Vascular and interventional radiology

Background

Vascular and interventional radiology is the subspecialty of diagnostic radiology that encompasses the diagnosis of abnormalities and anomalies of the arteries, veins, and lymphatics.

Vascular and interventional radiologists complete specialized training in image-guided therapies, such as fluoroscopy, digital radiography, CT, sonography, and MRI, to guide a catheter in the body, usually in an artery, to treat at the source of the disease non-surgically, according to the Society for Interventional Radiology (SIR). These minimally invasive, image-guided approaches enable the safe performance of a large variety of effective therapeutic procedures, many without the need for general anesthesia or hospital admission.

Procedures performed by vascular and interventional radiologists include:

➤ Arterial and venous revascularizations (such as balloon angioplasty, thrombolysis, and stenting)
➤ Transcatheter embolotherapy
➤ Percutaneous inferior vena cava filter placement
➤ Endoluminal grafts for aneurysms, biliary and genitourinary drainages, and abscess drainages

Physicians wishing to become a vascular and interventional radiologist must successfully complete a one-year fellowship program in vascular and interventional radiology, following completion of a diagnostic radiology residency training program. Residency training to become a diagnostic radiologist includes one year of clinical work, followed by four years of training in diagnostic radiology.

Involved specialties
Radiologists

Positions of societies and academies

In its *Clinical Practice Guidelines*, SIR, in conjunction with the American Heart Association (AHA) and the American College of Radiology (ACR), makes recommendations for credentialing...
specific interventional radiology procedures. These recommendations invariably include performance of a particular number of cases necessary to meet the required training needed to perform a procedure. However, these numbers can be ambiguous for vascular cases because interventional radiologists may treat or catheterize multiple vessels in a single encounter. SIR states that when these numbers are used for credentialing purposes, the number should apply to a complete patient encounter regardless of the number of vessels selected or treated during a given encounter.

In its Position Statement: Documenting Physician Experience for Credentials for Peripheral Arterial Procedures—What You Need to Know, SIR references and supports the AHA’s minimum training numbers to perform peripheral percutaneous transluminal angioplasty:

➤ 100 peripheral arteriography procedures
➤ 50 peripheral/renal PTA procedures with 25 as primary operator
➤ 10 peripheral thrombolysis cases with five as primary operator

SIR also supports the AHA’s guideline that physicians should obtain 50 category 1 continuing medical education credits in peripheral angiography and interventions.

SIR states that there are few, if any, publications that have analyzed the learning curve necessary for interventional radiology procedures. Therefore, there is little scientific structure for developing credentialing standards.

ACR  In its Clinical Practice of Interventional Radiology and Neurointerventional Radiology White Paper, the ACR states that interventional radiologists’ ability to admit patients to the interventional service is very important when providing comprehensive care to a large minority of the patients. It not only signifies that the interventionalist is willing and able to take the lead responsibility for the patient while in the hospital, but it also is an important aspect of a service that will facilitate direct referrals to the interventional radiologist. The notion that a physician can take the lead role in treating a patient in the interventional suite but not take the lead role in providing care during the remainder of the patient’s hospital stay is antiquated and is the single best way to encourage a change in referral patterns from the interventionalist to another physician who is more than willing to
admit the patient when providing similar interventional services regardless of his or her specialty.

The number of physicians within the radiology department who provide interventional services and have admitting privileges should be sufficient to provide 24-hour interventional call coverage. This includes managing the clinical problems that fall within the interventionalist’s scope of practice and making appropriate referrals when clinical problems go beyond the interventionalist’s scope of practice.

In addition, part of the daily duties of the interventional radiologist should be clinical rounds. Any patient who is admitted to the interventional service or has a clinical problem that is being managed by the interventional service in consultation must be seen by the interventional radiologist or by a nonphysician practitioner who is under the direct supervision of the interventional radiologist. Furthermore, the interventional radiologist should personally see any patient who is admitted to the interventional service or has a significant portion of his or her inpatient care managed by the interventional service. This includes patients treated with abscess drainage. The physician inpatient visit can be done in concert with the nonphysician practitioner visit. The latter strategy will ensure the most efficient use of physician time while maintaining the all-important personal contact provided to the patient by the interventional radiologist.

