

American Board of Psychiatry and Neurology

Vascular Neurology Core Competencies Outline

I. Vascular Neurology Patient Care and Procedural Skills Core Competencies

- A. Vascular neurologists shall demonstrate the following abilities:
1. To perform and document a relevant history and examination on culturally diverse patients¹ to include as appropriate:
 - a. Chief complaint
 - b. History of present illness
 - c. Past medical history
 - d. A comprehensive review of systems
 - e. A biological family history
 - f. A sociocultural history²
 - g. A developmental history (especially for children)
 - h. A situationally germane general and neurologic examination
 2. To delineate appropriate differential diagnoses
 3. To evaluate, assess, and recommend effective management of patients
- B. Based on a comprehensive neurologic assessment, vascular neurologists shall demonstrate the following abilities:
1. To determine:
 - a. If a patient's symptoms are the result of a vascular disease affecting the central/vascular nervous system or are of another origin (e.g., of a systemic, psychiatric, or psychogenic illness)
 - b. A formulation, differential diagnosis, laboratory investigation, and management plan
 2. To develop and maintain the technical skills to:
 - a. Perform lumbar puncture
 - b. Identify and describe abnormalities seen in common vascular disorders on radiographic testing, including plain films, arteriography, computed tomography (CT), and magnetic resonance imaging (MRI)
 - c. Evaluate the application and relevance of investigative procedures and interpretation in the diagnosis of neurologic disease, including the following:
 - (1) Electroencephalogram and evoked potentials
 - (2) Perimetry
 - (3) Psychometrics
 - (4) Cerebrospinal fluid (CSF) analysis
 - (5) Vascular imaging (duplex, transcranial Doppler)
 - (6) Radiographic studies as outlined above
 - d. Identify and describe gross and microscopic specimens taken from the normal nervous system and from patients with vascular neurologic disorders
 3. To recognize and treat vascular neurologic disorders in both adults and children

II. Vascular Neurology Medical Knowledge Core Competencies

- A. Vascular neurologists shall demonstrate the following:
1. Knowledge of major vascular diseases, including considerations relating to age, gender, race, and ethnicity, based on the literature and standards of practice. This knowledge shall include:
 - a. The epidemiology of the disorder
 - b. The etiology of the disorder, including medical, genetic, and sociocultural factors
 - c. The phenomenology of the disorder
 - d. An understanding of the impact of physical illness on the patient's functioning
 - e. The experience, meaning, and explanation of the illness for the patient and family, including the influence of cultural factors and culture-bound syndromes
 - f. Effective treatment strategies
 - g. Course and prognosis
 2. Knowledge of health care delivery systems, including patient and family counseling
 3. Knowledge of the application of ethical principles in delivering medical care
 4. Ability to reference and utilize electronic systems to access medical, scientific, and patient information
- B. Vascular neurologists shall demonstrate knowledge of the following:
1. Basic science aspects of vascular neurology
 - a. Vascular neuroanatomy
 - b. Stroke pathophysiology
 - (1) Cerebral blood flow
 - (2) Blood-brain barrier in stroke
 - (3) Coagulation cascade
 - (4) Metabolic and cellular consequences of ischemia
 - (5) Inflammation and stroke
 - (6) Brain edema and increased intracranial pressure
 - (7) Restoration and recovery following stroke
 - (8) Secondary consequences from intracranial bleeding
 - c. Neuropathology of stroke
 - (1) Pathological/imaging/clinical correlations
 - d. Pharmacology
 - (1) Antiplatelet agents – prevention, acute treatment
 - (2) Anticoagulants – prevention, acute treatment
 - (3) Thrombolytic agents
 - (4) Neuroprotective agents and other acute treatments
 - (5) Cardioactive agents
 - (6) Medications to prevent stroke by treating risk factors
 - (7) Medications to treat autoimmune diseases and vasculitis

