

# NEUROLOGY

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# The neurology clerkship core curriculum

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**Abstract**—Neurologic symptoms are common in all practice settings, and neurologic diseases comprise a large and increasing proportion of health care expenditures and global disease burden. Consequently, the training of all physicians should prepare them to recognize patients who may have neurologic disease, and to take the initial steps in evaluating and managing those patients. We present a core curriculum outlining the clinical neurology skills and knowledge necessary to achieve that degree of preparation. The curriculum emphasizes general principles and a systematic approach to patients with neurologic symptoms and signs. The ability to perform and interpret the neurologic examination is fundamental to that approach, so the curriculum delineates the essential components of the examination in three different clinical settings. The focus of the curriculum is on symptom-based rather than disease-based learning. The only specific diseases selected for inclusion are conditions that are common or require urgent management. This curriculum has been approved by the national organization of neurology clerkship directors and endorsed by the major national professional organizations of neurologists. It is intended as a template for planning a neurology clerkship and as a benchmark for evaluating existing clerkships. It should be especially helpful to clerkship directors, neurology chairs, deans of medical education, and members of external accreditation groups.

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In surveys of primary care physicians, patients with symptoms suggestive of neurologic disease typically comprise 9 to 10% of all patient encounters,<sup>1–6</sup> although this fraction ranges from 2 to 17%, depending on methodology and the definition of neurologic disease.<sup>7–15</sup> Primary care physicians evaluate and manage most of these symptoms without referring the patients to neurologists.<sup>12,16</sup> In studies of hospitalized patients, the proportion admitted for a neurologic diagnosis ranges from 5 to 19%,<sup>10,17–23</sup> and the proportion with secondary neurologic diagnoses is much higher.<sup>18,22</sup> Furthermore, neurologic disease accounts for a substantial fraction of health care expenditures and global disease burden.<sup>24–26</sup> With geriatric patients constituting a steadily increasing fraction of the overall patient population, stroke and

degenerative neurologic diseases will become even more prominent public health issues.<sup>23,26,27</sup> For example, cerebrovascular disease was the sixth leading cause of disease burden worldwide in 1990; in the year 2020 it will be the fourth leading cause worldwide and the second leading cause in developed countries.<sup>26</sup>

This document presents a core curriculum outlining the fundamental components of a clinical neurology clerkship designed to ensure that all physicians receive the training necessary to recognize patients who may have neurologic disease and to direct their initial evaluation and management. An initial draft of the core curriculum was prepared in October 1998, under the auspices of the Consortium of Neurology Clerkship Directors (CNCD) and the Undergraduate Education Subcommittee (UES) of the American Academy of Neurology (AAN). After receiving advice from members of both those groups, a writing task force revised the document over the subsequent year.

Additional material related to this article can be found on the *Neurology* Web site. Go to [www.neurology.org](http://www.neurology.org) and scroll down the Table of Contents for the March 26 issue to find the title link for this article.

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In March 2000, all CNCD members received a final draft of the core curriculum by mail and were invited to suggest changes. All suggestions were discussed in detail at the CNCD Annual Meeting in April 2000, and a revised version of the core curriculum was approved by the members at the meeting's conclusion. The core curriculum was subsequently approved by the UES and endorsed by the governing bodies of the AAN, the American Neurological Association (ANA), and the Association of University Professors of Neurology (AUPN).

The core curriculum is an attempt to define the minimum body of clinical neurology skills and knowledge required of all graduating medical students, regardless of their eventual career path. It is meant to be a realistic and practical tool for neurology departments to use both in routine self-assessment and during the process of developing or reorganizing a neurology clerkship. The document is also intended for use at the medical school level, both for internal curriculum development and for purposes of external review.

The educational philosophy underlying the core curriculum has been articulated in previous discussions of medical student training in clinical neurology.<sup>1,2,16,28-31</sup> The emphasis is on learning general principles and a systematic approach to patients with neurologic symptoms and signs, rather than a large body of disease-specific facts. Specific conditions are emphasized only if they are common, illustrate essential concepts, or require urgent management.

The core curriculum adheres strictly to this philosophy. For example, several CNCD members urged specific mention of myasthenia gravis (MG) because it is a "model disease" in many ways, but this position was ultimately rejected because the same lessons can be illustrated with conditions that are more common than MG. Of course, individual teachers and clerkships are free to include MG (and other subjects they deem appropriate) in their own curricula. The core curriculum is meant to define a minimum, not a maximum.

