Editors' Choice

Guidelines for hospital privileges in vascular surgery and endovascular interventions: Recommendations of the Society for Vascular Surgery

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ABSTRACT

The Hospital Privileges Practice Guideline Writing Group of the Society for Vascular Surgery is making the following five recommendations concerning guidelines for hospital privileges for vascular surgery and endovascular therapy. Advanced endovascular procedures are currently entrenched in the everyday practice of specialized vascular interventionalists, including vascular surgeons, but open vascular surgery remains uniquely essential to the specialty. First, we endorse the Residency Review Committee for Surgery recommendations regarding open and endovascular cases during vascular residency and fellowship training. Second, applicants for new hospital privileges wishing to perform vascular surgery should have completed an Accreditation Council for Graduate Medical Education-accredited vascular surgery residency or fellowship or American Osteopathic Association-accredited training program before 2020 and should obtain American Board of Surgery certification in vascular surgery or American Osteopathic Association certification within 7 years of completion of their training. Third, we recommend that applicants for renewal of hospital privileges in vascular surgery include physicians who are board certified in vascular surgery, general surgery, or cardiothoracic surgery. These physicians with an established practice in vascular surgery should participate in Maintenance of Certification programs as established by the American Board of Surgery and maintain their respective board certification. Fourth, we provide recommendations concerning guidelines for endovascular procedures for vascular surgeons and other vascular interventionalists who are applying for new or renewed hospital privileges. All physicians performing open or endovascular procedures should track outcomes using nationally validated registries, ideally by the Vascular Quality Initiative. Fifth, we endorse the Intersocietal Accreditation Commission recommendations for noninvasive vascular laboratory interpretations and examinations to become a Registered Physician in Vascular Interpretation, which is included in the requirements for board eligibility in vascular surgery, but recommend that only physicians with demonstrated clinical experience in the diagnosis and management of vascular disease be allowed to interpret these studies. (J Vasc Surg 2018;67:1337-44.)

The following recommendations of the Society for Vascular Surgery (SVS) are meant to provide guidelines for granting hospital privileges to perform vascular interventions including open surgical and endovascular procedures of blood vessels in the body, excluding intracardiac and intracranial vessels. Of note, these

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Author conflict of interest: K.M.J. is an owner of National Office Endovascular Labs LLC. T.P.S. holds an officer position with TMT Systems and Peritec Biosciences. W.P.S. has been a consultant and lecturer for Medtronic.

These guidelines were reviewed and are endorsed by the Association of Program Directors in Vascular Surgery: William D. Jordan, MD (President), Jeffrey Jim, MD (Education Committee Chair).

Independent peer review and oversight have been provided by members of the Society for Vascular Surgery (SVS) Document Oversight Committee: Thomas L. Forbes, MD (Chair), Ali AbuRahma, MD, Neal Barshes, MD, Ruth Bush, MD, Ronald L. Dalman, MD, Hans Henning Eckstein, MD, Anil Hingorani, MD, Eva Rzucidlo, MD, Marc Schermerhorn, MD. The Document Oversight Committee approved the final version, and the Guidelines were endorsed as an official SVS document by the Executive Committee: R. Clement Darling III, MD (Chair), Ali F. AbuRahma, MD, Michael Belkin, MD, Ronald M. Fairman, MD, Kim J. Hodgson, MD, Michel S. Makaroun, MD, Samuel R. Money, MD, and William Shutze, MD. A public consultation period followed, with these guidelines posted on the SVS website (www.vascular.org) and sent electronically to all members. Revisions were made by the writing group in response to comments received.

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interventions also apply to the thoracic aorta (exclusive of intracardiac vessels). These guidelines are intended to be inclusive, applying to individuals completing Accreditation Council for Graduate Medical Education (ACGME)-accredited vascular surgery training programs as well as individuals who have completed training in other catheter-based procedures, such as interventional cardiology and interventional radiology. We encourage hospitals to consider these guidelines for all specialties when granting endovascular privileges.