- (8) Medications to treat complications of stroke
 - (9) Medications to improve or restore neurologic function or to augment rehabilitation
 - (10) Medications to prevent rebleeding or vasospasm following hemorrhage
 - (11) Antimigraine medications
 - (12) Vitamins
 - (13) Interactions between medications
 - (14) Drugs that cause stroke, including drugs and substances of abuse
- 2. Patient evaluation and treatment selection, including:
 - a. The nature of the patient's history and physical findings and the ability to correlate the findings with a likely localization for neurologic dysfunction
 - b. Likely diagnoses and differential diagnoses
 - (1) In adults
 - (2) In children
 - c. Planning for evaluation and management
 - d. Potential risks and benefits of potential therapies, including surgical procedures
 - 3. Employment of principles of quality improvement in practice
- C. Prevention, risk factors, and epidemiology
- 1. Populations at risk for stroke
 - 2. Modifiable risk factors for stroke
 - 3. Infections predisposing to stroke
 - 4. Genetic factors predicting stroke
 - 5. Stroke as a complication of other medical illnesses
 - 6. Special populations at risk for stroke
 - 7. Stroke education programs and regional health services
 - 8. Concepts of clinical research
 - 9. Outcomes
 - a. Prognosis
 - b. Mortality and morbidity of subtypes of stroke
- D. Clinical features of cerebrovascular diseases
- 1. Neuro-otologic signs and symptoms
 - 2. Neuro-ophthalmologic signs and symptoms
 - 3. Transient ischemic attack
 - 4. Ischemic stroke syndromes – cerebral hemispheres
 - 5. Ischemic stroke syndromes – brain stem and cerebellum
 - 6. Ischemic stroke syndromes of the spinal cord
 - 7. Vascular dementia and vascular cognitive syndromes
 - 8. Features differentiating hemorrhagic or ischemic stroke
 - 9. Intracerebral hemorrhage
 - 10. Subarachnoid hemorrhage/saccular aneurysms
 - 11. Vascular malformations

12. Primary intraventricular hemorrhage
13. Subdural or epidural hematoma
14. Spinal cord hemorrhage or infarction
15. Carotid cavernous or dural fistulas
16. Pituitary apoplexy
17. Venous thrombosis
18. Hypertensive encephalopathy and eclampsia
19. Clinical presentations of primary and multisystem vasculitides
20. Hypoxia-ischemia
21. Brain death
22. Mitochondrial encephalopathy, lactic acidosis, and stroke-like episodes (MELAS) and metabolic disorders causing neurologic symptoms
23. Non-stroke presentations of vascular disease
24. Cardiovascular disease
25. Vascular presentations of other diseases of central nervous systems
26. Infectious diseases and stroke
27. Migraine

E. Evaluation of the patient with cerebrovascular disease

1. Evaluation of the brain and spinal cord
 - a. Computed tomography of brain
 - b. Computed tomography of spine and spinal cord
 - c. Magnetic resonance imaging of brain and spinal cord
 - d. Positron emission tomography (PET) and single-photon emission computed tomography (SPECT)
 - e. Electroencephalography and evoked potentials
 - f. Examination of the CSF
 - g. Intracranial pressure monitoring
2. Evaluation of the vasculature – occlusive or non-occlusive
 - a. Arteriography and venography
 - b. Extracranial ultrasonography
 - c. Intracranial ultrasonography
 - d. CT angiography
 - e. MR angiography and venography
3. Evaluation of the heart and great vessels
 - a. Electrocardiography
 - b. Transthoracic echocardiography and transesophageal echocardiography
 - c. Other chest imaging studies
4. Other diagnostic studies
 - a. Hematologic studies
 - b. Immunological studies
 - c. Biochemical studies
 - d. Urine tests
 - e. Biopsies
 - f. Evaluation of the complications of stroke
 - g. Evaluation of the consequences of stroke

h. Genetic testing

F. Causes of stroke

1. Atherosclerosis – ischemic stroke
2. Non-atherosclerotic vasculopathies – ischemic stroke
 - a. Non-inflammatory
 - b. Infectious
 - c. Inflammatory, non-infectious
3. Migraine
4. Other causes of ischemic stroke
5. Genetic and metabolic causes of stroke
6. Drug abuse and toxicities
7. Cerebral amyloid angiopathy – infarction or hemorrhage
8. Cardioembolic causes of stroke
9. Pro-thrombotic causes of stroke
 - a. Inherited
 - b. Acquired
 - c. Autoimmune causes of thrombosis
 - d. Iatrogenic/drugs/toxins
10. Bleeding diatheses
 - a. Inherited
 - b. Acquired
 - c. Systemic diseases
 - d. Iatrogenic/drugs/toxins
11. Aneurysms
12. Vascular malformations
13. Trauma and intracranial bleeding
14. Moyamoya disease and syndrome
15. Hypertensive hemorrhage
16. Other causes of hemorrhage
17. Genetic diseases causing hemorrhagic stroke
18. Causes of venous thrombosis
19. Complications of stroke
 - a. Early neurologic complications
 - b. Early medical complications
 - c. Chronic neurologic sequelae
 - d. Chronic medical sequelae

G. Treatment of patients with stroke

1. Outpatient management
2. Medical therapies to prevent stroke
3. Hyperacute treatment of ischemic stroke
 - a. Emergency department
 - b. Hospitalization
 - c. ICU
 - d. Neurosurgical management
4. Chronic care

