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Clinical Appropriateness Guidelines

Cardiovascular

Appropriate Use Criteria: Diagnostic Coronary Angiography

Proprietary

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Description and Application of the Guidelines

The Carelon Clinical Appropriateness Guidelines (hereinafter “the Carelon Clinical Appropriateness Guidelines” or the “Guidelines”) are designed to assist providers in making the most appropriate treatment decision for a specific clinical condition for an individual. The Guidelines establish objective and evidence-based criteria for medical necessity determinations, where possible, that can be used in support of the following:

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

The Carelon guideline development process complies with applicable accreditation and legal standards, including the requirement that the Guidelines be developed with involvement from appropriate providers with current clinical expertise relevant to the Guidelines under review and be based on the most up-to-date clinical principles and best practices. Resources reviewed include widely used treatment guidelines, randomized controlled trials or prospective cohort studies, and large systematic reviews or meta-analyses. Carelon reviews all of its Guidelines at least annually.

Carelon makes its Guidelines publicly available on its website. Copies of the Guidelines are also available upon oral or written request. Additional details, such as summaries of evidence, a list of the sources of evidence, and an explanation of the rationale that supports the adoption of the Guidelines, are included in each guideline document.

Although the Guidelines are publicly available, Carelon considers the Guidelines to be important, proprietary information of Carelon, which cannot be sold, assigned, leased, licensed, reproduced or distributed without the written consent of Carelon.

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

The Guidelines do not address coverage, benefit or other plan specific issues. Applicable federal and state coverage mandates take precedence over these clinical guidelines, and in the case of reviews for Medicare Advantage Plans, the Guidelines are only applied where there are not fully established CMS criteria. If requested by a health plan, Carelon will review requests based on health plan medical policy/guidelines in lieu of the Carelon Guidelines. Pharmaceuticals, radiotracers, or medical devices used in any of the diagnostic or therapeutic interventions listed in the Guidelines must be FDA approved or conditionally approved for the intended use. However, use of an FDA approved or conditionally approved product does not constitute medical necessity or guarantee reimbursement by the respective health plan.

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

General Clinical Guideline

Clinical Appropriateness Framework

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

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

Providers may be required to submit clinical documentation in support of a request for services. Such documentation must a) accurately reflect the clinical situation at the time of the requested service, and b) sufficiently document the ordering provider's clinical intent.

If these elements are not established with respect to a given request, the determination of appropriateness will most likely require a peer-to-peer conversation to understand the individual and unique facts that would justify a finding of clinical appropriateness. During the peer-to-peer conversation, factors such as patient acuity and setting of service may also be taken into account to the extent permitted by law.

Simultaneous Ordering of Multiple Diagnostic or Therapeutic Interventions

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

Additionally, either of the following may apply:

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

Repeat Diagnostic Intervention

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

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

- Repeated diagnostic testing at the same facility due to technical issues
- Repeated diagnostic testing requested at a different facility due to provider preference or quality concerns

- Repeated diagnostic testing of the same anatomic area based on persistent symptoms with no clinical change, treatment, or intervention since the previous study
- Repeated diagnostic testing of the same anatomic area by different providers for the same member over a short period of time

Repeat Therapeutic Intervention

In general, repeated therapeutic intervention in the same anatomic area is considered appropriate when the prior intervention proved effective or beneficial and the expected duration of relief has lapsed. A repeat intervention requested prior to the expected duration of relief is not appropriate unless it can be confirmed that the prior intervention was never administered. Requests for ongoing services may depend on completion of previously authorized services in situations where a patient's response to authorized services is relevant to a determination of clinical appropriateness.

Diagnostic Coronary Angiography

General Information

Standard Anatomic Coverage

- Coronary arteries

Guideline Scope

- This guideline addresses the appropriate use of nonemergency coronary angiography. It does not pertain to coronary angiography when performed as part of an inpatient stay nor does it apply when urgent coronary angiography is performed in patients with unstable coronary syndrome (myocardial infarction and/or unstable angina pectoris).
- Diagnostic cardiac catheterization procedures that DO NOT include coronary angiography (e.g., isolated right heart catheterization, isolated left heart catheterization, combined right and left heart catheterization, aortography) are not subject to preauthorization and are therefore not addressed in this guideline.