Positions of other interested parties

The American Board of Radiology (ABR) offers subspecialty certification in vascular interventional radiology. Applicants must already hold certification in diagnostic radiology by the ABR. Requirements include:

➤ Successful completion of one year of fellowship training (after residency) in a vascular interventional radiology program accredited by the Accreditation Council for Graduate Medical Education (ACGME) or by the Royal College of Physicians and Surgeons of Canada. Applicants must also complete one year of practice or additional approved training, with one-third of that year spent in vascular interventional radiology.

➤ Fellowship training documented by a letter from the program director.

➤ Practice experience verified by a letter from the chief of the service or department chair.

➤ Procedure logs from fellowship and practice year.

➤ Current state medical license with expiration date.
A physician who has already been certified by the ABR may attain subspecialty certification without taking an accredited fellowship in vascular interventional radiology if the applicant is on the subspecialty faculty at an institution with an accredited fellowship in that discipline. Serving on the subspecialty faculty for at least two years as a 75% full-time employee (FTE) in that discipline, or for three years as a 50% FTE in that discipline, would qualify the faculty member to take the initial subspecialty examination. Less than 50% FTE in a subspecialty is not acceptable to qualify for the alternate pathway.

AOA/AOBR

The American Osteopathic Board of Radiology (AOBR) is authorized by the American Osteopathic Association (AOA) to grant certification in vascular interventional radiology.

To become certified, applicants must:
➤ Be a diplomate of the AOBR in radiology or diagnostic radiology
➤ Have completed a period of one year of formal concentrated study approved by the AOA in the specific area of examination
➤ Have American Osteopathic College of Radiology approval of all completed training
➤ Be licensed to practice in the state where his/her practice is conducted
➤ Show evidence of conformity to the standards set forth in the AOA’s code of ethics
➤ Be a member in good standing of the AOA or the Canadian Osteopathic Association for the two years immediately prior to the date of certification
➤ Successfully complete the subspecialty examination

ACGME

Programs in vascular interventional radiology approved by the ACGME are one year in length.

According to the ACGME, the training program must include didactic and clinical experiences that encompass the full clinical spectrum of vascular interventional radiology. Fellows must have the opportunity to carry out all of the following under close, graded responsibility and supervision:
➤ Clinical pre-procedure evaluation of patients
➤ Interpretation of diagnostic studies
➤ Consultation with clinicians on other services
➤ Performance of vascular and interventional procedures
➤ Generation of formal consultation reports
➤ Procedural reports
➤ Follow-up communications with referring physicians and delivery of both short- and long-term follow-up care, including inpatient rounds and scheduled outpatient clinical responsibilities

Both vascular and nonvascular interventional procedures must be included in the training program. Examples of vascular procedures include but are not limited to:
➤ Arteriography
➤ Venography
➤ Lymphography
➤ Angioplasty
➤ Vascular stenting
➤ Percutaneous revascularization procedures
➤ Embolotherapy
➤ Transcatheter infusion therapy
➤ Intravascular foreign body removal
➤ Percutaneous placement of endovascular prostheses such as stent grafts and inferior vena cava filters and insertion of vascular access catheters

Examples of nonvascular procedures include but are not limited to:
➤ Percutaneous imaging-guided biopsy
➤ Percutaneous gastrostomy
➤ Percutaneous nephrostomy
➤ Ureteral stenting and other transcatheter genitourinary procedures for diagnosis and for treatment of lithiasis, obstruction, and fistula
➤ Percutaneous transhepatic and transcholecystic biliary procedures
➤ Percutaneous drainage for diagnosis and treatment of infections and other fluid collections
➤ Percutaneous imaging-guided procedures such as ablation of neoplasms and cysts

Fellows must have specific clinical time dedicated to the performance and interpretation of vascular ultrasound studies, magnetic resonance angiograms, and CT angiograms.

