Training Standards in Neuroendovascular Surgery
Program Accreditation and Practitioner Certification

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Background and Purpose—Neuroendovascular surgery is a medical subspecialty that uses minimally invasive catheter-based technology and radiological imaging to diagnose and treat diseases of the central nervous system, head, neck, spine, and their vasculature. To perform these procedures, the practitioner needs an extensive knowledge of the anatomy of the nervous system, vasculature, and pathological conditions that affect their physiology. A working knowledge of radiation biology and safety is essential. Similarly, a sufficient volume of clinical and interventional experience, first as a trainee and then as a practitioner, is required so that these treatments can be delivered safely and effectively.

Methods—This document has been prepared under the aegis of the Society of Neurological Surgeons and its Committee for Advanced Subspecialty Training in conjunction with the Joint Section of Cerebrovascular Surgery for the American Association of Neurological Surgeons and Congress of Neurological Surgeons, the Society of NeuroInterventional Surgery, and the Society of Vascular and Interventional Neurology.

Results—The material herein outlines the requirements for institutional accreditation of training programs in neuroendovascular surgery, as well as those needed to obtain individual subspecialty certification, as agreed on by Committee for Advanced Subspecialty Training, the Society of Neurological Surgeons, and the aforementioned Societies. This document also clarifies the pathway to certification through an advanced practice track mechanism for those current practitioners of this subspecialty who trained before Committee for Advanced Subspecialty Training standards were formulated.

Conclusions—Representing neuroendovascular surgery physicians from neurosurgery, neuroradiology, and neurology, the above mentioned societies seek to standardize neuroendovascular surgery training to ensure the highest quality delivery of this subspecialty within the United States. **(*Stroke*. 2017;48:2318-2325. DOI: 10.1161/STROKEAHA.117.016560.)**

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Neuroendovascular surgery (NES) is the medical subspecialty that uses minimally invasive catheter-based technology and radiological imaging combined with clinical and technical expertise to diagnose and treat diseases of the central nervous system, head, neck, spine, and their vascular supply. In specific circumstances, endovascular and other minimally invasive procedures have supplanted open surgical procedures.

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The growing adoption into clinical practice of NES represents an important paradigm shift and has prompted a major reappraisal of training standards.

Until recently, NES training standards were neither defined nor consistently applied across the neuroscience disciplines. Unlike previous attempts to define training criteria,[1–5] this document has been prepared under the aegis of the multidisciplinary societies that represent many of the leading NES practitioners from neurosurgery, neuroradiology, and neurology: the Joint Section of Cerebrovascular Surgery (JSCVS) for the American Association of Neurological Surgeons and Congress of Neurological Surgeons, the Society of NeuroInterventional Surgery (SNIS), and the Society of Vascular and Interventional Neurology (SVIN).

The definition of standards for NES training and practice establishes expectations for the highest quality medical care. Accreditation of training programs and certification of individual practitioners are 2 other key components to this goal. This document details our consensus organizational structure and requirements for institutional accreditation of training programs in NES. The specific requirements for obtaining individual Committee for Advanced Subspecialty Training (CAST) fellowship certification and the pathway to CAST certification through an advanced practice track for current practitioners of this subspecialty are also described.

Background

During the past 2 decades, many cerebrovascular lesions that were once exclusively the purview of open surgery are now often preferentially managed using endovascular techniques. Furthermore, multiple recent prospective randomized trials now strongly support neuroendovascular intervention in the management of acute ischemic stroke because of large vessel occlusion.[6–10]

The American Society of Interventional and Therapeutic Neuroradiology (now the SNIS), the JSCVS of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons the American College of Radiology, and the SVIN have each individually published subspecialty guidelines on the number of diagnostic and interventional procedures required for adequate training in NES.[1–5,11,12] Each has agreed that to deliver this subspecialty safely to patients, prospective NES trainees should receive preparatory training including: (1) mastery of the didactic material relevant to the pathophysiology of cerebrovascular disease, (2) acquisition of the ability to interpret neuroradiological studies, (3) comprehension of the various management options, (4) development of the basic technical skills needed to perform diagnostic angiography, and (5) acquisition of a working knowledge of radiation biology to ensure patient and operator safety.