Imaging Considerations

- In addition to coronary angiography, diagnostic cardiac catheterization may include any or all of the following: left heart catheterization, right heart catheterization, left ventriculography, right ventriculography, aortography and intracardiac shunt studies. Only procedures which provide clinically relevant information should be performed at the time of coronary angiography.
- Selection of the optimal diagnostic imaging study for coronary artery evaluation should be made within the context of other available modalities (which include treadmill stress test, myocardial perfusion imaging, stress echocardiography, cardiac CT, cardiac MRI, and cardiac PET), so that the resulting information facilitates patient management decisions and does not merely add a new layer of testing.
- Although the risk-benefit ratio for any procedure should dictate clinical appropriateness on a case-by-case basis, advanced age, advanced renal disease, advanced malignancy, or coagulopathy should be considered relative contraindications to coronary angiography.
- Providers who refer patients for coronary angiography and those who perform such procedures are responsible for considering safety issues. One of the most significant considerations is the requirement for intravascular iodinated contrast material, which may have an adverse effect on patients with a history of documented allergic contrast reactions or atopy, as well as on individuals with renal impairment, who are at greater risk for contrast-induced nephropathy.
- Since coronary angiography requires the use of fluoroscopy, it is critically important that every effort be made to minimize both patient and laboratory staff exposure to ionizing radiation.
- For most subgroups of patients with stable coronary artery disease (CAD), coronary revascularization procedures have not been shown to reduce mortality or incidence of myocardial infarction. Percutaneous revascularization has been shown to ameliorate angina or anginal equivalent symptoms. Therefore, in asymptomatic patients, coronary angiography with a view to percutaneous revascularization is seldom justified.
- In stable CAD patients with advanced chronic kidney disease, revascularization confers no benefit over medical management and risks of coronary angiography are higher. This is true regardless of symptom status or degree of abnormality on stress testing.
- Coronary angiography followed by revascularization (in combination with Guideline Directed Medical Therapy [GDMT]) does not improve outcomes compared to GDMT alone for most patients with stable

CAD. Therefore, GDMT should generally be instituted prior to coronary angiography in patients with stable CAD. Exceptions to this approach include patients with left main CAD, left ventricular ejection fraction $\leq 35\%$, advanced heart failure, or revascularization within the preceding year.

Definitions

Acute coronary syndrome: Clinical term encompassing myocardial infarction (ST elevation and non-ST elevation) and unstable angina.

Advanced chronic kidney disease: On dialysis or with glomerular filtration rate < 30 ml/min/1.73 m²

Established CAD and **Suspected CAD** are defined as follows for purposes of this guideline:

- Patients with **any of the following** are considered to have **established CAD**:
 - At least 70% stenosis (50% in the case of left main coronary artery) on CT coronary angiography (CCTA) or invasive coronary angiography
 - History of unstable coronary syndrome
 - History of percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG)
- Patients who do not meet the above definition are considered to have **suspected CAD**.

Guideline-directed medical therapy (GDMT) consists of risk factor management and, in symptomatic patients, antianginal medications which improve quality of life.