The responsibility or independence given to fellows must depend on an assessment of their knowledge, manual skill, and experience. In supervising fellows during vascular and interventional procedures, faculty members should reinforce the understanding gained during fellowship training.
of x-ray generators, image intensifiers, film processing, ultrasonography, CT, and other imaging modalities.

Fellows must be provided with instruction in the use of needles, catheters, guide wires, balloons, stents, and other interventional devices.

Fellows should also be instructed in proper use and interpretation of laboratory tests and in methods that are adjunctive to vascular and interventional procedures, such as use of physiologic monitoring, devices, noninvasive vascular testing, and noninvasive vascular imaging.

There should be specific instruction in the clinical aspects of patient assessment, patient treatment, planning, and patient management related to vascular interventional radiology in both inpatient and outpatient settings.

There also should be instruction in the use of analgesics, antibiotics, and other drugs commonly employed in conjunction with these procedures.

Fellows must be thoroughly familiar with all aspects of administering and monitoring sedation of the conscious patient. They also must have advanced cardiac life support training and certification.

**OSHA**  
The Occupational Safety and Health Administration (OSHA) does not have a formal position on the delineation of privileges for interventional radiologists.

However, the *OSHA Program Manual for Medical Facilities* states that employees who work in regulated areas who can potentially be exposed to radiation must be monitored for exposure levels through the use of monitoring devices. According to OSHA, an exposure of 5 rem per year is considered safe for employees.

Additionally, OSHA’s guidelines for radiation safety state that employees must take an annual radiation safety refresher course that includes a review of the basics of radiation protections, including the principles of time, distance, and shielding.

**CMS**  
CMS’ *Conditions of Participation for Hospitals—Radiologic Services*, §482.26, states that the hospital must maintain or have
available diagnostic radiologic services. If therapeutic services are also provided, they, as well as the diagnostic services, must meet professionally approved standards for safety and personnel qualifications.

Furthermore, in §482.26(b), CMS states that the radiologic services, particularly ionizing radiology procedures, must be free from hazards for patients and personnel.

The ECRI Institute

The ECRI Institute is an organization that researches and publishes specialized information for hospitals, government agencies, and healthcare plans on a variety of issues regarding patient safety, quality improvement, risk management, procurement, and health policy. It also offers consulting services and educational events on these same topics.

In its guidance article, “Vascular and Interventional Radiology CT Radiation Dose,” the Institute notes that as CT technology has become more precise and powerful, the potential for higher radiation doses has grown.

In the document, the Institute outlines recommendations to help facilities get their CT doses under control, grouped into the following categories, several of which affect radiologists:

➤ Prioritizing dose reduction
➤ Determining CT parameters to be incorporated into scanning protocols
➤ Patient selection
➤ Monitoring doses continuously as part of quality control

The Institute also outlines several points regarding the risks of CT radiation in a slide presentation, “Vascular and Interventional Radiology Radiation Dose in CT.”

In the presentation, the Institute notes that although CT is “indispensable” to modern medicine, there are issues of risk to be considered. For example, according to a report in the August 2009 New England Journal of Medicine, many CT studies expose patients to an unnecessary risk of cancer without a demonstrated benefit. Further, the Institute notes that in October 2009, the Cedars-Sinai Medical Center in Los Angeles reported that more than 200 patients had been accidentally exposed to extremely high doses of radiation during CT stroke scans. The Institute also notes that pediatric patients in particular are at risk.
The Institute states that risks can be mitigated by:

➤ Eliminating unnecessary CT use.
➤ Raising referring physician awareness of the dangers of radiation doses.
➤ Using lower or zero-radiation alternatives when possible.
➤ Quality assurance: Small calibrations can affect the dose level.
➤ Optimization of protocols: A variety of units of measure are used to specify radiation dose in diagnostic imaging. These units of measure are poorly understood and sometimes do not convey adequate information for comparison between procedures.
➤ Using patient-specific dose controls.

The Joint Commission (formerly JCAHO) has no formal position concerning the delineation of privileges for vascular and interventional radiology. 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 rationale 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 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 says the information review and analysis process is clearly defined. 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 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.

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 this practice area.

