CERTIFICATION EXAMINATION IN VASCULAR NEUROLOGY

The American Board of Psychiatry and Neurology, Inc. (ABPN) is a not-for-profit corporation dedicated to serving the public interest and the professions of psychiatry and neurology by promoting excellence in practice through certification and continuing certification processes.

The ABPN designs and develops the initial vascular neurology certification examination to assess the knowledge and reasoning skills needed to provide high quality patient care in the broad domain of the subspecialty. It utilizes two-dimensional content specifications. Within the two- dimensional format, one dimension is comprised of disorders and topics while the other is comprised of competencies and mechanisms that cut across the various disorders of the first dimension. By design, the two dimensions are interrelated and not independent of each other. All of the questions on the examination will fall into one of the disorders/topics and will be aligned with a competency/mechanism. For example, an item on ischemic stroke could focus on treatment, or it could focus on systems-based practice.

Candidates should use the detailed content outline as a guide to prepare for a certification examination. Please note that no single examination tests everything on the content outline.

For more information, please contact us at questions@abpn.org or visit our website at www.abpn.org.

CERTIFICATION EXAMINATION IN VASCULAR NEUROLOGY
Content Blueprint

Number of questions: 220		
Dimension 1		
Neurologic Disorders and Topics		
01.	Headache and pain disorders	1-2%
02.	Epilepsy and episodic disorders	1-2%
03.	Sleep disorders	1-2%
04.	Vascular neurology	77-87%
05.	Neuroinfectious diseases	1-2%
06.	Brain and spinal trauma and spinal diseases	1-2%
07.	Neuro-ophthalmologic and neuro-otologic disorders	1-2%
08.	Metabolic diseases, nutritional deficiency states, and disorders due to toxins, drugs, and physical agents	1-2%
09.	Behavioral neurology and neurocognitive disorders	1-2%
10.	Questions not associated with a specific neurologic disorder	7-11%
11.	Neuroimmunologic and paraneoplastic CNS disorders	1-2%

Dimension 2		
Physician Competencies and Mechanisms		
A.	Neuroscience and mechanism of disease	8-12%
B.	Clinical aspects of neurologic disease	22-28%
C.	Diagnostic procedures	22-28%
D.	Treatment/Management	31-39%
E.	Interpersonal and communication skills	1-2%
F.	Professionalism	1-2%
G.	Practice-based learning and improvement	1-2%
H.	Systems-based practice	1-3%

CERTIFICATION EXAMINATION IN VASCULAR NEUROLOGY
Content Outline

Number of items: 220
Dimension 1
Neurologic Disorders and Topics
01. Headache and pain disorders
A. Headache
01. Primary headaches
a. Migraine
02. Secondary headaches
a. Headache due to head and neck trauma (posttraumatic headache)
b. Headache due to cranial or cervical vascular disorder (thunderclap headache, reversible cerebral vasoconstriction syndrome (RCVS), arterial dissection, cerebral hemorrhage, ischemia)
c. Headache due to nonvascular intracranial disorder (hydrocephalus, idiopathic intracranial hypertension, increased intracranial pressure and cerebral edema, low-CSF-pressure headaches, tumors)
d. Headache due to infection
e. Headache due to a substance or its withdrawal
03. Cranial neuralgia, central and primary facial pain (trigeminal neuralgia, idiopathic facial pain, post-herpetic neuralgia)
B. Pain disorders
01. Central pain syndromes (thalamic, phantom, etc.)
02. Complex regional pain syndromes
02. Epilepsy and episodic disorders
A. Epilepsies attributed to and organized by structural-metabolic causes
01. Structural (including tumors, vascular malformations)
02. Infection
03. Trauma
04. Perinatal insults
05. Malformations of cortical development (including neurocutaneous syndromes)
06. Mitochondrial and metabolic disorders
07. Stroke
08. Genetic epilepsies
B. Epilepsies of unknown cause
C. Conditions with epileptic seizures traditionally not diagnosed as a form of epilepsy
01. Benign neonatal seizures
02. Febrile seizures
03. Provoked seizures