5. Prevention of recurrent stroke
6. Treatment of venous thrombosis
7. Treatment of spinal cord vascular disease
8. Treatment of pituitary apoplexy
9. Professionalism, ethics, systems-based practice
 - a. Palliative care
 - b. End-of-life decisions
 - c. Advance directives, informed consent, regulations
 - d. Other

H. Recovery, regenerative approaches, and rehabilitation

III. Vascular Neurology Interpersonal and Communications Skills Core Competencies

- A. Vascular neurologists shall demonstrate the following abilities:
 1. To listen to and understand patients and their families and to attend to nonverbal communication
 2. To communicate effectively with patients and their families using verbal, nonverbal, and written skills as appropriate
 3. To develop and maintain a therapeutic alliance with patients by instilling feelings of trust, honesty, openness, rapport, and comfort in their relationships with vascular neurologists
 4. To partner with patients and families to develop an agreed-upon health care management plan
 5. To transmit information to patients and families in a clear and meaningful fashion
 6. To understand the impact of the vascular neurologist's own feelings and behavior so that these do not interfere with appropriate treatment
 7. To communicate effectively and work collaboratively with allied health care professionals and with other professionals involved in the lives of patients and families
 8. To educate patients, their families, and professionals about medical, psychosocial, and behavioral issues
- B. Vascular neurologists shall demonstrate the ability to obtain, interpret, and evaluate consultations from other medical specialties. This shall include:
 1. Knowing when to solicit consultation and having the sensitivity to assess the need for consultation
 2. Formulating and clearly communicating the consultation question
 3. Discussing the consultation findings with the consultant
 4. Discussing the consultation findings with the patient and family
- C. Vascular neurologists shall serve as effective consultants to other health care professionals and community agencies by demonstrating the abilities to:
 1. Communicate effectively with the requesting party to refine the consultation question
 2. Maintain the role of consultant

3. Communicate clear and specific recommendations
 4. Respect the knowledge and expertise of the requesting professionals
- D. Vascular neurologists shall demonstrate the ability to communicate effectively with patients and their families by:
1. Gearing all communication to the educational and intellectual levels of patients and their families
 2. Demonstrating sociocultural sensitivity to patients and their families
 3. Providing explanations of neurologic disorders and treatment that are jargon-free and geared to the educational/intellectual levels of patients and their families
 4. Providing preventive education that is understandable and practical
 5. Respecting the patients' and families' cultural, ethnic, religious, and economic backgrounds
 6. Developing and enhancing rapport and a working alliance with patients and their families
 7. Ensuring that the patient and/or family have understood the communication
 8. Responding promptly to electronic communications when used as a communication method agreed upon by vascular neurologists and their patients and patients' families
- E. Vascular neurologists shall maintain up-to-date medical records . These records must capture essential information while simultaneously respecting patient privacy, and they must be useful to health professionals outside neurology. Written prescriptions must be written legibly. Electronic prescriptions must be entered accurately and transmitted securely.
- F. Vascular neurologists shall demonstrate the ability to effectively lead a multidisciplinary treatment team, including being able to:
1. Listen effectively
 2. Elicit needed information from team members
 3. Integrate information from different disciplines
 4. Manage conflict
 5. Clearly communicate an integrated treatment plan
- G. Vascular neurologists shall demonstrate the ability to communicate effectively with patients and their families while respecting confidentiality. Such communication may include:
1. The results of the assessment
 2. Use of informed consent when considering investigative procedures
 3. Genetic counseling and palliative care when appropriate
 4. Consideration and compassion for the patient in providing accurate medical information and prognosis
 5. The risks and benefits of the proposed treatment plan, including possible side effects of medications and/or complications of nonpharmacologic treatments

6. Alternatives (if any) to the proposed treatment plan
7. Appropriate education concerning the disorder, its prognosis, and prevention strategies

IV. Vascular Neurology Practice-Based Learning and Improvement Core Competencies

- A. Vascular neurologists shall recognize limitations in their own knowledge base and clinical skills, and understand and address the need for lifelong learning.
- B. Vascular neurologists shall demonstrate appropriate skills for obtaining and evaluating up-to-date information from scientific and practice literature and other sources to assist in the quality care of patients. This shall include, but not be limited to:
 1. Use of medical libraries
 2. Use of information technology, including Internet-based searches and literature databases
 3. Use of drug information databases
 4. Active participation, as appropriate, in educational courses, conferences, and other organized educational activities both at the local and national levels.
- C. Vascular neurologists shall evaluate caseload and practice experience in a systematic manner. This may include:
 1. Case-based learning
 2. Use of best practices through practice guidelines or clinical pathways
 3. The review of patient records
 4. Obtaining evaluations from patients (e.g., outcomes and patient satisfaction)
 5. Employment of principles of quality improvement in practice
 6. Obtaining appropriate supervision and consultation
 7. Maintaining a system for examining errors in practice and initiating improvements to eliminate or reduce errors
- D. Vascular neurologists shall demonstrate an ability to critically evaluate relevant medical literature. This ability may include:
 1. Using knowledge of common methodologies employed in neurologic research
 2. Researching and summarizing a particular problem that derives from their own caseloads
- E. Vascular neurologists shall demonstrate the abilities to:
 1. Review and critically assess scientific literature to determine how quality of care can be improved in relation to one's practice (e.g., reliable and valid assessment techniques, treatment approaches with established effectiveness, practice parameter adherence). Within this aim, vascular neurologists shall be able to assess the generalizability or applicability of research finding to their patients in relation to their sociodemographic and

