

# Neurosurgery

1. **Overview:** This is a 4-week block required rotation on the neurosurgical service during PGY-1 and PGY-2 year. Inpatient and outpatients are evaluated and cared for in the ED, on the wards, ICU and in the OR. Surgical residents will work directly under the supervision of two full-time neurosurgeons.
2. **GOALS:**

The major goals of this rotation are:

  - a. To provide instruction to surgical residents, which allows them responsibility and experience in caring for patients with neurosurgical problems. This instruction, responsibility, and experience allows the development of judgment in clinical skills needed to accurately assess neurosurgical ill patients, to appropriately utilize and interpret laboratory and diagnostic studies, and to rationally manage neurosurgical patients in pre/post operative phases of care. Instruction will enhance knowledge of the resident in clinical anatomy, physiology and pathology of neurosurgical conditions. This instruction includes the natural history, prevalence, manifestations, differential diagnosis, rational therapy and management of the surgical condition. Preventive and rehabilitative features for surgical conditions are considered.
  - b. To enhance the patient management skills of surgical residents by teaching the following: history taking, physical examination, diagnostic procedures, problem identification and formulation, recording of data, problem-solving skills, and appropriate patient-physician and patient-family relationships.
3. **OBJECTIVES**
  - a. **Patient Care:** Upon completion of this rotation, residents will demonstrate knowledge of and skills in neurological examination of patients with neurological or neurosurgical disease or injury so that:
    - i. An accurate history can be taken
    - ii. A sufficient physical examination can be performed
    - iii. Logical conclusions can be drawn regarding location and nature of neuropathology
    - iv. Demonstrate an understanding of the management of head injuries to include:
      1. Selection, prioritizing, and performance of resuscitation efforts
      2. Analyzing components and results of baseline neurological examination to determine and evaluate changes in patient neurological status
      3. Treatment of a scalp wound

4. Initial treatment of compound depressed skull fractures
  5. Management of increased intracranial pressure
  6. Recognition of Cerebral Herniation Syndromes
  7. Initiation, management, and interpretation of intracranial pressure monitoring
  8. Recognition and initial management of post-traumatic intracranial hemorrhage
- v. Residents can demonstrate skills, to the satisfaction of the neurosurgical attendings, in the evaluation and management of conditions such as:
1. Closed head injury: problems related to coma, brain swelling, increased intracranial pressure (ICP), ICP monitoring
  2. Spinal cord injury: problems related to paralysis, sensory deficit, roto bed, tongs, halo
  3. Airway and respiratory problems secondary to coma or high cord injury: arterial blood gases, respirator, endotracheal tube, tracheostomy
  4. Vascular problems: hypo and hypertension, cerebral circulation, cerebral ischemia
  5. Bladder problems: secondary to brain, cord, or cauda pathology
  6. Metabolic problems: hypopituitary, hypoadrenal, hyponatremia, water intoxication
- vi. Residents can apply knowledge of cervical and thoracolumbar spine injuries, including:
1. Means of stabilization of spine (tongs, halo)
  2. Recognition of neurological deficit from cord and/or root injury at various levels
  3. Pathophysiological responses in quadriplegic or paraplegic patient
- vii. Residents can demonstrate the ability to assess and manage diseases of the cervical and lumbar discs according to:
1. Anatomical strictures involved: disc (cartilage), annulus (ligament), joint capsule, pedicle, nerve root, and foramen
  2. Conservative management: traction, rest, physical therapy, and analgesic medications
  3. Indications for surgical management intractable radicular pain, neurological deficit
- viii. Residents can discuss ethical and socio-economic issues relating to neurosurgery (e.g., brain death, mental incompetence, dysphasia, compensation neuroses, and intractable or chronic pain).
- ix. Residents can demonstrate an understanding of the importance of early referral of head and spinal cord injury patients to,

rehabilitation services and to recognize the potential impact of these services for long-term prognosis.

