LEARNING OBJECTIVES FOR NEUROANESTHESIA ROTATION, UCSD MEDICAL CENTER

The core neuroanesthesia rotation will provide the resident with a comprehensive exposure to and experience in the management of patients who undergo neurosurgical and interventional neuroradiologic procedures of the brain and spinal cord. Residents will receive exposure to neurosurgical and spine surgery patients in the peri-operative period and both formal and informal didactic instruction. This instruction is to be supplemented with guided independent study. In aggregate, the experience will serve to facilitate the development of the resident into a consultant neuroanesthesiologist who is able to provide expert care of neurosurgical and spine surgical patients.

Upon completion of the neuroanesthesia rotation, residents should be able to demonstrate proficiency in the management of both simple and complex neurosurgical problems. Residents are expected to provide comprehensive care in a compassionate manner. This care should be based on the current state of the knowledge of the patient’s medical problems, a focused review of current literature and appropriate use of on-line medical information pertinent to the patient’s medical problems. The care that is provided is expected to be cost effective and of high quality. Communication with the patients and their families, as well as with the health care team is essential. At all times, the residents are expected to conduct themselves in a manner that is consistent with the ethical and moral principles of the highest order.

I. PATIENT CARE

A central principle of the medical care of patients is that we strive to provide appropriate, effective and compassionate clinical care. To that end, it is expected that the resident will:

1. Develop and demonstrate skills to effectively communicate with patients and their families in a respectful manner.

2. Demonstrate a review the patient’s medical history with an emphasis on those aspects that have direct bearing on the anesthetic care.

3. Review the findings of neurosurgery team. Emphasis should be placed on pre-existing neurologic deficits and their relevance to the anesthetic management of the patient in the operating room.

4. Review pertinent radiologic studies, including CT and MRI scans and angiography. The type and location of the pathologic findings and their relevance to patient’s symptoms and signs should be evaluated. Evidence of the presence of intracranial hypertension should be sought.
5. Discuss the need for neurophysiologic monitoring with the surgical team. Appropriate consultation with the monitoring technicians and surgeons is essential.

6. Formulate an appropriate anesthetic plan. Patient needs, the goals of the surgeons and the need for electrophysiologic monitoring should be taken into consideration in the formulation of this plan.

7. Understand the surgical and anesthetic considerations of the position that the patient will be placed in.

8. Develop facility with monitoring equipment that is required and with the invasive procedures that are germane to each procedure. These include arterial and venous cannulation, insertion of central venous catheters and pulmonary artery catheters, placement of intravenous devices for aspiration of intracardiac air and devices for detection of venous air embolism.

9. Understand the need for prompt neurologic examination of the patient at the conclusion of the surgery.

10. Plan the management of the patient in the recovery room. Specific attention should be focused on the ongoing neurologic examination of the patient, provision of adequate analgesia and hemodynamic stability.

11. Formulate a plan for the disposition of the patient.

12. Understand that a team approach is essential to an optimum outcome. Respect for and communication with other members of the team will ensure that the patient will receive the best care that is possible.

II. MEDICAL KNOWLEDGE

The proper peri-operative management of the neurosurgical patient requires a thorough knowledge of normal cerebrovascular and neurophysiology, pathophysiology that is germane to most neurosurgical cases and specific knowledge of the primary disease process.

A) Basic Science Knowledge

1. Normal cerebrovascular and neurophysiology:
   a. Neuroanatomy of the brain and spinal cord
   b. Regulation of cerebral blood flow
      i. Chemical regulation
      ii. Myogenic regulation
      iii. Neurogenic regulation
iv. Effect of blood viscosity
v. Effect of vasoactive agents
vi. Effect of age
c. CSF dynamics
d. Effect of hypothermia and hyperthermia

2. Anesthetic neuropharmacology
   a. Cerebral blood flow and volume
   b. Cerebral metabolic rate
c. Intracranial pressure
d. Electroencephalography
e. Sensory evoked potentials
f. Motor evoked potentials
g. CSF dynamics
h. Blood brain barrier
i. Epileptogenesis

3. Cerebral pathophysiology
   a. Cerebral ischemia
   b. Chronic arterial hypertension
c. Intracranial hypertension
d. Brain tumors
e. Coma
f. Epilepsy

