

Neurological System Management Overview in the ICU

Key Points: Use an **order set** whenever possible; this provides maximum instructions and consistency for other members of the healthcare team. It is also important to remember that a patient does not necessarily require significant sedation simply because they are intubated... doses of sedation should be titrated to the patient's examination **every shift**.

Sedation, Pain Control

- The **ABCDE** Bundle is helpful to determine sedation needs- **Assess**, **Prevent**, and **Manage** Pain, **Both Spontaneous Awakening Trials (SAT)** and **Spontaneous Breathing Trials (SBT)**, **Choice of analgesia and sedation**, **Delirium: Assess, Prevent, and Manage**, **Early mobility and Exercise**, and **Family engagement and empowerment**.
- **Delirium** screening should be performed daily; the Confusion Assessment Method for the ICU (CAM-ICU) is commonly used and validated for use, more information at <https://www.icudelirium.org/>. Delirium increases mortality and should be prevented.
- **Sedation** should be targeted for a (Richmond Agitation and Sedation Scale) RASS= (-) 1. Sedation beyond this point is associated with increased time on mechanical ventilation and other complications. The RASS ranges from +4 (combative) → 0 (awake and calm) → -5 (comatose)
 - **Propofol infusion syndrome** should always be considered if sudden acidosis occurs after prolonged infusion
- **Pain control** with IV infusions and po regimens are both acceptable, particularly after a patient has been in the ICU for several days. For now, avoiding NSIADs is not indicated but try to use other drugs first. 50% of ICU patients will have pain, multimodal regimens can be used even while a patient is mechanically ventilated (i.e.- Acetaminophen, Gabapentinoids, Lidocaine patch (doesn't matter where it goes as long as it's on the skin), tramadol, muscle relaxants (methocarbamol, etc.) and opioids).

Emergencies

Strokes should always be on the differential diagnosis list of sudden changes in mental status or *focal* neurologic changes not explained by drugs. The NIH Stroke Scale (NIHSS) is performed for all stroke patients (like the ASA score). Call your intensivist/consultant backup if this occurs

- Head CT should be ordered when a stroke is suspected. Ischemic strokes take 24 hours to become clinically appreciable on a head CT unless the stroke is large.
 - A **'CODE STROKE'** is always **STAT** which mobilizes the neurology team and makes the patient at top priority for a head CT. Hospitals which are certified stroke centers have code stroke teams. Smaller hospitals may not so the following is important to recall. MRI is the most sensitive way to find a small stroke
- **Ischemic** strokes may require a higher blood pressure for several days in order to prevent permanent loss of function | **Hemorrhagic** strokes require tighter blood pressure control commonly with an infusion
- **SAH** also results in strokes... blood pressure should be kept low normal until the aneurysm is clipped or coiled and an EVD needs to be placed immediately. After coiling, blood pressure

COVID Activated Emergency Scaling of Anesthesiology Responsibilities (CAESAR) ICU

Content developed and sourced in collaboration with ASA, SOCCA, SCCM and APSF

Dated: 03/20/2020

made need to be elevated with vasopressors up to 14 days; this is done in collaboration with the neurosurgery or interventional neurology service. Use the **Hunt-Hess** score every day when evaluating.

Spinal Cord Injuries may have refractory respiratory failure if the injury is C-7 or above; also expect more secretions, desaturations with bathing and turning, and lower extremity spasms which can be treated with Diazepam

Traumatic brain injury should be managed with an ICP monitor anytime the GCS is <8; ICP should be < 22mmHg and CPP should be >55mmHg. Hypertonic saline (2%, 3% or 23.4%) may be given to treat, along with mannitol, head up, sedation (propofol) and CSF drainage.

***Hyperventilation should not be used to control ICP**

Status Epilepticus (SE) is a neurological emergency and mortality increases every 20 minutes that it persists; **lorazepam** is the single most effective drug to break SE (may need repeated doses) and another longer acting antiepileptic should be given as well

Comfort care's primary goal is to keep the patient comfortable. This may involve significant opioid (morphine) use, symptom control with adjunct therapies such as glycopyrrolate and pleasure feeding. Calling the palliative service is helpful if available; in most instances, the ICU team recommends/starts comfort care once the family agrees. **See the Ethics section for goals of care discussions.**

Covid-19 ICU Patient Specific Points

Sedation with propofol and opioids (fentanyl, etc.) is a good first line regimen. Wean ventilator weaning starts, dexmedetomidine has been useful.

- **Sevoflurane and Propofol** interact with **chloroquine and hydroxychloroquine** resulting in potential QT prolongation. **Remdesivir** does not appear to have interactions with any major anesthesia drugs.
- **Benzodiazepines** interact with many antivirals, be conservative with their use
 - Noted to present with hypercoagulopathy during their admission, therefore screening for strokes will be important
 - Prone position, when indicated may be required for 12-18 hours. **Deep sedation** is helpful to facilitate, and sometimes neuromuscular blockade is needed as well. When possible, neuromuscular blockade should be avoided as their prolonged use can lead to critical care neuromyopathy.
 - Depression may occur in the ICU; patients with grim clinical conditions may present with flattened affect, treatment with an SSRI of choice for your hospital is reasonable