- Risk factor management: All patients with stable CAD should be encouraged to adopt healthy lifestyles including tobacco cessation/avoidance, regular physical activity, maintenance of a healthy weight and adherence to a healthy diet. In addition, absent a contraindication, all stable CAD patients should be taking the following evidence-supported medications:
 - Antiplatelet agents – Aspirin and/or P2Y₁₂ receptor antagonist
 - Statin – Maximum tolerated dose of high-intensity statin (atorvastatin 40-80 mg or rosuvastatin 20-40 mg). Patients intolerant of statins and/or not reaching LDL cholesterol goal on maximum tolerated statin dose should be treated with ezetimibe, a PCSK9 inhibitor, or bempedoic acid.
 - Beta blockers – In patients with a history of myocardial infarction, who have left ventricular systolic dysfunction (ejection fraction $\leq 40\%$), or as an option for management of hypertension.
 - ACE Inhibitor or Angiotensin Receptor Blocker – In patients with left ventricular systolic dysfunction (ejection fraction $\leq 40\%$), diabetes, chronic kidney disease, or as an option for management of hypertension
 - Antidiabetic agents – For patients who are diabetic (Hemoglobin A1c goal should be $< 8\%$ in all patients although more aggressive management may be appropriate for some)
- Symptom control: Most patients with stable CAD who have symptoms should be offered antianginal medications as an initial approach with revascularization reserved for those who have persistent unacceptable symptoms despite maximally tolerated doses.
 - Beta blockers – Unless contraindicated beta blockers are first-line therapy with dose escalation until symptoms resolve or side effects develop.
 - Calcium channel blockers and/or long acting-nitrates should be used as alternative initial therapy in symptomatic patients who have contraindication to, or intolerance of, beta blockers. They should also be prescribed when symptoms persist despite maximum tolerated doses of beta blockers.
 - Ranolazine may be prescribed either as initial therapy in symptomatic patients who have contraindication to, or intolerance of, other antianginal medication, or for those with persistent symptoms despite treatment with other medications as described above.

New York Heart Association (NYHA) functional class: Symptom-based classification of the severity of heart failure as outlined below.

- Class I. Individuals with cardiac disease but without resulting limitation of physical activity; ordinary physical activity does not cause undue fatigue, palpitation, dyspnea, or anginal pain; symptoms only occur on severe exertion.
- Class II. Individuals with cardiac disease resulting in slight limitation of physical activity; they are comfortable at rest; ordinary physical activity (e.g., moderate physical exertion, such as carrying shopping bags up several flights of stairs) results in fatigue, palpitation, dyspnea, or anginal pain.
- Class III. Individuals with cardiac disease resulting in marked limitation of physical activity; they are comfortable at rest; less than ordinary activity causes fatigue, palpitation, dyspnea, or anginal pain.
- Class IV. Individuals with cardiac disease resulting in inability to carry on any physical activity without discomfort; symptoms of heart failure or the anginal syndrome may be present even at rest; if any physical activity is undertaken, discomfort is increased.

Recent: Within the past 90 days

Sustained ventricular tachycardia: Ventricular tachycardia persisting for at least 30 seconds or requiring termination due to hemodynamic instability.

Unstable angina: Myocardial ischemia at rest or on minimal exertion in the absence of acute myocardial injury/necrosis. Since the diagnosis of unstable angina generally requires measurement of biochemical markers of myocardial injury or necrosis, and subsequent management at a setting that can provide cardiac rhythm monitoring and intravenous medications, patients undergoing elective outpatient coronary angiography for unstable angina must have had recent hospitalization for that condition.

Table 1. Classification of EKG treadmill and stress test results

Test Result	EKG treadmill test (performed <i>without</i> imaging)	SPECT MPI or Stress PET (performed <i>with</i> imaging)	Stress Echocardiography (performed <i>with</i> imaging)
Low risk	Duke treadmill score ≥ 5	< 5% ischemic myocardium	No stress-induced WMA
Intermediate risk	Duke treadmill score -10 to +4	5% to 10% ischemic myocardium	Stress-induced WMA in a single segment
High risk	ANY of the following: <ul style="list-style-type: none"> • Duke treadmill score ≤ -11 • ST segment elevation • Hypotension with exercise • Ventricular tachycardia • Prolonged ST segment depression 	ANY of the following: <ul style="list-style-type: none"> • > 10% ischemic myocardium • Stress-induced WMA in 2 or more segments • Significant stress-induced LV dysfunction • Transient ischemic LV dilation 	ANY of the following: <ul style="list-style-type: none"> • Stress-induced WMA in 2 or more segments • Significant stress-induced LV dysfunction • Transient ischemic LV dilation

Excerpted from Table 1.3 in the ACCF/SCAI/AATS/AHA/ASE/ASNC/HFSA/HRS/SCCM/SCCT/SCMR/STS 2012 Appropriate Use Criteria for Diagnostic Catheterization (Patel, 2012)

MPI = myocardial perfusion imaging; WMA = wall motion abnormality

Requirements

- Elective coronary angiography is generally to be considered only when a patient has undergone noninvasive evaluation.
- Coronary angiography requires conscious sedation; it should only be performed at locations where cardiac monitoring and appropriate equipment for cardiopulmonary resuscitation are readily available.