Although the ultimate determination of who should and should not practice vascular surgery and endovascular therapy in a given hospital remains its own responsibility, these SVS guidelines provide a reference for credentialing committees regardless of the specialty of the applicant. The most recent guidelines for credentialing and hospital privileges in vascular surgery were published in 2008.[1] The specialty of vascular surgery has evolved with the creation of primary board certification such that general surgery board certification[2] is no longer a prerequisite for new vascular training paradigms.

Establishing minimum annual case volumes for every open and endovascular procedure for vascular surgeons or other interventionalists in clinical practice as a measure of competency is beyond the scope of the SVS at this time, and other specialties agree with this position.[2] Such guidelines for every arterial tree cannot be defended with existing supporting data and would be so subject to opinion that they would not be relevant. The SVS recommends that hospitals take into account board certification and Maintenance of Certification (MOC), irrespective of specialty, along with guidelines established by interventionalists practicing at a given hospital during the appointment process. The specialists performing both open surgical and endovascular procedures should also perform ongoing evaluation of outcomes of these interventions.

DEFINITION OF VASCULAR SURGERY

Vascular surgery is the specialty that deals with the diagnosis and management of disorders of the arterial, venous, and lymphatic systems, exclusive of intracardiac and intracranial vessels but including the thoracic aorta. We wish to emphasize that a fully trained "vascular surgeon" should be considered a vascular specialist who performs traditional open surgery but who also performs endovascular interventions and is competent to treat vascular diseases with noninterventional means. A fully trained vascular surgeon must have advanced knowledge and experience in the following six areas:

1. Pathophysiology and natural history: Understanding of the pathophysiology and the natural history of vascular disorders to include atherosclerosis, intimal hyperplasia, nonatherosclerotic arterial disease, vasculitides, thrombophilia and thrombotic disorders, venous and lymphatic diseases, and vascular end-organ disorders.
2. Clinical management: Clinical evaluation of vascular patients, including history, physical examination, and medical management including pharmacotherapy and risk factor reduction.
3. Vascular diagnostic testing and imaging: Noninvasive and invasive diagnostic testing of vascular disease, including but not limited to duplex ultrasound scanning, Doppler testing, plethysmography, magnetic resonance imaging, computed tomography angiography, contrast angiography and venography, intravascular ultrasound, and other new and evolving imaging tools.
4. Open vascular surgery: Indications for and techniques of open surgical treatment, including management of their complications, for vascular disorders involving arteries, veins, and lymphatic vessels throughout the body, exclusive of intrinsic cardiac and intracerebral vessels. These arteries include the carotid artery and its extracranial branches, vertebral arteries, upper extremity arteries, intrathoracic arch branches, aortic arch and descending thoracic aorta, abdominal aorta, visceral and renal arteries, and pelvic and lower extremity arteries. Venous[2] and lymphatic disorders are also included. The SVS confirms that vascular surgeons are the only specialists trained to treat patients with pathologic processes affecting all of these vessels with open surgical treatment while also being the only specialists that can effectively treat complications of said operations with appropriate endovascular and open surgical intervention.[1]
5. Endovascular therapy: Indications for and techniques of endovascular interventions, including management of their complications, for vascular disorders involving all vessels listed for open surgery. Although vascular surgeons may not be the only specialists that can treat patients with these lesions with endovascular treatment, they are the only specialists that can offer the comprehensive and combined elements of medical management, endovascular therapy, or open surgery as effective initial treatment for all of these disorders affecting all of the vessels listed. They are also the only specialists able to effectively treat complications of endovascular intervention with appropriate endovascular and open surgical intervention.
6. Critical care management: Management of patients including preoperative and postoperative evaluation and treatment of vascular patients in the intensive care setting. This management includes understanding indications and techniques for the insertion of peripheral artery, central venous, and pulmonary artery catheters for hemodynamic monitoring.

