Interventional cardiology

Background

Interventional cardiology is a subspecialty of cardiovascular medicine that focuses on the management of ischemic heart disease, congenital heart disease, and acquired valvular disease. The Accreditation Council for Graduate Medical Education (ACGME) defines interventional cardiology as the practice of techniques that improve coronary circulation, alleviate valvular stenosis and regurgitation, and treat other structural heart disease. Interventional cardiologists perform procedures such as:

- Coronary artery catheterization
- Angioplasty
- Intracoronary thrombolysis
- Valvuloplasty
- Coronary artery stent placement
- Intra-aortic balloon counterpulsation

Certification in interventional cardiology requires a 12-month fellowship accredited by the ACGME or the American Osteopathic Association (AOA). The American Board of Internal Medicine (ABIM) offers certification in interventional cardiology. The American Osteopathic Board of Internal Medicine (AOBIM) offers a certificate of added qualifications in interventional cardiology.

For a related white paper, see Clinical Privilege White Paper, Internal medicine—Practice area 135.

Involved specialties

Cardiologists, interventional cardiologists

Positions of specialty boards

**ABIM**

The ABIM offers certification in interventional cardiology. To become certified in the subspecialty, physicians must:

- Maintain current, valid ABIM certification in cardiovascular disease
- Complete the required formal training and procedural requirements
- Demonstrate clinical competence, procedural skills, and moral and ethical behavior in the clinical setting
- Hold a valid, unrestricted, and unchallenged license to practice medicine
- Pass the interventional cardiology certification examination
The interventional cardiology clinical training pathway requires 12 months of satisfactorily completed clinical fellowship training in interventional cardiology in addition to the required three years of accredited cardiovascular disease training.

During training in interventional cardiology, the fellow must have performed at least 250 therapeutic interventional cardiac procedures. Those out of training three years or more must document post-training performance as primary operator of 150 therapeutic interventional cardiac procedures in the two years prior to application for the exam.

With regard to clinical competence, ABIM requires documentation that candidates are competent in:
- Patient care and procedural skills
- Medical knowledge
- Practice-based learning and improvement
- Interpersonal and communication skills
- Professionalism
- Systems-based practice

All fellows must have satisfactory ratings of overall clinical competence and moral and ethical behavior for each year of training. They must also have satisfactory ratings in each of the components of clinical competence and the required procedures during the final year of required training.

**AOBIM**

The AOBIM offers a certificate of added qualifications in interventional cardiology. The fellowship is three years in duration, followed by one year of training in interventional cardiology. The training must occur in 1997 or later and must be AOA or ACGME accredited. Candidates must participate in a minimum of 300 cardiac interventional procedures and serve as the primary operator in a minimum of 200 of these cases. The training director must attest to the completion of the required number of procedures and also judge the clinical skill, judgment, and technical expertise of the candidate.

In order to receive the certificate, candidates must also:
- Pass a comprehensive one-day examination
- Have a valid, unrestricted license to practice medicine in a state of the United States
- Submit a clinical competence document from the director of the applicant’s interventional cardiology fellowship
- Have certification in internal medicine and cardiology by the AOA through the ABIM
- Have training in the field of clinical cardiac electrophysiology
The certificate of added qualifications in interventional cardiology is time-limited and valid for 10 years from the date of certification.

Positions of societies, academies, colleges, and associations

ACGME

The ACGME publishes program requirements for graduate medical education in interventional cardiology. According to its guidelines, fellows must have completed a cardiovascular disease program accredited by the ACGME in order to be eligible for an interventional cardiology program.

The ACGME describes interventional cardiology as the special knowledge and skill required of cardiologists to care for patients receiving cardiac interventional procedures. It includes techniques that improve coronary circulation, alleviate valvular stenosis, and treat valvular and structural heart disease.

The subspecialty program must function as an integral component of an accredited subspecialty fellowship in cardiovascular disease. The interventional cardiology program is accredited for 12 continuous months of clinical training.

