

# Overview of Goals and Objectives of Rotation: OHSU Neuro-Intensive Care

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Training in Neurointensive Care is intended to provide fellows with the necessary cognitive, technical, and ethical/social skills to manage a variety of complex neurologic and neurosurgical conditions. As part of the Neurointensive Care Team, fellows are provided the opportunity to evaluate, manage, and coordinate the care of this unique population of patients. Specifically, the rotation offers training in CT/MRI interpretation, peri-operative management, traumatic brain and spinal cord injury along with education in acute seizure management, control of intracranial pressure, and acute stroke intervention. In addition, fellows will provide general management of the non-neurologic aspects of care such as mechanical ventilation, hemodynamic interpretation and support.

**Medical Knowledge:** *Residents are expected to demonstrate knowledge of established and evolving biomedical, clinical and social sciences, and the application of their knowledge to patient care and the education of others.*

## Central Nervous System:

### Brain Death:

- List the various herniation syndromes and their respective neurologic features
- List the criteria necessary for determination & certification of brain death
- Describe the metabolic & hemodynamic management of the potential organ donor

### Cerebral Vascular Accidents:

- Understand the indications/contraindications for urgent systemic / intrarterial thrombolysis in ischemic CVA
- Describe the natural history, risk factors and management options for "malignant MCA infarcts"
- List the common causes/ locations of intra-parenchymal hemorrhage
- Describe the natural history of ICH along with the role of early surgical, interventional, and medical treatment (i.e. BP& glucose control, rVIIa)

### Coma:

- Understand the nomenclature/criteria of altered levels of consciousness (coma, persistent & permanent vegetative states, minimally conscious states)
- Describe the pathology, pathophysiology, and therapy of coma arising from metabolic, traumatic, infectious, mass lesions, vascular-anoxic or ischemic, drug induced events
- Review methods of assessment (EEG, SPEPS, neuroimaging) and their link to prognosis

### General Care of the Neurointensive Care Patient:

- Describe the pathophysiology and management of the hypo-/hypernatremia in neurosurgical patients
- Understand the causes and management of hyperthermia in the neurointensive care population
- Understand the pharmacodynamic/pharmacokinetic properties of sedative and paralytic agents along with their principle toxicities

### Infectious Diseases of the CNS:

- List the major causative organisms of community-acquired & noscomial meningitis / ventriculitis / abscesses along with preferred antibiotic agents
- Describe the pharmacodynamic/ pharmacokinetic principles influencing CNS antibiotic activity

- Understand the natural history of CNS infections and the role of 1) persistent parenchymal infection 2) vessel thrombosis and 3) raised intracranial pressure in determining outcome
- Review the indications for and dosages of steroids in central nervous system infections

### **Neuroimaging:**

- Identify the basic structures in the central nervous system (ventricles, cisterns, sinuses, major anatomic landmarks)
- List the imaging techniques/signs used to identify acute intracranial hemorrhages, mass lesions, arterial and venous lesions, and ischemic penumbras / infarcts
- Distinguish imaging characteristics of SAH, epidurals, subdurals, intraparenchymal hemorrhage and relate to anatomic structure

### **Subarachnoid Hemorrhage:**

- Describe the common aneurysm locations leading to SAH
- Understand the clinical and radiographic grades of SAH
- Describe the methods used to detect cerebral vasospasm & strategies to prevent secondary ischemic stroke
- Understand the indications for temporary external ventricular drains / permanent shunts
- List the common cardio-pulmonary complications of SAH and describe their management

### **Seizure Disorders:**

- Understand the natural history/ expression of seizure disorders in the ICU (prolonged status, nonconvulsive status, increased ICP)
- Describe the priorities in management of status epilepticus
- Review the conventional agents and dosages of antiepileptic drugs

### **Traumatic Brain/Chord Injury:**

- Describe the management of TBI/chord injury according to the Brain Trauma Foundation Guidelines
- Understand the determinants of brain elastance, cerebral perfusion pressure, cerebral auto-regulation, and metabolic coupling
- List the methods available to measure/estimate ICP/ cerebral perfusion along with advantages and disadvantages of each method
- Describe approaches to management of refractory ICP elevation
- Understand the role of early stabilization/imaging/clinical evaluation of patients with potential chord injuries

### **Peripheral Motor Neuron Disease:**

- Review the natural history / expression of motor neuron disease related to 1) degenerative diseases 2) infectious agents 3) inflammatory conditions
- List the changes that occur in denervated muscles and describe implications for use of medications with activity at the neuro-muscular junction
- Understand the presentation of respiratory failure and indications for non-invasive and invasive ventilatory support in this population
- Describe the indications for and problems associated with 1) plasmapheresis and 2) Intravenous immunoglobulin
- Review the non-neurologic complications and management of motor neuron disease (cardiac denervation, intestinal movement disorders)

**Patient Care:** *Residents are expected to provide patient care that is compassionate, appropriate and effective for the promotion of health, prevention of illness, treatment of disease and at the end of life.*

- Demonstrate proficiency in use of information systems technology (such as LCR Web, PACS) to assist in patient care