In summary, it is the position of the SVS that vascular surgeons are the only specialists trained to treat patients with all of the defined vascular disorders and vascular trees with both open and endovascular treatments while also being able to effectively treat complications with appropriate endovascular or open surgical methods.

TRAINING AND CERTIFICATION IN VASCULAR SURGERY

Currently there are three pathways approved by the ACGME for training in vascular surgery that lead to board certification by the American Board of Surgery (ABS), a member board of the American Board of Medical Specialties.

1. Traditional pathway. This traditional training paradigm, which requires 7 years to complete, is referred to as a 5 + 2 pathway. This pathway remains the most common training paradigm, with 77 vascular surgery training programs in the Electronic Residency Application Service of the Association of American Medical Colleges participating in this traditional pathway (www.aamc.org). This pathway requires completion of a 5-year general surgery training program at an ACGME-approved site with a minimum experience of 850 total operative procedures during this training. Completion of general surgery training is followed by 2 years of vascular surgery training at an ACGME-approved site, which can be at the same institution or a different one, with an operative experience requirement of at least 250 major vascular reconstructions. On completing this traditional 5 + 2 pathway, the trainee is eligible for board certification in both general surgery and vascular surgery by the ABS. Although the ABS initially required board certification in general surgery before board certification in vascular surgery, an ABS policy enacted in 2012 now requires that the candidate have only an approved application for the general surgery qualifying examination for eligibility for vascular surgery boards (www.absurgery.org).
2. Integrated pathway. The integrated pathway, also referred to as a 0 + 5 pathway, is geared to medical students who have decided on a career in vascular surgery, participate in the main National Resident Matching Program during medical school,[3] and match into vascular surgery training to begin immediately after graduation from medical school. The integrated pathway was first approved in 2006 by the ABS and eliminated the need for board certification in general surgery before board certification in vascular surgery by establishment of a primary board certificate in vascular surgery. Two years are devoted to core surgical training and 3 years to vascular surgery training, all of which must be completed at the same institution.[3] The ACGME requires that residents in an integrated program complete a minimum of 500 total operative procedures and 250 major vascular reconstructions. On completion of the 5-year training program, these trainees are eligible for board certification by the ABS only in vascular surgery. This integrated pathway has become increasingly popular among applicants, and there are presently 50 such training programs participating with the Electronic Residency Application Service. Certain institutions offer both 5 + 2 and 0 + 5 pathways.
3. Early specialization pathway. This pathway requires 4 years of general surgery residency and 2 years of vascular surgery residency at the same institution and enables the trainees to obtain ABS certification in both general surgery and vascular surgery. Only three programs currently offer an early specialization pathway. Trainees must complete a minimum of 850 total operative procedures and 250 major vascular reconstructions during these 6 years.

The ABS requires that all training programs in vascular surgery must be accredited by the ACGME through the Residency Review Committee for Surgery (RRC-S). The purpose of the RRC-S is to ensure that programs provide a broad and comprehensive exposure to the field of vascular surgery and meet other educational, administrative, and ethical requirements. Of note, an independent RRC for vascular surgery does not currently exist; however, three vascular surgeons sit on the RRC-S at all times.[3] All vascular training programs reviewed by the RRC-S will be reviewed by at least one vascular surgeon.

On completion of any of these training programs, the ABS allows a period of up to 7 years for trainees to achieve initial board certification in vascular surgery, during which time the candidate is considered board eligible. To achieve initial vascular surgery board certification, the physician must successfully complete clinical training in vascular surgery through one of the three previously listed pathways, obtain a letter of attestation from the training program director, obtain an unrestricted state medical license to practice, successfully pass the Registered Physician in Vascular Interpretation (RPVI) examination before sitting for the certifying examination, and pass the written (qualifying) and oral (certifying) examinations administered by the Vascular Surgery Board of the ABS. The SVS emphasizes that graduates from general surgery or cardiothoracic surgery residencies are not eligible for ABS vascular surgery board certification unless they have completed an ACGME-accredited vascular surgery residency. It is the position of the SVS that exposure to the field of vascular surgery during these other residencies is not sufficient to acquire the experience and judgment necessary for the independent practice of vascular surgery.