D. Nonepileptic paroxysmal disorders
01. Syncope and anoxic seizures
a. Vasovagal syncope
b. Neurological syncope
c. Orthostatic intolerance
d. Long QT and cardiac syncope
02. Migraine-associated disorders
a. Migraine with visual aura
b. Familial hemiplegic migraine
c. Benign paroxysmal torticollis
d. Benign paroxysmal vertigo
e. Cyclical vomiting
f. Migraine with speech disorder
E. Status epilepticus
01. Convulsive
02. Nonconvulsive
03. Focal motor
03. Sleep disorders
A. Sleep-disordered breathing
01. Obstructive sleep apnea
02. Central apnea syndromes
03. Sleep-related hypoventilation disorders
B. Circadian rhythm sleep-wake disorders
01. Delayed sleep-wake phase disorder
02. Advanced sleep-wake phase disorder
03. Irregular sleep-wake rhythm disorder
04. Non-24-hour sleep-wake phase disorder
C. Sleep disorders in other conditions
01. Effects of sleep disorders on cardiovascular/cerebrovascular risk factors
a. Hypertension
b. Atrial fibrillation
c. Congestive heart failure
d. Myocardial infarction
e. Stroke
04. Vascular neurology
A. Ischemic stroke (cerebral infarction and transient ischemic attack)
01. Atherosclerosis
a. Large-artery
b. Small-artery
02. Cardioembolic

a. Atrial fibrillation/atrial cardiopathy
b. Cardiovascular procedures and operations
c. Acute myocardial infarction
d. Cardiomyopathies/myocarditis
e. Rheumatic mitral or aortic stenosis
f. Infective endocarditis
g. Libman-Sacks endocarditis
h. Nonbacterial thrombotic endocarditis
i. Mechanical or bioprosthetic valves
j. Atrial myxoma
k. Sick sinus syndrome
l. Other valvular heart disease
m. Patent foramen ovale, including atrial septal aneurysm
n. Congenital heart diseases, including cyanotic heart disease
o. Air embolism
p. Fat embolism
xx. Other
03. Arterial dissection
04. Other vasculopathies, including vasculitis
a. Noninflammatory
i. Moyamoya disease
ii. Fibromuscular dysplasia
iii. Trauma
iv. Radiation-induced vasculopathy
xx. Other
b. Infectious
i. Syphilis
ii. Varicella (chickenpox)
iii. Varicella zoster
iv. AIDS
v. Cysticercosis
vi. Bacterial meningitis
vii. Aspergillosis
viii. Mucormycosis
ix. Candidiasis
x. Cat-scratch disease
xi. Behçet disease
xii. SARS-CoV-2
xx. Other
c. Inflammatory

05. Spinal cord infarction/ischemia
06. Carotid circulation TIA including amaurosis fugax
07. Vertebrobasilar circulation TIA
08. Asymptomatic carotid bruit or stenosis
09. Cortical stroke syndromes
a. Branch cortical artery syndromes
b. Watershed syndromes
10. Subcortical stroke syndromes
a. Lacunar strokes
b. Striatocapsular infarctions
c. Multiple lacunar infarcts
11. Major hemispheric syndromes
a. Internal carotid artery occlusion
b. Middle cerebral, anterior cerebral, or posterior cerebral artery
12. Behavioral and cognitive impairments following stroke
13. Bi-hemispheric stroke, including hypotensive events
14. Multifocal or diffuse disease
15. Basilar artery occlusion
a. Locked-in syndrome
b. Major brainstem strokes
16. Vertebral artery occlusion
17. Branch brainstem stroke syndromes
18. Syndromes from cerebellar arteries (brainstem/cerebellum)
19. Top-of-the-basilar syndrome
20. Thalamic syndromes
XX. Other
a. Kawasaki disease
B. Intracerebral hemorrhage
01. Chronic hypertension
02. Vascular malformations
a. Arteriovenous
b. Developmental venous anomaly
c. Cavernous malformations
d. Telangiectasia
e. Dural arteriovenous fistula
f. Vein of Galen malformation
03. Bleeding diatheses and antithrombotic agents
a. Inherited
i. Hemophilias
ii. Von Willebrand disease