- Coronary angiography is never clinically appropriate when used as a screening test in asymptomatic individuals.

Clinical Indications

Patients with established CAD

Diagnostic coronary angiography is considered medically necessary in **ANY** of the following scenarios:

- Significant stenosis ($\geq 50\%$) in an unprotected left main coronary artery on recent CCTA
- Lesions of unclear severity in an unprotected left main coronary artery on recent CCTA
- Persistence or recurrence of unacceptable symptoms despite GDMT in patients with established CAD
- **ANY** of the following findings on recent noninvasive stress testing:
 - Stress-induced left ventricular dilation
 - Stress-induced fall in left ventricular ejection fraction
 - Increased lung/heart isotope uptake on stress imaging
 - Significant fall in systolic blood pressure during exercise (> 10 mmHg)
 - Stress-induced ventricular fibrillation or sustained ventricular tachycardia
- Intermediate- or high-risk findings (other than those listed above) on recent noninvasive stress testing (see [Table 1](#)) with **ANY** of the following:
 - Left main CAD is suspected and CCTA is not available or contraindicated
 - NYHA class III or IV heart failure
 - Left ventricular ejection fraction $< 35\%$
 - Persistence or recurrence of unacceptable symptoms despite GDMT
 - CABG or PCI within the preceding year
- Low-risk findings on noninvasive stress testing (see [Table 1](#)) in patient with persistence of unacceptable ischemic equivalent symptoms despite GDMT when CCTA is not available or contraindicated
- Angina, heart failure, arrhythmia, or abnormal stress testing despite GDMT within 90 days of inpatient evaluation for acute coronary syndrome (ACS)
- Within 45 days of STEMI in a patient known to have significant non-culprit vessel(s) stenosis with a view to percutaneous revascularization of that vessel(s)

Patients with suspected CAD

Diagnostic coronary angiography is considered medically necessary in **ANY** of the following scenarios:

- Lesions of unclear severity in an unprotected left main coronary artery on recent CCTA
- Newly recognized resting LV systolic dysfunction (ejection fraction $\leq 40\%$) when non-ischemic etiologies have been excluded in patients who are at intermediate or high risk of CAD (using ASCVD Pooled Cohort Equations)
- Persistence or recurrence of unacceptable symptoms in patients with $> 50\%$ stenosis on CCTA
- **ANY** of the following findings on recent noninvasive stress testing:
 - Stress-induced left ventricular dilation
 - Stress-induced fall in left ventricular ejection fraction
 - Increased lung/heart isotope uptake on stress imaging

- Significant fall in systolic blood pressure during exercise (>10 mmHg)
- Stress-induced ventricular fibrillation or sustained ventricular tachycardia
- Intermediate- or high-risk findings (other than those listed above) on recent noninvasive stress testing (see [Table 1](#)) with **ANY** of the following:
 - Left main CAD is suspected and CCTA is not available or contraindicated
 - NYHA class III or IV heart failure
 - Persistence of unacceptable symptoms despite GDMT
- Low-risk findings on noninvasive stress testing (see [Table 1](#)) in patient with persistence of unacceptable ischemic equivalent symptoms despite GDMT when CCTA is not available or contraindicated
- Equivocal or uninterpretable noninvasive stress testing in a patient with persistent symptoms when CCTA is not available or contraindicated

Patients with either suspected or established CAD

Diagnostic coronary angiography is considered medically necessary in **ANY** of the following scenarios:

