

CURRICULUM ON NEUROLOGY
INTERNAL MEDICINE RESIDENCY PROGRAM

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I. Educational Purpose and Goals

The purpose of this rotation is to provide a core of clinical knowledge in neuroscience for internal medicine residents. Internists must be able to evaluate and assess patients with neurological complaints. Residents are, therefore, expected to competently perform a neurological examination and localize a lesion, formulate a differential diagnosis for the lesion, understand the basic laboratory and imaging evaluation of the neurological lesion, and understand the pathophysiology and natural history of common neurological lesions. In this rotation, residents will be exposed to a variety of problems that are frequently seen by internists and learn about diseases more frequently seen by subspecialty neurologists.

II. Principal Teaching Methods

- a. Supervised Direct Patient Care Activities
 - i. Patient encounters occur at Denver Health Hospital. All neurological consultations requested in Denver Health will be performed by the residents and teaching neurologist on the service. Residents learn the practical aspects of performing a consultation by observing the teaching neurologist.
- b. Small Group discussions
 - i. On both services noted below, teaching rounds are combined with management rounds, and occur daily by reviewing consultations with the teaching neurologist. The resident is expected to make a preliminary diagnosis, plan a workup and treatment strategy, and document the consultation. Review and approval of the resident's evaluation occurs in a conference room followed by bedside rounds.
 - ii. Direct bedside teaching occurs for a minimum of 4.5 hours per week at Denver Health Hospital in addition to daily general neurology rounds.
 - iii. During the rotation, residents also spend time in the neurology clinics.
 - iv. Neurology rounds at Denver Health once per week at which interesting cases are reviewed from the previous week
- c. Didactic Lectures
 - i. Each rotation a core of 16 lectures will be presented to the resident on the service by the teaching neurologist including: The neurological examination and lesion localization, seizure disorder, vascular disease, headache, Parkinson's disease and other movement disorders, neurological emergencies, peripheral neuropathy, myoneural junctional lesions, low back pain and spinal cord paralysis, brain and spinal cord tumors, neoplasia and

paraneoplastic syndromes, Neuro-ophthalmology, Neuro-imaging and other ancillary tests, CNS infections, chronic degenerative diseases, dementia and evaluation of the comatose.

ii. Case base lectures once per week based upon the previous week's cases. Each resident will present at least one case during the rotation. An updated lecture schedule, much increased, is attached.

iii. Neurology Grand Rounds (location varies) are held weekly with presentations by neurologists, visiting faculty and neurology residents. In attendance are the practicing neurologists, neurosurgeons, psychiatrists, and residents on the service.

iv. Interactive TV rounds twice per month. Neurology residents throughout the state of Michigan perform case based presentations using Picture Tell.

d. Assigned Readings - It is expected that each resident will read and study independently on their patients seen in consultation. An extensive collection of articles will be sent to the resident one week before the rotation. Recommended texts, but not required, are: Aminoff – Neurology in General Medicine; Adams/Victor – Principles of Neurology

e. On the first day of the rotation, the residents meet the involved neurology residents in the doctors' dining room at EWSH at 0700. They should have relevant examination equipment with them, including the mini-mental status protocol. The PX re. the nervous system will be reviewed extensively at this time. In addition, they will be oriented to the rotation and be provided an overview of the collection of articles they have received.

III. Educational Content

a. Mix of diseases - Residents on the neurology consultation service sees almost all the inpatient neurology consultations **at Denver Health Hospital**. The disease mix represents a wide spectrum seen in primary and specialty care.

b. Patient characteristics - Patients range from young adolescents to elderly with advanced diseases. Patients are of diverse race and socioeconomic backgrounds, representing the extremely diverse demographic characteristics of the community.

c. Learning venues:

i. Clinical encounters will be consultations regarding neurological complaints, not management of all general medical issues

ii. Location:

1. For the Denver Health Hospital outpatient neurology clinics and the inpatient neurology experience internal medicine residents are integrated into the Neurology residency program activities. Residents on the stroke service join neurology residents in providing full care for all admissions. Residents perform consultations both on the wards and in the dedicated

Neurological ICU with a wide variety of neurological critical care issues.

iii. Procedures Learned:

1. Residents will reinforce or learn indications as well as techniques for lumbar puncture.
2. Residents will review the indications for and interpret the results of the following tests: CSF analysis, carotid dopplers, CT angiography and MRI MRA, EMG, and nerve conduction studies, EEG and evoked potentials, metabolic and toxic blood evaluations.

d. Structure of rotation

- i. The rotation is a 2-week block integrated with the neurology residency's Denver Health Hospital. Schedules are available at the start of the rotation.
- ii. The average consult census is between 10-20 patients during the week. Similarly, the average stroke team census is 2-8 patients.
- iii. Residents continue to attend mandatory Internal Medicine conferences and continuity clinic.

IV. Principal Ancillary Educational Materials

- a. At the beginning of the rotation, each resident receives a copy of the Neurology curriculum's Goals and Learning Objectives.
- b. Readings from recent and classic neurological journal literature are given to residents for discussion with attendings.
- c. Four texts are suggested: Neurology for the House Officer, Principles of Neurology, Harrison's Principles of Medicine, and Manter and Ganz Neuroanatomy.

