

NEUROLOGY CLERKSHIP

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General Description

Elective Rotation

This elective rotation is a four (4) week introductory, structured clinical experience under direct supervision designed to provide the student experience diagnosing, treating and caring for patients with neurologic disorders.

Purpose

Clinical experiences are intended to assist the student's transition from didactic to integrated clinical evaluation and patient management. Under supervision, students are expected to assist in the management of acute and chronic neurologic diseases. The student should also develop fundamental psychomotor skills by performing routine basic procedures under direct supervision.

Course Objectives

General Overview

The student should be able to:

- elicit a complete and reliable history
- perform a focused and reliable neurologic examination
- examine patients with altered level of consciousness or altered mental status
- deliver a clear, concise, and thorough oral presentation of a patient's history and examination
- prepare a clear, concise, and thorough written presentation of a patient's history and examination
- recognize symptoms that may signify neurologic disease (including disturbances of consciousness, cognition, language, vision, hearing, equilibrium, motor function, somatic sensation, and autonomic function)
- distinguish normal from abnormal findings on a neurologic examination
- localize the likely site or sites in the nervous system where a lesion could produce a patient's symptoms and signs
- formulate a differential diagnosis based on lesion localization, time course, and relevant historical and demographic features
- use and interpretation of common tests used in diagnosing neurologic disease
- utilize the principles underlying a systematic approach to the management of common neurologic diseases (including the recognition and management of situations that are potential emergencies)
- recognize situations in which it is appropriate to request neurologic consultation

Technical and Interpretation Skills

Students are expected to acquire certain technical and interpretation skills that are commonly employed in neurologic care. Wherever possible, students are encouraged to participate in procedures under adequate supervision.

The student should be able to:

- identify the following normal anatomy on a CT or MR scan
 - frontal, parietal, temporal and occipital lobes
 - sylvian fissure
 - caudate and putamen
 - globus pallidus
 - substantia nigra
 - thalamus
 - pituitary gland
 - cerebellum and cerebellar peduncles
 - midbrain, pons and medulla
 - lateral, third and fourth ventricles and the cerebral aqueduct
 - corpus callosum
 - spinal cord
 - intervertebral disc and nerve root
 - cauda equina

- identify the following types of pathology on a CT scan or MR scan
 - subarachnoid hemorrhage
 - intracerebral hematoma
 - brain abscess
 - infarct (hemorrhagic vs bland)
 - meningioma and metastatic brain tumor
 - subdural and epidural hemorrhage
 - hydrocephalus
 - multiple sclerosis
 - herniated intervertebral disk
 - cerebral edema

- identify the following normal anatomy on a conventional cerebral angiogram or MR angiogram.
 - common, internal and external carotid arteries
 - vertebral and basilar arteries
 - anterior, middle and posterior cerebral arteries

General Clinical Core Competencies

The curriculum detailed in the APPENDIX (adapted from the CDIM-SGIM Core Medicine Clerkship Curriculum Guide Ver.3.0) specifies course objectives in terms of the basic internal medicine core clinical competencies and the specific learning objectives (knowledge, skills, and attitudes) pertinent to those competencies. **Every effort should be made to integrate them into the neurology clerkship.**

NEUROLOGIC CORE TOPICS AND DISEASES

The student is responsible for reviewing these topics during the neurology elective. Introductory information can be found in Internal Medicine Clerkship Guide, 3rd Ed. by Paauw*. *. Also there are excellent questions with answers and critiques in MKSAP for Students 5[†].

- Neurology (Section 8[†])
- Altered mental status (pp. 463-468*)
- Stroke (pp. 468--474*)
- Seizure (pp. 475-481*)
- Dizziness and syncope (pp. 109-116*)
- Headache (pp. 154-162*)
- Low back pain (pp. 185-192*)

Students are encouraged to supplement these basic discussions by reference to Clinical Neurology, Cecil Medicine or Harrison's Principles of Internal Medicine and current clinical papers from refereed journals. Additional reading in the following areas is recommended:

- Headache
- Back and neck pain
- Episodic loss of consciousness
- Dizziness and vertigo
- Coma
- Cerebrovascular disease
- Hypoxic-ischemic encephalopathy
- Seizures and epilepsy
- Confusion and delirium
- Dementia
- Central nervous system infection
- Parkinson's disease and other extrapyramidal disorders
- Neurodiagnostic studies

Implementation

Course objectives are to be accomplished in a College affiliated hospital or clinical facility, under supervision. Objectives should be covered as completely as possible during the rotation to assure adequate student preparation for board examinations and clinical practice. The use of diverse methods appropriate to the individual and the clinical site are encouraged, but patient-centered teaching is optimal.