In regard to competencies, the ACGME states that the program must integrate competencies in patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

To demonstrate patient care, fellows must have practiced health promotion, disease prevention, diagnosis, care and treatment of patients of each gender, from adolescence to old age, during health and all stages of illness. The fellow must demonstrate competence in the prevention, evaluation, and management of both inpatients and outpatients with:

➤ Acute ischemic syndromes
➤ Bleeding disorders or complications associated with percutaneous intervention or drugs
➤ Chronic ischemic heart disease
➤ Valvular and structural heart disease

Candidates must also demonstrate competence in:

➤ Caring for patients before and after interventional procedures
➤ Caring for patients in the cardiac care unit, emergency department, or other intensive care settings
➤ Outpatient follow-up of patients treated with drugs, interventions, devices, or surgery
➤ Use and limitations of intra-aortic balloon counterpulsation and other hemodynamic support devices (as available)
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➤ Use of antiarrhythmic drugs
➤ Use of thrombolytic and antithrombolytic, antiplatelet, and antithrombin agents
➤ Use of vasoactive agents for epicardial and microvascular spasm

The fellow must demonstrate competence performing:
➤ A minimum of 250 coronary interventions, including balloon angioplasty, stents, and other devices, and femoral and abnormally located coronary ostia
➤ Doppler flow, intracoronary pressure measurement and monitoring, and coronary flow reserve
➤ Hemodynamic measurements
➤ Intravascular ultrasound
➤ Ventriculography and aortography

The fellows must demonstrate competence managing mechanical complications of percutaneous intervention, such as:
➤ Cardiac tamponade, including pericardiocentesis
➤ Cardiogenic shock
➤ Coronary dissection
➤ Perforation
➤ Slow reflow
➤ Spasm
➤ Thrombosis

The fellow must also demonstrate competence managing patients with vascular assessment complications, including managing closure device complications and pseudoaneurysm. He or she must also demonstrate competence managing patients with major and minor bleeding complications, including retroperitoneal bleeding.

In regard to medical knowledge, fellows must demonstrate knowledge of the scientific method of problem solving and evidence-based decision-making. He or she must also demonstrate knowledge of indications, contraindications, limitations, complications, techniques, and interpretation of results of those diagnostic and therapeutic procedures that are integral to the discipline.

The fellow must demonstrate medical knowledge of:
➤ Detailed coronary anatomy
➤ Clinical utility and limitations in the treatment of valvular and structural heart disease
➤ Pathophysiology of restenosis
➤ Physiology of coronary flow and detection of flow-limiting conditions
➤ Radiation physics, biology, and safety related to the use of x-ray imaging equipment
➤ Strengths and limitations of both noninvasive and invasive coronary evaluation during the recovery phase after acute myocardial infarction
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➤ Strengths and limitations, both short- and long-term, of differing percutaneous approaches for a wide variety of anatomic situations related to cardiovascular disease
➤ Strengths and weaknesses of mechanical versus lytic approaches for patients with acute myocardiac infarction
➤ The assessment of plaque composition and response to intervention
➤ The clinical importance of complete versus incomplete revascularization in a wide variety of clinical and anatomic situations
➤ The role of emergency coronary bypass surgery in the management of complications of percutaneous intervention
➤ The role and limitations of established and emerging therapies to treat restenosis
➤ The role of platelets and the clotting cascade in response to vascular injury
➤ The role of randomized clinical trials and registry experiences in clinical decision-making
➤ The use of pharmacologic agents appropriate in the post-intervention management of patients

AOA

The AOA publishes Specific Basic Standards for Osteopathic Fellowship Training in Interventional Cardiology. The document states that candidates should complete a 12-month training program after completing a three-year general cardiology fellowship. Eleven of the 12 months must be spent in the interventional cardiology laboratory.

In regard to procedural training requirements, the fellow must participate in no fewer than 400 interventional procedures during the fellowship. The fellow must serve as the primary operator under supervision in no fewer than 250 cases.