After initial board certification is achieved in vascular surgery, the ABS requires physician participation in a program for MOC, which continuously measures the six core competencies defined by the ACGME to enhance patient care and to improve outcomes. A four-part framework is used for MOC, including professional standing, lifelong learning, cognitive expertise, and performance in practice. Key elements of the MOC process, although subject to change, currently include a minimum of 90 hours of category 1 credits during a 3-year cycle (at least 60 of the 90 credit hours should include self-assessment),

successful completion of a written examination at 10-year intervals, and participation in a surgical outcomes database. Failure to maintain these requirements for MOC will result in loss of board certification (www.absurgery.org).

TRAINING REQUIREMENTS FOR VASCULAR SURGERY TRAINEES

The recommendations for training requirements take into account the comprehensive specialized training in vascular surgery and include nonoperative medical management, endovascular interventions, open surgical treatment, and interpretation of noninvasive vascular laboratory studies.

Medical Management Requirements. Training in medical management of peripheral vascular disease is an integral part of vascular surgery training. Vascular trainees should have a thorough understanding of vascular disease risk factor modification. The care of the vascular patient occurs in a continuum, and the trainee is expected to be able to evaluate these patients preoperatively, in the perioperative period including critical care management in the intensive care unit, and in the postoperative outpatient setting including surveillance of interventions.

For individuals who have completed the traditional (5 + 2) or early specialization (4 + 2) training programs, their general surgery training experience includes a minimum of 40 cases in surgical critical care, with at least one in each of seven categories: ventilator management; bleeding (nontrauma); hemodynamic instability; organ dysfunction/failure; dysrhythmias; invasive line management and monitoring; and parenteral/enteral nutrition. For individuals who began integrated (0 + 5) training in July 2015, the minimum of 40 cases is also required (http://www.absurgery.org/default.jsp?certvsqe).

Endovascular Intervention Requirements. Open surgical training requirements were determined by the RRC-S, but endovascular training requirements were developed by the SVS in conjunction with other specialties performing these procedures. Vascular surgery trainees are expected to acquire sufficient training to perform vascular catheter-based interventions, and previous guidelines have been published.[3] Trainees are expected to submit their endovascular case load experience as part of their complete operative log, as verified by the program director, to the ACGME. Experience should be gained in performing diagnostic catheterizations among the various vascular beds, and at least half should be selective catheterizations with 75% being arterial and 25% venous.[3] Similarly, at least 75% of the therapeutic procedures should be on the arterial system so that the majority of the endovascular experience is not gained primarily through arteriovenous dialysis access interventions.[4] The minimum number of diagnostic catheterizations is 100, and the minimum number of interventional catheterizations is 80 (Table I).[4]

Table I. Residency Review Committee minimum criteria for endovascular and open vascular surgery cases

Category	Minimum required No.
Endovascular abdominal aortic aneurysm repair (EVAR)	20
Endovascular therapeutic procedures	80
Endovascular diagnostic procedures	100
Complex	10
Peripheral	45
Cerebrovascular	25
Abdominal	30

It is not realistic or feasible to require minimum numbers to confer competency for all endovascular interventions because of an absence of supporting evidence-based research. Nonetheless, the SVS wishes to address three specific endovascular interventions: endovascular aneurysm repair (EVAR), thoracic endovascular aortic repair (TEVAR), and carotid artery stenting (CAS). The recommended minimum number of EVAR cases is 20 and represents an increase over the 2002 RRC minimum of 5 cases as the primary operator. This number reflects the increasing percentage of EVAR vs open repair in the United States and specifically in vascular training programs. These guidelines may change with time to remain consistent with future training.