- clinical characteristics
2. Develop and pursue effective remediation strategies that are based on critical review of the scientific literature

V. Vascular Neurology Professionalism Core Competencies

- A. Vascular neurologists shall demonstrate responsibility for their patients' care, including:
 1. Responding to communication from patients and health professionals in a timely manner
 2. Establishing and communicating back-up arrangements, including how to seek emergent and urgent care when necessary
 3. Using medical records for appropriate documentation of the course of illness and its treatment
 4. Providing coverage if unavailable (e.g., when out of town or on vacation)
 5. Coordinating care with other members of the medical and/or multidisciplinary team
 6. Providing for continuity of care, including appropriate consultation, transfer, or referral if necessary
- B. Vascular neurologists shall demonstrate ethical behavior, integrity, honesty, compassion, and confidentiality in the delivery of care, including matters of informed consent/assent, professional conduct, and conflict of interest.
- C. Vascular neurologists shall demonstrate respect for patients and their families, and their colleagues as persons, including their ages, cultures, disabilities, ethnicities, genders, socioeconomic backgrounds, religious beliefs, political leanings, and sexual orientations.
- D. Vascular neurologists shall demonstrate understanding of, and sensitivity to, end-of-life care and issues regarding provision of care.
- E. Vascular neurologists shall review their professional conduct and remediate when appropriate.
- F. Vascular neurologists shall participate in the review of the professional conduct of their colleagues.

VI. Vascular Neurology Systems-Based Practice Core Competencies

- A. Vascular neurologists shall have a working knowledge of the diverse systems involved in treating patients of all ages, and understand how to use the systems as part of a comprehensive system of care in general and as part of a comprehensive, individualized treatment plan. This shall include the:
 1. Use of practice guidelines
 2. Ability to access community, national, and allied health professional resources that may enhance the quality of life of patients with chronic

- neurologic illnesses
 - 3. Demonstration of the ability to lead and delegate authority to health care teams needed to provide comprehensive care for patients with neurologic disease
 - 4. Demonstration of skills of the practice of ambulatory medicine, including time management, clinical scheduling, and efficient communication with referring physicians
 - 5. Use of appropriate consultation and referral mechanisms for the optimal clinical management of patients with complicated medical illness
 - 6. Demonstration of awareness of the importance of adequate cross-coverage
 - 7. Use of accurate medical data in the communication with and effective management of patients
- B. In the community system, vascular neurologists shall:
- 1. Recognize the limitation of health care resources and demonstrate the ability to act as an advocate for patients within their sociocultural and financial constraints
 - 2. Demonstrate knowledge of the legal aspects of vascular neurologic diseases as they impact patients and their families
 - 3. Demonstrate an understanding of risk management
- C. Vascular neurologists shall demonstrate knowledge of, and interact with, managed health systems, including:
- 1. Participating in utilization review communications and, when appropriate, advocating for quality patient care
 - 2. Educating patients concerning such systems of care
- D. Vascular neurologists shall demonstrate knowledge of community systems of care and assist patients to access appropriate care and other support services. This requires knowledge of treatment settings in the community, which include ambulatory, consulting, acute care, partial hospital, skilled care, rehabilitation, nursing homes and home care facilities, substance abuse facilities, and hospice organizations. Vascular neurologists shall demonstrate knowledge of the organization of care in each relevant delivery setting and the ability to integrate the care of patients across such settings.
- E. Vascular neurologists shall be aware of safety issues, including acknowledging and remedying medical errors, should they occur.

¹Cultural diversity includes issues of race, gender, language, age, country of origin, sexual orientation, religious/spiritual beliefs, sociocultural class, educational/intellectual levels, and physical disability. Working with a culturally diverse population requires knowledge about cultural factors in the delivery of health care. For the purposes of this document, all patient and peer populations are to be considered culturally diverse.

²Regarding sociocultural issues, for the purposes of this document, “family” is defined as those having a biological or otherwise meaningful relationship with the patient. Such “significant others” are to be defined from the patient’s point of view.