

## Stanford Neuro-ICU Service

The Neurological Intensive Care Unit cares for patients with a wide range of CNS and PNS disorders. It is not a physical ward; rather, the Neuro-ICU team co-manages or assists with patients with neurological disorders. It is comprised of a Neurointensivist, Neuro-ICU resident (PGY-2 or -3), and a Neuro-ICU or Stroke fellow and/or Neurosurgery intern. Sub-interns may rotate through this service.

The Neuro-ICU team primarily provides assistance to the MICU and Neurosurgery teams, but is often consulted by Trauma/Surgery, Cardiac and Cardiothoracic Surgery as well. The Neuro-ICU team co-manages “primary” neurology patients with the MICU service (but does not write orders). The team also co-follows many Neurosurgery/Neurointerventional patients, including all neurovascular (i.e., post-op EC/IC bypass or aneurysm clipping) and neurointerventional (i.e., aneurysm coiling) cases. Some Neurosurgery attendings (i.e., Dr. Steinberg and Dr. Dodd) request that the Neuro-ICU follow all of their patients in the ICU. The variety of cases makes for a dynamic service.

The Neuro-ICU resident is expected to learn how to manage and optimize care for patients with a broad range of neurological issues. Though this is a specialty service, the resident should be aware of all ongoing medical or neurosurgical issues. There is no overnight call on this rotation.

### **PATIENT MIX**

“Primary” neurology patients: These patients are admitted to the ICU for treatment of a non-surgical neurological disorder. These include: Brain hemorrhages (non-surgical), large strokes and stroke patients who are post-tPA or endovascular procedure, status epilepticus, neuromuscular disorders, autoimmune CNS/PNS disease, encephalitis and meningitis. Upon discharge from the ICU, these patients are typically transferred to the inpatient Neurology ward service (Stroke or General). If they are medically complicated, they may go to Medicine with ongoing assistance from the Consult resident.

Consult patients: These patients include patients in: Neurosurgical ICU (i.e., subarachnoid hemorrhages, post-neurointerventional procedures), SICU (i.e., head trauma, spinal injury), CCU (i.e., therapeutic hypothermia post-cardiac arrest), CVICU (i.e., new stroke post-CABG), and also MICU (i.e., delirium, tremor, longstanding epilepsy) whose primary ICU problem is non-neurologic.

### **RESIDENT RESPONSIBILITIES (also applicable to Neurosurgery interns)**

Each resident follows up to 8 patients (with the rest being followed by the Neuro-ICU or Stroke fellow, or Neuro-ICU attending). The residents should focus on following “primary” neurology patients (those that will eventually go to the Neurology ward service).

### **TRANSFERS**

Patients are transferred from the ICU to the inpatient Ward team only upon approval of the Neuro-ICU attending and the accepting Ward Senior and Ward Attending. As such, the Neuro-ICU resident should contact the Ward Senior ASAP (even during rounds) to inform them of possible transfers. Be aware that the primary ICU team may also contact the inpatient Neurology service to try to 'hasten' the transfer and free up beds (which are in short supply in the ICU). The Ward Senior must physically see the patient prior to accepting the transfer. Transfer orders must be written prior to the transfer by the accepting Junior resident or Psych intern. A transfer summary (using the EPIC Smartphrase ".transfer") must be written by the Neuro-ICU resident (in lieu of the usual daily progress note). This should include a summary of the patient's neurological course. In addition, the primary ICU team must write a transfer summary with the non-neurological hospital course and plan for ongoing medical problems.

Patients often transfer from the ICU to a non-Neurology service. The Neuro-ICU team should either sign off of the case, or sign it out in full to the Consult resident if necessary.

### **WEEKENDS**

Neurosurgery residents may work on one weekend day, at the discretion of the Neuro-ICU resident and fellow/attending. They follow the schedule below.