The SVS endorses multidisciplinary guideline papers in which the SVS has participated concerning TEVARs.[5] Requirements for TEVARs include full basic endovascular privileges with an experience of (1) 10 TEVARs within the last 2 years or (2) less than this minimum for surgeons with robust EVAR experience of at least 25 EVARs with 12 as the primary operator. The term *full basic endovascular privileges* means that the operator is fully qualified as defined by multispecialty guidelines. On completion of their training, vascular surgery trainees performing TEVAR should be skilled in the perioperative management of aortic surgical patients and are expected to have experience in performing adjunctive procedures for TEVARs, including iliac conduits, femoral artery exposure, and debranching procedures such as carotid-subclavian bypasses. By definition, vascular surgeons should have open thoracoabdominal aortic privileges,[3] assuming their training encompassed these operations (see earlier section, Definition of Vascular Surgery).

Multidisciplinary credentialing guidelines for CAS have previously been published and endorsed by the SVS.[6] These guidelines specify that diagnostic and stenting procedures may both be counted if they are performed during the same procedure. However, considering the

broad range of exposures to catheter-based procedures in vascular surgery training with a variety of platforms and based on the most recent recommendations of the Association of Program Directors in Vascular Surgery (personal communication), we recommend a minimum of 20 carotid angiograms, with half as the primary operator, and a minimum of 15 carotid stent procedures,[3] with half as the primary operator.[5]

Open Vascular Surgery Requirements. The vascular surgery trainee is expected to have performed sufficient numbers of open operations covering the full spectrum in the field of vascular surgery. The requirement is carefully evaluated by the RRC-S. This body and the ABS track individual components of complex operations and consider all components when evaluating programs and trainees. Trainees are expected to submit their operative experience to the ACGME. Their case load is verified on their graduation by their program director.

The RRC has established minimum criteria for major vascular reconstructive procedures performed by vascular surgery trainees (https://www.acgme.org/Portals/0/VS_CatMins.pdf). The required numbers are 250 major vascular cases for all vascular surgery trainees, regardless of whether they participate in the traditional (5 + 2), early specialization (4 + 2), or integrated (0 + 5) programs. These cases should reflect an adequate representation of current practice as well as breadth and balance of experience in the surgical care of vascular diseases. Although these numbers are continually subject to change, the minimum criteria for vascular procedures currently include 30 abdominal vascular procedures, 25 cerebrovascular, 45 peripheral, and 10 complex vascular reconstructions (Table I).

Noninvasive vascular laboratory diagnosis requirements. Vascular surgery training programs must include training in noninvasive vascular laboratory studies. To interpret these studies, a graduating trainee must demonstrate knowledge of vascular anatomy and physiology, as well as ultrasound physics, through the interpretation of noninvasive vascular studies. As suggested by the Intersocietal Accreditation Commission (previously the Intersocietal Commission for the Accreditation of Vascular Laboratories), a minimum number of supervised interpreted studies during postgraduate training are required for individuals desiring to apply for privileges in interpretation of specific individual areas of the vascular laboratory[7] (Table II). Not all individuals interpreting vascular laboratory studies will wish to interpret studies in all the areas of the vascular laboratory or will be qualified to interpret studies in all areas outlined before. Individuals[3] may therefore elect to pursue privileges only in those areas in which they have sufficient qualifications and training. The SVS believes that clinical experience in the treatment of vascular disorders is the other mandatory component of the noninvasive vascular laboratory experience that other specialties may not provide. After completing training, the practicing vascular surgeon who wishes to interpret these studies must provide evidence of continuing medical education (CME) activity specific to noninvasive vascular diagnostic studies. As of 2014, initial board certification in vascular surgery by the Vascular Surgery Board of the ABS is predicated on successfully passing the RPVI examination.