To gain medical knowledge, the fellow must have learning activities in:
➤ Diagnosing cardiovascular disease states using catheter-based intervention. Indications for these interventions must be discussed along with alternatives such as medical therapy or surgery.
➤ Indications for urgent catheterization in the management of patients with acute coronary syndromes.
➤ Indications for the proper technical placement of intra-aortic balloon counterpulsation devices.
➤ Indications and proper technique for placement of emergency temporary pacemakers.
➤ Proper patient screening, evaluation, and preparation for interventional procedures.
➤ Selection and use of vascular access devices, guiding catheters, guide wires, and balloon catheters.
➤ The biological effects and indications for the use of pharmacologic agents that are common in interventional cardiology, including thrombolytics,
antiplatelet agents, antithrombin agents, anticoagulants, vasoactive drugs, antiarrhythmics, sedatives, analgesics, and radiocontrast agents.

➤ Managing coronary interventional complications, including but not limited to coronary dissection, coronary perforation, acute vessel closure, slow- and no-reflow phenomenon, distal coronary embolization, side branch occlusion, and local hemorrhage.

➤ Vascular biology, including plaque formation, vascular injury, and vasoreactivity.

➤ Regulation of the coagulation cascade.

➤ The process of native vessel and in-stent restenosis and the treatment options for each.

➤ Basic radiology safety principles and practice.

➤ Operating the radiographic equipment in the catheter table.

**SCAI**

To become a member of the Society for Cardiovascular Angiography and Interventions (SCAI), candidates must be eligible or certified by an appropriate certifying board and be eligible or certified by an appropriate subspecialty board in the primary specialty. Candidates must have completed at least one full year or its equivalent in training exclusively in the performance of cardiac catheterization and angiographic techniques and spend a significant percentage of their working time after training in the performance and interpretation of cardiac catheterization and angiographic studies. Each candidate must also qualify and submit documentation for catheterization lab privileges at their primary hospital.

To apply for fellowship in SCAI, the candidate must:

➤ Be eligible or certified by an appropriate certifying board (e.g., internal medicine, radiology, pediatrics) in the country in which he or she practices

➤ Be board eligible or certified by an appropriate subspecialty board, if one exists, in the primary specialty (e.g., cardiology, pediatric cardiology)

Alternately, the candidate must have completed appropriate training in cardiac and/or endovascular angiography and intervention, or in a related field (including noninvasive fields). The candidate must also have at least one full year or its equivalent in specialized training.

Invasive interventional cardiology fellow candidates must also meet at least one of the following three conditions:

➤ Have unrestricted privileges in the cardiovascular and/or endovascular catheterization laboratory in good standing as a primary operator for five years and have performed 2,000 diagnostic and interventional procedures as primary operator after training. Also, he or she must have cardiovascular or endovascular board certification. If not, the committee may consider other evidence of academic achievement, such as the number of articles published, books or chapters written, or presentations at major meetings.
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> Have demonstrated achievement of ABIM certification in interventional cardiology and currently have been in good standing in a catheterization laboratory for at least one year. He or she must also have performed a minimum of 100 interventions as primary operator after training.

> Have currently have been in good standing in a catheterization laboratory for at least one year and performed more than 400 diagnostic and interventional procedures after training as a pediatric/congenital interventional cardiologist.

Positions of accreditation bodies

**CMS**

CMS has no formal position concerning the delineation of privileges for interventional cardiology. However, the CMS *Conditions of Participation (CoP)* define a requirement for a criteria-based privileging process in §482.22(c)(6) stating, “The bylaws must include criteria for determining the privileges to be granted to individual practitioners and a procedure for applying the criteria to individuals requesting privileges.”

§482.12(a)(6) states, “The governing body must assure that the medical staff bylaws describe the privileging process. The process articulated in the bylaws, rules or regulations must include criteria for determining the privileges that may be granted to individual practitioners and a procedure for applying the criteria to individual practitioners that considers:

> Individual character
> Individual competence
> Individual training
> Individual experience
> Individual judgment

The governing body must ensure that the hospital’s bylaws governing medical staff membership or the granting of privileges apply equally to all practitioners in each professional category of practitioners.”