- Use information technology (BICC, PubMed, National Guidelines Clearing House) to support patient care decisions and patient education
- Develop a primary, patient-specific management plan, with a reasonable alternate plan
- Identify patients at high risk for elevated intracranial pressure/herniation and develop an appropriate management strategy
- Develop and perform the skills required to 1) level 2) interpret 3) troubleshoot and 4) obtain samples from intracranial monitoring devices
- Use data from appropriate invasive and non-invasive monitoring devices to titrate patient therapy in support of CPP strategies and vasospasm management
- Assess the impact of intrathoracic pressure secondary to mechanical ventilation on ICP and CPP
- Assist in identifying patients who may benefit from hematoma evacuation or use of early hemostatic therapies
- Identify thrombolytic candidates and monitor for complications of treatment
- Identify cardio-pulmonary complications in patients suffering SAH and initiate appropriate support strategies
- Identify appropriate candidates and implement protocol for therapeutic hypothermia
- Insure that all patients in the NICU receive appropriate prophylactic therapy based on perceived risk of developing complications associate with medical illness
- Identify patient care situations requiring complex management/arrange and participate in patient-centered care conferences
- Recognize potentially futile care based on available evidence and individual patient goals
- With assistance, lead discussions regarding withdrawal or withholding of care
- Provide adequate and appropriate sedation and analgesia at the end-of-life
- Participate in 1) assessment of brain death 2) evaluation of and support for potentially transplantable organs

**Practice based Learning:** *Residents are expected to be able to use scientific evidence and methods to investigate, evaluate, and improve patient care practices.*

- Maintain a list of patients experiencing an untoward event (morbidity and mortality) during their ICU stay
- Review relevant literature surrounding occurrences and presenting findings to fellows and faculty at monthly M&M conference
- Provide limited “root cause” analysis of significant errors and developing relevant action plans
- Demonstrate ability to access critical event and adverse drug reporting forms and participating in surveillance
- Use data from Administrative Quality Improvement projects (i.e. “Crystal report”) to analyze care, identify areas for improvement, and implement practice reform
- Support ongoing basic and clinical science protocols in the ICU by participating in candidate identification or in proposing future projects
- Contribute to and support process improvements in the ICU by meeting with nursing or physician staff to assess current practice
- Participate in development of protocols and guidelines pertinent to ICU care (i.e. VAP investigation and treatment approaches reflecting available University resources and local antibiogram)
- Participate and directing Multi-disciplinary rounds and be responsible for completion of daily goal sheets

**Interpersonal and Communication Skills:** *Residents are expected to demonstrate interpersonal and communication skills that enable them to establish and maintain professional relationships with patients, families, and other members of health care teams.*

- Provide effective and professional consultation to other physicians and health care professionals and sustain therapeutic and ethically sound professional relationships with patients, their families, and colleagues.
- Counsel and educate patients and families
- Consider ethical issues and patient wishes in treatment decision
- Communicate clearly, correctly, and concisely in a written report, stressing the important issues and an articulate plan.
- Use nomenclature and writing standards consistent with that of the institution
- Transfer care of the patient in a manner that ensures patients safety, comfort and continuity of care
- Demonstrate respect for and recognition of particular skill sets possessed by other CC practitioners, such as CC nurses, RT, PT, OT, dieticians, pharmacists

**Professionalism:** *Residents are expected to demonstrate behaviors that reflect a commitment to continuous professional development, ethical practice, an understanding and sensitivity to diversity and a responsible attitude toward their patients, their profession, and society.*

- Demonstrate respect, compassion, integrity, and altruism in relationships with patients, families, and colleagues
- Demonstrate sensitivity and responsiveness to the gender, age, culture, religion, sexual preference, socioeconomic status, beliefs, behaviors and disabilities of patients and professional colleagues
- Adhere to principles of confidentiality, scientific/academic integrity, and informed consent
- Recognize and identify deficiencies in peer performance
- Teach junior colleagues or peers
- Admit to and seek help in remedying errors
- Interact with nursing staff and other professionals as two-way educational opportunities when current approach does not appear to be effective

**Systems-Based Practice:** *Residents are expected to demonstrate both an understanding of the contexts and systems in which health care is provided, and the ability to apply this knowledge to improve and optimize health care.*

- Understand, access and utilize the resources, providers and systems necessary to provide optimal care
- Apply evidence-based, cost-conscious strategies to prevention, diagnosis, and disease management
- Collaborate with other members of the health care team to assist patients in dealing effectively with complex systems and to improve systematic processes of care
- Demonstrate the Critical Care Practitioner's role as patient/quality care advocate
- Participate actively in multidisciplinary M&M or case conferences
- Interpret drug costs in context of outcomes (e.g. rVlla)
- Discuss the issues of patient safety including the medical systems that put patients at risk, medication, operations, transfusions & nursing ratios.
- Recognize, describe and ensure compliance with institutional and unit policies and procedures as well as regulatory policies from accreditation agencies, regulators, and payers

### **Instructional Methods:**

Introductory Lecture Series, Web-Based Curriculum (RICU), Weekly Critical Care Fellows Conference, Multidisciplinary ICU lecture Series

### **Methods of Assessment:**

- Competency-based staff evaluations

- Ancillary care provider evaluations
- Critical incident reporting
- Conference attendance and participation

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## **Webpages:**

The Brain Trauma Foundation website

<http://www.braintrauma.org/>

Update Notice: Guidelines for the Management of Severe Traumatic Brain Injury: Cerebral Perfusion Pressure

[http://www2.braintrauma.org/guidelines/downloads/btf\\_guidelines\\_cpp\\_u1.pdf](http://www2.braintrauma.org/guidelines/downloads/btf_guidelines_cpp_u1.pdf)

The Whole Brain Atlas:

<http://www.med.harvard.edu/AANLIB/home.html>

Steroids for spinal injury

<http://www.trauma.org/spine/steroids.html>