**Minimum threshold criteria for requesting core privileges in vascular and interventional radiology**

**Basic education:** MD or DO  
**Minimal formal training:** Successful completion of an ACGME- or AOA-accredited residency in diagnostic radiology, followed by completion of a one-year accredited fellowship in vascular and interventional radiology and/or current subspecialty certification or active participation in the examination process (with achievement of certification within [n] years) leading to subspecialty certification in vascular and interventional radiology by the ABR or completion of a certificate of added qualifications in vascular and interventional radiology by the AOBR.  
**Required previous experience:** At least 500 vascular and interventional radiology procedures, reflective of the scope of privileges requested, in the past 12 months or successful completion of an ACGME- or AOA-accredited residency or clinical fellowship within the past 12 months.

**References**

A letter of reference must come from the director of the applicant’s training program in vascular and interventional radiology. Alternatively, a letter of reference regarding competence should come from the chief of vascular and interventional radiology at the institution where the applicant most recently practiced.

**Core privileges in vascular and interventional radiology**

Core privileges in vascular and interventional radiology include the ability to admit, evaluate, diagnose, and treat patients of all ages by various radiologic imaging modalities (fluoroscopy, digital radiography, CT, sonography, and MRI). Physicians may also provide care to patients in the intensive care unit.
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Care setting in conformance with unit policies. Core 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.

Core privileges include but are not limited to:

➤ Angiography/arteriography
➤ Angioplasty
➤ Arthrography
➤ Coil occlusions of aneurysms
➤ Endovenous laser therapy
➤ Insertion and management of central venous and dialysis access line
➤ Lymphography
➤ Myelography and cisternography
➤ Neurointerventional procedures for pain, including epidural steroid injection, nerve blocks, and discography
➤ Noninvasive diagnostic vascular radiology, including ultrasonography, pulse volume recordings, CT, and MRI
➤ Nonvascular interventional procedures, including soft-tissue biopsy, abscess and fluid drainage, gastrostomy, nephrostomy, biliary procedures, ablation of neoplasms and cysts, and ureteral stents
➤ Placement of catheter for tumor treatment
➤ Placement of inferior vena cava filter
➤ Therapeutic infusion of vasoactive agents
➤ Therapeutic vascular radiology, including balloon angioplasty, stent placement, atherectomy, intra-arterial and IV thrombolytic therapy, and embolization/ablation, including transarterial chemoembolization (excluding carotid and intracranial intervention)
➤ Transcervical fallopian tube recannalization
➤ Transjugular intrahepatic portosystemic shunt (tips)
➤ Uterine artery embolization for leiomyoma
➤ Venography and venous sampling

Reappointment

Reappointment should be based on unbiased, objective results of care according to the hospital’s existing quality assurance mechanisms.

Applicants must demonstrate that they have maintained competence by showing evidence that they have successfully completed at least 500 vascular and interventional radiology procedures,
reflective of the scope of privileges requested, annually over the reappointment cycle based on the results of ongoing professional practice evaluation and outcomes.

In addition, continuing medical education related to vascular and interventional radiology should be required.

**For more information**

For more information regarding this practice area, contact:

Accreditation Council for Graduate Medical Education  
515 North State Street, Suite 200  
Chicago, IL 60654  
Telephone: 312/755-5000  
Fax: 312/755-7498  
Website: www.acgme.org

American Board of Medical Specialties  
1007 Church Street, Suite 404  
Evanston, IL 60201-5913  
Telephone: 847/491-9091 or 800/776-2378  
Fax: 847/328-3596  
Website: www.abms.org

American Board of Radiology  
5441 East Williams Boulevard, Suite 200  
Tucson, AZ 85711  
Telephone: 520/790-2900  
Fax: 520/790-3200  
Website: www.theabr.org

American Osteopathic Association  
142 East Ontario Street  
Chicago, IL 60611  
Telephone: 800/621-1773  
Fax: 312/202-8200  
Website: www.osteopathic.org