Specific privileges must reflect activities that the majority of practitioners in that category can perform competently and that the hospital can support. Privileges are not granted for tasks, procedures, or activities that are not conducted within the hospital, regardless of the practitioner’s ability to perform them.

Each practitioner must be individually evaluated for requested privileges. It cannot be assumed that every practitioner can perform every task, activity, or privilege specific to a specialty, nor can it be assumed that the practitioner should be automatically granted the full range of privileges. The individual practitioner’s ability to perform each task, activity, or privilege must be individually assessed.
CMS also requires that the organization have a process to ensure that practitioners granted privileges are working within the scope of those privileges.

CMS’ CoPs include the need for a periodic appraisal of practitioners appointed to the medical staff/granted medical staff privileges (§482.22[a][1]). In the absence of a state law that establishes a time frame for the periodic appraisal, CMS recommends that an appraisal be conducted at least every 24 months. The purpose of the periodic appraisal is to determine whether clinical privileges or membership should be continued, discontinued, revised, or otherwise changed.

The Joint Commission

The Joint Commission has no formal position concerning the delineation of privileges for interventional cardiology. However, in its Comprehensive Accreditation Manual for Hospitals, The Joint Commission states, “The hospital collects information regarding each practitioner’s current license status, training, experience, competence, and ability to perform the requested privilege” (MS.06.01.03).

In the introduction for MS.06.01.03, The Joint Commission states that there must be a reliable and consistent system in place to process applications and verify credentials. The organized medical staff must then review and evaluate the data collected. The resultant privilege recommendations to the governing body are based on the assessment of the data.

The Joint Commission introduces MS.06.01.05 by stating, “The organized medical staff is responsible for planning and implementing a privileging process.” It goes on to state that this process typically includes:

➤ Developing and approving a procedures list
➤ Processing the application
➤ Evaluating applicant-specific information
➤ Submitting recommendations to the governing body for applicant-specific delineated privileges
➤ Notifying the applicant, relevant personnel, and, as required by law, external entities of the privileging decision
➤ Monitoring the use of privileges and quality-of-care issues

MS.06.01.05 further states, “The decision to grant or deny a privilege(s) and/or to renew an existing privilege(s) is an objective, evidence-based process.”

The EPs for standard MS.06.01.05 include several requirements as follows:

➤ The need for all licensed independent practitioners who provide care, treatment, and services to have a current license, certification, or registration, as required by law and regulation
➤ Established criteria as recommended by the organized medical staff and approved by the governing body with specific evaluation of current licensure
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and/or certification, specific relevant training, evidence of physical ability, professional practice review data from the applicant’s current organization, peer and/or faculty recommendation, and a review of the practitioner’s performance within the hospital (for renewal of privileges)

➤ Consistent application of criteria
➤ A clearly defined (documented) procedure for processing clinical privilege requests that is approved by the organized medical staff
➤ Documentation and confirmation of the applicant’s statement that no health problems exist that would affect his or her ability to perform privileges requested
➤ A query of the NPDB for initial privileges, renewal of privileges, and when a new privilege is requested
➤ Written peer recommendations that address the practitioner’s current medical/clinical knowledge, technical and clinical skills, clinical judgment, interpersonal skills, communication skills, and professionalism
➤ A list of specific challenges or concerns that the organized medical staff must evaluate prior to recommending privileges (MS.06.01.05, EP 9)
➤ A process to determine whether there is sufficient clinical performance information to make a decision related to privileges
➤ A decision (action) on the completed application for privileges that occurs within the time period specified in the organization’s medical staff bylaws
➤ Information regarding any changes to practitioners’ clinical privileges, updated as they occur

The Joint Commission further states, “The organized medical staff reviews and analyzes information regarding each requesting practitioner’s current licensure status, training, experience, current competence, and ability to perform the requested privilege” (MS.06.01.07).