The goals and objectives of the neurology clerkship are stated in table 1. Table E3 in the supplemental material on the *Neurology* Web site (go to [www.neurology.org](http://www.neurology.org) and scroll down the Table of Contents to find the title link for this article) provides a list of specific subjects to be covered in the neurology clerkship, divided into four general topics: the neurologic examination, principles of neuroanatomical localization, a systematic approach to common symptom complexes, and principles of evaluation and management of particularly noteworthy neurologic conditions. To some extent, these four topics represent alternative and overlapping ways to organize the same subject matter. Some instructors may choose to emphasize some of these approaches more than others. Regardless of how the clerkship and educational materials are organized, all of the subjects listed in table E3 of the supplementary data (go to [www.neurology.org](http://www.neurology.org)) should be covered in some

**Table 1** 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 table E4, Part I in the supplementary data on the *Neurology* Web site)
  - c. The ability to examine patients with altered level of consciousness or abnormal mental status (see table E4, Part III in the supplementary data on the *Neurology* Web site)
  - 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

way. Table E4 of the supplemental material (go to [www.neurology.org](http://www.neurology.org)) lists the components of the neurologic examination that students should be able to perform, and identifies the components that are necessary and sufficient for a screening examination. The supplemental material on the *Neurology* Web site (go to [www.neurology.org](http://www.neurology.org)) also outlines the neurologic examination in patients with altered levels of consciousness. Ideally, students should be observed while performing a neurologic examination, and given constructive feedback.

Table 2 outlines essential structural features of the neurology clerkship. Again, the intent is to de-

**Table 2** Structural features of the required 4-week neurology core clerkship

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- A. Prerequisite: Preclinical curriculum of neuroanatomy, neurophysiology, neuropathophysiology, and physical diagnosis
  - B. Setting: Within the first 12 months of clinical training (third year), in outpatient and inpatient sites, with time and space reserved for didactic instruction and examinations
  - C. Personnel
    - 1. Clerkship director
    - 2. At least three full-time instructional faculty
    - 3. Secretarial and administrative support for the clerkship director
    - 4. Optional: a) Clinical adjunct faculty b) Neurology house officers
  - D. Trainer qualifications: Successful completion of or participation in an accredited neurology residency program
  - E. Methods
    - 1. Supervised patient care experiences, including longitudinal care
    - 2. Review of students' oral and written presentations
    - 3. Didactic teaching sessions
    - 4. Material for independent study, including at least one of the following: a) locally generated syllabus, b) textbooks, c) computer software, d) videotapes
    - 5. Optional: a) Formal lectures b) Simulated patients
  - F. Methods of evaluation of the trainee
    - 1. Performance evaluations by the trainers
    - 2. Oral or written examinations
  - G. Methods of evaluation of the training process
    - 1. Analysis of student performance on examinations
    - 2. Student evaluations of a) the trainers and b) the training
  - H. Mechanisms for feedback to students
    - 1. Regularly scheduled feedback sessions
    - 2. Written comments on written presentations
    - 3. Oral and written comments on oral presentations
  - I. Faculty development: Regular review of faculty performance by clerkship director and periodic faculty development activities
- 

fine a minimum, not a maximum, and to permit as much flexibility and institutional autonomy as possible. Didactic teaching sessions are essential, for example, but these can range from formal lectures to small group discussions with Socratic format, to supervised, problem-based learning exercises. Structural innovations, such as combined clerkships with other disciplines, are consistent with the intent of this document. As another example, evaluation of the training process should include at least the mechanisms listed in table 2, but this is not meant to be a restrictive list. In particular, peer review by faculty members from within or outside the department may be valuable. Such peer review requires a considerable commitment of time and resources,

however, and it would be unrealistic to designate it as a requirement in the current academic environment.

One alternative to a neurology clerkship would be to teach part or all of this material in another setting. For example, students could be taught about back pain, headaches, and dizziness in an ambulatory office setting or in the emergency department. Even to manage these "routine" problems, however, students must know how to perform a reliable neurologic examination and to identify patients who require nonstandard investigation or treatment. Neurologists should be actively involved in teaching these skills. Ideally, neurologists would collaborate with specialists in emergency medicine and ambulatory medicine to define appropriate goals and methods of teaching neurology in these settings, but this type of multidisciplinary clinical and educational effort would require substantial programmatic changes in most medical schools. The clerkship structure outlined in table 2 conforms to the current standard curricular model.

Given the rapid pace of medical discovery, different disciplines compete for time and emphasis in the medical school curriculum. The current document attempts to avoid being unrealistic or overreaching in this regard. Indeed, the topics included in this curriculum correspond closely to the neurologic topics listed in curriculum guidelines for house officers in family practice and emergency medicine.<sup>32,33</sup> This document reflects a broad consensus among neurology clerkship directors across the country and has been endorsed by the AAN, the ANA, and the AUPN. Individual medical schools may still deviate from this curriculum with respect to various particulars, but such deviations should be based on principles of pedagogy rather than on considerations of expedience. This document will help to ensure that this is the case.

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