- b. **Medical Knowledge:** By the completion of this rotation, residents will
  - i. Demonstrate an understanding of important non-surgical problems and postoperative complications relating to neurosurgery, including:
    - 1. Closed head injury: problems related to coma, brain swelling, increased intracranial pressure (ICP), ICP monitoring
    - 2. Spinal cord injury: problems related to paralysis, sensory deficit, rotobed, tongs, halo
    - 3. Airway and respiratory problems secondary to coma or high cord injury: arterial blood gases, respirator, endotracheal tube, and tracheostomy
    - 4. Vascular problems: hypo and hypertension, cerebral circulation, cerebral ischemia
    - 5. Bladder problems: secondary to brain, cord, or cauda pathology
    - 6. Metabolic problems: hypopituitary, hypoadrenal, hyponatremia, water intoxication
  - ii. Know the indications, contraindications, risks and benefits for the use of the following procedures and the basics of reading them:
    - 1. Plain skull and spine radiographs
    - 2. Computed axial tomography (CAT) scan: head and spine
    - 3. Cerebral arteriography
    - 4. Myelography
    - 5. Magnetic resonance imaging (MRI)
- c. **Practice-based learning:** Residents are expected to
  - i. Be able to evaluate own performance,
  - ii. Incorporate feedback into improvement activities;
  - iii. Effectively use technology to manage information for patient care and self-improvement.
- d. **Interpersonal and communication skills:** Residents are expected to:
  - i. Create and sustain a therapeutic and ethically sound relationship with patients.
  - ii. Use effective listening skills and elicit and provide information using effective nonverbal, explanatory, questioning, and writing skills.
  - iii. Work effectively with others as a member of the Neurosurgical team.
- e. **Professionalism:** Residents are expected to demonstrate a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to a diverse patient population. They are expected to:

- i. Demonstrate respect, compassion, and integrity; a responsiveness to the needs of patients that supercedes self-interest; accountability to patients; and a commitment to excellence and on-going professional development.
  - ii. Demonstrate a commitment to ethical principles pertaining to confidentiality of patient information and informed consent.
  - iii. Demonstrate sensitivity and responsiveness to patients' culture, age, gender, and disabilities.
- f. **Systems-based practice:** Residents are expected to:
  - i. Demonstrate understanding of how their patient care and other professional practices affect other health care professionals and the hospital.
  - ii. Practice cost-effective health care and demonstrate knowledge of resource allocation that does not compromise quality of care
  - iii. Advocate for quality patient care and assist patients and families in dealing with the complexities of the system.

#### **4. CLINICAL EXPERIENCE**

- a. The Neurosurgical service consists of 1 or 2 residents from the departments of surgery, transitional, or emergency medicine, and two full-time staff neurosurgeons. Residents work under the direct supervision of a staff neurosurgeon. Each 24 hours, one resident is on home call and admits all neurosurgical patients and performs consults on any other patients during that period. The bulk of instruction occurs during daily patient care rounds and during clinic, which occurs weekly.
- b. In-patient care rounds occur at least once a day, seven days a week. Residents are expected to evaluate each in-patient daily, using a comprehensive problem-oriented strategy and develop an assessment and plan of care for the patient for the day.
- c. In the outpatient setting, residents evaluate clinic patients with a variety of neurosurgical complaints. Each resident performs limited, focused history and physicals, makes an evaluation and discusses the plan of care as needed with the staff clinic staff neurosurgeon.
- d. Residents assist in the operating room as needed and/or desired.

#### **5. DIDACTIC COMPONENT**

- a. Reading assignments are distributed on the first day of each experience in the departments. In addition, following a case-based reading approach, residents are expected to utilize resources for self-education which include general reference neurosurgical textbooks available in the medical library, bound medical and surgical journals in the medical library, and on-line searching capabilities maintained throughout the institution.
- b. Morbidity and mortality conference and surgical grand rounds occur every Wednesday from 4-6pm, and surgical residents on the neurosurgery service are expected to attend. Journal club occurs every other Wednesday after grand rounds. Articles are distributed and discussed.

Spontaneous lectures may also occur throughout the month by the staff neurosurgeons.

