NEUROLOGY CLERKSHIP CORE CURRICULUM GUIDELINES

Endorsed by the following organizations - October 2000:

American Academy of Neurology
Association of University Professors of Neurology
American Neurological Association

1. *Introduction*

Up to 10% of patients seen by family practitioners present with neurologic symptoms and pose neurologic questions to their physicians. Only 16% of the 45 million Americans who visit a physician for a chief complaint referable to the nervous system are ever evaluated by neurologists. Clearly, primary care physicians are routinely called upon to evaluate and manage patients with neurologic disease. Practicing physicians require a firm understanding of the general principles of clinical neurology. The most suitable setting in which to lay the foundation for that understanding is in a neurology clerkship in the clinical phase of medical school. This document outlines the desirable components of a clinical neurology clerkship.

2. *Goals and Objectives of the Clinical Neurology Clerkship*

A. Goal

To teach the principles and skills underlying the recognition and management of the neurologic diseases a general medical practitioner is most likely to encounter in practice.

B. Objectives

1. To teach or reinforce the following PROCEDURAL SKILLS:
    a. the ability to obtain a complete and reliable history
    b. the ability to perform a focused and reliable neurologic examination [see Appendix 1]
    c. the ability to examine patients with altered level of consciousness or abnormal mental status [see Appendix 3]
    d. the ability to deliver a clear, concise, and thorough oral presentation of a patient's history and examination
    e. the ability to prepare a clear, concise, and thorough written presentation of a patient's history and examination
    f. [*Ideally*] the ability to perform a lumbar puncture

2. To teach or reinforce the following ANALYTICAL SKILLS:
    a. the ability to recognize symptoms that may signify neurologic disease (including disturbances of consciousness, cognition, language, vision, hearing, equilibrium, motor function, somatic sensation, and autonomic function)
    b. the ability to distinguish normal from abnormal findings on a neurologic examination
    c. the ability to localize the likely site or sites in the nervous system where a lesion could produce a patient's symptoms and signs
    d. the ability to formulate a differential diagnosis based on lesion localization, time course, and relevant historical and demographic features

e. an awareness of the use and interpretation of common tests used in diagnosing neurologic disease
f. an awareness of the principles underlying a systematic approach to the management of common neurologic diseases (including the recognition and management of situations that are potential emergencies)
g. an awareness of situations in which it is appropriate to request neurologic consultation
h. the ability to review and interpret the medical literature (including electronic databases) pertinent to specific issues of patient care

3. *Content of subjects to be taught*

A. The Neurologic Examination (as an integral component of the general medical examination)
1. how to perform a focused but thorough neurologic examination [see Appendix 1]
2. how to perform a screening neurologic examination [see Appendix 2]
3. how to perform a neurologic examination on patients with an altered level of consciousness [see Appendix 3]
4. how to recognize and interpret abnormal findings on the neurologic examination

B. Localization – general principles differentiating lesions at the following levels:
1. Cerebral hemisphere
2. Posterior fossa
3. Spinal cord
4. Nerve root/Plexus
5. Peripheral nerve (mononeuropathy, polyneuropathy, and mononeuropathy multiplex)
6. Neuromuscular junction
7. Muscle

C. Symptom Complexes – a systematic approach to the evaluation and differential diagnosis of patients who present with:
1. Focal weakness
2. Diffuse weakness
3. Clumsiness
4. Involuntary movements
5. Gait disturbance
6. Urinary or fecal incontinence
7. Dizziness
8. Vision loss
9. Diplopia
10. Dysarthria
11. Dysphagia
12. Acute mental status changes
13. Dementia
14. Aphasia
15. Headache
16. Focal pain
    a. facial pain

b. neck pain
c. low back pain
d. neuropathic pain

17. Numbness or paresthesias
18. Transient or episodic focal symptoms
19. Transient or episodic alteration of consciousness
20. Sleep disorders
21. Developmental disorders

D. Approach to Specific Diseases – general principles for recognizing, evaluating and managing the following neurologic conditions (either because they are important prototypes, or because they are potentially life-threatening):

1. Potential emergencies
    a. Increased intracranial pressure
    b. Toxic-metabolic encephalopathy
    c. Subarachnoid hemorrhage
    d. Meningitis/Encephalitis
    e. Status epilepticus
    f. Acute stroke (ischemic or hemorrhagic)
    g. Spinal cord or cauda equina compression
    h. Head Trauma
    i. Acute respiratory distress due to neuromuscular disease (e.g., myasthenic crisis or acute inflammatory demyelinating polyradiculoneuropathy)
    j. Temporal arteritis
2. Strokes
3. Seizures
4. Alzheimer's disease
5. Parkinson's disease
6. Essential tremor
7. Multiple sclerosis
8. Migraine
9. Bell's palsy
10. Carpal tunnel syndrome
11. Diabetic polyneuropathy
12. Brain death

Note: To some extent, Sections A, B, C, and D represent alternative ways of organizing the same subject matter. Some instructors may choose to emphasize some of these approaches more than others. The present curriculum is not meant to prescribe a particular way of presenting or organizing the material. No matter how the clerkship and educational materials are organized, however, all of the topics included in the sections above should be covered in some way.

4. *Prerequisites for the trainee*

Successful completion of the pre-clinical curriculum of medical school, including clinically relevant neuroanatomy, neurophysiology, neuropathophysiology, and physical diagnosis.