- Patients resuscitated from sudden cardiac death (SCD) or with documented ventricular fibrillation or sustained ventricular tachycardia when coronary angiography has not been performed since SCD or identification of the arrhythmia
- Following cardiac transplant in a patient who has not undergone coronary angiography in the preceding 6 months
- Patients undergoing evaluation for transcatheter aortic valve replacement (TAVR) who fall into **ANY** of the following categories:
 - Men aged 41 years or older
 - Women who are postmenopausal
 - Established CAD
 - Intermediate or high risk of CAD (using ASCVD Pooled Cohort Equations)
 - Recent noninvasive testing (stress test or CCTA) suggesting CAD
- Patients undergoing evaluation for transcatheter valve replacement/repair (other than aortic valve replacement) or surgical valve replacement/repair who fall into **ANY** of the following categories:
 - Chronic severe secondary mitral regurgitation
 - Angina
 - Decreased LV systolic function
 - Established CAD
 - High risk of CAD (using ASCVD Pooled Cohort Equations)
 - Recent noninvasive testing (stress test or CCTA) suggesting CAD
- Congenital heart disease in **EITHER** of the following scenarios:
 - To exclude coexistent atheromatous CAD in patients undergoing surgical repair of congenital heart disease who have intermediate or high risk of CAD (using ASCVD Pooled Cohort Equations)
 - To evaluate congenital coronary artery anomalies when **ANY** of the following apply:
 - Diagnosis has been established using CCTA or cardiac MR, and coronary angiography will provide additional information which will change management
 - Patient has undergone CCTA or cardiac MR, and the diagnosis could not be excluded

- Neither CCTA nor MRI is available to establish or exclude the diagnosis in a patient with suspected disease
- CCTA and MRI have been considered, but neither study is considered appropriate for a patient with suspected disease

Rationale

The Carelon Clinical Appropriateness Guidelines for diagnostic coronary angiography are in concordance with professional society guidelines regarding the use of invasive coronary angiography and diagnostic cardiac catheterization for the evaluation of CAD.^{14,16,20} The appropriate evaluation and management of patients with known or suspected CAD rely on the patient's cardiac risk. For low-risk patients presenting with chest pain, there is no evidence that stress testing or cardiac imaging within 30 days of the initial emergency department visit improves outcomes.¹⁴

References

1. Al-Lamee R, Thompson D, Dehbi HM, et al. Percutaneous coronary intervention in stable angina (ORBITA): a double-blind, randomised controlled trial. *Lancet* (London, England). 2018;391(10115):31-40.
2. American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines; American Society of Echocardiography; American Society of Nuclear Cardiology; Heart Rhythm Society; Society of Cardiovascular Anesthesiologists; Society for Cardiovascular Angiography and Interventions; Society for Vascular Medicine; Society for Vascular Surgery, Fleisher LA, Beckman JA, Brown KA, et al. 2009 ACCF/AHA focused Update on Perioperative Beta Blockade Incorporated into the ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery. *J Am Coll Cardiol*. 2009; 54(22):e113–e118.
3. Bangalore S, Maron DJ, O'Brien SM, et al. Management of Coronary Disease in Patients with Advanced Kidney Disease. *N Engl J Med*. 2020;382(17):1608-18.
4. Bashore TM, Balter S, Barac A, et al. 2012 American College of Cardiology Foundation/Society for Cardiovascular Angiography and Interventions expert consensus document on cardiac catheterization laboratory standards update: A report of the American College of Cardiology Foundation Task Force on Expert Consensus documents developed in collaboration with the Society of Thoracic Surgeons and Society for Vascular Medicine. *J Am Coll Cardiol*. 2012; 59(24):2221-2305.
5. Brothers JA, Frommelt MA, Jaquiss RDB, et al. Expert consensus guidelines: Anomalous aortic origin of a coronary artery. *J Thorac Cardiovasc Surg*. 2017;153(6):1440-57.
6. Costanzo MR, Dipchand A, Starling R, et al. The International Society of Heart and Lung Transplantation Guidelines for the care of heart transplant recipients. *J Heart Lung Transplant*. 2010; 29(8):914-956.
7. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *JAMA*. 2001; 285(19):2486–97.
8. Ferraro R, Latina JM, Alfaddagh A, et al. Evaluation and Management of Patients With Stable Angina: Beyond the Ischemia Paradigm: JACC State-of-the-Art Review. *J Am Coll Cardiol*. 2020;76(19):2252-66.
9. Fihn SD, Gardin JM, Abrams J, et al. 2012 ACCF/AHA/ACP/AATS/PCNA/SCAI/STS guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, Preventive Cardiovascular Nurses Association, Society for Cardiovascular Angiography and Interventions, and Society of Thoracic Surgeons. *J Am Coll Cardiol*. 2012; 60(24):e44–e164.
10. Gibbons RJ, Abrams J, Chatterjee K, et al. ACC/AHA 2002 guideline update for the management of patients with chronic stable angina--summary article: a report of the American College of Cardiology/American Heart Association Task Force on practice guidelines (Committee on the Management of Patients with Chronic Stable Angina). *J Am Coll Cardiol*. 2003; 41(1):159–68.
11. Goff DC, Jr., Lloyd-Jones DM, Bennett G, et al. 2013 ACC/AHA guideline on the assessment of cardiovascular risk: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. 2014;63(25 Pt B):2935-59.
12. Götzberg M, Christiansen EH, Gudmundsdottir IJ, et al. Instantaneous Wave-free Ratio versus Fractional Flow Reserve to Guide PCI. *N Engl J Med*. 2017;376(19):1813-23.
13. Grani C, Buechel RR, Kaufmann PA, et al. Multimodality Imaging in Individuals With Anomalous Coronary Arteries. *JACC Cardiovasc Imaging*. 2017;10(4):471-81.