American Osteopathic Board of Radiology  
119 East Second Street  
Milan, MO 63556  
Telephone: 660/265-4011  
Fax: 660/265-3494  
Website: www.aocr.org
Centers for Medicare & Medicaid Services
7500 Security Boulevard
Baltimore, MD 21244
Telephone: 877/267-2323
Website: www.cms.hhs.gov

OSHA
U.S. Department of Labor
Occupational Safety & Health Administration
200 Constitution Avenue
Washington, DC 20210
Telephone: 800/321-OSHA
Website: www.osha.gov

The Joint Commission
One Renaissance Boulevard
Oakbrook Terrace, IL 60181
Telephone: 630/792-5000
Fax: 630/792-5005
Website: www.jointcommission.org

Society of Interventional Radiology
3975 Fair Ridge Drive
Suite 400 North
Fairfax, VA 22033
Telephone: 800/488-7284 or 703/691-1805
Fax: 703/691-1855
Website: www.sirweb.org
To be eligible to request clinical privileges in vascular and interventional radiology, an applicant must meet the following minimum threshold criteria:

➤ Basic education: MD or DO.

➤ Minimum formal training: Successful completion of an ACGME- or AOA-accredited residency in diagnostic radiology, followed by completion of a one-year accredited fellowship in vascular and interventional radiology and/or current subspecialty certification or active participation in the examination process (with achievement of certification within [n] years) leading to subspecialty certification in vascular and interventional radiology by the ABR or completion of a certificate of added qualifications in vascular and interventional radiology by the AOBR.

➤ Required previous experience: At least 500 vascular and interventional radiology procedures, reflective of the scope of privileges requested, in the past 12 months or successful completion of an ACGME- or AOA-accredited residency or clinical fellowship within the past 12 months.

➤ References: A letter of reference must come from the director of the applicant’s training program in vascular and interventional radiology. Alternatively, a letter of reference regarding competence should come from the chief of vascular and interventional radiology at the institution where the applicant most recently practiced.

➤ Core privileges: Core privileges in vascular and interventional radiology include the ability to admit, evaluate, diagnose, and treat patients of all ages by various radiologic imaging modalities (fluoroscopy, digital radiography, CT, sonography, and MRI). Physicians may also provide care to patients in the intensive care setting in conformance with unit policies. Core 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. Core privileges include but are not limited to:
  - Angiography/arteriography
  - Angioplasty
  - Arthrography
  - Coil occlusions of aneurysms
  - Endovenous laser therapy
  - Insertion and management of central venous and dialysis access line
  - Lymphography
  - Myelography and cisternography
  - Neurointerventional procedures for pain, including epidural steroid injection, nerve blocks, and discography
Noninvasive diagnostic vascular radiology, including ultrasonography, pulse volume recordings, CT, and MRI

Nonvascular interventional procedures, including soft-tissue biopsy, abscess and fluid drainage, gastrostomy, nephrostomy, biliary procedures, ablation of neoplasms and cysts, and ureteral stents

Placement of catheter for tumor treatment

Placement of inferior vena cava filter

Therapeutic infusion of vasoactive agents

Therapeutic vascular radiology, including balloon angioplasty, stent placement, atherectomy, intra-arterial and IV thrombolytic therapy, and embolization/ablation, including transarterial chemoembolization (excluding carotid and intracranial intervention)

Transcervical fallopian tube recannalization

Transjugular intrahepatic portosystemic shunt (tips)

Uterine artery embolization for leiomyoma

Venography and venous sampling

➤ Reappointment: Reappointment should be based on unbiased, objective results of care according to the hospital’s existing quality assurance mechanisms.

Applicants must demonstrate that they have maintained competence by showing evidence that they have successfully completed at least 500 vascular and interventional radiology procedures, reflective of the scope of privileges requested, annually over the reappointment cycle based on the results of ongoing professional practice evaluation and outcomes.

In addition, continuing medical education related to vascular and interventional radiology should be required.

I understand that by making this request, I am bound by the applicable bylaws or policies of the hospital, and hereby stipulate that I meet the minimum threshold criteria for this request.

Physician’s signature: _________________________________________________________

Typed or printed name: _________________________________________________________

Date: _________________________________________________________________________
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