Participating societies connected to NES, including neurosurgery, neuroradiology, and neurology, have also agreed within an Accreditation Council for Graduate Medical Education (ACGME)–sponsored training curriculum and summary document.[1] Before starting an NES fellowship, this document requires that a trainee must complete an ACGME-accredited Residency in neurosurgery, neurology, or radiology. The document also clarifies the need for preliminary training in stroke, critical care, and neuroradiology required for neurologists and radiologists.

To date only a handful of NES training programs in the United States have chosen to pursue the ACGME accreditation pathway. One reason for this poor response has been the reporting complexity and the resident-level work restrictions that are not as applicable to a post-primary and often post-subspecialty training fellowship experience. Another is that the ACGME does not provide a mechanism for individual certification tied to this subspecialty.

Recognizing the consequences of these shortcomings, the JSCVS, SNIS, and SVIN have assembled this document to standardize and optimize the training program accreditation and individual certification processes for NES under the aegis of the CAST program of the Society of Neurological Surgeons (SNS). The structure for NES training outlined here accounts for the need for sufficient practical experience across the range of pathologies and case volume. This document also considers the parallel requirements for experienced and immediate neurosurgical availability, neurocritical care, and neuroradiological support in combination to achieve the highest quality treatment outcomes, both for endovascular and open surgical procedures.

The Neuroendovascular Surgery Advisory Committee (NESAC) will operate through the CAST infrastructure to advise and assist CAST in the development and implementation of guidelines for accreditation of training programs and certification of individuals. NESAC comprises 3 persons from each of the neuroscience specialties of neurosurgery, neurology, and neuroradiology, working in concert with the CAST Chairman and Secretary. These 9 members will be appointed by the JSCVS (for neurosurgery), SVIN (for neurology), and SNIS (for radiology), in consultation with CAST. Each member will be appointed for a 3-year term, with an opportunity for 1 reappointment (maximum of 6 years). Appointments are staggered so that 1 new member from each specialty is (re) appointed every year to provide balance, continuity, and institutional memory. The initial 3 members for each specialty will be appointed for 4, 5, and 6 years, respectively.

Requirements for CAST NES Training Program Accreditation

A matrix consistent with the elements listed in the detailed Program Requirements has been created by the SNS alongside the accompanying ACGME Milestones to ensure successful completion of these elements. The detailed CAST NES training requirements are available on the SNS CAST website: http://www.societyns.org/fellowships/NeuroEndovascularNeurosurgery.asp. The basic structural specifics for a program to gain CAST accreditation include:

Sponsoring Programs

A CAST-approved program for advanced training in NES must exist within or be closely affiliated with an ACGME-accredited neurosurgical residency training program. In addition, the institution where the training program is based should have an emergency room, a dedicated neurointensive care unit, ACGME-accredited residency programs in neurology and radiology, and ACGME, United Council for Neurological Specialties, and CAST-accredited fellowship programs in stroke and vascular neurology, neurocritical care, and neuroradiology. There should be a robust open surgical neurovascular

program meeting ACGME accreditation requirements at the same institution, a designated Comprehensive Stroke Center, and access to both adult and pediatric patients.

Each program should perform at least 250 therapeutic NES procedures per year, including a minimum number of core cases that comprise:

- 40 aneurysm treatments, including 10 presenting with rupture
- 20 intracranial embolizations (arteriovenous malformation, arteriovenous fistula, tumor)
- 25 intracranial or extracranial stent placements (at least 5 in each category and may include stents or flow diverters for aneurysms)
- 30 acute ischemic stroke treatments
- 10 intracranial infusions (eg, vasospasm, chemotherapy, and stroke)
- 10 extracranial embolizations
- 5 spinal angiograms and embolizations

A program that does not meet these recommended numbers for specific procedures may partner with other programs/institutions to provide experience for their trainees. Programs failing to meet these criteria jeopardize their CAST accreditation and must promptly rectify any deficiencies in accordance with directives from CAST and NESAC.

