

Neurosurgery

Office for Clinical Affairs
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General Description

Elective Rotation

This elective rotation in Neurosurgery is a four (4) week experience in the management of injury and illness of the neurologic system. The student may be required to travel to the clinic, outpatient surgery center and/or hospital facility during his/her rotation time. Many students electing this rotation will be in their third or fourth year of osteopathic medical school. A post-rotation examination is **not** required.

Recommended Textbook:

Lawrence, Peter F. **Essentials of Surgical Specialties**, 3rd Ed. Lippincott, Williams and Wilkins, 2007.
- Chapter 8: Neurosurgery: Diseases of the Nervous System (pp 331-395).

Other Suggested Textbooks:

Brunicaudi FC, et al. **Schwartz's Principles of Surgery**, 9th Ed. The McGraw-Hill Companies, 2010.
- Chapter 42: Neurosurgery. (Available electronically on *Access Surgery* through DMU Library portal.)

Doherty, Gerard M (ed.), **Current Diagnosis and Treatment: Surgery**, 13e. The McGraw-Hill Companies, 2010.
- Chapter 36: Neurosurgery. (Available electronically on *Access Surgery* through DMU Library portal.)

Feliciano DV., Mattox KL, and Moore EE. **Trauma**, 6e. The McGraw-Hill Companies, 2008.
- Chapter 20: The Brain. (Available electronically on *Access Surgery* through DMU Library portal.)

Useful Links:

<http://www.neuroexam.com/> An online, interactive instruction manual on how to conduct various aspects of the neurologic exam.

<http://cns.org/education/medStudCur/index.asp> The Congress of Neurological Surgeons "Medical Student Curriculum" that provides an excellent summary of neurosurgery topics of interest to all physicians.

Pre- Request for Elective

Completion of General Surgery Clerkship Core Rotation.

Basic textbook knowledge and skills lab experience with basic suturing and aseptic techniques.

Basic textbook knowledge and skills lab experience with anesthetics, intubation, and patient resuscitation.

Basic textbook knowledge of the anatomy, physiology, biochemistry, and pathology of the neurological system.

Basic textbook knowledge of and understands principles of neurologic disease and injury.

Student Responsibility

It is required that the student meet with their preceptor at the beginning of the rotation to discuss the learning objectives outlined in this document. Students should also seek and receive preceptor feedback midway through the rotation.

Because of the short duration of this rotation, students must be professionally assertive, attentive, and well prepared.

These characteristics are imperative for the student to get the most out of this rotation. Student must develop a trusting relationship with the attending before asking to attempt skills on a patient.

Purpose

The overall goal of this rotation is to provide the student with an opportunity to gain in appreciation of the wide variety of acute and chronic neurological disease. In this rotation, you will expand upon your understanding of the basic physiology of the nervous system and explore critical concepts in the pathophysiology of neurosurgical treatment. Your participation in patient care provides a fruitful ground for integrating knowledge of the basic neurosciences, disease pathophysiology,

and clinical practices. Students on service will improve their ability to conduct a neurological exam, manage acute neurological emergencies, and participate in clinic and operating room activities.

At the completion of this rotation, the student should have reinforced certain broad goals, including:

- **The ability to obtain and report a basic neurologic patient history for common neurologic conditions and injuries.**
- **The ability to perform and report a basic neurologic physical examination.**
- **Demonstrate and understanding of the basic science, physiology, pathophysiology, pathology, and natural history of common neurologic conditions and injuries.**
- **The ability to develop a working differential diagnosis for common neurologic conditions and injuries and to demonstrate an understanding of the appropriate timing and use of common diagnostic testing modalities to assist with determining a definitive diagnosis.**
- **Knowledge of appropriate available treatment alternatives, including both non-operative and operative for common neurologic conditions and injuries. Students should be able to discuss the relative merits and limitations of each type of treatment as well as any potential side effects or complications of the treatment.**
- **Knowledge of possible preventative measures to avoid common neurologic conditions and injuries.**

Students are expected to assist in the management of preoperative, perioperative and postoperative patient care under supervision. The student should also develop fundamental psychosocial skills by observing physician-patient interactions during this rotation.

