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Recommended Curriculum Guidelines for Family Medicine Residents

# Conditions of the Nervous System

*This document was endorsed by the American Academy of Family Physicians (AAFP), the American Academy of Neurology (AAN), the Association of Departments of Family Medicine (ADFM), the Association of Family Medicine Residency Directors (AFMRD) and the Society of Teachers of Family Medicine (STFM), and was developed in cooperation with the Presbyterian Intercommunity Hospital Family Medicine Residency Program.*

## Introduction

This Curriculum Guideline defines a recommended training strategy for family medicine residents. Attitudes, knowledge and skills that are critical to family medicine should be attained through longitudinal experience that promotes educational competencies defined by the Accreditation Council for Graduate Medical Education (ACGME) http://www.acgme.org. The curriculum must include structured experience in several specified areas. Most of the resident's knowledge will be gained by caring for ambulatory patients who visit the family medicine center. Structured didactic lectures, conferences, journal clubs and workshops must be included in the curriculum with an emphasis on outcomes-oriented, evidence-based studies that delineate common and chronic diseases affecting patients of all ages. Targeted techniques of health promotion and disease prevention are hallmarks of family medicine. Appropriate referral patterns and provision of cost-effective care should also be part of the curriculum.

Program requirements specific to family medicine residencies may be found on the ACGME Web site. Current AAFP Curriculum Guidelines may be found online at http://www.aafp.org/cg. These guidelines are periodically updated and endorsed by the AAFP and, in many instances, other specialty societies as indicated on each guideline.

Each residency program is responsible for its own curriculum. ***This guideline provides a useful strategy to help residency programs form their curricula for educating family physicians.***

A range of learning methods and activities are appropriate to the curricular objectives; these substantially overlap but include:

- Observation of and case discussion with other staff / trainees
- Supervised clinical practice (inpatient, outpatient, primary care, referral and on–call)
- Clinical attachments (predominant observation, discussion and modeling)
- Clinical and other presentations: preparation of case reports
- Participation in clinical meetings, seminars & tutorials
- Self directed learning by reading of texts, reviews and papers, e-learning
- Specific lectures or focused courses
- General (generic or specific) courses and appropriate educational meetings
- Research and presentation of research
- Teaching of undergraduates & postgraduates (medical and other health professionals)

## Preamble

A solid understanding of normal neurological development, anatomy and neurophysiology is imperative to the treatment of neurological pathology. The goal of these guidelines is to sensitize the family medicine resident to the role of neurological disease in patients and familiarize residents with its particular place in the overall practice of family medicine. Neurological problems are estimated to comprise 10 to 15 percent of a family physician's workload. The specialty of family medicine is vitally interested in all aspects of neurological disease. History-taking in neurology and performance of a comprehensive neurological examination are essential skills for all family physicians. Emphasis on good diagnostic and therapeutic skills and the appropriate consideration of bio-psychosocial and cultural factors must be included in the curriculum.

The maturation of the nervous system is complex, and it changes based on genetic, environmental, learned and acquired influences. Both the variability of presentation and degree of pathophysiology can make diagnosis very difficult. Many of the processes are marked by slow episodic degeneration, which patients often learn to overcome or hide. Although many disorders are genetic, detailed family history may not always be helpful. Diseases such as seizure disorders, amyotrophic lateral sclerosis (ALS) and dystonia (as well as many other neurological disorders) carry significant social stigma. Family physicians must be capable diagnosticians as well as efficient, compassionate managers of diseases of the nervous system. Diagnosis is the beginning of a long struggle with neurological disease. Family physicians must address both the medical stress and the often extreme psychosocial stress that each disorder can cause in the patient and his or her family. Cultural differences influence how patients integrate medical care into their own life and family systems. Almost 50 million people in the United States are ethnically diverse. Family medicine residents should be aware of social-cultural variations and take time to be sensitive to the differences between cultures. Teaching residents to learn and study differences of belief systems should be a major goal of family medicine education.