Program Personnel and Resources

Fellowship Program (Co) Director

A NES fellowship must have a fellowship program director or codirector who:

- is certified by CAST and the American Board of Neurological Surgery (ABNS), American Board of Radiology, or the American Board of Psychiatry and Neurology
- has fulfilled all other respective specialty and subspecialty requirements including Maintenance of Certification (MOC)
- has special expertise in NES, with his/her practice concentrated in this field
- is appointed or coappointed by and responsive to the Chair of the sponsoring ACGME-accredited program in neurological surgery, in consensus with the chairs of the ACGME programs in neurology and radiology if these specialties are represented as faculty in the CAST NES fellowship program.

Other Faculty

The fellowship must include at least 2 faculty members with special expertise in NES who are board certified or tracking for certification by the ABNS or certified by the American Board of Radiology or American Board of Psychiatry and Neurology and possess all other additional required educational qualifications as determined by CAST and its NESAC. Internationally recognized individuals with special expertise in NES will be eligible to serve as faculty in CAST-accredited programs. The faculty must have documented qualifications to supervise patient care and instruct all fellows in all aspects of the training program.

Facilities and Resources

The imaging equipment and procedure rooms must be appropriately equipped and available for all NES procedures. Imaging equipment should include biplanar fluoroscopy with digital subtraction and roadmap capability[3,11,13] and rotational 3-dimensional imaging. The training program must be hospital based to provide the adequate inpatient, outpatient, emergency, and dedicated neurointensive care. Ancillary up-to-date imaging, such as MRI and computed tomography with perfusion analysis software and ultrasound, are also necessary.[3,4,11,13–16] CAST and NESAC will verify the adequacy of these resources at each training program during the program application process.

Fellow Appointments, Including Trainee-to-Faculty Ratio

The appointment of fellows must not detract from the educational opportunities available to regularly appointed neurosurgery residents or neuroradiology fellows. The number of trainees (resident and fellows) in the program must be commensurate with the capacity of the program to offer an adequate educational experience in NES for each trainee.

To ensure adequate teaching, supervision, trainee evaluation, and their academic progress, the trainee-to-faculty ratio must be at least 2 full-time NES faculty for the first graduating trainee completing the training program each year. Increased faculty numbers will be required to gain additional numbers of CAST-approved fellowship spots. International fellows may train at CAST-approved programs as long as they do not compete with the case volume and training requirements of CAST-eligible fellows; however, they will not receive a CAST certificate unless they are American Board of Medical Specialties (ABMS) certified. The number of CAST-approved slots will be adjudicated based on commensurate faculty clinical and academic experience, by any dilution from fellows not tracking for CAST certification, and by any negative effects on the required training of the ACGME residents/fellows at that institution.

Environment

The NES training program must foster a rich educational environment that includes frequent interactions between open vascular neurosurgery, critical care, stroke neurology, neuroradiology, and state-of-the-art neuroimaging. Trainees must have the opportunity to participate in research and other scholarly activities. Each program must ensure that the learning objectives of the program are not compromised by excessive reliance on trainees to fulfill service obligations. Didactic and clinical education must have priority in the allotment of fellows' time and energy. Duty hour assignments must recognize that faculty and fellows are responsible for patient welfare. All training done within a residency must follow the ACGME guidelines for duration and time away from the hospital.

All neuroendovascular procedures performed should be logged through a quality assurance database. There should also be a well-developed, multidisciplinary peer-review process for identification of complications and their discussion. Trainee and faculty evaluations must be performed regularly and reviewed by the sponsoring CAST fellowship program director and any other appropriate institutional review committee to ensure the educational efficacy of the NES program. The entire clinical experience of the NES program and its trainees must be available to NESAC at the time of any application or review in the format prescribed by NESAC.