Didactic methods to achieve required objectives include:

- Reading assignments
- Lectures
- Computer-assisted programs (if available)
- Student attendance at/participation in formal clinical presentations by medical faculty

Clinically oriented teaching methods may include:

- Assignment of limited co-management responsibilities under supervision
- Participation in clinic visits, daily patient rounds and conferences
- Supervised and critique clinical work-ups of patients admitted to the service
- Assigned, case-oriented reading case presentations

POST-ROTATION EVALUATION

At the beginning of the rotation, the physician/mentor should review expectations/guidelines of performance with the student. A mid-rotation evaluation is encouraged. On the last day of service, the supervising physician should review the student's performance with the student and have the student sign the evaluation form before submission. A student's signature simply indicates that the student has received a grade directly from the attending; it does not indicate agreement with the grade. Evaluations of students must be completed within two weeks of completion of the rotation.

TEXTS AND RESOURCES

Required Assignment Texts:

Greenberg, D., Clinical Neurology, 8th Edition, McGraw Hill, 2012. ([Available through Pulse -AccessMedicine](#))

Kasper, et al (eds), Harrison's Principles of Internal Medicine 18th Ed., McGraw-Hill, 2012. ([Available through Pulse-AccessMedicine](#))

or

Goldman, et al (eds), Cecil Medicine, 24th Ed., Saunders, 2011. ([Available through Pulse-MD Consult](#))

Paauw, DS. (eds), Internal Medicine Clerkship Guide, 3rd Ed., St. Louis, Mosby, 2008.

American College of Physicians, MKSAP for Students 5, 5th Ed., Philadelphia, ACP, 2011. ([Available through Pulse- STAT! Ref](#))

READING ASSIGNMENTS

1. Review all core topics and diseases listed above.
2. In-depth reading of individual diseases and disorders listed above.

ELECTRONIC RESOURCES

(All are available through Pulse)

Evidence-Based Medicine:

- **Cochrane Library for Evidence-Based Medicine-** The Cochrane Library contains high-quality, independent evidence to inform healthcare decision-making.
- **UpToDate®**- an evidence-based knowledge system authored by physicians to help clinicians make the right decisions at the point of care. All UpToDate content is written and edited by a global community of 4,800 physicians, world-renowned experts in their specialties..
- **Essential Evidence Plus-** A powerful resource packed with content, tools, calculators and alerts for clinicians who deliver first-contact care.
- **ACP Smart Medicine-** ACP Smart Medicine is a comprehensive, evidence-based reference for fast, current answers on the best clinical care.

Electronic Texts:

- **Clinical Neurology-**[AccessMedicine](#)
- **Cecil Medicine-**[Clinical Key](#)
- **Harrison's Online-**[AccessMedicine](#)
- **Current Medical Diagnosis and Treatment 2013 -**[AccessMedicine](#)
- **Clinical Key-** Provides full-text access to approximately 40 medical textbooks, 50 medical journals, comprehensive drug information, and more than 600 clinical practice guidelines
- **eJournals A-to-Z-** Database provides link and coverage information to more than 124,000 unique titles from more than 1,100 database and e-journal packages.
- **The Medical Letter on Drugs and Therapeutics-** An independent, peer-reviewed, nonprofit publication that offers unbiased critical evaluations of drugs, with special emphasis on new drugs

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APPENDIX

Detailed General Clinical Competencies

DIAGNOSTIC DECISION-MAKING

Rationale:

Physicians are responsible for directing and conducting the diagnostic evaluation of patients with acute and chronic neurologic illnesses. In a time of rapidly proliferating tests, medical students must learn how to design safe, expeditious, and cost-effective diagnostic evaluations.