iii. Other
b. Acquired
i. Leukemia
ii. Thrombocytopenia
iii. Disseminated intravascular coagulation
xx. Other
c. Systemic diseases
d. Iatrogenic/drugs/toxins
i. Anticoagulants
ii. Antiplatelet aggregating agents
iii. Thrombolytic agents
iv. Drugs of abuse
xx. Other
04. Cerebral amyloid angiopathy
05. Hemorrhagic tumors
a. Primary
b. Metastatic
06. Pituitary apoplexy
07. Locations of intracerebral hemorrhage
a. Putamen
b. Thalamus
c. Lobar and white matter
d. Brainstem
e. Cerebellum
f. Caudate
g. Intraventricular
XX. Other
C. Subarachnoid hemorrhage
01. Aneurysm
a. Saccular aneurysms
b. Infectious
c. Traumatic
d. Neoplastic
e. Dolichoectatic
f. Dissecting
g. Unruptured aneurysm
xx. Other aneurysms
02. Vascular malformations
03. Complications (including vasospasm)
04. Trauma

D. Cerebral venous thrombosis
01. Pregnancy and puerperium
02. Hypercoagulability (thrombophilia)
03. Cavernous sinus thrombosis
04. Superior sagittal sinus
05. Other sinuses
06. Cortical thrombophlebitis
07. Deep cerebral venous thrombosis
E. Reversible cerebrovascular constriction syndrome (RCVS) and posterior reversible encephalopathy syndrome (PRES)
F. Sickle cell disease
G. Unruptured brain aneurysm or unruptured vascular malformation
H. Primary intraventricular hemorrhage
I. Carotid cavernous or dural fistulas
J. Cardiovascular diseases
01. Heart disease, including coronary artery disease
02. Cardiac complications of stroke
03. Peripheral arterial disease
04. Aortic disease
05. Venous disease
K. Stroke genetics
01. Genetics of atherosclerosis
a. Hypertension
b. Diabetes mellitus
c. Lipids and lipoproteins
d. Homocysteine
e. Polymorphisms of the MTHFR gene
f. Glu298Asp allele of the ecNOS gene
g. Alleles of inflammatory molecules
h. Cigarette smoking (paraoxonase-1 gene)
02. Genetics of leukoaraiosis
a. Genes-HTN-arteriolosclerosis-leukoaraiosis-cognitive impairment
03. Mendelian and mitochondrial disorders associated with stroke
a. MELAS
b. Homocystinuria
c. Hereditary cerebroretinal vasculopathy (HCVR)
d. Hereditary endotheliopathy with retinopathy, nephropathy, and stroke (HERNS)
e. Fabry disease
f. CADASIL

g. CARASIL
h. Sickle cell disease
04. Genetics of aneurysms
a. Autosomal dominant polycystic kidney disease (ADPKD)
b. Marfan syndrome
c. Fibromuscular dysplasia (FMD)
d. Collagen type III gene
e. MMP-9
05. Genetics of intracerebral hemorrhage
a. Genes associated with CAA - APOE (Ɛ 2, 3 and 4)
b. Genes associated with hemostasis
06. Genetics of cerebrovascular malformations
a. Cavernous malformations (CMs)
b. CCM 1, 2 and 3 (human Krev interaction trapped 1 gene [KREV 1])
c. Arteriovenous malformations (AVMs)
d. Osler-Weber-Rendu
e. Familial cerebral AVMs
f. Wyburn-Mason syndrome
g. Sturge-Weber syndrome
L. Prothrombotic (hypercoagulable) causes of stroke
01. Inherited
a. Factor V Leiden—activated protein C resistance
b. Prothrombin gene mutation
c. Protein S, C, antithrombin
d. Thalassemia
e. Sickle cell disease
xx. Other
02. Acquired
a. Pregnancy
b. Cancer
c. Dehydration
d. Thrombocytosis
e. Thrombotic thrombocytopenic purpura
f. Heparin-induced thrombocytopenia and thrombosis (HITT)
g. Leukemia
h. Disseminated intravascular coagulation
i. Nephrotic syndrome
j. Hemolytic uremic syndrome
k. Sepsis and inflammation
xx. Other