CAST Accreditation Application (Processes/Details)

All required documentation must be completed before the application will be considered for action by NESAC. All programs desiring CAST accreditation in NES must submit an application through the SNS website http://www.societyns.org/fellowships/PracticeTrackCertification-Neuroendovascular%20Surgery.asp.

Once approved by CAST and the SNS, program accreditation will be valid for 5 years. During that interval, the program must submit annual reports detailing the status of trainees in their program and a case log of their experience. Reaccreditation cycles will be due every 5 years, with institutional total and subspecialty case report forms resubmitted.

NES Individual Training, Including Stages, Timing, and Duration

To produce a well-trained, experienced endovascular surgeon capable of delivering advanced proficiency in the endovascular management of cerebrovascular diseases, NES training will consist of 3 distinct phases.

Preliminary Specialty Training

Each individual seeking training in NES must satisfy the requirements of their primary specialty training, which include the following:

Neurosurgeons

- Satisfactory completion of an ACGME-approved residency in neurological surgery.
- Eligibility for certification by the ABNS.
- Satisfactory completion of MOC requirements to maintain good standing in ABNS.

Neurologists

- Satisfactory completion of an ACGME-approved residency in neurology.
- Eligibility for certification by the American Board of Psychiatry and Neurology.
- Satisfactory completion of an ACGME-accredited Vascular/Stroke Neurology Fellowship including, or in addition to, at least 3 months in the neurointensive care unit, or completion of and certification by a United Council for Neurological Specialties or CAST-approved Neurocritical Care Fellowship.
- Satisfactory completion of MOC requirements to maintain good standing in American Board of Psychiatry and Neurology.

Radiologists

- Satisfactory completion of an ACGME-approved residency in diagnostic radiology or interventional radiology.
- Eligibility for certification by the American Board of Radiology.
- Satisfactory completion of an ACGME-accredited neuroradiology fellowship including, or in addition to, at least 6 months of clinical service in a neurological surgery, vascular neurology, or neurocritical care program before entering the advanced year of NES fellowship.
- Eligibility for Certificate of Added Qualification in neuroradiology.
- Satisfactory completion of MOC requirements to maintain good standing in the American Board of Radiology.

As a result of the foregoing training, the CAST NES fellowship candidate should have the expected level of competence required to enter NES. The candidate should be knowledgeable about the pathophysiology of cerebrovascular disease and skilled in the interpretation of neuroradiological studies, such as computed tomography and MRI, neuroangiography, and other neurovascular studies, such as cervical and transcranial Doppler sonography, computed tomography and magnetic resonance perfusion imaging, single photon emission computed tomography, and positron emission tomography. Candidates should be well-versed in the essentials of the intensive care unit management of NES patients, the complexities of anticoagulation and its reversal algorithms, and the manipulations of central and cerebral hemodynamics in patients with cerebral ischemia. Knowledge of the specific management issues in NES patients requiring mechanical ventilation, with elevated intracranial pressure requiring clinical or invasive monitoring and with other conditions routinely encountered in an intensive care unit, is also essential.

NES Pre-Requisite Training

Each individual seeking NES training must possess the specialty's necessary surgical skill set. Candidates interested in pursuing NES subspecialty training must be technically competent in catheter access to and manipulations within the vasculature supplying the brain and spinal cord. Craniocervical and spinal angiography are technically demanding procedures to perform effectively and safely on a consistent basis. The intracranial vasculature is much different and more delicate than that seen in any other organ system, and the central nervous system is uniquely vulnerable to vascular insults.

The relationship between volume and type of experience with competence and safety has been demonstrated for numerous procedures, including cerebral angiography.[17,18] Dion et al[18] have demonstrated a linear decrease in complication rates and fluoroscopy time among trainees for up to 100 procedures performed, with peak performance not reached until 200 procedures. Similarly, in their analysis of 5000 procedures, Mani et al[13–15] found a significantly higher complication rate with cerebral angiography at training institutions than at private hospitals (3.9% versus 0.9%, respectively) and attributed the difference largely to the number of procedures performed by the primary operator. A correlation between patient outcomes and volume is also evident in the performance of index procedures, such as endovascular treatment of aneurysms[16] and acute ischemic stroke,[19] just like that seen with open cerebrovascular procedures.[20]

Because noninvasive imaging modalities have become more accurate and used, a concomitant volume reduction in diagnostic cerebral angiography may restrict the trainee's ability to become competent in the performance of both diagnostic craniocervical angiography and additional NES procedures. Therefore, training should occur at centers where large volumes of index procedures allow for mature management strategies and established best practices.