In the EPs for standard MS.06.01.07, The Joint Commission states that the information review and analysis process is clearly defined and that the decision process must be timely. The organization, based on recommendations by the organized medical staff and approval by the governing body, develops criteria that will be considered in the decision to grant, limit, or deny a request for privileges. The criteria must be consistently applied and directly relate to the quality of care, treatment, and services. Ultimately, the governing body or delegated governing body has the final authority for granting, renewing, or denying clinical privileges. Privileges may not be granted for a period beyond two years.

Criteria that determine a practitioner’s ability to provide patient care, treatment, and services within the scope of the privilege(s) requested are consistently evaluated.

The Joint Commission further states, “Ongoing professional practice evaluation information is factored into the decision to maintain existing privilege(s), to
revise existing privileges, or to revoke an existing privilege prior to or at the time of renewal” (MS.08.01.03).

In the EPs for MS.08.01.03, The Joint Commission says there is a clearly defined process facilitating the evaluation of each practitioner’s professional practice, in which the type of information collected is determined by individual departments and approved by the organized medical staff. Information resulting from the ongoing professional practice evaluation is used to determine whether to continue, limit, or revoke any existing privilege.

**HFAP**

The Healthcare Facilities Accreditation Program (HFAP) has no formal position concerning the delineation of privileges for interventional cardiology. The bylaws must include the criteria for determining the privileges to be granted to the individual practitioners and the procedure for applying the criteria to individuals requesting privileges (03.01.09). Privileges are granted based on the medical staff’s review of an individual practitioner’s qualifications and its recommendation regarding that individual practitioner to the governing body.

It is also required that the organization have a process to ensure that practitioners granted privileges are working within the scope of those privileges.

Privileges must be granted within the capabilities of the facility. For example, if an organization is not capable of performing open-heart surgery, no physician should be granted that privilege.

In the explanation for standard 03.01.13 related to membership selection criteria, HFAP states, “Basic criteria listed in the bylaws, or the credentials manual, include the items listed in this standard. (Emphasis is placed on training and competence in the requested privileges.)”

The bylaws also define the mechanisms by which the clinical departments, if applicable, or the medical staff as a whole establish criteria for specific privilege delineation.

Periodic appraisals of the suitability for membership and clinical privileges is required to determine whether the individual practitioner’s clinical privileges should be approved, continued, discontinued, revised, or otherwise changed (03.00.04). The appraisals are to be conducted at least every 24 months.

The medical staff is accountable to the governing body for the quality of medical care provided, and quality assessment and performance improvement (03.02.01) information must be used in the process of evaluating and acting on re-privileging and reappointment requests from members and other credentialed staff.
DNV

DNV has no formal position concerning the delineation of privileges for interventional cardiology. MS.12 Standard Requirement (SR) #1 states, “The medical staff bylaws shall include criteria for determining the privileges to be granted to individual practitioners and a procedure for applying the criteria to those individuals that request privileges.”

The governing body shall ensure that under no circumstances is medical staff membership or professional privileges in the organization dependent solely upon certification, fellowship, or membership in a specialty body or society.

Regarding the Medical Staff Standards related to Clinical Privileges (MS.12), DNV requires specific provisions within the medical staff bylaws for:

➤ The consideration of automatic suspension of clinical privileges in the following circumstances: revocation/restriction of licensure; revocation, suspension, or probation of a DEA license; failure to maintain professional liability insurance as specified; and noncompliance with written medical record delinquency/deficiency requirements

➤ Immediate and automatic suspension of clinical privileges due to the termination or revocation of the practitioner’s Medicare/Medicaid status

➤ Fair hearing and appeal

The Interpretive Guidelines also state that core privileges for general surgery and surgical subspecialties are acceptable as long as the core is properly defined.

DNV also requires a mechanism (outlined in the bylaws) to ensure that all individuals provide services only within the scope of privileges granted (MS.12, SR.4).

Clinical privileges (and appointments or reappointments) are for a period as defined by state law or, if permitted by state law, not to exceed three years (MS.12, SR.2).

Individual practitioner performance data must be measured, utilized, and evaluated as a part of the decision-making for appointment and reappointment. Although not specifically stated, this would apply to the individual practitioner’s respective delineation of privilege requests.