03. Autoimmune causes of thrombosis
a. Antiphospholipid syndrome, Sneddon syndrome
b. Other
04. Iatrogenic/drugs/toxins
a. Antineoplastic
b. Prothrombotic agents
c. Other
M. Hypoxic-ischemic encephalopathy
XX. Other
05. Neuroinfectious diseases
A. Bacterial infections
01. Meningitis
02. Brain and spine abscess
B. Fungal infections
01. Meningitis
02. Cerebritis
C. Mycobacteria, including tuberculosis
D. Viral infections
E. Protozoan infections
F. Parasitic infections
06. Brain and spinal trauma and spinal cord diseases
A. Brain trauma
01. Diffuse axonal injury
02. Cerebral contusion
03. Traumatic hemorrhage
a. Epidural hematoma
b. Subdural hematoma
c. Traumatic subarachnoid hemorrhage
B. Spinal trauma
01. Spinal cord contusion and transection
02. Spinal epidural hematoma
C. Nontraumatic spinal cord disorders
01. Spinal cord infarction
02. Vascular myelopathies
03. Spinal cord vascular malformations
D. Nonaccidental trauma in children
E. Myeloneuropathy
07. Neuro-ophthalmologic and neuro-otologic disorders
A. Neuro-ophthalmology
01. Disorders of the optic nerve

a. Vascular (e.g., anterior ischemic optic neuropathy)
02. Disorders of the retina
a. Retinal artery occlusion, including Susac syndrome
b. Retinal venous occlusion
03. Other lesions of optic pathways
a. Optic chiasm
b. Optic tracts
c. Optic radiations
d. Visual cortex, including visual agnosias and cortical blindness
04. Disorders of the pupil
a. Horner syndrome
b. Argyll-Robertson pupil
c. Tonic pupil
05. Disorders of ocular motility
a. Disorders of supranuclear control of eye movements
i. Horizontal gaze paresis, including internuclear ophthalmoplegia (INO) and one-and-a-half syndrome
ii. Upgaze paresis, including Parinaud syndrome
iii. Downgaze paresis
b. Disorders of cranial nerves 3,4, 6, and their nuclei
c. Nystagmus
d. Cavernous sinus disorders
e. Extraocular disorders
06. Intraocular manifestations of stroke
B. Neuro-otology
01. Vestibular disease
a. Benign paroxysmal positional vertigo
b. Ménière disease
c. Acute labyrinthitis
d. Toxic vestibulopathy
e. Cerebellopontine angle tumors
f. Central vertigo, including disembarkment syndrome
02. Hearing loss
03. Tinnitus
08. Metabolic diseases, nutritional deficiency states, and disorders due to toxins, drugs, and physical agents
A. Metabolic diseases
01. Hypoxic-ischemic encephalopathy
a. Cardiac arrest
b. Carbon monoxide poisoning

c. Cortical laminar necrosis
xx. Other
02. Disorders of glucose metabolism, including hypoglycemia, diabetic ketoacidosis, and nonketotic hyperglycemia
03. Hepatic encephalopathy
04. Uremic encephalopathy, including dialysis dementia and dialysis dysequilibrium syndrome
05. Disorders of sodium, potassium, and water metabolism, including hyponatremia, hypernatremia, hypokalemia, and hyperkalemia
06. Disorders of calcium and magnesium metabolism, including hypocalcemia, hypercalcemia, hypomagnesemia, and hypermagnesemia
07. Endocrine diseases, including those of thyroid, parathyroid, adrenal, and pituitary glands (including pituitary apoplexy)
08. Drug overdose
B. Nutritional deficiency states
C. Toxins, drugs, and physical agents
01. Effects of drug abuse
a. Opioids
b. Cocaine
c. Amphetamines
d. Sedative-hypnotics
e. Inhalants
f. Hallucinogens
xx. Other
02. Effects of alcohol
03. Effects of ionizing radiation
04. Hypothermia and hyperthermia
05. Electric current and lightning
06. Animal and insect neurotoxins
a. Snakes
b. Spiders
c. Scorpions
D. Iatrogenic/therapeutic drugs
09. Behavioral neurology and neurocognitive disorders
A. Delirium, dementia, and other cognitive disorders
01. Delirium
a. Delirium due to a medical condition
b. Substance intoxication delirium
02. Dementia
a. Vascular dementia