Specific Learning Objectives:

- A. Knowledge:** Students should be able to define, describe, and discuss:
1. Key history and physical examination findings pertinent to the differential diagnosis. *(MK, OPP)*
 2. Information resources for determining diagnostic options for patients with common and uncommon neurologic problems. *(MK, PLI)*
 3. How critical pathways or practice guidelines can be used to guide diagnostic test ordering. *(MK)*
- B. Skills:** Students should demonstrate specific skills, including:
1. Identifying problems with which a patient presents, appropriately synthesizing these into logical clinical syndromes. *(PC)*
 2. Identifying which problems are of highest priority. *(PC)*
 3. Formulating a differential diagnosis based on the findings from the history and physical examination. *(PC, OPP)*
 4. Using the differential diagnosis to help guide diagnostic test ordering and sequencing. *(PC)*
- C. Attitudes and Professional Behaviors:** Students should be able to:
1. Seek feedback regularly regarding diagnostic decision-making and respond appropriately *(P)*
 2. Recognize the importance of and demonstrate a commitment to the utilization of other health care professionals in diagnostic decision making. *(P, SBP)*

AOA Competencies:

PC = Patient Care
MK = Medical Knowledge
PLI = Practice-Based Learning and Improvement
OPP = Osteopathic Philosophy, Principles and Practice

CS = Communication Skills
P = Professionalism
SBP = Systems-Based Practice

CASE PRESENTATION SKILLS

Rationale:

Communicating patient care information to colleagues and other health care professionals is an essential skill regardless of specialty. Students should develop facility with different types of case presentations (e.g. written, oral, new patient, follow-up, inpatient and outpatient).

Specific Learning Objectives:

- A. Knowledge:** Students should be able to define, describe, and discuss components of comprehensive and abbreviated case presentations (oral and written) and settings appropriate for each. *(MK)*
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Prepare legible, comprehensive, and focused new patient workups that include the following features as clinically appropriate:
 - Concise history of the present illness organized chronologically with minimal repetition, omission, or extraneous information, and including pertinent positives and negatives. *(PC, CS)*
 - A comprehensive physical examination with detail pertinent to the patient's neurologic problem. *(PC, CS, OPP)*
 - A succinct, prioritized, and, where appropriate, complete list of all problems identified by the history and physical examination. *(PC, CS, OPP)*
 - A differential diagnosis for each problem (appropriate for the student's level of training). *(PC, CS)*
 - A diagnostic and treatment plan for each problem (appropriate for the student's level of training). *(PC, CS, OPP)*
 2. Orally present a new or follow-up inpatient's or outpatient's case in a logical manner, chronologically developing the present illness, summarizing the pertinent positive and negative findings as well as the differential diagnosis and plans for further testing and treatment. *(PC, CS)*
- C. Attitudes and Professional Behaviors:** Students should be able to:
1. Demonstrate ongoing commitment to improving case presentation skills by regularly seeking feedback on presentations. *(PLI, P)*
 2. Accurately and objectively record and present all data. *(P)*

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HISTORY-TAKING AND PHYSICAL EXAMINATION

Rationale:

The ability to obtain an accurate medical history and carefully perform a physical examination is fundamental to providing comprehensive care to adult patients. In particular, the internist must be thorough and efficient in obtaining a history and performing a physical examination with a wide variety of patients, including adults with acute and chronic neurologic diseases.

Specific Learning Objectives:

- A. Knowledge:** Students should be able to define, describe, and discuss:
1. The significant attributes of a symptom, including: location and radiation, intensity, quality, temporal sequence (onset, duration, frequency), alleviating factors, aggravating factors, setting, associated symptoms, functional impairment, and patient's interpretation of symptom. (*MK, OPP*)
 2. The four methods of physical examination (inspection, palpation, percussion, and auscultation), including where and when to use them, their purposes, and the findings they elicit. (*MK, OPP*)
 3. The physiologic mechanisms that explain key findings in the history and neurologic exam. (*MK, OPP*)
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Using language appropriate for each patient. (*PC, CS*)
 2. Eliciting the patient's chief complaint as well as a complete list of the patient's neurologic concerns. (*PC, CS*)
 3. Obtaining a patient's history in a logical, organized, and thorough manner, covering the history of present illness; past medical history; preventive health measures; social, family, and occupational history; and review of systems.
 4. Demonstrating proper hygienic practices whenever examining a patient. (*PC*)
 5. Performing a physical examination for a patient in a logical, organized, respectful, and thorough manner, giving attention to the patient's general appearance, vital signs, and pertinent body regions. (*PC*)
- C. Attitudes and Professional Behaviors:** Students should be able to:
1. Recognize the essential contribution of a pertinent history and physical examination to patient care. (*P*)
 2. Establish a habit of updating historical information and repeating important parts of the neurologic examination during follow-up visits. (*P*)
 3. Demonstrate consideration for the patient's feelings, limitations, and cultural and social background whenever taking a history and performing a physical exam. (*P*)