The use of ionizing radiation during diagnostic and interventional NES procedures requires that the trainee has a

working knowledge of radiation biology to ensure patient and operator safety.

The specifics of pre-requisite training include:

- Performance of at least 200 catheter-based diagnostic and interventional cerebral angiographic procedures as a primary operator.
- Demonstrated competency in catheter techniques as validated by the NES Fellowship Program Director.
- ABNS Milestones 1 to 4 for cerebrovascular diseases and NES completed and signed off by both the residency and NES fellowship program directors.

All candidates must demonstrate competency in catheter techniques and must perform 200 catheter-based diagnostic and interventional cerebral angiographic procedures as primary operator before starting their focused NES training year, regardless of their primary specialty. The practical endovascular training aspect can be significantly buttressed by incorporating simulation-based modules.[21,22]

For neurosurgeons who spend their residency doing technical procedures, their pre-requisite training in diagnostic catheter angiography can be completed during an intensive rotation in NES for a broader time frame during neurosurgical residency. Neuroradiology or neurology trainees may complete their pre-requisite training in diagnostic catheter angiography during an intensive rotation in NES during a diagnostic neuroradiology or vascular neurology/stroke/neurocritical care fellowship. This pre-requisite may also be obtained for any of the specialties during the first year of a multiyear NES fellowship.

Advanced NES Training

Advanced fellowship training in NES must provide the trainee the opportunity to perform a spectrum of endovascular procedures. The didactic and practical curriculum during this year must be standardized to establish expectations for the highest quality medical care. The specifics of advanced NES training, regardless of primary specialty (neurology, neurosurgery, or neuroradiology), include:

- 12 continuous months of a dedicated NES fellowship experience, during which the fellow performs a broad spectrum of endovascular procedures as defined by the core-competency requirements, to be performed after completion of their preliminary specialty and subspecialty requirements (and endovascular pre-requisites as outlined above). For neurosurgeons, the 12-month NES fellowship may occur during residency but not before Post Graduate Year 6.
- Satisfactory completion of ACGME Milestone Level 5 training and competence for cerebrovascular diseases and NES signed off by the NES Fellowship Program Director.

A minimum of 250 interventional treatment procedures should be performed as primary operator to ensure that the trainee is exposed to diverse cerebrovascular diseases and the endovascular procedures used in their treatment. As a general guideline, those performed should have a core experience consisting of:

- 40 aneurysm treatments, including 10 presenting with rupture
- 20 intracranial embolizations (arteriovenous malformation, arteriovenous fistula, tumor)
- 25 intracranial or extracranial stent placements (at least 5 in each category and may include stents or flow diverters for aneurysms)
- 30 acute ischemic stroke treatments
- 10 intracranial infusions (eg, vasospasm, chemotherapy, and stroke)
- 10 extracranial embolizations
- 5 spinal angiograms and embolizations

Candidates unable to complete the required interventions during the 12 months should extend their training or seek training at other institutions. The continuity of care must be of sufficient duration, so the trainee is familiar with the natural history of each disease and the outcome of these treatment procedures.

Individual NES Certification

CAST will issue certificates to individuals based on 2 pathways: (1) prior NES training and experience (Practice Track) and (2) satisfactory completion of training within a CAST-accredited NES training program.

Pathways to Certification

Practice Track Pathway (Only Available to Applicants Through December 2020)

This pathway is open to all NES practitioners and trainees who have completed training by this date and filed an application to CAST. Certification obtained under the Practice Track Pathway has the same limitations and renewal requirements as certification obtained via the standard CAST-accredited fellowship pathway.