V. Methods of Evaluation

a. Resident Performance

At the end of each rotation faculty complete a web-based electronic resident evaluation form provided by the Internal Medicine Residency office. The evaluation is competency-based, fully assessing core competency performance. The evaluation is verbally discussed with the resident by the neurology attending, is available for on-line review by the resident at their convenience, and is sent to the residency office for internal review. The evaluation will be part of the resident file and will be incorporated into the semiannual performance review for directed resident feedback.

b. Program and Faculty Performance

Upon completion of the rotation, residents complete a service evaluation form commenting on the faculty, facilities, and service experience. These evaluations are sent to the residency office for review. The neurology supervisor will receive periodic aggregate

summaries of completed evaluations. The Training and Evaluation Committee will review results annually.

VI. Institutional Resources: Strengths and Limitations

a. Strengths

- i. Faculty actively practice neurology in the Denver Health and UCH systems. All are board certified in their specialty. Included are neuro-ophthalmologists, geriatric neurologist, cerebrovascular neurologist, movement neurologists and neuromuscular neurologists. All have teaching experience.
- ii. The greatest strengths are the disease and patient mixes. All consultations are seen by the teaching service.
- iii. All modern neurology facilities exist including: angiography, MRI/CT, carotid dopplers, EEG, EMG/NCS, evoked potentials, neurosurgery, and an intensive care unit at Denver Health Hospital, and a neuro-ophthalmology office.

b. Limitations

- i. Residents do not follow all consults actively on a daily basis, nor perform daily general management of the patients. The clinical duties are primarily those performed by neurology consultants.

VII. Rotation Specific Competency Objectives

a. Patient Care

- i. Residents should demonstrate ability to apply clinical skills and use the physical examination to localize neurologic lesions. By the end of the rotation, the resident must be able to complete a comprehensive history and must develop the ability to perform a competent neurological examination, including:
 - a. Mental status: language, memory, attention/concentration, affect, intellect
 - b. Cranial nerves
 - c. Motor exam including details on bulk, strength and tone
 - d. Reflex exam including stretch and pathological reflexes
 - e. Detailed sensory examination
 - f. Coordination and gait and balance
- ii. The resident will demonstrate ability to develop a rational clinical approach to solving basic clinical neurological problems including:
 - a. Stupor and coma
 - b. Seizures
 - c. Tremor
 - d. Weakness
 - e. Dizziness, syncope

- f. Vertigo
 - g. Sensation changes
 - h. Dementia and delirium
 - i. Paralysis
 - j. Headaches
 - k. Changes in vision or other sensory organs
- iii. The resident will demonstrate ability to perform lumbar puncture including appropriate pre- and post-procedure counseling and care.
- iv. The resident will demonstrate satisfactory skills in clinical documentation of neurologic complaints and general evaluations in the medical record.

b. Medical Knowledge

- i. Residents should demonstrate understanding of neuroanatomy sufficient to localize neurologic lesions.
- ii. By completion of the rotation, the resident must reflect an understanding of the differential diagnosis and natural history of common neurological issues (see above list).
- iii. The residents will demonstrate understanding of the indications, basic techniques, and basic interpretation of the following tests
 - a. lumbar puncture and CSF analysis
 - b. Carotid Dopplers
 - c. Neuro-imaging including CT scans MRI scans PET scans
 - d. EMG and nerve conduction studies
 - e. EEG and evoked potential studies
 - f. Metabolic testing, testing for autoimmune neurological diseases
- iv. The residents will understand the pathophysiology, clinical presentations, and achieve competence in the diagnosis and treatment of the following diseases:
 - a. Stroke
 - b. TIA/ RIND
 - c. Meningitis- both acute and chronic
 - d. Alzheimer's disease and other causes of dementia
 - e. Alcohol and drug related neurological disorders

 - f. Seizure disorder
 - g. Parkinsonism and other movement disorders
 - h. MS and other demyelinating diseases
 - i. Carpal tunnel and other entrapment syndromes
 - j. CNS tumors and malignancy
 - k. Peripheral neuropathy and radiculopathies
 - l. Migraines and other causes of headaches
 - m. Guillian-Barre Syndrome
 - n. ALS and other motor neuron diseases

- o. Peripheral neuropathy
 - p. Myopathy
 - q. Muscular dystrophy
 - r. Myasthenia gravis and other dystonias
 - s. Neuro AIDS
- v. Residents will reflect satisfactory knowledge of the use of specific neurological drugs.
- c. Interpersonal and Communication Skills**
- i. Residents will appropriately work with other neurological residents and show respect and ability to work well in a team setting
 - ii. Residents will create and sustain a therapeutic and ethically sound relationship with patients and their families.
 - iii. Residents will demonstrate ability to communicate effectively and demonstrate caring, compassionate, and respectful behavior.
- d. Professionalism**
- i. Residents will demonstrate respect, compassion, and integrity. They will demonstrate commitment to excellence and continuous professional development.
- e. Practice Based Learning and Improvement**
- i. Residents will be able to locate, critically appraise, and assimilate evidence from scientific studies and apply this knowledge to patients seen on the neurology consultation service.
 - ii. Residents will demonstrate ability to use information technology to manage information, access on-line medical resources, and support self-education, patient care decisions and patient education.
- f. Systems Based Practice**
- i. Residents will practice cost-effective health care and resource allocation while advocating for quality.
 - ii. Residents will productively and cooperatively participate in Multidisciplinary Treatment Planning.