b. Dementia due to a medical condition
c. Substance/medication-induced dementia
03. Amnestic disorders (including transient global amnesia)
XX. Other
B. Higher cortical function and clinical syndromes
01. Frontal lobe syndromes
02. Aphasia
03. Apraxia
04. Neglect
05. Agnosia
06. Disconnection syndromes
C. Alteration of mental status/encephalopathy/coma/brain death
01. Cerebral death criteria
D. Pseudobulbar affect/pseudobulbar palsy
XX. Other
10. Questions not associated with a specific neurologic disorder
A. Normal anatomy, process, neurophysiology
01. Vascular anatomy
B. Pharmacology
C. Medical-legal, public policy/regulatory factors, professional practice
D. Procedures/procedural safety
E. Normal test results, findings, variants, artifacts, and methods
11. Neuroimmunologic and paraneoplastic CNS disorders
A. CNS vasculitis and microangiopathies
01. Primary angiitis of the CNS
02. Secondary CNS vasculitis
a. Systemic vasculitides (giant cell arteritis, polyarteritis nodosa, microscopic polyangiitis, Behçet disease)
b. Systemic autoimmune disease (systemic lupus erythematosus, rheumatoid arthritis, Sjogren syndrome, sarcoidosis)
c. Infectious vasculitis (varicella zoster)
d. Substance-induced vasculitis (amphetamines, cocaine)
03. Microangiopathies (Susac syndrome, Sneddon syndrome)

Dimension 2
Physician Competencies and Mechanisms
A. Neuroscience and mechanism of disease
01. Neuroanatomy
a. Vascular
i. Extracranial arterial anatomy
ii. Intracranial arterial anatomy
iii. Collaterals
iv. Common anatomical variations
v. Venous anatomy
vi. Spinal cord vascular anatomy
vii. Specific vascular-brain anatomic correlations
viii. End vessel syndromes
ix. Trigeminovascular system
x. White matter
xi. Vascular malformations
b. Radiologic anatomy, cerebral blood vessels (angiography or MRA)
c. Meninges
02. Neuropathology
a. Cerebrovascular disease
b. Trauma (cranial and spinal)
c. Medium and large-vessel vasculitis
03. Neurochemistry
a. Neurotransmitters
b. Blood-brain barrier
c. Excitotoxicity
04. Neurophysiology
a. Cerebral blood flow
i. Vascular smooth muscle control
ii. Vasodilation and vasoconstriction
iii. Autoregulation
iv. Vasospasm
v. Rheology
vi. Blood flow in stroke
b. Coagulation cascade
i. Clotting factors
ii. Platelet function
iii. Endothelium function
iv. Biochemical factors
c. Metabolic and cellular consequences of ischemia

i. Ischemic cascade
ii. Reperfusion changes
iii. Electrophysiology
iv. Gene regulation
v. Neuroinflammation of acute ischemic and hemorrhagic stroke
d. Inflammation and stroke
xx. Other
05. Neurogenetics/molecular neurology, and neuroepidemiology
a. Mendelian-inherited diseases
b. Other modes of inheritance
c. Mitochondrial disorders
d. Channelopathies
e. Risk factors in neurologic disease
f. Demographics of neurologic disease
06. Pathophysiology
a. Vascular
i. Restoration and recovery following stroke
ii. Secondary consequences from intracranial bleeding
iii. Neurovascular unit
b. Brain edema and increased ICP
B. Clinical aspects of neurologic disease
01. Epidemiology
02. Risk factors
a. Risk factors for stroke
i. Nonmodifiable
(a) Age
(b) Gender
(c) Ethnicity
(d) Geography
(e) Family history
(f) Genetic factors
ii. Modifiable
(a) Hypertension
(b) Diabetes mellitus
(c) Cholesterol
(d) Homocysteine
(e) Obesity
(f) Alcohol abuse
(g) Tobacco use
(h) Drug abuse
(i) Exercise and other lifestyle factors