14. Gulati M, Levy PD, Mukherjee D, et al. 2021 AHA/ACC/AASE/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;78(22):e187-e285.
15. Mäkikallio T, Holm NR, Lindsay M, et al. Percutaneous coronary angioplasty versus coronary artery bypass grafting in treatment of unprotected left main stenosis (NOBLE): a prospective, randomised, open-label, non-inferiority trial. *Lancet (London, England).* 2016;388(10061):2743-52.
16. Maron DJ, Hochman JS, Reynolds HR, et al. Initial Invasive or Conservative Strategy for Stable Coronary Disease. *N Engl J Med.* 2020;382(15):1395-407.
17. McDonagh TA, Metra M, Adamo M, et al. 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J.* 2021;42(36):3599-726.
18. Nishimura RA, Otto CM, Bonow RO, et al. 2014 AHA/ACC Guidelines for the management of patients with valvular heart disease: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol.* 2014; 63(22):e57-185.
19. 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. *J Am Coll Cardiol.* 2021;77(4):e25-e197.
20. 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: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, Society for Cardiovascular Angiography and Interventions, American Association for Thoracic Surgery, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, Heart Rhythm Society, Society of Critical Care Medicine, Society of Cardiovascular Computed Tomography, Society for Cardiovascular Magnetic Resonance, and Society of Thoracic Surgeons. *J Am Coll Cardiol.* 2012; 59(22):1995–2027.
21. Patel MR, Calhoun JH, Dehmer GJ, et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2016 Appropriate Use Criteria for Coronary Revascularization in Patients With Acute Coronary Syndromes: 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, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Computed Tomography, and the Society of Thoracic Surgeons. *J Am Coll Cardiol.* 2017;69(5):570-91.
22. Scanlon PJ, Faxon DP, Audet AM, et al. ACC/AHA Guidelines for coronary angiography: A report of the American College of Cardiology/American Heart Association Task Force on practice guidelines (Committee on Coronary Angiography). Developed in collaboration with the Society for Cardiac Angiography and Interventions. *J Am Coll Cardiol.* 1999; 33(6):1756-1824.
23. Shaw LJ, Peterson ED, Shaw LK, et al. Use of a prognostic treadmill score in identifying diagnostic coronary disease subgroups. *Circulation.* 1998; 98(16):1622–30.
24. Spertus JA, Jones PG, Maron DJ, et al. Health Status after Invasive or Conservative Care in Coronary and Advanced Kidney Disease. *N Engl J Med.* 2020;382(17):1619-28.
25. Spertus JA, Jones PG, Maron DJ, et al. Health-Status Outcomes with Invasive or Conservative Care in Coronary Disease. *N Engl J Med.* 2020;382(15):1408-19.
26. Stone GW, Kappetein AP, Sabik JF, et al. Five-Year Outcomes after PCI or CABG for Left Main Coronary Disease. *N Engl J Med.* 2019;381(19):1820-30.
27. 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;139(14):e698-e800.
28. Vahanian A, Beyersdorf F, Praz F, et al. 2021 ESC/EACTS Guidelines for the management of valvular heart disease. *Eur Heart J.* 2022;43(7):561-632.
29. Warnes CA, Williams RG, Bashore TM, et al. ACC/AHA 2008 Guidelines 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 Practice Guidelines (writing committee to develop guidelines for the management of adults with congenital heart disease). *Circulation.* 2008; 118(23):2395-2451.
30. Wolk MJ, Bailey SR, Doherty JU, et al. ACCF/AHA/ASE/ASNC/HFSA/HRS/SCAI/SCCT/SCMR/STS 2013 multimodality appropriate use criteria for the detection and risk assessment of stable ischemic heart disease: a report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, American Heart Association, American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Failure Society of America, 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.* 2014; 63(4):380-406.
31. Wood DA, Cairns JA, Wang J, et al. Timing of Staged Nonculprit Artery Revascularization in Patients With ST-Segment Elevation Myocardial Infarction: COMPLETE Trial. *J Am Coll Cardiol.* 2019;74(22):2713-23.
32. Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA Guidelines for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on practice guidelines. *Circulation.* 2013; 128(16):e240-e327.