We recognize that four weeks is an insufficient amount of time to cover a comprehensive list of objectives in any area of practice. Clearly, subjects addressed in any clinical rotation are dependent on the numbers of patients and kinds of disease entities presenting to a particular service. Nevertheless, certain minimum content **must** be addressed, either by clinical exposure or by didactic materials so that students are prepared for Board examinations and other testing. Broad goals listed above are a minimum; objectives for rotations not specifically listed in these guidelines should include the Affective Objectives listed below. The College depends on the supervising physician to establish more specific objectives dealing with the scope of the particular specialty. Therefore, the following sections contain relatively broad, basic objectives for which students are responsible.

Competencies

Osteopathic Philosophy and Osteopathic Manipulative Medicine

OBJECTIVES: Osteopathic Philosophy and Osteopathic Manipulative Medicine

1. Demonstrate the ability to perform and record an osteopathic structural examination including neuron sensory, motor, and reflex neurologic exam on a surgical patient and document such using acceptable osteopathic terminology.
2. Demonstrate the application of the osteopathic philosophy into the pre- and post-operative care of the surgical patient.
3. Demonstrate an understanding of palpatory findings, which are found in common conditions, encountered in a surgical practice.
4. Demonstrate ability to assess sensory and perfusion of extremities after injury.
5. Demonstrate ability to assess unique congenital deformities in the head, neck, and spine that can affect pre- and postoperative care.

Interpersonal and Communication Skills

OBJECTIVES: Interpersonal and Communication Skills

1. Communicates effectively with attending, resident, team members and other health care professionals.
2. Documentation in medical records is legible.
3. Communicates appropriately and professionally to patient and family members.
4. Demonstrates ability to develop and execute patient care plans appropriate for level of training and follows the SOAP/problem oriented format.

Professionalism

OBJECTIVES: Professionalism

1. Demonstrates a commitment to continuity of patient care.
2. Displays a sense of responsibility and respect to patients, families, staff and peers.
3. Demonstrates cultural sensitivity.
4. Maintains a professional appearance, well groomed, appropriately dressed.
5. Punctual in attendance, prompt and available when called upon.
6. Motivated to learn, shows appropriate assertiveness, flexibility, adaptability toward education.
7. Demonstrates appropriate attitude, cooperative, receptive to feedback.
8. Introduce self to those who you are working with, the patient, attending, resident, other physicians, nurses, staff, etc.

Practice-Based Learning

OBJECTIVES: Practice-Based Learning

1. Demonstrates motivation and a desire to learn.
2. Demonstrates the ability to learn from practice.
3. Critiques personal practice outcomes appropriate to level of training.
4. Demonstrates recognition of the importance of lifelong learning in medical/surgical practice.
5. Seeks and responds to feedback.

Systems-Based Practice

OBJECTIVES: Systems-Based Practice

1. Know where to go for help—personal and professional.
2. Attends all required orientations presented by the facility and completes needed paperwork for rotation.
3. Follows policy and procedures set forth by the health care facility and departments within that facility.
4. Follows the policies for a medical student at the surgery rotation facility.
5. Report to appropriate institutional authority when absent following Clinical Affairs guidelines.

Patient Care

OBJECTIVES: Patient Care

1. Communicates effectively with attending, resident, team members and other health care professionals.
2. Demonstrate the ability to obtain and report a basic neurologic **patient history** for common neurologic conditions and injuries with particular emphasis on the chief complaint, inciting events, mechanism of injury, exacerbating and alleviating factors, timing of symptoms and associated symptoms.
3. Demonstrate the ability to perform and report a basic neurologic **physical examination**.
4. Documentation in medical records is legible.
5. Communicates appropriately and professionally to patient and family members with the attending knowledge of the discussion.
6. Demonstrates ability to develop and execute patient care plans appropriate for level of training and follows the SOAP/problem oriented format.
7. Demonstrate aseptic technique in the OR and in ER when asked to manage a wound or scrub in for a surgical procedure.
8. Demonstrate patient safety concerns regarding body alignment, padding bony prominence, and environmental safety preoperatively when preparing the patient for surgery.
9. Demonstrate proper immobilization methods, drain care, surgical site assessment postoperatively and rehabilitation.

