced embolization and neurologic deficit in these patients) Defined anginal syndrome by evidence of ischemia through a number of avenues (imaging, exercise test, etc.), thereby ensuring proper patient selection for this relatively high-risk procedure Minor criteria changes for policy’s ease of use (specifying that the existing MI indication includes NSTEMI; specifying that the existing presurgical indication includes pre-transplant and TAVR; providing a definition for pulmonary hypertension; providing a note clarifying that combined left/right cath requires both left and right cath criteria to be met) Added non-indication directly from LCD: When performed for reasons other than hemodynamic

		evaluation or LV angiography required for patient management (i.e., when routinely performed with coronary/bypass angiography, electrophysiologic or pacing studies, or endomyocardial biopsies) Added one previously unaddressed LCD (L33959). Added code: 93462 (Left heart catheterization by transseptal puncture through intact septum or by transapical puncture). Updated medical evidence, including literature review and references.