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INTERPRETATION OF CLINICAL INFORMATION

Rationale:

In the routine course of clinical practice, most physicians are required to order and interpret a wide variety of diagnostic tests and procedures. Determining how these test results will influence clinical decision making and communicating this information to patients in a timely and effective manner are core clinical skills that third-year medical students should possess.

Specific Learning Objectives:

- A. Knowledge:** Students should be able to:
1. Interpret specific diagnostic tests and procedures that are ordered to evaluate patients who present with common symptoms and diagnoses encountered in the practice of neurology. *(PC, MK)*
 2. Take into account the important differential diagnostic considerations, including potential diagnostic emergencies. *(PC, MK)*
 3. Define and describe for the tests and procedures listed:
 - Indications for testing. *(PC, MK)*
 - Critical values that require immediate attention. *(PC, MK)*
 4. Independently interpret the results of the following laboratory tests:
 - CSF Gram stain and differential cell count, CSF chemistry and serology, glucose, hepatic function panel, electrolytes, PT/INR, PTT, thyroid function tests, ANA, VDRL, ESR, arterial blood gases, *(PC, MK)*
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Interpreting a CSF Gram stain, chemistries and serology *(PC)*
 2. Recording the results of laboratory tests in an organized manner, using flow sheets when appropriate. *(PC)*
- C. Attitudes and Professional Behaviors:** Students should be able to:
1. Appreciate the importance of follow-up on all diagnostic tests and procedures and timely communication of information to patients and appropriate team members. *(P)*
 2. Personally review medical imaging studies, ECGs, CSF chemistry and smears, etc. to assess the accuracy and significance of the results. *(P)*

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THERAPEUTIC DECISION-MAKING

Rationale:

Internists are responsible for directing and coordinating the therapeutic management of patients with a wide variety of neurologic problems. To manage patients effectively, physicians need basic therapeutic decision-making skills that incorporate both pathophysiologic reasoning and evidence-based knowledge.

Specific Learning Objectives:

- A. Knowledge:** Students should be able to define, describe, and discuss:
1. Information resources for determining medical and surgical treatment options for patients with common and uncommon neurologic problems. *(MK)*
 2. How to use critical pathways and clinical practice guidelines to help guide therapeutic decision making. *(MK)*
 3. Factors that frequently alter the effects of medications, including drug interactions and compliance problems. *(MK)*
 4. Factors to consider in selecting a medication from within a class of medications. *(MK)*
 5. Factors to consider in monitoring a patient's response to treatment, including potential adverse effects. *(MK)*
 6. Methods of monitoring therapy and how to communicate them in both written and oral form. *(MK)*
- B. Skills:** Students should be able to demonstrate specific skills, including:
1. Formulating an initial therapeutic plan. *(PC)*
 2. Accessing and utilizing, when appropriate, information resources to help develop an appropriate and timely therapeutic plan. *(PC, PLI)*
 3. Writing prescriptions and inpatient orders safely and accurately. *(PC)*
 4. Counseling patients about how to take their medications and what to expect when doing so, including beneficial outcomes and potential adverse effects. *(PC, CS)*
 5. Monitoring response to therapy. *(PC)*
- C. Attitudes and Professional Behaviors:** Students should be able to:
1. Incorporate the patient in therapeutic decision making, explaining the risks and benefits of treatment. *(CS, P)*
 2. Respect patient's informed choices, including the right to refuse treatment. *(P)*
 3. Recognize the importance of and demonstrate a commitment to the utilization of other health care professionals in therapeutic decision making. *(P, SBP)*

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