WestVirginiaUniversity
SCHOOL OF MEDICINE

Department of Anesthesiology

Clinical Base Year
Neurosurgery Curriculum

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Educational Purpose: The purpose of this rotation is for residents to develop an understanding of the anatomy, physiology, pathophysiology, and presentation of traumatic injuries of the brain, spinal cord, and peripheral nervous system, including their supporting structures. Residents should be able to demonstrate the ability to formulate and implement appropriate diagnostic and treatment plans for traumatic injuries to the nervous system, including both surgical and nonsurgical management, the ability to triage neurosurgical patients to and from a critical care setting, and knowledge of and the ability to manage neurosurgical patients in the critical care setting.

I. Principle Teaching Methods

a. **Supervised Patient Care:** Residents rotate through the Neurosurgery wards located at Ruby Memorial Hospital at West Virginia University. Residents will be assessing patients along with Neurosurgery Faculty and Residents. Supervision should be structured to allow residents to act independently at various tasks commensurate with their skills and the specific medical situation.

b. **Didactic Lectures:** Didactic presentations by the faculty and/or Neurosurgery residents will occur at least one time per week. Residents will attend all available Neurosurgery conferences during the rotation.

c. Additional reading is expected to occur independently to address clinical questions as they arise.

II. Educational Goals

a. The global goals of the rotation are to familiarize residents with the anatomic, physiologic and patient care areas that are concerns in the Neurosurgical patient including knowledge of;

i. Neuroanatomy
ii. Neurophysiology
iii. Neuropathology
iv. Neuropharmacology
v. Neuroradiology
vi. Cerebrovascular Surgery
vii. Neurosurgical Oncology
viii. Neurotrauma
ix. Neurosurgical Critical Care
x. Pain Management

xi. Pediatric Neurosurgery
xii. Surgery of the Peripheral Nervous System
xiii. Spinal Surgery
xiv. Stereotactic and Functional Neurosurgery

III. Principal Ancillary Educational Materials

a. A variety of electronic resources are available to residents through the WVU electronic library, in addition to department-provided UpToDate subscriptions. Desktop computers in Ruby Memorial Hospital have internet access and the hospital has wireless capability so residents can access the electronic medical record on a PDA.

IV. Methods of Evaluation

a. **Resident Performance:** At the end of each rotation the faculty completes a resident web-based electronic evaluation form through E-Value. The evaluation is competency based and assesses core competency performance. The evaluation is shared with the resident and is available for on-line review by the resident and is also sent to the residency office for internal review. This evaluation is part of the resident file.
b. **Program and Faculty Performance:** Upon completion of the rotation, the residents will be asked to complete a service evaluation form commenting on the faculty, facilities, and service experience. These evaluations will be sent to the residency office for review and the attending faculty physician will receive anonymous semi-annual copies of completed evaluation forms. The Program Directors will review results annually.

V. **Rotation Specific Competency Objectives**

a. Patient Care

i. Perform and document pertinent history, physical findings, and radiologic findings in a neurosurgical patient.
ii. Differentiate central from peripheral nervous system pathology and injuries.
iii. Decide appropriately which patients require emergency craniotomy and other procedures.
iv. Assist with opening and closure of craniotomies.
v. Demonstrate the ability to perform an initial evaluation and management of critically ill neurosurgical patients.
vi. Demonstrate an ability to manage neurosurgical patients in a critical care setting.
vii. Diagnose and treat acid-base abnormalities in neurosurgical patients.

viii. Propose appropriate initial ventilator settings for patients with different types of common neurosurgical conditions and explain changes in that choice based upon specific changes in the patient's metabolic or pulmonary status.

b. Medical Knowledge

i. Define the adult and pediatric patient which would be best served in a critical care setting; include both medical and neurosurgical issues within the context of this discussion.
ii. Review general medical issues pertinent to the management of neurosurgical patients in a critical care setting.
iii. Describe the indications and pharmacokinetics for medications commonly used in the management of critically ill neurosurgical patients including:
    1. vasoactive drugs
    2. ionotropic drugs
    3. bronchodilators
    4. diuretics
    5. antiarrhythmics
    6. antihypertensives
    7. antimicrobials
    8. anticonvulsants
iv. Describe the clinical presentation, evaluation, and treatment of infections which commonly occur in critical care neurosurgical patients.
v. Describe the clinical presentation, evaluation, and treatment of diabetes insipidus
vi. Review the medical and legal definitions of brain death. Discuss moral and ethical issues pertaining to critically ill neurosurgical patients.
vii. Review the impact of renal insufficiency as it pertains to the management of neurosurgical patients .
viii. Review the diagnosis and management principles of the following endocrine disorders:
    1. hypo/hyperthyroidism
    2. hypo/hyperparathyroidism
    3. adrenal cortical excess and deficiency
    4. diabetes mellitus
ix. Review the effects of acid-base disturbances on the central nervous system and intracranial pressure.
x. Demonstrate an understanding of the management of complex acid-base disturbances in the critical care setting .
xi. Name an initial choice for intravenous fluids for a newly admitted Intensive Care Unit (ICU) patients with the following diagnoses and explain changes in that choice based upon specific changes in

the patient's diagnosis, clinical condition, electrolyte and volume status:

1. head injury
2. stroke
3. tumor

xii. Discuss the pathophysiology and management of coagulopathy after head injury.
xiii. Describe basic principles of nutritional management in neurosurgical critical care.
xiv. Explain the treatment of posttraumatic seizures .
xv. Outline basic principles of ICU management of patients with spinal cord injury.
xvi. Name the major structures supplied by the major vessels of the brain and spinal cord.
xvii. Discuss the evaluation, treatment, and prognosis of subarachnoid hemorrhage, both traumatic and spontaneous.
xviii. Explain the pathophysiology and treatment of cerebral vasospasm.
xix. Formulate a diagnostic and treatment plan for patients with cerebral ischemia.
xx. Explain the evaluation and management of birth-related intracranial hemorrhage, spinal cord injury, and brachial plexus injury.
xxi. Describe a systematic approach to the examination of the peripheral nervous system. Describe the basic principles of management of peripheral nerve injuries.
xxii. List principles of rehabilitation of different types of neurosurgical patients.
xxiii. Define brain death and discuss methods of making such a diagnosis.
xxiv. Describe the pathophysiology of electrical injuries to the nervous system and review treatment of same.
xxv. List the mechanisms of action and potential complications of commonly used pressors and hypotensive agents.
xxvi. Discuss indications, pharmacologic mechanism, duration of action, and effect on the neurologic examination for sedative, paralytic, and analgesic agents commonly used in the ICU and operative suite.

c. **Interpersonal and Communication Skills**
   i. Residents will communicate effectively with physicians, patients, and staff members in their roles as learners and active observers on this rotation

d. Professionalism
   i. Residents will demonstrate appropriate professional behaviors with support staff physicians and patients.

ii. Residents will demonstrate compassion and respect for patients with disfiguring or disabling conditions.

e. Practice Based Learning and Improvement

i. Residents will be well versed in the use of technology (such as electronic Neurosurgery atlases or search engines, literature searches, etc.) to support medical decisions.

f. Systems Based Practice

i. Residents will be able to understand the management of common Neurosurgery pathology and interact appropriately within the healthcare system.

CURRICULUM TIMELINE

Modified from recommended Neurosurgical PGY1 curriculum by Richard Driver, MD
Approved by the Education Committee October 10, 2007