CRC draft criteria

The following draft criteria are intended to serve solely as a starting point for the development of an institution’s policy regarding interventional cardiology. The core privileges and accompanying procedure list are not meant to be all-encompassing. They define the types of activities, procedures, and privileges that the majority of practitioners in this specialty perform. Additionally, it cannot be
expected or required that practitioners perform every procedure listed. Instruct practitioners that they may strikethrough or delete any procedures they do not wish to request.

**Minimum threshold criteria for requesting privileges in interventional cardiology**

**Basic education:** MD or DO

**Minimal formal training:** Applicants must be able to demonstrate successful completion of an ACGME- or AOA-accredited training program in interventional cardiology or equivalent practice experience if training occurred prior to 2003. Applicants must also hold subspecialty certification in interventional cardiology by the ABIM or complete a certificate of added qualification in interventional cardiology by the AOBIM.

**Required current experience:** Applicants must be able to demonstrate that they have performed at least 75 percutaneous coronary intervention procedures, reflective of the scope of privileges requested, in the past 12 months or successful completion of an ACGME or AOA residency or clinical fellowship within the past 12 months.

**References**

If the applicant is recently trained, a letter of reference should come from the director of the applicant’s training program. Alternatively, a letter of reference may come from the applicable department chair and/or clinical service chief at the facility where the applicant most recently practiced.

**Core privileges in interventional cardiology**

Core privileges in interventional cardiology include the ability to admit, evaluate, treat, and provide consultation to adolescent and adult patients by use of specialized imaging and other diagnostic techniques to evaluate blood flow and pressure in the coronary arteries and chambers of the heart, as well as technical procedures and medications to treat abnormalities that impair the function of the cardiovascular system. Physicians may provide care to patients in the intensive care setting in conformance with unit policies. Privileges also include the ability to assess, stabilize, and determine the disposition of patients with emergent conditions consistent with medical staff policy regarding emergency and consultative call services. The core privileges in this specialty include the procedures on the following procedures list and such other procedures that are extensions of the same techniques and skills:

- Endomyocardial biopsy
- Femoral, brachial, or radial axillary cannulation for diagnostic angiography or percutaneous coronary intervention
- Interpretation of coronary arteriograms, ventriculography, and hemodynamics
- Intracoronary foreign body retrieval
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➤ Intracoronary infusion of pharmacological agents, including thrombolytics
➤ Intracoronary mechanical thrombectomy
➤ Intracoronary stents
➤ Intravascular ultrasound of coronaries
➤ Management of mechanical complications of percutaneous intervention
➤ Performance of balloon angioplasty, stents, and other commonly used interventional devices
➤ Percutaneous transluminal septal myocardial ablation
➤ Use of intracoronary Doppler and flow wire
➤ Use of vasoactive agents for epicardial and microvascular spasm

Special noncore privileges in interventional cardiology

If desired, noncore privileges are requested individually in addition to requesting the core. Each individual requesting noncore privileges must meet the specific threshold criteria governing the exercise of the privilege requested, including training, required previous experience, and maintenance of clinical competence. Noncore privileges include:
➤ Carotid stenting
➤ Percutaneous arterial septal defect/patent foramen ovale closure
➤ Valvuloplasty

Reappointment

Reappointment should be based on unbiased, objective results of care according to a hospital’s quality assurance mechanism.

To be eligible to renew privileges in interventional cardiology, the applicant must have current demonstrated competence and an adequate volume of experience (150 percutaneous coronary intervention procedures) with acceptable results, reflective of the scope of privileges requested, for the past 24 months based on results of ongoing professional practice evaluation and outcomes. Evidence of current physical and mental ability to perform privileges requested is required of all applicants for renewal of privileges. In addition, continuing education related to interventional cardiology should be required.

For more information

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American Osteopathic Association
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Website: www.osteopathic.org

American Osteopathic Board of Internal Medicine
1111 W. 17th Street
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Website: www.aobim.org

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