CLINICAL APPROPRIATENESS GUIDELINES

CARDIOLOGY

Appropriate Use Criteria: Diagnostic Coronary Angiography

Key to Revisions	Indicates
Blue underline	Insertion
~~Red strikethrough~~	Deletion
Yellow highlight	Substantive change

EFFECTIVE MARCH 13, 2022 ~~SEPTEMBER 12, 2021~~

Proprietary

Approval and implementation dates for specific health plans may vary. Please consult the applicable health plan for more details.

AIM Specialty Health disclaims any responsibility for the completeness or accuracy of the information contained herein.

8600 West Bryn Mawr Avenue
South Tower – Suite 800 Chicago, IL 60631
www.aimspecialtyhealth.com

Table of Contents

Description and Application of the Guidelines

The AIM Clinical Appropriateness Guidelines (hereinafter "the AIM 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. As used by AIM, the Guidelines establish objective and evidence-based criteria for medical necessity determinations where possible. In the process, multiple functions are accomplished:

- 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 advocate for patient safety concerns
- To enhance the quality of health care
- To promote the most efficient and cost-effective use of services

The AIM guideline development process complies with applicable accreditation 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. Relevant citations are included in the References section attached to each Guideline. AIM reviews all of its Guidelines at least annually.

AIM makes its Guidelines publicly available on its website twenty-four hours a day, seven days a week. Copies of the AIM Clinical Appropriateness Guidelines are also available upon oral or written request. Although the Guidelines are publicly-available, AIM considers the Guidelines to be important, proprietary information of AIM, which cannot be sold, assigned, leased, licensed, reproduced or distributed without the written consent of AIM.

AIM 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 AIM 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. If requested by a health plan, AIM will review requests based on health plan medical policy/guidelines in lieu of the AIM Guidelines.

The Guidelines may also be used by the health plan or by AIM 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 should outweigh any potential harms that may result (net benefit).
- Current literature and/or standards of medical practice should support that the recommended intervention offers the greatest net benefit among competing alternatives.
- Based on the clinical evaluation, current literature, and standards of medical practice, there exists a reasonable likelihood that the intervention will change management and/or lead to an improved outcome for the patient.

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 supersede the requirements set forth above. During the peer-to-peer conversation, factors such as patient acuity and setting of service may also be taken into account.

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.

Diagnostic Coronary Angiography

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

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

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 which 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 document.

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 ~~cardiac~~ 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 35% or less, advanced heart failure, or revascularization withing the preceding year.

Definitions

Advanced Chronic Kidney Disease: On dialysis or with Glomerular Filtration Rate < 30 ml per minute per 1.73 m^2

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

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.

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 ≤ 40%), or as an option for management of hypertension.
  - ACE Inhibitor or Angiotensin Receptor Blocker – In patients with left ventricular systolic dysfunction (ejection fraction ≤ 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 anti anginal 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.

Recent: Within the past 90 days

Established CAD: For the purpose of this guideline, patients with **any of the following** are considered to have established CAD. (Patients who do not meet this definition are considered to have suspected CAD).

- At least 70% stenosis (50% in the case of left main coronary artery) on CCTA or invasive coronary angiography
- History of unstable coronary syndrome
- History of percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG)

Suspected CAD: For the purposes of this guideline, patients who do not meet the above definition of Established CAD.

CCTA: CT coronary angiography

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

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 without imaging*	SPECT MPI or Stress PET *performed with imaging*	Stress Echocardiography *performed with 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: • Duke treadmill score ≤ -11 • ST-segment elevation • Hypotension with exercise • Ventricular tachycardia • Prolonged ST-segment depression	**ANY** of the following: • > 10% ischemic myocardium • Stress-induced WMA in 2 or more segments • Significant stress-induced LV dysfunction • Transient ischemic LV dilation	**ANY** of the following: • 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

~~**Table 2. Pretest probability of coronary artery disease by age, gender, and symptoms**~~

~~Age (yrs)~~	~~Gender~~	~~Typical/Definite Angina Pectoris~~	~~Atypical/Probable Angina Pectoris~~	~~Nonanginal Chest Pain~~	~~Asymptomatic~~
~~30-39~~	~~Men~~	~~Intermediate~~	~~Intermediate~~	~~Low~~	~~Very Low~~
	~~Women~~	~~Intermediate~~	~~Very Low~~	~~Very Low~~	~~Very Low~~
~~40-49~~	~~Men~~	~~High~~	~~Intermediate~~	~~Intermediate~~	~~Low~~
	~~Women~~	~~Intermediate~~	~~Low~~	~~Very Low~~	~~Very Low~~
~~50-59~~	~~Men~~	~~High~~	~~Intermediate~~	~~Intermediate~~	~~Low~~
	~~Women~~	~~Intermediate~~	~~Intermediate~~	~~Low~~	~~Very Low~~
~~60-69~~	~~Men~~	~~High~~	~~Intermediate~~	~~Intermediate~~	~~Low~~
	~~Women~~	~~High~~	~~Intermediate~~	~~Intermediate~~	~~Low~~

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

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 ~~arteriography~~ angiography is never clinically appropriate when used as a screening test in asymptomatic individuals.