Medical Knowledge

Students should be able to define, describe and discuss the following topics under medical knowledge:

OBJECTIVES: Medical Knowledge

Source: Congress of Neurological Surgery

A. General Skills Topics

1. The Neurological Examination
 - Evaluate patient's mental status and speech.
 - Examine the cranial nerves.
 - Examine central and peripheral sensory function.
 - Examine motor function.
 - Examine cranial and peripheral reflexes.
 - Examine cerebellar function and gait.
2. Fundamentals of Neuro-Imaging
 - Recognize spine fractures and dislocations.
 - Differentiate on computerized images between blood, air, fat, CSF, and bone.
 - Recognize specific disease entities listed below such as epidural, subdural, intracranial hematoma, subarachnoid hemorrhage, brain tumors, and hydrocephalus.
3. Intracranial hypertension
 - Understand the pathophysiology of elevated intracranial pressure, cerebral perfusion and the influence of blood pressure, blood gases, fluid and electrolyte balance.
 - Recognize the clinical manifestations of acute brain herniation including the Cushing reflex, midbrain effects and vital signs.
 - Understand the impact of focal mass lesions, structural shifts and their consequences.

B. Intracranial Disease Topics

1. Diagnosis and Management of Head Trauma
 - Understand and assign the Glasgow Coma Score.
 - Recognize the presentation of brain herniation syndromes in the setting of trauma.
 - Initiate management of elevated intracranial pressure in head trauma.
 - Recognize and initiate management of concussion, brain contusion and diffuse axonal injury.
 - Recognize and initiate management of acute subdural and epidural hematoma, including surgical indications.
 - Recognize and initiate management of penetrating trauma including gunshot wounds.
 - Recognize and understand the principles of management of open, closed and basilar skull fractures, including cerebrospinal fluid leaks, and chronic subdural hematoma (in children and adults).
2. Diagnosis and Management of Brain Tumor and Abscess
 - Know the relative incidence and location of the major types of primary and secondary brain tumors.
 - Understand the general clinical manifestations (focal deficit and irritations, mass effect; supratentorial) of brain tumors.
 - Recognize specific syndromes: extra-axial (cerebellopontine, pituitary, frontal) and intra-axial, in brain tumor presentation.
 - Review the diagnostic tools that are currently used for evaluation (laboratory tests, radiology, and biopsy).
 - Understand broad treatment strategies (surgery, radiosurgery, radiation, and chemotherapy) in the treatment of tumors.
 - Recognize the clinical manifestations of abscess and focal infections due to local spread, hematogenous disease associated with immune deficiency, and how they differ from the mimic tumors.
 - Understand the general principles in the treatment of abscess and focal intracranial infections.
3. Diagnosis and Management of Headaches
 - Know the major causes of intracranial hemorrhage: vasculopathy in the aged (hypertension and amyloidosis), aneurysm, vascular malformation, tumor and coagulopathy.
 - Recognize the symptoms and signs of subarachnoid, cerebral and cerebellar hemorrhage.
 - Apply diagnostic tools in evaluation of acute headache (CT and MRI, role of lumbar puncture).
 - Understand the natural history and broad treatment strategies (surgery, radiosurgery, interventional radiology as well as treatment of vasospasm) of intracranial aneurysms and vascular malformations.
 - Differentiate the symptomatology of migraine, cluster, and tension headache and sinusitis headache.

4. Diagnosis and Management of Ischemic Cerebrovascular Disease
 - Recognize the symptoms and signs of anterior and posterior circulation ischemia emphasizing carotid disease and contrasting it with hemorrhagic stroke.
 - Differentiate among the types of ischemic stroke: embolic, hemodynamic, lacunar.
 - Categorize etiologic factors of brain ischemia including atherosclerosis, cardiac disease, arterial dissection, fibromuscular dysplasia, vasculitis, venous thrombosis and hematologic disease.
 - Understand the treatment options in ischemic disease and their indications, including medical management, risk factor modification and surgical therapy.
 - Diagnose and monitor carotid occlusive disease using noninvasive methods and understand indications for angiography and carotid endarterectomy.