The Neuro-ICU is covered by the Neuro-ICU resident on Saturdays, and the Consult resident on Sundays. Not all consults need to be seen on the weekend! On Friday and Saturday, the Neuro-ICU resident should discuss with their attending which patients need to be seen over the weekend. The Neuro-ICU resident sees only followup consults (this includes consults already seen on the day or night prior that still need to be staffed by an attending). Any new consults are given to the Junior Float (or to the Senior if the consult is urgent).

The covering resident should arrive in time to pre-round prior to ICU rounds (usually by 6:30 or 7 AM). The covering Neuro-ICU attending is also staffing the Stroke inpatients and Stroke consults. As such, timing of ICU rounds is flexible on the weekends. The Consult resident should call/page the Stroke attending prior to 8 AM to schedule rounds, which may start as early as 8 or as late as 10 AM. Afterwards, the resident should complete progress notes and communicate with all ICU teams as necessary. They may leave after updating Charcot, indicating which patients need to be seen the next day, and signing out to the Junior Float resident. This includes verbal signout of sick patients, items to be followed up on, etc.

On Saturdays, the Neuro-ICU resident should provide written signout in Charcot, and verbal signout as needed, regarding which patients should be seen on Sunday. On Sundays, the covering resident should

### **SPECIFIC NOTES (also applicable to Neurosurgery interns)**

1. Neuro-ICU residents (including NSx interns) follow up to 8 patients daily. The fellow and attending should follow the rest of the patients.
2. They should arrive by 6:30 AM to get verbal signout from Nightfloat and discuss new admissions. Every attempt should be made to finish pre-rounding and patient assessment prior to Morning Report and Grand Rounds (which start at 8 AM). Given the varying patient load, the Neuro-ICU resident should arrive as early as needed to familiarize themselves with patients and overnight events. Each resident might work at their own pace.
3. Pre-rounding can be done using the ICU computers or COWs (computers on wheels).
4. The ICU team usually meets at the end of E2 closest to the D wing at 9 AM for rounds.
5. Neuro-ICU rounds are systems-based rather than problem-based (unlike inpatient Ward rounds). This means that the plan should include the current plan for all systems, starting with neurologic, followed by cardiac, pulmonary, GI, etc. Residents should be prepared to discuss antibiotics, IV fluids, ventilator settings, etc.
6. Rounds are conducted at the bedside using a COW to look at images, labs, etc.
7. Rounds are usually finished by noon. The rest of the day is spent writing notes, seeing new consults, and possibly doing abbreviated PM rounds in the afternoon.
8. **There is strong emphasis on working together with primary teams to manage patients. All recommendations should be given verbally to the primary teams, and all major changes in care or treatment plans should be discussed in full.**
9. Progress notes should be written in EPIC using the "IP Neurocritical care progress note" template. H&Ps written after midnight (i.e., by the Nightfloat resident) can be edited with an Addendum that includes the updated plan. However, if the Nightfloat has only written a minimal H&P, it may be necessary to write a new Neuro-ICU progress note that includes more of an assessment.
10. All new consults (patients within the ICU or directly admitted to ICU) should be seen and written up by Neuro-ICU residents when possible (as opposed to fellows). **Every new consult must be discussed with the Neuro-ICU fellow or attending during the day, and with the on-call fellow or Senior resident overnight.**
11. Patients initially presenting to the ED are usually seen by the Consult resident first, with ICU admission decided upon afterwards. If it is obvious that the patient will be admitted to the ICU, the ICU team should do the initial consultation.
12. Signout is given to the Nightfloat resident at 6:30 PM. Prior to signout the Neuro-ICU resident and Neurosurg intern should fully update the Charcot signout (ultimately the Neuro resident is responsible for making sure this is done). They should sign out the sickest patients to the night float resident, and verbally discuss what needs to be followed overnight (i.e., serial exams, MRIs, sodium checks, etc)
13. The Neuro-ICU rotation can be very busy, but is one of the highest yield rotations. The knowledge gleaned there will help immensely with home call at VA and SCVMC, and alleviates much of the anxiety of working as Nightfloat. Good luck!