This Curriculum Guideline provides an outline of the attitudes, knowledge and skills that should be among the objectives of training programs in family medicine and which will lead to optimal care of patients with neurological disorders by future family physicians.

## Competencies

At the completion of residency training, a family medicine resident should:

- Be able to perform standardized comprehensive neurological assessments, obtain necessary further investigation and develop acute and long-term comprehensive treatment plans based on the basis of presenting and progressively deteriorating neurological processes. (Patient Care, Medical Knowledge)
- Be able to understand normal neurological development, anatomy and physiology. (Patient Care, Medical Knowledge)
- Be able to optimize treatment plans based on knowledge of local resources that include local, state and federal agencies. (Systems-based Practice, Practice-based Knowledge)
- Coordinate ambulatory, in-patient and institutional care across health care providers, institutions and governmental agencies. (System-based Practice)
- Be able to communicate in a compassionate, knowledgeable manner and address complex psychosocial issues based on the patient and his or her family unit. (Interpersonal Communications)
- Be able to recognize his or her own practice limitations and seek consultation with other health care providers to provide optimal care. (Medical Knowledge)

## Attitudes

The resident should develop attitudes that encompass:

- A compassionate approach to the care of the patient who has a neurological disease in context of the patient’s own cultural, religious and social context, especially in the case of patients who have chronic disorders.
- The recognition of the importance of family, home and social support in the overall life of patients who have neurological disease.
- The recognition of the physician's own level of competence in handling neurological problems and the need for further consultation as appropriate.
- The utilization of self-directed learning toward further knowledge and competence in neurology.
- An understanding of the role played by the neurology consultant and the concept of shared care for certain neurological conditions. (One example is the progressive disease of multiple sclerosis, where the patient may be stable and managed routinely by a family physician, but may also need periodic consultation by a neurology specialist.)
- Support of the patient through the process of consultation, neurological evaluation, treatment, rehabilitation and possible long-term neurological degeneration.

- An understanding of the appropriate limitation of investigation and treatment for the benefit of the patient.
- Lifelong learning and contribution to the body of knowledge about neurological disease, health and the medical management of the neurologically-impaired patient.
- An awareness of the importance of a multi-disciplinary approach to the enhancement of individualized care.
- The willingness to be accessible to and accountable for his or her patients.
- An awareness of the importance of cost containment.

## Knowledge

In the appropriate setting, the resident should demonstrate the ability to apply knowledge of:

1. Normal anatomy, physiology and anatomic principles that allow localization of neurological disease

2. Normal growth, development and senescence of the nervous system

3. Pathologic neurological disorders, including:
    a. Disorders of motor function
        i. Upper and lower motor neuron disorders
        ii. Coordination
        iii. Movement disorders
            1). Hypokinetic
                a). Parkinson's disease
                b). Parkinson plus syndrome
            2). Hyperkinetic
                a). Athetosis
                b). Chorea
                c). Dystonia
                d). Tics
                e). Tremors
    b. Disorders of sensation
        i. Central
        ii. Peripheral
    c. Disorders of vision
        i. Visual field defects
        ii. Monocular and binocular blindness
        iii. Diplopia and gaze palsies
        iv. Nystagmus
        v. Pupillary abnormalities
    d. Cerebrovascular diseases
        i. Ischemic stroke
            1). Thrombolytics
                a). Indications and use
                b). Risks and benefits

ii. Hemorrhagic stroke
iii. Vasculitis
iv. Transient ischemic attacks
v. Symptomatic and asymptomatic carotid stenosis
vi. Aneurysmal disease

e. Head and spinal cord trauma
i. Evaluation
ii. Management to include long-term complications
iii. Consequences and prevention

f. Multiple sclerosis
i. Diagnostic criteria
ii. Laboratory findings
iii. Management

g. Dizziness and disorders of hearing
i. Central vs. peripheral hearing loss
1). Acute
2). Chronic
ii. Central vs. peripheral vertigo
1). Acute
2). Chronic
3). Evocative testing (e.g., Dix-Hallpike maneuver)
iii. Tinnitus