## 6. RESPONSIBILITIES

- a. **Decision-making:** Residents are expected to, based upon information gathered and the clinical situation, make independent decisions for patient care. These decisions are then reviewed with the staff neurosurgeon before being implemented, at any time, day or night, and at least on daily rounds.
- b. **Planning:** Planning for patient care is done with the staff neurosurgeon daily on patient rounds.
- c. **Direct patient care:** Residents have direct patient care responsibilities on the neurosurgery service with close, direct supervision by the staff neurosurgeon.
- d. **Record keeping:** The resident or the covering resident responsible for the patient writes daily notes. Restraint, procedural consent, and other forms are to be filled out by the resident in charge of that patient, and signatures of staff are obtained as necessary. Appropriate documentation of these procedures is to occur at the time of the procedures or daily as is required. Discharge summaries are dictated on all. In the clinic, notes are written by the residents, reviewed and signed by the neurosurgery attending. It is the responsibility of the resident to be sure problem lists and medication lists are updated. Consents for surgery are obtained under direct supervision by the staff neurosurgeon. Residents are expected to fill out all necessary paperwork to schedule patients for surgery and to get the necessary consultations before, during and after surgery.
- e. **Order writing:** Only the residents or staff neurosurgeon in charge of the patient writes orders. If you are consulting for a patient on another service, recommendations are made, if needed, by phone, to the service responsible for that patient and orders are written only if requested to do so by them.
- f. **Ongoing patient management:** The ongoing neurosurgical patient management remains the responsibility of the neurosurgery service and the residents caring for that patient until the patient is discharged. While the neurosurgical patients are in the intensive care unit, the resident may consult SICU or MICU for co-management of the patients. If the patient has any medical problems, medical consultations are obtained and the patient is then followed in the medicine clinics if he/she has no primary care physician. Patients are seen in follow-up for their neurosurgery complaints in the outpatient neurosurgery clinic.

7. **SUPERVISION:** One or more of the staff neurosurgeons directly and indirectly supervises surgical residents all times in the neurosurgery clinic, in the hospital, and in the operating room. An attending or a resident who has been certified by his/her department to be competent to perform and teach that procedure supervises all procedures.
8. **SCHEDULE:** Residents are on home call every second or third night. In-patient morning rounds begin at 7am. Residents are scheduled at least 4 full days away from patient care duties. During days off, the neurosurgery service is cross-covered by available surgical residents. On weekends, only the call resident is expected in the hospital to make rounds with the staff neurosurgeon. Neurosurgery clinics occur Wed, 8:30 am – 12 noon
9. **DISTRIBUTION OF GOALS, OBJECTIVES:**  
Goals and objectives of this rotation are distributed at the beginning of the residency year to each resident. Copies are sent by email to each resident assigned to this rotation prior to the beginning of the rotation. Additional copies can be obtained in the surgery residency coordinator's office. The goals and objectives can also be assessed via the KMC surgery website: [www.kmcsurgery.org](http://www.kmcsurgery.org)
10. **METHODS OF IMPLEMENTATION:** Goals and objectives are implemented through one on one precepting, direct staff supervision, faculty and resident role modeling, case-based readings, daily rounds, and spontaneous and planned didactic sessions.
11. **FUNDAMENTAL CLINICAL SKILLS:** All neurosurgery patients admitted to the hospital require full History and physical examination. Neurosurgery patients, therefore, offer residents a vast opportunity for developing the fundamental clinical skills of:
  - a. Obtaining a complete medical history
  - b. Performing a complete physical exam (with a focused extensive neurological exam),
  - c. Evaluating data,
  - d. Collating information,
  - e. Defining patient's problems,
  - f. Generating differential diagnoses,
  - g. Developing a rational plan for patient care,
  - h. Implementing therapy based on etiology, pathogenesis, and manifestations of various diseases and injuries, and
  - i. Knowing when it is necessary to ask for consultation.
12. **SENIOR RESIDENT CONTACT:** Though senior residents from the emergency department and surgery rotate through neurosurgery, these residents may be first or second year. The line of response is always directly to the staff neurosurgeon.

13. **VACATION:** Vacation cannot be taken during this rotation
14. **CALL RESPONSIBILITIES:** Call is taken from home every second, third or fourth night, depending on the available manpower for the month. If the resident has worked continuously for 24 hours, the resident is expected to be relieved of clinical duties by noon with no new patients beginning at 8 am the next morning.