(j) History of stroke
iii. Infections predisposing to stroke
iv. Stroke as a complication of other medical illness
v. Special populations at risk for stroke
(a) Neonates and infants
(b) Children and adolescents
(c) Young adults
(d) Pregnancy and puerperium
b. Risk factors for epilepsy
03. Signs and symptoms
04. Comorbidities
05. Course of illness
06. Prognosis
07. Localization
08. Pregnancy/peripartum
09. Complications of illness
a. Complications of stroke
i. Neurologic complications
(a) Cerebral edema, increased ICP, and herniation
(b) Hydrocephalus
(c) Seizures
(d) Hemorrhagic transformation
(e) Recurrent infarction
(f) Recurrent hemorrhage
(xx) Other
ii. Medical complications
(a) Cardiac
(b) Gastrointestinal
(c) Pulmonary
(d) Electrolyte
(e) Chronic neurologic sequelae
(f) Chronic medical sequelae
(xx) Other
b. Complications of epilepsy
10. Quality of life
a. Dating
b. Marriage
c. Stigma
C. Diagnostic procedures
01. Neuroimaging
a. Structural imaging (computed tomography, magnetic resonance imaging)

i. Head CT
(a) Acute changes of ischemic stroke
(b) Acute changes of hemorrhagic stroke
(c) Chronic changes of stroke
(d) Complications of stroke
(e) CT perfusion
ii. Spine and spinal cord neuroimaging (CT, MRI, myelogram)
iii. MRI of the brain
(a) MRI sequences—T1, T2, FLAIR, DWI, PWI, gradient echo, SWI, DTI
(b) MR spectroscopy
(c) Acute changes of ischemic stroke
(d) Acute changes of hemorrhagic stroke
(e) Changes affected by time
iv. Specific protocols
v. Neuromuscular ultrasound
b. Vascular imaging (conventional angiography, computed tomographic angiography, magnetic resonance angiography, ultrasound)
i. Arteriography and venography
(a) Cerebral
(b) Spinal cord
ii. Extracranial ultrasonography
(a) Duplex and other imaging
(b) Collateral flow challenges
(c) Monitoring
iii. Intracranial ultrasonography
(a) Collateral flow changes
(b) Contrast enhancement
(c) Monitoring
c. Functional neuroimaging
i. SPECT
ii. PET
iii. MRS
iv. fMRI
v. Diffusion tensor imaging
02. Autonomic function testing
a. Tilt table testing
b. Valsalva testing
c. Heart rate variability
d. Quantitative sudomotor axon reflex test/thermoregulatory sweat testing
e. Sympathetic pathways

f. Parasympathetic pathways
g. Cardiovagal
xx. Other
03. CSF examination/lumbar puncture
04. Laboratory studies
a. Hematologic studies
i. Blood count
ii. Platelet count
iii. Special coagulation studies
iv. Antiplatelet (aspirin, clopidogrel) resistance studies
b. Immunological studies
i. Inflammatory markers
ii. Other autoimmune studies (multisystem)
iii. Serologic studies
c. Biochemical studies
i. Glucose
ii. Cholesterol
iii. Blood gases
iv. Hepatic and renal tests
v. Toxicology screen
d. Infectious studies
i. Cultures
ii. PCR or other molecular studies
iii. Other
e. Urine tests
05. Cardiac testing
a. Electrocardiography
i. Monitoring
ii. Holter and event monitors
b. Transthoracic and transesophageal echocardiography (TTE and TEE)
i. Contrast-enhanced echocardiography studies
c. Other chest imaging studies
i. Chest x-ray
ii. Cardiac CT
iii. Cardiac MRI
d. Other studies
i. Blood pressure monitoring
ii. Testing for ischemic heart disease
iii. Peripheral artery disease
e. Metabolic testing
06. Skin/nerve/muscle biopsy