Table II. Intersocietal Accreditation Committee guidelines for supervised interpreted studies

- Peripheral arterial physiologic test, 100
- Peripheral arterial duplex scanning, 100
- Peripheral venous duplex scanning, 100
- Carotid duplex scanning, 100
- Transcranial duplex/Doppler scanning, 100
- Visceral vascular duplex scanning, 75

As of June 2016, the Alliance for Physician Certification and Advancement (APCA) certifies a physician to be an RPVI (previously administered by the American Registry of Diagnostic Medical Sonographers). The RPVI examination has specific prerequisites that must be completed before the vascular board examinations are taken. Successful passing of the RPVI examination ensures expertise in the interpretation of vascular laboratory studies among current vascular surgery trainees. An exception would be those individuals who successfully passed the Registered Vascular Technology examination before the creation of the RPVI examination.

TRAINING REQUIREMENTS FOR NEW VASCULAR PROCEDURES

Vascular surgeons are expected to acquire proficiency in new and evolving open and endovascular procedures. As new procedures are introduced, it is important that practitioners be properly credentialed to ensure excellent outcomes and patient safety, which should include evidence of participation in CME courses relevant to the topic. On- or off-site mentoring may be required, depending on the complexity of the new procedure and experience of the operator, and will need to be determined on a case-by-case basis. Physicians already trained and credentialed in endovascular interventions can use many new and modified devices, however, without additional special certification. Proctoring for certain new procedures may be desirable (http://www.sts.org/about-sts/policies/proctoring-policy).

The SVS proposes the following guidelines regarding training requirements for new open and endovascular vascular procedures.

1. Training requirements for new endovascular procedures at a given hospital, including cognitive training in disease management and patient care, should be the same for all interventionalists, regardless of

specialty and regardless of whether they are applying for new vascular privileges or are already credentialed in vascular procedures at that hospital. We recognize that training requirements for certain procedures may vary across specialties and have addressed this issue in other sections.[3]

2. The definition of a "new" procedure changes with time. Societies may accumulate data providing a basis for performing new procedures at later dates. For example, criteria were previously proposed specifically for TEVAR and carotid stenting at a time when these procedures were considered new (see earlier section, Training Requirements for Vascular Surgery Trainees). Now these procedures are performed frequently in many institutions and are an integral part of all accredited vascular surgery training programs. Other procedures, such as fenestrated aortic grafts, renal angioplasty and stenting, visceral artery angioplasty and stenting, catheter-based thrombolysis, and intravascular ultrasound-directed venous stenting, are also routinely performed in many hospitals. Whereas other societies have created criteria for credentialing for some of these procedures, consensus statements are lacking for most. There may be a role for further intersocietal criteria in the future.
3. Training requirements should be determined by frequency and complexity of the new procedures, industry requirements, and standards set by societies and by individual hospitals already performing these procedures. There should be an initial period of monitoring and evaluation of the provider's performance of the new procedure.
4. Individual hospitals should establish guidelines determined by all accredited interventionalists practicing these newer procedures. These guidelines should include ongoing evaluation of outcomes for these new vascular surgical and endovascular procedures (see later section, Renewal of Privileges).

The SVS continues to support past recommendations by multidisciplinary writing groups, which included SVS participation, regarding TEVAR and CAS.[4,5] The same numbers mentioned for vascular residents entering practice apply to credentialed surgeons already in practice (see earlier section, Training Requirements for Vascular Surgery Trainees). For credentialed vascular surgeons in practice, a minimum of 10 hours of CME activity should be devoted to TEVAR every 2 years. For those performing CAS, 20 hours of CME activity specific to percutaneous therapeutic endovascular intervention and cerebrovascular disease should be required, 10 of which should be relevant to cervical or extracranial carotid angioplasty and stenting every 3 years.[8] Successful completion of an industry-sponsored course by credentialed surgeons in practice may also be desirable to ensure familiarity with the nuances of various new devices; however, this should not be equated with having achieved competency in the overall procedure. As suggested earlier, proctoring for certain procedures may be considered.