The specific requirements for individuals are different dependent on the date of training completion and the practice experience of the applicant and are outlined on the SNS website (http://www.societyns.org/fellowships/PracticeTrackCertification-Neuroendovascular%20Surgery.asp).

Applicants for Practice Track certification must satisfy most or all of the following conditions:

- Neurosurgery/neurology/radiology residency (ACGME accredited or equivalent)
- Stroke/Neuro Critical Care/neuroradiology subspecialty fellowship (accredited by ACGME, CAST, or United Council for Neurological Specialties) for neurologists or radiologists
- ABMS certified in primary specialty and active in MOC for primary specialty and subspecialties
- NES Training (CAST-accredited program/equivalent)
- Summary of practice experience or a case log of the most recent 2 years of practice data, including a summary of their case category numbers as outlined on CAST NES practice data form (See Figure).
- Take and pass the ABNS NES examination after satisfactory NES fellowship completion.

The Practice Track Pathway will close on December 31, 2020, for all applicants who have not initiated the application process by that date, regardless of whether they have trained in a CAST-accredited program. After December 2020, the CAST training pathway will be the only method open to NES practitioners and trainees to achieve CAST certification. Certification obtained under the Practice Track Pathway has

INDIVIDUAL CASE REPORT FORM - TRAINEE (Form 3)
SNS CAST FELLOWSHIP PROGRAM ACCREDITATION APPLICATION

SUBSPECIALTY:
NeuroEndovascular Surgery

Please complete this case log summary form when: (1) submitting a CAST Fellowship Program Accreditation Application (new or renewal) - include the most recent 5 years of fellows trained. The report should include each case done by the trainee during their focused 1-year training interval. Each patient operative experience should generate one case in one category (do not sort or classify using CPT codes), or (2) case category summary report of practice experience when applying for individual CAST certification

Trainee/Applicant Name:			
Interval Assessed:		TO	
Select one (1) of the following options:			
☐ **fellowship (training program):**			
☐ **2-year practice experience (practice site):**			

Case/Procedure Type	MINIMUM REQUIRED NUMBER	My Case Data
DIAGNOSTIC		
Angiogram		
1. cerebral		
2. spinal	5	
Wada		
Venous Sinus Sampling		
Balloon Test Occlusion		
Other		
TOTAL: diagnostic		
THERAPEUTIC		
Embolization/infusion (vascular lesions, injuries)		
1. aneurysm (at least 10 with SAH)	40	
a. coil		
- coil only		
- balloon assisted coil		
- stent assisted coil		
b. pipeline/other flow diversion		
c. web embolization/other similar device		
d. vessel sacrifice/ligation +/- coils		
2. AVM/AVF/Tumor embolization	20	
3. infusions - vasospasm, chemotherapy +/- -plasty	10	
4. epistaxis		
5. other extracranial embolizations	10	
Arteriosclerosis - cerebral embolism/ischemia		
1. arterial thrombectomy (acute stroke) - +/- stenting	30	
2. angioplasty +/- stenting	25	
a. intracranial		
b. extracranial		
Venous Sinus Disease/pseudotumor		
Other		
TOTAL: therapeutic	135	
OTHER TYPES OF PROCEDURES		
Blood Patch		
CT Biopsy		
Epidural/trigger point injection		
Kyphoplasty/Vertebroplasty/etc		
Other		
TOTAL: other		

ATTESTATION:

The Program Director and Applicant have reviewed this operative log and certify that all case numbers are accurate.

(double click in the 'X' to e-sign)

Applicant Name: _____ Signature: X _____

Fellowship Program Director _____ Signature: X _____

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Figure. Individual case report—trainee (form 3). AVF indicates arteriovenous fistula; AVM, arteriovenous malformation; CAST, Committee for Advanced Subspecialty Training; CPT, current procedural terminology; CT, computed tomography; and SAH, subarachnoid hemorrhage.

the same limitations and renewal requirements as certification obtained via the standard CAST-accredited fellowship pathway.