07. Genetic testing
08. Testing of special senses (e.g., hearing, vision)
09. Clinical/disease severity/rating scales
10. Systemic imaging (e.g., CT, MRI, PET)
XX. Other
D. Treatment
01. General principles of neuropharmacology
a. Neuropharmacokinetics/neuropharmacodynamics
b. Drug toxicity/side effects/idiosyncratic reactions/medication withdrawal/contraindications
c. Drug interactions
d. Pregnancy
i. Teratogenicity/neurodevelopmental effects in offspring
ii. Drug level fluctuations
iii. Breastfeeding
e. Age, gender, and ethnicity issues
f. Pharmacogenomics
g. Mechanisms of action
h. Drug management decisions (initiation, continuation, discontinuation)
02. Pharmacotherapy
a. Drugs for migraine and other headache syndromes
b. Analgesics (nonnarcotic, narcotic, etc.)
c. Antiseizure medications
d. Drugs for sleep disorders
e. Drugs for cerebrovascular disease, including antiplatelet agents, anticoagulants, and thrombolytics
i. Antiplatelet agents
(a) Aspirin
(b) Clopidogrel
(c) Ticlodipine
(d) Dipyridamole
(e) Cilostazol
(f) Prasugrel
(g) Ticagrelor
(h) Dual therapy
(xx) Other
ii. Anticoagulant agents
(a) Warfarin
(b) Heparin
(c) Low molecular weight heparins
(d) Oral thrombin inhibitors

(e) Oral factor X inhibitors
(f) Factor XI inhibitors
(xx) Other
iii. Thrombolytic agents (rtPA, TNK)
iv. Neuroprotective agents and other acute treatments
v. Cardioactive agents
vi. Medications to prevent stroke by treating risk factors
(a) Hyperlipidemia
(b) Diabetes mellitus
(c) Hypertension
(d) Smoking
(e) Hyperhomocysteinemia
(f) Anti-inflammatory
(g) Alcohol dependence and detoxification
vii. Medications to treat autoimmune diseases and vasculitis
viii. Medications to improve or restore neurologic function or to augment rehabilitation
ix. Medications to prevent rebleeding or vasospasm following a hemorrhage
(a) Aminocaproic acid
(b) Nimodipine
(c) Bleeding reversal agents/antidotes
x. Anti-vasospasm therapy
f. Drugs for psychiatric disorders (sedative-hypnotics, antianxiety agents, antidepressants, antipsychotics)
g. Vitamins/minerals/nutrients
h. Immunomodulatory agents, including oral medications, prednisone, IV Ig, and plasma exchange
i. Antimicrobial agents
j. Drugs used for increased intracranial pressure and for brain/spinal cord edema
k. Drugs for autonomic dysfunctions
l. Drugs for dementia/cognition/alertness
m. Spasticity treatments
i. Botulinum toxin
n. Monotherapy vs polytherapy
o. Hormonal therapies
xx. Other
i. Sedation
ii. Stimulants
iii. Antidotes
03. Endovascular treatment

04. Critical care
05. Surgical treatment/interventions
a. Vascular surgery
i. Hemorrhage
(a) Evacuation
(b) Ventriculostomy
ii. Ruptured aneurysms
(c) Management of vasospasm
iii. Vascular malformations
iv. Surgical treatment of brain edema – decompressive craniectomy
v. Complications
b. Other
06. Radiation therapy
07. Rehabilitation
a. Exercise
b. Assistive devices
c. Assistive technologies
d. Braces
e. Physical therapy and occupational therapy
f. Pulmonary
g. Speech/swallowing
h. Nutrition management
i. Principles of neurorehabilitation (e.g. regeneration and plasticity)
j. Functional assessment
08. Psychotherapy, biofeedback etc.
09. Reassurance, observation, lifestyle modification, etc.
10. Specific dietary treatment
11. Genetic counseling
12. Complications of management
13. Gene therapy/enzyme replacement therapy/stem cell replacement
14. Non-surgical/non-pharmacological
XX. Other
E. Interpersonal and communications skills
01. Communication with patients
02. Communication with patients' families
03. Communication with other professionals
04. Communication with the healthcare team
05. Communication with the public
06. Management of conflict
07. Common errors in communication
08. Patient and family education

F.	**Professionalism**
01.	Professional behavior
02.	Adherence to ethical principles (e.g., informed consent, research issues, clinical care)
03.	Participation in the professional community
04.	Sensitivity to diverse patient populations
05.	End-of-life issues and brain death
06.	Fatigue management/burnout
G.	**Practice-based learning and improvement**
01.	Development and execution of lifelong learning
02.	Formal practice-based quality improvement
H.	**Systems-based practice**
01.	Patient safety and the healthcare team
02.	Resource management
03.	Community-based care
04.	Referral for appropriate consultation/decision making
05.	Working with local and national disease-based and advocacy groups