Codes

The following code list is not meant to be all-inclusive. Authorization requirements will vary by health plan. Please consult the applicable health plan for guidance on specific procedure codes.

Specific CPT codes for services should be used when available. Nonspecific or not otherwise classified codes may be subject to additional documentation requirements and review.

CPT/HCPCS

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92973	Percutaneous transluminal coronary thrombectomy mechanical (List separately in addition to code for primary procedure)
92974	Transcatheter placement of radiation delivery device for subsequent coronary intravascular brachytherapy (List separately in addition to code for primary procedure)
92978	Endoluminal imaging of coronary vessel or graft using intravascular ultrasound (IVUS) or optical coherence tomography (OCT) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation, and report; initial vessel (List separately in addition to code for primary procedure)
92979	Endoluminal imaging of coronary vessel or graft using intravascular ultrasound (IVUS) or optical coherence tomography (OCT) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation, and report; each additional vessel (List separately in addition to code for primary procedure)
93454	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation
93455	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography
93456	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right heart catheterization
93457	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography and right heart catheterization
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
93461	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography
C7516	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, with endoluminal imaging of initial coronary vessel or graft using intravascular ultrasound (ivus) or optical coherence tomography (oct) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation and report

C7518	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography with endoluminal imaging of initial coronary vessel or graft using intravascular ultrasound (ivus) or optical coherence tomography (oct) during diagnostic evaluation and/or therapeutic intervention including imaging, supervision, interpretation and report
C7519	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) including intraprocedural injection(s) for bypass graft angiography with intravascular doppler velocity and/or pressure derived coronary flow reserve measurement (initial coronary vessel or graft) during coronary angiography including pharmacologically induced stress
C7520	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) includes intraprocedural injection(s) for bypass graft angiography with iliac and/or femoral artery angiography, non-selective, bilateral or ipsilateral to catheter insertion, performed at the same time as cardiac catheterization and/or coronary angiography, includes positioning or placement of the catheter in the distal aorta or ipsilateral femoral or iliac artery, injection of dye, production of permanent images, and radiologic supervision and interpretation
C7521	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography with right heart catheterization with endoluminal imaging of initial coronary vessel or graft using intravascular ultrasound (ivus) or optical coherence tomography (oct) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation and report
C7522	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation with right heart catheterization, with intravascular doppler velocity and/or pressure derived coronary flow reserve measurement (initial coronary vessel or graft) during coronary angiography including pharmacologically induced stress
C7523	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, with endoluminal imaging of initial coronary vessel or graft using intravascular ultrasound (ivus) or optical coherence tomography (oct) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation and report
C7524	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, with intravascular doppler velocity and/or pressure derived coronary flow reserve measurement (initial coronary vessel or graft) during coronary angiography including pharmacologically induced stress
C7525	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography with endoluminal imaging of initial coronary vessel or graft using intravascular ultrasound (ivus) or optical coherence tomography (oct) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation and report
C7526	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography with intravascular doppler velocity and/or pressure derived coronary flow reserve measurement (initial coronary vessel or graft) during coronary angiography including pharmacologically induced stress
C7527	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, with endoluminal imaging of initial coronary vessel or graft using intravascular ultrasound (ivus) or optical coherence tomography (oct) during diagnostic evaluation and/or therapeutic intervention including imaging supervision, interpretation and report

