013 - Neuro Nurse Tips for Nurses

Part I: Disease Processes, When to Worry

This episode discusses the main questions newbies to neuro have: if neuro changes are subtle, when do I worry? We also discuss common neuro disease processes including ischemic and hemorrhagic stroke, subarachnoid hemorrhage, intraventricular hemorrhage, and more.

Increased intracranial pressure

*Monroe-Kellie Hypothesis* - you’ve got to know this!

- Brain + CSF + blood = components
- If any one of those three increases, the other two must decreases/compensate, or increased ICP will result
- Untreated cerebral edema will result in herniation, and subsequent brain death
- You cannot get brain cells back; when they die, they die
  - Literally, time is brain
  - Early intervention is KEY

Airway

- Typically, neuro patients are not intubated due to low oxygen levels
  - They are intubated for brain problems, not lung problems
- The brain controls breathing
- If there has been a neurological injury and/or edema, and there is pressure on the brainstem, their breathing will change
- The brain is not able to tell the body to breathe properly and/or protect the airway (deal with normal oral secretions, keep the airway open) due to injury
  - This can result in aspiration pneumonia easily, as they may have a diminished or absent cough reflex
- They may have a normal ABG and PaO2, but are working hard to breathe or simply not breathing enough
  - No alarms are going off… **they just don’t look right**
  - You do not want to wait until this is an emergency, this should be proactively dealt with
• Their oxygen saturation may be okay, but that doesn’t mean their brain is actually getting enough oxygen
• **You cannot rely on the monitor, you must rely on your assessment**

**Blood pressure management**

• Increased BP can increase ICP
• There is a delicate balance between ensuring there’s enough blood pressure to perfuse the brain, but not so much that it’s creating additional pressure
  ○ **Cerebral perfusion pressure**
• **Know your blood pressure parameters** - verify the order, the physician’s note, and the monitor to ensure all match up
• Neuro exams can change with high and low BP’s
  ○ In ischemic strokes, higher blood pressure (even as high as 180-220 systolic) to ensure collateral circulation can perfuse to the vulnerable areas of the brain
    ■ [Helpful article](#), go to the end for the part on collateral circulation

**Neuro assessment**

• It’s not just checking the pupils and following commands
• Enables you to detect changes early, way before vital sign changes occur
• Changes in the neuro assessment tell you if there are changes occurring in their brain
• You must know your baseline assessment so you know if things change
• Changes will occur in the neuro assessment FIRST, not vitals
• Look at changes and trends in the assessment, you must continually compare
• Important to be able to communicate findings to other nurses and providers - they are relying on you to let them know about the patient’s presentation when they’re not there
• ALWAYS complete your first neuro assessment with the off-going nurse
• Continual, consistent, routine assessment will be the difference of catching changes early and not
• Must know how much stimuli it takes to elicit the same response and if that’s changed

**What can impact your assessment**

• Sedation
  ○ You must pause your sedation for every neuro assessment to get an accurate neuro assessment
  ○ Use the least amount of sedation as medically appropriate
  ○ Typically, severely neurologically impaired patients do not require sedation because their injury is so profound
For awake, non-intubated patients, delicate balance between pain management and impairing the assessment with pain meds
  - No exact science for what’s too much and what’s not enough
  - Patient’s are different and dynamic
  - It’s up to the nurse to identify the change and communicate to the provider early to enable them to make the best decision possible for the patient before additional deterioration occurs

- Fever
  - Managing aggressively in neuro patients is essential
  - If your patient is newly lethargic, check their temp!

Ischemic stroke

- When stroke is suspected, a CT will be done first to look for blood
- MD’s decide if patient is eligible for tPA or another intervention
- Monitor for hemorrhagic conversion, especially with larger areas of infarction
  - Closely monitor if patient is on asa and/or subcut heparin and has a larger infarction
- Know where the stroke was and the size; age matters so if someone is older their brain atrophies and they have more room to swell
- Peak swelling occurs 72 hours after the injury
- Think of the brain like real estate
  - If a small bomb goes off in Manhattan, it does a lot of damage
    - Think brainstem
  - If a large bomb goes off in field in Montana, it may do less damage even though it’s larger
    - Think cerebellum
- Permissive hypertension - we may let the BP run high to maintain perfusion to the penumbra

Hemorrhagic stroke

- BP control is crucial - typically systolic less than 140
- Know if they’re on blood thinners - make sure coag studies are done, as they may need to be reversed
- Assessments are the same as ischemic
- High risk for seizures - may be on an antiepileptic
- The brain will slowly absorb the blood over time (weeks - months)
- Follow up CT’s may be done to see if the bleeding has subsided
Surgery does not reverse damage that’s been done - important to educator.

Subarachnoid hemorrhage

- When blood is in the subarachnoid space
- Typically in the ICU for roughly 2 weeks because of the many very serious complications that can result
- Most common cause is trauma, fall... then aneurysms (most aneurysm ruptures don’t make it to the hospital)
- First 24 hours is...
  1. Why did they have it?
     - CTA is typically done to identify this
  2. Fix the cause
     - If it was an aneurysm, go to surgery for clipping/repair
- Cerebral edema is essential to monitor
- Vasospasms - the blood in the subarachnoid space acts as an irritant to the outside of major blood vessels within that space and causes them to clamp down
  - Subsequent ischemic strokes can result

Intraventricular hemorrhage

- You create and reabsorb cerebrospinal fluid in this ventricular space
- You can get a hemorrhage in this space - which is bad news
- That blood can sit in this space and start to clot
- You are constantly creating and reabsorbing spinal fluid, however in this instance, the blood prevents this reabsorption from occurring, therefore increased pressure results
- Hydrocephalus/ventriculomegaly results because of the increased pressure (basically the ventricles just get bigger because more and more fluid is building up)
- May need an extraventricular drain inserted to relieve this pressure because we can’t tell the body to stop making cerebrospinal fluid
  - This is a device that a neurosurgeon inserts, but the nurse manages
- Intraventricular tPA may be necessary to break up that blood that clotted

Resources

- Blog post: How to Assess an Unconscious Neuro Patient Like a Neuro ICU Nurse
- Video: How to Assess an Unconscious Neuro Patient Like a Neuro ICU Nurse

FreshRN Podcast specifically related to neuro:
• Episode 014 Neuro Nurse Tips for Newbies, Part 2: Disease Processes
• Episode 015 Neuro Nurse Tips for Newbies, Part 3: Meds, Monitoring, Diagnostics, and Surgeries

NRSNG Podcast Episodes specifically related to neuro:
• Ep27: Neuro Anatomy | Basic Microanatomy of the Neurological System
• Ep3: Stroke 101 (Ischemic vs Hemorrhagic Stroke)
• Ep2: Brain Death Testing | Apnea Testing

Neuro-specific blog posts:
• Nursing Considerations for 3 Neuro ICU Meds
• How to Assess an Unconscious Neuro Patient Like a Neuro ICU Nurse
• Why is My Stroke Patient NPO?
• Nursing Blood Pressure Management in Stroke Patients
• Nursing Priorities for Ischemic Stroke Patients