h. Disorders of higher cognitive function and communication
i. Dementia
1). Differential diagnosis
2). Evaluation
3). Management
ii. Encephalopathy (acute, chronic)
1). Toxic
2). Metabolic
iii. Aphasia and apraxia

i. Disorders of consciousness
i. Syncope
ii. Epilepsy
1). Generalized at onset seizures
2). Simple partial seizures
3). Complex partial seizures
4). Treatment
a). Medical management with anticonvulsant medications
b). Surgical management
c). Vagal nerve stimulation
iii. Recognition and treatment of increased intracranial pressure
iv. Stupor and coma
1). Toxic and metabolic
2). Structural disease
3). Herniation syndromes
v. Brain death

j. Headache
    i. Migraine and variants
    ii. Cluster headache
    iii. Tension-type headache
    iv. Headache associated with a structural lesion
    v. Benign intracranial hypertension (pseudotumor cerebri)
    vi. Chronic daily headache
    vii. Emergent headaches
        1). Subarachnoid hemorrhage
        2). Meningitis
        3). Giant cell arteritis and temporal arteritis

k. Brain tumors
    i. Anterior or posterior fossa
        1). Primary
            a). Benign
            b). Malignant
        2). Metastatic

l. Infections (e.g., meningitis, encephalitis)
    i. Bacterial
    ii. Viral or retroviral (human immunodeficiency virus)
    iii. Fungal
    iv. Tuberculosis
    v. Prion disease
    vi. Parasitic (especially cystercicosis)

m. Spinal cord disorders
    i. Anatomy and localization
    ii. Extrinsic compressive lesions
    iii. Intrinsic lesions

n. Sleep disorders (e.g. central and peripheral sleep apnea, periodic limb movement disorder)

o. Disorders of peripheral nerve, neuromuscular junction and muscle
    i. Muscular dystrophy
    ii. Peripheral neuropathy
    iii. Mononeuritis multiplex
    iv. Myopathy
    v. Guillain-Barre syndrome
    vi. Myasthenia gravis
    vii. Plexopathy
    viii. Radiculopathy
    ix. Diagnostic studies (e.g., nerve conduction velocity, electromyograph, neural scan, muscle biopsy)

p. Congenital disorders
    i. Brain and spinal cord malformations
        1). Arnold-Chiari malformation
        2). Meningomyelocele
        3). Cortical malformations

q. Chromosomal abnormalities (e.g., Down's syndrome)

r. Abnormal head growth
    i. Microcephaly
    ii. Macrocephaly (including hydrocephalus)

s. Aberrant development
    i. Development delay
    ii. Mental retardation
    iii. Neurodegenerative diseases

t. Developmental disorders of higher cerebral function
    i. Mental retardation
    ii. Developmental language disorders
    iii. Learning disabilities (e.g., dyslexia)
    iv. Attention deficit disorder, with or without hyperactivity
    v. Pervasive developmental disorders (e.g., autism)

u. Psychiatric disorders mimicking neurological disease
    i. Non-epileptic spells (e.g., pseudoseizures)
    ii. Dementia of depression (e.g., pseudodementia)
    iii. Conversion disorder
    iv. Malingering
    v. Disorders of somatization and hypochondriasis

4. Principles of pain management
    a. Pharmacologic agents
    b. Surgical management
    c. Cognitive and behavioral techniques
    d. Interventions such as injections, nerve stimulation and nerve root ablation

5. The psychological and rehabilitation aspects of patient management, especially for chronic or long-term neurological conditions. The use of other specialties including physical/manipulation, massage, occupational therapy and integrative medicine adjuncts to patient management

6. The genetic basis of certain neurological disorders as they affect the patient, his or her family and education of the family regarding the benefits of genetic counseling

7. An understanding of the neurological disabilities of elderly patients and the importance of assessing, restoring and maintaining their functional capacity (see also the Curriculum Guidelines for Care of Older Adults)