C7528	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, with intravascular doppler velocity and/or pressure derived coronary flow reserve measurement (initial coronary vessel or graft) during coronary angiography including pharmacologically induced stress
C7529	Catheter placement in coronary artery(ies) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation, with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography with intravascular doppler velocity and/or pressure derived coronary flow reserve measurement (initial coronary vessel or graft) during coronary angiography including pharmacologically induced stress
C7557	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed and intraprocedural coronary fractional flow reserve (ffr) with 3d functional mapping of color-coded ffr values for the coronary tree, derived from coronary angiogram data, for real-time review and interpretation of possible atherosclerotic stenosis(es) intervention
C7558	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injection(s) for coronary angiography, imaging supervision and interpretation with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed, catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous grafts) with bypass graft angiography with pharmacologic agent administration (eg, inhaled nitric oxide, intravenous infusion of nitroprusside, dobutamine, milrinone, or other agent) including assessing hemodynamic measurements before, during, after and repeat pharmacologic agent administration, when performed

History

Status	Review Date	Effective Date	Action
Updated codes 10/20/2024	n/a	Unchanged	Added HCPCS codes C7516, C7518, C7519, C7520, C7521, C7522, C7523, C7524, C7525, C7526, C7527, C7528, and C7529.
Updated codes 04/01/2024	n/a	Unchanged	Added HCPCS codes C7557 and C7558.
Reaffirmed/ Updated	01/23/2024	Unchanged	Independent Multispecialty Physician Panel (IMPP) review. Guidelines reaffirmed. Added required language to the General Clinical Guideline per new Medicare regulations. Expanded guideline rationale.
Reaffirmed	07/18/2023	Unchanged	IMPP review. Guidelines reaffirmed.
Updated	n/a	04/01/2023	Added CPT codes 92973, 92974, 92978, 92979. Added references.
Revised	05/09/2022	11/06/2022* *for Anthem Medicaid 1/2024	IMPP review. Clarified that patients with established CAD who have failed GDMT may undergo coronary angiography regardless of how initially diagnosed.
Revised	05/26/2021	03/13/2022	IMPP review. Aligned guidelines with ISCHEMIA trial such that only those with persistent unacceptable symptoms and moderate or severe stress test abnormalities can proceed to coronary angiography/revascularization. Removed indication for asymptomatic patients. Expanded criteria to include non-culprit vessels in patients following STEMI. Added criteria for use prior to TAVR. Added references.
Revised	12/03/2020	09/12/2021	IMPP review. Replaced use of SCORE risk calculator with the AHA/ACC risk calculator (ASCVD Pooled Cohort Equations). Added reference.
Revised	02/03/2020	03/14/2021	IMPP review. Added criteria to specify appropriate scenarios for evaluation of suspected congenital coronary artery anomalies.

Status	Review Date	Effective Date	Action
Revised	07/11/2018	03/09/2019	IMPP review. Added the General Clinical Guideline.
Revised	03/01/2018	06/11/2018	IMPP review. Added language in preamble section to clarify application of this guideline to elective coronary angiography.
Revised	03/06/2017	01/02/2018	IMPP review. Original effective date.
Created	08/27/2015	-	Date of origin.