C. Spinal Disease

1. Diagnosis and Management of Spinal Cord Injury
 - The emergency room diagnosis and interpretation of radiologic studies in spinal trauma.
 - Initiate acute management of spinal cord injury including immobilization, steroids and systemic measures.
 - Understand the definition and subsequent management principles of the unstable spine.
 - Understand management principles in spinal cord injury including indications for decompressive surgery and treatment of the medical complications associated with cord injury (skin, bladder, bowel movement, respiratory).
2. Diagnosis and Management of Nontraumatic Neck and Back Problems
 - Diagnosis and understand the natural history and management principles of whiplash and soft tissue injury.
 - Recognize the broad categories of spinal pain and radiculopathy:
 - The signs and symptoms (including cauda equina syndrome).
 - Their common causes, their diagnosis and their management (cervical and lumbar disc herniation, osteoarthritic disease, spondylolisthesis).
 - Their differential diagnosis and management (including metastatic disease and primary spinal tumors).
 - Recognize the broad categories of myelopathy:
 - The signs and symptoms (including comparison of acute and chronic spinal cord injury).
 - The common causes, their diagnosis and their management (cervical and lumbar disc herniation and osteoarthritic disease).
 - Differential diagnosis and management (including transverse myelopathy, metastatic disease and primary spinal tumors).

D. Peripheral Nerve Disease

1. Diagnosis and Management of Peripheral Nerve Injury and Entrapment
 - Diagnosis traumatic nerve injury (laceration, stretch and compression) and understand indications and general strategies of treatment.
 - Recognize the signs and symptoms of common nerve entrapment (carpal tunnel syndrome, ulnar nerve entrapment, thoracic outlet syndrome and meralgia paresthetica), their etiology, conservative management strategies and indications for surgical intervention.

E. Other Common Neurosurgical Problems

1. Diagnosis and Management of Hydrocephalus and Spinal Dysraphism
 - Recognize the symptoms and signs of hydrocephalus in children.
 - Recognize the symptoms and signs of hydrocephalus in adults.
 - Understand common etiologies of hydrocephalus in children and adults, and differentiate between communicating and obstructive hydrocephalus.
 - Understand treatment strategies for hydrocephalus.
 - Recognize common syndromes of spinal dysraphism, their neurologic manifestations and broad principles of management.
2. Diagnosis and Management of Surgically Treatable Pain Problems, Movement Disorders and Epilepsy
 - Recognize the features of trigeminal and glossopharyngeal neuralgia, causalgia and cancer pain, indications for surgical referral and the spectrum of surgical therapeutic options.

- Recognize movement disorders amenable to surgical intervention, including Parkinson's disease, dystonia, spasticity, and hemifacial spasm, indications for surgical referral and the spectrum of surgical therapeutic options.
- Understand the general classification of seizure disorders, definition of intractable epilepsy, and broad categories of surgical intervention for epilepsy including invasive electrodes, resective and disconnective surgery.

Implementation

Course objectives are to be accomplished in a College affiliated hospital or clinical facility, under supervision. Basic objectives **must** be covered during the rotation to assure adequate student preparation for Board examinations and other evaluations such as post-rotation examinations. 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 critiqued clinical work-ups of patients admitted to the service
- assigned, case-oriented reading case presentations

Three levels of achievement are identified:

- familiarity with a variety of medical procedures through observation and assisting
- proficiency in clinical procedures through actual supervised performance
- awareness of the availability of various medical procedures and their use

Evaluations of student must be completed within one week from completion of the rotation.

On the last day of service, the supervising physician should review the student's performance with the student. If a student signs the evaluation the signature simply indicates that the student has received a grade directly from the attending; it does not indicate agreement with the grade.

Assignments

The rotation director or preceptor may direct specific and general reading assignments from texts and current literature. Supplemental readings from current periodical literature are recommended.