

Neurocritical Care Unit (NCCU) Rotation

Emergency Medicine Residency

Advocate Christ Medical Center

Rotation Description

The Neurocritical Care Unit (NCCU) rotation provides Emergency Medicine residents with focused experience in the evaluation, stabilization, monitoring, and management of critically ill neurologic and neurosurgical patients. Residents function as integrated members of a multidisciplinary neurocritical care team under the supervision of neurointensivists, neurologists, neurosurgeons, and critical care faculty.

The Advocate Christ Medical Center NCCU is part of the Brain & Spine Institute and Comprehensive Stroke Center, providing specialized care for patients with acute neurologic injury and life-threatening neurologic emergencies including ischemic stroke, intracranial hemorrhage, traumatic brain injury, status epilepticus, spinal cord injury, and neurosurgical emergencies.

This rotation emphasizes:

- neurologic resuscitation
- acute stroke management
- intracranial pressure management
- neurotrauma care
- seizure and status epilepticus management
- neuromonitoring
- ventilator management in neurologic injury
- post-cardiac arrest neurologic care
- multidisciplinary critical care
- family-centered communication

Educational Goals

1. Recognize and stabilize critically ill neurologic and neurosurgical patients.
2. Develop differential diagnoses and treatment plans for neurologic emergencies.
3. Demonstrate competency in neurologic examination and serial neurologic reassessment.
4. Apply principles of acute stroke management and neurocritical care resuscitation.
5. Demonstrate understanding of intracranial pressure management and cerebral perfusion principles.
6. Manage ventilators, sedation, hemodynamics, and critical care therapies in neurologically injured patients.
7. Interpret neurologic imaging and neuromonitoring data.

8. Participate effectively within a multidisciplinary neurocritical care team.
9. Communicate effectively with patients, families, consultants, and interdisciplinary team members regarding neurologic illness and prognosis.
10. Demonstrate professionalism, patient-centered care, and systems-based critical care practice.

Educational Methods

Educational goals will be achieved through:

- Direct patient care in the NCCU
- Bedside teaching with neurointensivists and critical care faculty
- Participation in multidisciplinary rounds
- Stroke and neurosurgical case discussions
- Neurologic imaging review
- Participation in family meetings and goals-of-care discussions
- EM didactic conference attendance
- Independent reading and evidence-based review
- Real-time clinical feedback

Clinical Responsibilities

Residents are expected to:

- Evaluate critically ill neurologic and neurosurgical patients
- Perform focused and serial neurologic examinations
- Participate in acute stroke evaluations and management
- Manage critically ill patients under supervision
- Participate in ventilator and hemodynamic management
- Interpret neurologic imaging and laboratory data
- Participate in multidisciplinary rounds and consultant discussions
- Communicate with patients and families regarding treatment plans
- Perform bedside procedures when appropriate
- Document patient encounters accurately and efficiently

Patient Care Objectives

1. Perform focused and serial neurologic examinations in critically ill patients. (PC2, PC4)
2. Rapidly recognize and stabilize patients with neurologic emergencies including acute ischemic stroke, intracranial hemorrhage, subarachnoid hemorrhage, traumatic brain injury, spinal cord injury, status epilepticus, and elevated intracranial pressure. (PC1, PC4, PC6)
3. Develop evidence-based treatment plans for critically ill neurologic patients. (PC4, PC6)

4. Participate in acute stroke evaluation and management including thrombolytic and thrombectomy pathways. (PC1, PC5)
5. Demonstrate understanding of intracranial pressure monitoring, cerebral perfusion pressure management, hyperosmolar therapy, and neuroprotective strategies. (PC5, MK1)
6. Manage mechanically ventilated neurologic patients including ventilator adjustments, sedation strategies, and airway management considerations. (PC5, PC10)
7. Appropriately interpret neuroimaging including CT brain, CT angiography, MRI brain, and spinal imaging. (PC3, PC4)
8. Recognize and manage complications of neurologic critical illness including cerebral edema, seizures, aspiration, autonomic instability, venous thromboembolism, and ventilator-associated complications. (PC1, PC6)
9. Participate in bedside procedures including airway management, vascular access, arterial line placement, lumbar puncture, and procedural sedation. (PC9, PC10, PC11)
10. Reassess critically ill neurologic patients and modify treatment plans based on evolving clinical conditions and diagnostic data. (PC6)
11. Develop appropriate disposition plans and participate in transitions of care for critically ill neurologic patients. (PC7)

Medical Knowledge Objectives

Acute Stroke and Cerebrovascular Disease:

- Ischemic stroke
- Intracranial hemorrhage
- Subarachnoid hemorrhage
- Cerebral venous thrombosis
- Thrombolytic therapy
- Mechanical thrombectomy
- Stroke systems of care

Neurotrauma:

- Traumatic brain injury
- Diffuse axonal injury
- Spinal cord injury
- Cervical spine trauma
- Intracranial pressure management
- Cerebral edema
- Neuroprotective strategies

Seizure and Neurologic Emergencies:

- Status epilepticus
- Non-convulsive seizures
- CNS infections
- Neuromuscular respiratory failure
- Altered mental status
- Brain death evaluation

Neurocritical Care Physiology:

- Cerebral blood flow
- Intracranial pressure physiology
- Cerebral perfusion pressure
- Sedation and analgesia
- Ventilator management in neurologic injury
- Hemodynamic management

Neuromonitoring and Imaging:

- EEG interpretation basics
- Intracranial pressure monitoring
- Neuroimaging interpretation
- CT angiography
- MRI applications in neurologic emergencies

Systems-Based Practice Objectives

1. Function effectively within a multidisciplinary neurocritical care team. (SBP1, ICS2)
2. Coordinate care with neurointensivists, neurologists, neurosurgeons, pharmacists, respiratory therapists, nursing staff, rehabilitation teams, and ancillary personnel. (SBP1, ICS2)
3. Demonstrate understanding of stroke systems of care, thrombectomy pathways, transfer systems, and neurosurgical consultation processes. (SBP2)
4. Participate in patient safety initiatives including structured handoffs, stroke protocols, sedation safety, ventilator safety, neuro checks, and medication safety practices. (SBP3)
5. Utilize healthcare resources appropriately and cost-consciously in neurocritical care management. (SBP2)
6. Utilize electronic medical records, imaging systems, and neuromonitoring systems effectively to support patient care. (SBP2)
7. Demonstrate understanding of rehabilitation planning, palliative care involvement, and goals-of-care discussions in severe neurologic injury. (SBP1)

Interpersonal & Communication Skills Objectives

1. Communicate effectively and compassionately with critically ill neurologic patients and their families. (ICS1)
2. Participate in goals-of-care discussions, prognostic counseling, and end-of-life discussions under faculty supervision. (ICS1, PROF1)
3. Present patient information in a concise, organized, and accurate manner during multidisciplinary rounds. (ICS2)
4. Demonstrate effective communication during neurologic emergencies, stroke activations, and critical care situations. (ICS2)
5. Develop collaborative relationships with neurocritical care faculty, consultants, nursing staff, therapists, and ancillary staff. (ICS2)
6. Demonstrate effective transitions-of-care communication during patient handoffs and transfers. (ICS2)

Professionalism Objectives

1. Demonstrate compassion, integrity, accountability, and respect toward patients, families, and healthcare team members. (PROF1, PROF2)
2. Demonstrate professionalism during high-acuity neurologic emergencies and emotionally difficult clinical situations. (PROF2)
3. Adhere to ethical principles relevant to neurologic critical care, end-of-life decision-making, and patient autonomy. (PROF1)
4. Demonstrate accountability through punctuality, clinical follow-through, and timely documentation. (PROF2)
5. Demonstrate sensitivity to diverse patient populations and healthcare disparities affecting neurologic outcomes. (PROF1)
6. Incorporate feedback into ongoing professional and clinical development. (PBLI1, PROF3)

Practice-Based Learning & Improvement Objectives

1. Utilize evidence-based resources and neurocritical care guidelines to guide patient management. (PBLI1)
2. Incorporate feedback into ongoing clinical and procedural improvement. (PBLI1)
3. Critically appraise literature relevant to neurocritical care, stroke management, and neurologic emergencies. (PBLI2)

4. Reflect on personal clinical performance and identify opportunities for improvement. (PBLI1)

5. Participate in quality improvement and patient safety activities related to stroke and neurocritical care systems. (PBLI1, SBP3)

6. Maintain accurate procedure logs and clinical documentation. (PBLI1)

Recommended Educational Resources

Required Reading:

- Tintinalli's Emergency Medicine: Neurologic Emergencies
- Rosen's Emergency Medicine: Neurologic Emergencies
- Neurocritical Care Society Guidelines
- AHA/ASA Stroke Guidelines
- Departmental stroke and neurocritical care protocols

Additional Resources:

- EMCrit Neurocritical Care resources
- Neurocritical Care Society educational materials
- SCCM critical care guidelines
- EEG and neuroimaging review sessions
- Departmental simulation curriculum

Evaluation & Feedback

Resident performance will be assessed through:

- Direct faculty observation
- Real-time bedside feedback
- End-of-rotation milestone-based evaluations
- Procedure assessments
- Multidisciplinary team evaluations
- Faculty and consultant evaluations
- Semiannual resident reviews
- In-Training Examination performance
- Oral board and simulation assessments

Residents are expected to:

- complete rotation evaluations
- submit faculty evaluations
- maintain procedure logs
- maintain duty hour compliance
- participate in departmental educational activities

Progressive Resident Responsibilities

EM-1:

Residents develop foundational skills in neurologic examination, stroke recognition, neurocritical care principles, and management of critically ill neurologic patients under close supervision.

EM-2:

Residents assume increasing responsibility for ventilator management, neurologic reassessment, stroke management, multidisciplinary communication, and procedural competency.

EM-3:

Residents function with advanced autonomy in neurocritical care management, lead multidisciplinary discussions, supervise junior learners, and coordinate complex neurologic critical care plans.

ACGME Emergency Medicine Milestone Mapping

Patient Care: PC1, PC2, PC3, PC4, PC5, PC6, PC7, PC9, PC10, PC11

Medical Knowledge: MK1, MK2

Systems-Based Practice: SBP1, SBP2, SBP3

Practice-Based Learning & Improvement: PBLI1, PBLI2

Professionalism: PROF1, PROF2, PROF3

Interpersonal & Communication Skills: ICS1, ICS2