8. Neurological complications of systemic illness especially zoonotic diseases (such as cystercicosis) that affect the nervous system

9. Prevention of neurological disease

10. Special Situations
    a. Understand the effect of pregnancy on existing neurological disorders and neurological disorders as complications of pregnancy

b. Understand the special needs of an adolescent patient's issues of confidentiality and transition disorders

11. Geriatric Issues

    a. Understand the normal clinical and radiological findings in the elderly

    b. Understand the special presentations of neurological disease in the elderly diagnosis, investigation and management of dementia

    c. Understand the effects of drugs in the elderly

    d. Understand the hospital-based and community services for the elderly

    e. Understand how to communicate with relatives and care agencies for the elderly and the importance of assessing, restoring and maintaining their functional capacity (see also Curriculum Guideline for Care of Older Adults – AAFP Reprint No. 264 – http://www.aafp.org/cg.

12. Understand end-of-life issues in neurological disorders, the role of palliative care services and ethical and legal aspects of terminal care.

## Skills

In the appropriate setting, the resident should demonstrate the ability to independently perform or appropriately refer:

1. Evaluation skills
    a. Recognizing and defining the neurological problem
    b. To be able to take an appropriate focused and comprehensive history (including necessary information from others) and communicate this verbally or in writing and in summary form
    c. To be able to examine the mental and physical state (including a complete neurological and mental status examination, Glasgow coma scale and pediatric developmental exam) and communicate verbally or in writing and in summary form to other providers
    d. Using clinical knowledge to localize the lesion and formulate an ordered differential diagnosis based on an appreciation of the patient, his or her past history, current problems and likely causes
    e. Assessing the acuity and prognosis of the clinical problem as it relates to the need for immediate management and the requirement for expert assistance
    f. Formulating a rational plan for further investigation and management
    g. Knowing the indications, contraindications, risks and significance of ancillary tests
        i. Lumbar puncture and its performance

ii. Electroencephalogram
iii. Visual, brain stem auditory and somatosensory evoked potential
iv. Nerve conduction study and electromyography (NeuralScan)
v. Muscle and nerve biopsy
vi. Computed axial tomography with and without contrast
vii. Magnetic resonance imaging with and without contrast
viii. Magnetic resonance angiography
ix. Angiography
x. Myelography
xi. Carotid ultrasound
xii. Sleep study
xiii. Genetic testing
xiv. Positron emission tomography (PET) scanning
xv. Single-photon emission computed tomography (SPECT) scanning

2. Management skills
   a. Formulating a diagnostic and management plan and assessing the need for expert advice with an awareness of the risks, benefits and costs of evaluation
   b. Understanding the role of a neurology specialist and the implications of special testing in patients who have neurologic disease and the implications of the test results for the patient
   c. Managing the prevalent and treatable conditions listed in this curriculum with consultation as appropriate
   d. Managing emergent neurology problems and obtaining urgent consultation when appropriate, including:
      i. Stroke
      ii. Coma
      iii. Meningitis and encephalitis
      iv. Status epilepticus
      v. Central nervous system trauma
      vi. Increased intracranial pressure
      vii. Acute visual loss
      viii. Rapidly progressive neurological deficit
      ix. Neurological respiratory failure
      x. Acute weakness
      xi. Altered mental status
3. Managing the family, cultural and psychosocial issues that accompany the long-term care of patients who have debilitating neurological conditions, including home and community care, the utilization of community resources, the use of a multi-disciplinary team and the primary role of the family physician as coordinator of long-term care
4. Continuing awareness of potential drug interactions and adverse drug effects, especially in elderly patients

## Implementation

Implementation of this Curriculum Guideline is best achieved within the capabilities of the particular residency program and at the discretion of the residency director. The resident must have the opportunity to diagnose and manage (under supervision) both patients who have neurological disorders and patients who have signs and symptoms possibly referable to the nervous system. Neurology consultation should supplement the educational process in the care of patients who have problems referable to the nervous system. Neurologists should take an active role in all aspects of resident education. Communication between all members of the multi-discipline management team should be emphasized with the intent on facilitation of patient diagnosis and management.