Clinical Indications

Patients with established ~~coronary artery disease~~CAD

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

- ~~Asymptomatic patients with high-risk findings on noninvasive stress testing (see Table 1)~~
- ~~Symptomatic patients with **ANY** of the following:~~
  - ~~Intermediate- or high-risk findings on noninvasive stress testing (see Table 1)~~
  - ~~Persistent symptoms despite use of (or contraindication to) guideline directed antianginal medical therapy~~
  - ~~Angina, heart failure, or arrhythmia within 90 days of myocardial infarction when coronary angiography was not performed at the time of the infarction~~

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

- Significant stenosis (≥ 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
- **ANY** of the following findings on recent non-invasive 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-risk or high-risk findings (other than those listed above) on recent non-invasive 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 ~~coronary artery disease~~CAD

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

- ~~Asymptomatic patients with **ANY** of the following:~~
  - ~~High-risk findings on noninvasive stress testing (see Table 1)~~
  - ~~Resting LV systolic dysfunction (ejection fraction 40% or less) with evidence of viability in the dysfunctional segment~~
  - ~~Lesions of unclear severity (left main) on CCTA~~
- ~~Symptomatic patients with **ANY** of the following:~~

- ~~High pretest probability (see Table 2) of coronary artery disease (based on age, gender, and symptom description) in a patient with high risk of coronary artery disease (using ASCVD Pooled Cohort Equations)~~
- ~~Intermediate- or high-risk findings on noninvasive stress testing (see Table 1)~~
- ~~Low-risk findings on noninvasive stress testing (see Table 1) in a patient with ongoing ischemic equivalent symptoms~~
- ~~Equivocal or uninterpretable noninvasive stress testing~~
- ~~Resting LV systolic dysfunction (ejection fraction 40% or less) with evidence of viability in the dysfunctional segment~~
- ~~Newly recognized LV systolic dysfunction (ejection fraction ≤ 49%) of unknown etiology~~
- ~~Newly recognized regional wall motion abnormality of unknown etiology (regardless of ejection fraction)~~
- ~~CCTA finding of > 50% stenosis~~
- ~~Lesions of unclear severity (left main or non left main) on CCTA~~

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 ≤ 40%) when non-ischemic etiologies have been excluded in patients who are at intermediate or high risk of CAD (using ASCVD Pooled Cohort Equations)
- **ANY** of the following findings on recent non-invasive 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-risk or high-risk findings (other than those listed above) on recent non-invasive 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~~coronary artery disease~~

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 ~~scheduled to~~ undergoing evaluation for transcatheter aortic valve replacement (TAVR)~~/repair~~ who fall into **ANY** of the following categories:

- ~~Male~~ Men aged ~~> 40~~41 years and older
- Women who are postmenopausal
- ~~Persons with known~~ Established CAD~~coronary artery disease~~
- ~~Persons with I~~intermediate or high risk of CAD~~coronary artery disease~~ (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 MR
  - 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 ~~coronary artery disease~~CAD in patients undergoing surgical repair of congenital heart disease who have intermediate or high risk of CAD~~coronary artery disease~~ (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 ~~arteriography~~ 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 to be appropriate for a patient with suspected disease

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.

~~1.~~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):e13–e118.

3. Bangalore S, Maron DJ, O'Brien SM, et al. Management of Coronary Disease in Patients with Advanced Kidney Disease. The New England journal of medicine. 2020;382(17):1608-18.

~~2.~~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. The Journal of thoracic and cardiovascular surgery. 2017;153(6):1440-57.

~~3.~~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.

~~4.~~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. Journal of the American College of Cardiology. 2020;76(19):2252-66.

~~5.~~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.

~~6.~~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.

~~7.~~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. Journal of the American College of Cardiology. 2014;63(25 Pt B):2935-59.

12. Götberg M, Christiansen EH, Gudmundsdottir IJ, et al. Instantaneous Wave-free Ratio versus Fractional Flow Reserve to Guide PCI. The New England journal of medicine. 2017;376(19):1813-23.

~~8.~~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. 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.

15. Maron DJ, Hochman JS, Reynolds HR, et al. Initial Invasive or Conservative Strategy for Stable Coronary Disease. The New England journal of medicine. 2020;382(15):1395-407.

~~9.~~16. 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.

17. 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. Journal of the American College of Cardiology. 2021;77(4):e25-e197.

~~10.~~18. 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.

19. Patel MR, Calhoon 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. Journal of the American College of Cardiology. 2017;69(5):570-91.

~~11.~~20. 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.

~~12.~~21. 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.

22. Spertus JA, Jones PG, Maron DJ, et al. Health Status after Invasive or Conservative Care in Coronary and Advanced Kidney Disease. The New England journal of medicine. 2020;382(17):1619-28.

23. Spertus JA, Jones PG, Maron DJ, et al. Health-Status Outcomes with Invasive or Conservative Care in Coronary Disease. The New England journal of medicine. 2020;382(15):1408-19.

24. Stone GW, Kappetein AP, Sabik JF, et al. Five-Year Outcomes after PCI or CABG for Left Main Coronary Disease. The New England journal of medicine. 2019;381(19):1820-30.

~~13.~~25. 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.

~~14.~~26. 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.

~~15.~~27. 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.

28. Wood DA, Cairns JA, Wang J, et al. Timing of Staged Nonculprit Artery Revascularization in Patients With ST-Segment Elevation Myocardial Infarction: COMPLETE Trial. Journal of the American College of Cardiology. 2019;74(22):2713-23.

~~16.~~29. 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.

History

Status	Review Date	Effective Date	Action
Revised	05/26/2021	03-13-2022	Independent Multispecialty Physician Panel (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	~~Independent Multispecialty Physician Panel (~~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.
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.