REQUIREMENTS FOR HOSPITAL PRIVILEGES IN VASCULAR SURGERY AND ENDOVASCULAR INTERVENTIONS AND NONINVASIVE VASCULAR LABORATORY INTERPRETATION

New applicants. Regarding initial open vascular surgical privileges, hospital credentialing committees must recognize the high level of training and expertise previously outlined and offer new privileges only to board-eligible or board-certified vascular surgeons. Regarding initial endovascular privileges, the SVS also firmly recommends that hospital committees recognize the high level of training required by board-eligible and board-certified vascular surgeons, which we have also previously detailed. We recognize that physicians from other specialties may be qualified to perform endovascular procedures if they have received sufficient training from their own ACGME-approved training programs. We agree with the recommendations of Reed and Gornik[9] that 1 year of training devoted to peripheral vascular interventions, in addition to 1 year of coronary intervention training, be required for interventional cardiologists to be granted peripheral endovascular privileges. The SVS recommends that the criteria used in each facility to grant initial privileges in endovascular procedures be designed to provide vascular care that is safe and centered on the best possible patient outcomes using evidence-based guidelines. As part of the credentialing process, we recommend that hospitals should have criteria in place to certify practitioners from different specialties when performing similar procedures.

Of note, The Joint Commission (www.jointcommission.org) holds all health care facilities responsible for credentialing physicians to the same standards, irrespective of the physician's specialty. Case volumes have been used as a surrogate for competence for these procedures with the realization that it is an imperfect standard.[2,7] The SVS believes that specific privileging criteria including minimum number of cases are not feasible for endovascular interventions for each vascular tree. However, specific criteria have been developed for endovascular interventions for thoracic aortic disease, carotid artery disease, and others that have been previously mentioned.

In addition, in accordance with The Joint Commission, the SVS recommends that credentialing of new applicants should also require verification of licensure and an assessment of the physician's current competence to perform the requested privileges.

Renewal of privileges. Renewal of privileges should be granted to physicians with existing privileges in (1) open vascular surgery, namely, vascular surgeons, general surgeons, or cardiothoracic surgeons, and (2) endovascular interventions, namely, vascular surgeons, interventional cardiologists, and interventional radiologists who have completed appropriate training programs and on the

Table III. Summary of guidelines for hospital privileges in vascular surgery and endovascular therapy

New hospital privileges
Completion of ACGME-approved vascular surgery residency with passing of ABS vascular certification within 7 years of completion of training
This training includes the open surgical and endovascular experience inherent in these approved programs, along with passing the RPVI examination and gaining knowledge of medical management of these patients
Renewal of existing vascular privileges for vascular surgeons
Passage of ABS recertifying examination in vascular surgery within 10 years
Completion of MOC by the ABS
Outcome analysis based on regional or local registries (eg, SVS VQI)
Passing the RPVI examination or appropriate CME in the noninvasive vascular laboratory
Renewal of existing vascular privileges for nonvascular surgeons
Passage of recertifying examination in the physician's specialty within 10 years
Completion of MOC
Outcome analysis based on regional or local registries
Passing the RPVI examination or appropriate CME in the noninvasive vascular laboratory

ABS, American Board of Surgery; *ACGME,* Accreditation Council for Graduate Medical Education; *CME,* continuing medical education; *MOC,* Maintenance of Certification; *RPVI,* Registered Physician in Vascular Interpretation; *SVS,* Society for Vascular Surgery; *VQI,* Vascular Quality Initiative.

basis of maintenance of board certification and MOC requirements.