CAST-Accredited Program Training Pathway

The specific requirements for individuals within this group include:

- Neurosurgery/neurology/radiology residency (ACGME accredited)
- Stroke/Neuro Critical Care/neuroradiology subspecialty fellowship (accredited by AGME, CAST, or United Council for Neurological Specialties) for neurologists or radiologists
- Pre-requisite training in catheter skills/radiation biology
- NES Training (CAST-accredited program)
- Taking and passing the ABNS NES examination after satisfactory NES fellowship completion
- A case log of the most recent 2 years of practice data, including a summary of their case category numbers as outlined in the CAST NES practice data forms available on the website.

CAST Certification Application (Processes/Details)

CAST certification will only be available for individuals certified by the ABMS in their respective primary specialty. Applications must be submitted through the SNS website at http://www.societyns.org/fellowships/PracticeTrackCertification-Neuroendovascular%20Surgery.asp. A checklist of required documentation must be completed before the application will be considered for action by CAST and NESAC.

NES certificates will be issued by CAST for qualified individuals thereafter. For individuals who have completed training in a CAST-accredited program and who are not yet board certified, CAST will issue an acknowledgment of that training valid until the individual obtains his/her primary ABMS board certification (within a generally acceptable timeline). This acknowledgment will be replaced with a CAST certificate once ABMS certification is obtained, and the CAST NES application requirements are satisfied. Subsequent 10-year recertification cycles will be tied to continued primary and subspecialty certification (and any attendant MOC requirements), a satisfactory score on the ABNS NES recertification examination, and any other essential requirements as judged by CAST and NESAC at the time of renewal.

Conclusions

This document represents a consensus statement by the JSCVS for the American Association of Neurological Surgeons and Congress of Neurological Surgeons, the SNIS, and the SVIN. Representing many of the leading NES practitioners from neurosurgery, neuroradiology, and neurology in the United States, these groups seek to standardize NES training and accreditation in the United States to establish expectations for the highest quality medical care in this discipline. The training parameters described herein provide pathways for individual fellow certification (including a practice track certification pathway for current practitioners) and for institutional accreditation of advanced fellowship training programs in NES, under the aegis of the SNS, the SNS CAST, and a collaborative multidisciplinary NESAC. The detailed CAST certification requirements for individuals, including trainees and advanced practitioners, and accreditation requirements for sponsoring institutions, including application materials, are available on the SNS website at the following URL: http://www.societyns.org/fellowships/NeuroEndovascularNeurosurgery.asp.

Disclosures

Dr Howington has potential conflicts of interest with Chemence Medical. Dr Jovin has potential conflicts of interest with Anaconda, Codman Neurovascular, Neuravi Silk Road, and Stryker. Dr Levy has potential conflicts of interest with Abbott Vascular, Covidien, Intratech Medical Ltd, MEDX, NeXtGen Biologics, Pulsar Vascular, and Stryker. Dr Linfante has potential conflicts of interest with Medtronic, Stryker, Surpass, and Three Rivers. Dr Mocco has potential conflicts of interest with Apama Medical, Cerebrotech, Comet, Cosmo, Endostream, Neuro Technology Investors, Pulsar, Rebound Medical, Synchron, and The Stroke Project, Inc. Dr Ringer has potential conflicts of interest with Microvention. Dr Siddiqui has potential conflicts of interest with Amnis Therapeutics, Ltd, Cardinal Health, Cerebrotech Medical Systems, CereVasc, LLC, Claret Medical, Codman, Corindus, GuidePoint Global Consulting, Intersocietal Accreditation Commission, Medina Medical Systems, Medtronic, Microvention, MUSC, Neuravi, Penumbra, Pulsar Vascular, Rapid Medical, Rebound Therapeutics Corp., Silk Road Medical, StimMed, Stryker, The Stroke Project, Inc, Three Rivers Medical, Valor Medical, and W.L. Gore & Associates. The other authors report no conflicts.

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