5. *Personnel needed for the training*
   A. Essential personnel
      1. a clerkship director
      2. additional full-time instructional faculty
      3. secretarial and administrative support for the clerkship director
   B. Desirable personnel
      1. clinical adjunct faculty
      2. neurology house officers

6. *Qualifications of the trainers*
   Successful completion of or participation in an accredited neurology residency program.

7. *Facilities needed for the training*
   Sites for both outpatient and inpatient longitudinal care, with adequate time and space to permit didactic instruction and examinations.

8. *Setup for the training*
   The training should be designated as a core clerkship required of all medical students.

9. *Methods of training*
   A. Essential
      1. supervised patient care experiences
      2. review of students' oral and written presentations
      3. didactic teaching sessions
      4. material for independent study, including one or more of the following:
         a. locally-generated syllabus
         b. published textbooks
         c. computer software
         d. videotapes
   B. Optional
      1. formal lectures
      2. simulated patients

10. *Timetable for training*
    At least four weeks during the clinical phase of medical school. Ideally, students should be required to complete the neurology clerkship within the first 12 months of the clinical phase (i.e., in the traditional 4-year curriculum, a required, 4-week neurology clerkship in the third year is strongly recommended).

11. *Methods of evaluation of the trainee*
    A. Performance evaluations by the trainers
    B. Examinations (written, oral, or both)

12. *Methods of evaluations of the training process*
    A. Student performance on examinations

B. Student evaluations of the trainers
C. Student evaluations of the training

13. *Mechanisms for feedback*
    A. Regularly scheduled feedback sessions
    B. Written comments on written presentations
    C. Oral and/or written comments on oral presentations

14. *Continuing medical education needed*
    A. Periodic faculty development activity
    B. Regular review of faculty performance by clerkship director

Appendix 1: Guidelines for a Comprehensive Neurologic Examination

All medical students should be able to perform the following parts of the neurologic examination.

A. Mental Status
    1. Level of alertness
    2. Language function (fluency, comprehension, repetition, and naming)
    3. Memory (short-term and long-term)
    4. Calculation
    5. Visuospatial processing
    6. Abstract reasoning

B. Cranial Nerves
    1. Vision (visual fields, visual acuity, and funduscopic examination)
    2. Pupillary light reflex
    3. Eye movements
    4. Facial sensation
    5. Facial strength (muscles of facial expression and muscles of facial expression)
    6. Hearing
    7. Palatal movement
    8. Speech
    9. Neck movements (head rotation, shoulder elevation)
    10. Tongue movement

C. Motor Function
    1. Gait (casual, on toes, on heels, and tandem gait)
    2. Coordination (fine finger movements, rapid alternating movements, finger-to-nose, and heel-to-shin)
    3. Involuntary movements
    4. Pronator Drift
    5. Tone (resistance to passive manipulation)
    6. Bulk
    7. Strength (shoulder abduction, elbow flexion/extension, wrist flexion/extension, finger flexion/extension/abduction, hip flexion/extension, knee flexion/extension, ankle dorsiflexion/plantar flexion)

D. Reflexes
    1. Deep tendon reflexes (biceps, triceps, brachioradialis, patellar, Achilles)
    2. Plantar responses

E. Sensation
    1. Light touch
    2. Pain or temperature
    3. Proprioception
    4. Vibration

Appendix 2: Guidelines for a Screening Neurologic Examination

All medical students should be able to perform a brief, screening neurologic examination that is sufficient to detect significant neurologic disease even in patients with no neurologic complaints. Although the exact format of such a screening examination may vary, it should contain at least some assessment of mental status, cranial nerves, gait, coordination, strength, reflexes, and sensation. One example of a screening examination is given here.

A. Mental Status (level of alertness, appropriateness of responses, orientation to date and place)

B. Cranial Nerves
    1. Visual acuity
    2. Pupillary light reflex
    3. Eye movements
    4. Hearing
    5. Facial strength (smile, eye closure)

C. Motor Function
    1. Gait (casual, tandem)
    2. Coordination (fine finger movements, finger-to-nose)
    3. Strength (shoulder abduction, elbow extension, wrist extension, finger abduction, hip flexion, knee flexion, ankle dorsiflexion)

D. Reflexes
    1. Deep tendon reflexes (biceps, patellar, Achilles)
    2. Plantar responses

E. Sensation (one modality at toes – can be light touch, pain/temperature, or proprioception)

Note: If there is reason to suspect neurologic disease based on the patient's history or the results of any components of the screening examination, a more complete neurologic examination may be necessary.

Appendix 3: Guidelines for the Neurologic Examination in Patients with Altered Level of Consciousness

A. Mental Status
    1. Level of arousal
    2. Response to auditory stimuli (including voice)
    3. Response to visual stimuli
    4. Response to noxious stimuli (applied centrally and to each limb individually)

B. Cranial Nerves
    1. Response to visual threat
    2. Pupillary light reflex
    3. Oculocephalic (doll's eyes) reflex
    4. Vestibulo-ocular (cold caloric) reflex
    5. Corneal reflex
    6. Gag reflex

C. Motor Function
    1. Voluntary movements
    2. Reflex withdrawal
    3. Spontaneous, involuntary movements
    4. Tone (resistance to passive manipulation)

D. Reflexes
    1. Deep tendon reflexes
    2. Plantar responses

E. Sensation (to noxious stimuli)