Credentialing committees in each hospital should define case volumes and outcomes for recredentialing. Renewal of privileges in vascular surgery and endovascular procedures for surgeons and other interventionalists who already have privileges to perform these procedures should be granted on the basis of an analysis of their patient outcomes in comparison to local, regional, and national standards. The SVS strongly encourages hospitals and their credentialing bodies to have access to a nationally validated registry of vascular surgery and endovascular procedures for all physicians performing these procedures, regardless of the physician's specialty or the location where they are performed (eg, cardiac catheterization laboratory, interventional radiology suite, and hybrid or conventional vascular operating rooms). The SVS endorses participation in the Vascular Quality Initiative (VQI; www.vascularqualityinitiative.org) to improve regional benchmarking by assessing the quality, safety, effectiveness, and cost of vascular procedures. By collecting, analyzing, and sharing data on preprocedure risk factors, intraprocedural variables, postprocedural outcomes, and 1-year follow-up data, outcome analysis can be performed. The SVS recommends that a procedure not reported in the VQI or other validated registries should not be referred to in terms of establishing minimum numbers for privileges but instead be reviewed with the goal being to demonstrate competent decision-making.

The SVS also endorses Ongoing Professional Practice Evaluation and Focused Professional Practice Evaluation processes as directed by The Joint Commission for newly credentialed physicians, newly credentialed procedures, and physician probationary periods (www.jointcommission.org). Ongoing Professional Practice Evaluation can be used as a performance enhancement tool to avoid adverse outcomes. Quality measures selected by the hospital's credentialing committee within the field of vascular surgery should be established and met during a predetermined time period immediately after initial appointment of a vascular surgeon or other endovascular specialist. These quality indicators, which can mirror ongoing VQI data collection, may be compared with peer or benchmark data and used to validate competence within the field and to determine the maintenance or alteration of privileges. More important, this valuable measure can allow early identification of negative trends and lead to timely proactive education, training, or collegial intervention. Similarly, Focused Professional Practice Evaluation can be instituted for vascular surgeons requiring additional review during probationary periods or for newly credentialed procedures. Meaningful quality measures should be established for all new procedures based on review of available data in the literature and input from a multidisciplinary group of peers. Prospective review of these indicators will ensure safe and proficient implementation of the new procedure for each qualifying vascular surgeon or endovascular interventionalist.

Mechanisms of audit, morbidity and mortality review, and corrective actions in each hospital fall under the purview of a peer review committee, credentialing committee, or designated subcommittee with input from a multidisciplinary quality assurance committee.

In regard to credentialing for interpretation of noninvasive vascular laboratory studies, whether for new privileges or for renewal of privileges, RPVI credentialing from the APCA should be construed as having fulfilled the requirements for vascular laboratory credentialing if the physicians have also demonstrated a commitment to treating vascular disorders. The APCA requires a specific number of cases and experience before allowing

physicians to take the examination (see earlier section, Training Requirements for Vascular Surgery Trainees). Vascular surgeons who completed an ACGME-approved vascular surgery training program since 2014 are required to obtain an RPVI certificate to become board eligible and therefore are qualified to have privileges for interpretation of noninvasive vascular laboratory studies because they also have fulfilled criteria of thorough training in treating vascular disease. We recommend that other specialists follow these same guidelines. The SVS firmly recommends that physicians not be allowed to interpret noninvasive vascular laboratory studies, even if the candidate passes the examination, unless the applicant also has completed or is in the process of completing a residency or fellowship dedicated to the comprehensive management of vascular disease, such as vascular surgery, vascular medicine, cardiology, or radiology. This additional requirement prohibits physicians who do not have thorough training in the diagnosis and treatment of vascular disorders from being allowed to interpret these studies.

Obtaining certification from the American Society of Neuroimaging is acceptable for physicians who wish to interpret extracranial and intracranial examinations only.

The SVS, in agreement with The Joint Commission standards, believes that the decision to grant or to deny hospital privileges in vascular surgery to new applicants or to those with established practices, irrespective of specialty, should be an objective evidence-based process.

A summary of guidelines for hospital privileges in vascular and endovascular surgery is provided in Table III.

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