## Resources


Cooper JR, Bloom FE, Roth RH. The Biochemical Basis of Neuropharmacology. 8th ed. Oxford, N.Y.: Oxford University Press, 2003.

Wilkinson JL. Neuroanatomy for Medical Students. 3rd ed. Boston, Ma.: Butterworth-Heinemann, 1998.

Carpenter MB. Core Text of Neuroanatomy. 4th ed. Baltimore, Md.: Williams & Wilkins, 1991.

Martin JH. Neuroanatomy: Text and Atlas. 3rd ed. New York, N.Y.: McGraw-Hill Medical, 2003.

Kandel ER, Schwartz JH, Jessell TM. Principles of Neural Science. 4th ed. New York, N.Y.: McGraw-Hill Medical, 2000).

Rowland LP, Merritt HH. Merritt's Neurology. 11th ed. Philadelphia, Pa.: Lippincott Williams & Wilkins, 2006.

Ropper AH, Adams RD, Victor M, Brown RH. Adams and Victor's Principles of Neurology. 8th ed. New York, N.Y.: McGraw-Hill Medical, 2005.

Bradley WG. Neurology in Clinical Practice. 5th ed. Philadelphia, Pa.: Butterworth-Heinemann/Elsevier, 2008.

Patten JP. Neurological Differential Diagnosis. 2nd ed. New York, N.Y.: Springer, 1996.

Samuels MA. Manual of Neurologic Therapeutics. 7th ed. Philadelphia, Pa.: Lippincott Williams & Wilkins, 2004.

Weiner WJ, Goetz CG. Neurology for the Non-Neurologist. 4th ed. Philadelphia, Pa.: Lippincott Williams & Wilkins, 1999.

Campbell WW, Dejong RN, Haerer AF. DeJong's The Neurologic Examination. 6th ed. Philadelphia, Pa.: Lippincott Williams & Wilkins, 2005.

Brazis PW, Masdeu JC, Biller J. Localization in Clinical Neurology. 5th ed. Philadelphia, Pa.: Lippincott Williams & Wilkins, 2007.

Simon RP, Aminoff MJ, Greenberg DA. Clinical Neurology. 4th ed. Stamford, Ct.: Appleton & Lange, 1999.

Posner JB, Plum F. Plum and Posner's Diagnosis of Stupor and Coma. 4th ed. New York, N.Y.: Oxford University Press, 2007.

Henry GL. Neurologic Emergencies: A Symptom-Oriented Approach. 2nd ed. New York, N.Y.: McGraw-Hill, 2003.

Ballantyne JC. The Massachusetts General Hospital Handbook of Pain Management. 3rd ed. Lippincott Williams & Wilkins, 2006.

Grossman RI, Yousem DM. Neuroradiology: The Requisites. 2nd ed. Philadelphia, Pa.: Mosby, 2003.

Fenichel GM. Clinical Pediatric Neurology: A Signs and Symptoms Approach. 5th ed. Philadelphia, Pa.: Elsevier/Saunders, 2005.

Special Training Curriculum for Neurology, May 2007
The Joint Royal Colleges of Physicians Training Board
5 St. Andrews Place, Regent's Place, London NW1 4LB, UK
http://www.jrcptb.org.uk/Specialty/Documents/Neurology%20Specialty%20Training%20Curriculum%20May%202007.pdf

## Web Sites

The American Medical Student Association
http://www.amsa.org/programs/gpit/cultural.cfm

American Academy of Neurology
http://www.aan.com

eMedicine from WebMD
http://www.emedicine.com/neuro/index.shtml

Washington University- Neuromuscular Disease Center
http://www.neuro.wustl.edu/neuromuscular

Harvard University- Whole Brain Atlas
http://www.med.harvard.edu/AANLIB/home.html

Diversity Rx
http://www.diversityrx.org/

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