B) Clinical Science Knowledge
1. Recurrent Issues in Neuroanesthesia
   a. Intracranial pressure
b. Brain relaxation

c. Management of arterial carbon dioxide tension

d. Blood pressure management

e. Steroids

f. Diuretics

g. Anticonvulsants

h. Patient positioning

i. Pneumocephalus

j. Venous air embolism

k. Monitoring

   i. Arterial pressure

   ii. Central venous pressure

   iii. Pulmonary artery catherization

   iv. Electroencephalography

   v. Evoked potentials

   vi. Precordial Doppler

   vii. Transesophageal echocardiography

l. Fluid management

m. Hypothermia

n. Emergence from anesthesia

2. Specific Procedures

   a. Supratentorial tumors

   b. Intracranial aneurysms

   c. Arteriovenous malformations

   d. Head injury
e. Posterior fossa procedures
f. Trans-sphenoidal hypophysectomy
g. Awake craniotomy, seizure surgery
h. Neurointerventional radiology
i. CSF shunting procedures
j. Pediatric neurosurgery
k. Spine surgery

C) Independent Study

Required reading:


Additional Sources:


III. PRACTICE-BASED LEARNING AND IMPROVEMENT

The rate of growth of knowledge in anesthesiology in general and in neuroanesthesia in particular is advancing rapidly. State of the art anesthesia care therefore necessitates a commitment to life-long learning. To that end, residents will be expected to participate in:

1. Continuous quality improvement
   a. develop procedures wherein the effectiveness of care is evaluated post-operatively
   b. identify sentinel events that indicate the occurrence of an adverse event
   c. participate in morbidity and mortality conferences in which the root causes of adverse events are identified and in which policies and procedures are implemented to prevent
such occurrences in the future. Participation in the Departmental QCI process and M&M conferences is expected.

d. perform focused reviews of pertinent literature to assure that the care that is provided is considered to the current state of the art.

2. Critical evaluation of pertinent literature
   a. periodic and regular review of literature to identify studies that have direct bearing on the anesthetic care of patients
   b. critically evaluate such studies, with a focus on study design, methodology, data collection and interpretation and the application of the findings of the studies to patient care

Residents will be given copies of two to three recent clinical studies of relevance to neuroanesthesia. These should be read by the residents and critically evaluated. Discussion with attending faculty will facilitate the development of necessary skills to critique published literature.

3. Use of information technology
   a. learn effective use of information technology to search medical databases for information of direct relevance to patient care
   b. organize the research in a manner in which the information can be readily retrieved

Access to PubMed is provided on all institutional computers. In addition to the library resources of the University, the Department library contains a large selection of anesthesia related textbooks. Access to CD-ROM based educational materials is also provided; these CD-ROMs are centrally located and connected to the Department server.

IV. INTERPERSONAL AND COMMUNICATION SKILLS

Residents are expected to demonstrate superior communication skills. As such, they are expected to:

1. Create and sustain a therapeutic and ethically sound relationship with patients.
2. Elicit and provide accurate information using nonverbal, questioning, explanatory, questioning and writing skills.
3. Work effectively with others as a member or leader of a health care team.

V. PROFESSIONALISM

Residents are expected to demonstrate, at all times, professionalism that is consistent with their role as physicians. As such, residents are expected to:
1. Demonstrate respect, regard, integrity and responsiveness to the needs of patients and society that supersedes self interest.

2. Assume responsibility and demonstrate a commitment to excellence and on going professional development

3. Demonstrate a commitment to ethical principles including provision or withholding appropriate care, confidentiality of patient information, informed consent etc.

VI. SYSTEMS-BASED PRACTICE

Health care is provided in the context of a larger system within which resources to provide effective health care to the patient exist. These components include, but are not limited to, consultation services, intensive care management, laboratory services, radiology services, nursing care and social services. Residents are expected to understand their role in the health care system and are expected to utilize the resources of the health care system in a cost effective manner. Residents are expected to:

1. Be able to discuss how their patient care practices and related actions impact component units of the health care delivery system

2. Be able to discuss system-based approaches for controlling health care costs and allocating resources and practice cost effective health care that does not compromise quality of health care.