Neuro Nurse Tips for Newbies

Part III: Meds, Diagnostics, Monitoring, and Surgeries

We continue our journey through neurocritical care nursing!

Medications

_tPA_ - discussed in [Neuro Nurse Tips, Part I](#)

**Mannitol** - osmotic diuretic, given to decrease ICP
- Increasing the plasma osmolality to pull fluid off of the brain, into the intravascular space, and out of the bed
- The cells actually shrink because they were “swollen” - this “shrinks” them back down to their normal size
  - You’re increasing cardiac output; increasing urine output
    - You’re putting more fluid into the vessels
    - Watch patients with existing fluid overload issues (like congestive heart failure)
- Watch electrolytes
- Basic metabolic panel (BMP), serum osmolality
- Know holding parameters
- If the serum osmo is too high, you can have cellular death because they’re shrinking too much which can ultimately cause more edema... there’s an inflammatory process that occurs when cells die
  - Normal serum osmo 275-285 (may differ between, typically holding if it gets to 320)
- Watch for kidney issues - intrarenal vasoconstriction can occur
- Know sodium and how quickly it trends up; we expect it to rise but we don’t want a sudden drastic increase - you may have a holding parameter for the sodium as well
- Give it through a filter set or draw it up with a filter needle - hurts like hell if you don’t
  - I would draw up with a blunt needle and give with a filter set because it’s faster
  - Whatever you do - FILTER it
- Mannitol crystallizes and can get cloudy; don’t give it if it’s cloudy/crystallized

**Hypertonic saline** (3%) - treat hyponatremia and/or cerebral edema
- Essentially salt water
- Most likely need a central venous catheter
FreshRN Podcast related episode: Central Venous Catheters 101

Resource: Safety of Continuous Peripheral Infusion of 3% Sodium Chloride Solution in Neurocritical Care Patients from the American Journal of Critical Care

- Places now give 23% hypertonic saline; physician must administer
  - Monitor labs and hemodynamics closely
- If you’re drawing labs on a patient receiving a continuous infusing - PAUSE THE DRIP before drawing labs and draw them from a different lumen if possible.
  - This can significantly impact the lab result and is easily overlooked

Vasoactive drips
- Nicardipine, Norepinephrine, Neosynephrine are some examples
  - KNOW THESE if you’re working in a neurocritical care unit
- Consider the disease process when giving PRN BP meds
- For example, if the patient has a hemorrhagic stroke and needs consistently blood pressure control, a Nicardipine drip at a low dose would offer more consistent/level blood pressure than intermittent dosing of a PRN IV push med (like 20 mg Hydralazine) when the BP spikes again
- If a patient is hemodynamically unstable and requiring vasoactive med, get a central line sooner than later
- If your patient is on a drip to keep their blood pressure UP, do not give their scheduled antihypertensive medications (if any). Clarify holding parameters or temporarily hold them (after clarifying with the physician) while the patient is on the medication to increase the blood pressure.
- Double check drips, dosings, titrating, why, and wean
- Consider other meds the patient is getting while vasoactive meds are getting and the impact they may have on the blood pressure medication
  - For example, many antiepileptics will lower blood pressure

Antiplatelets / anticoagulants
- Typically many patients with a hemorrhagic stroke are on a blood thinner
- Know if they’re on any; when it was last taken and the dose
- Reversal agents
  - Examples: Fresh frozen plasma (FFP), Kcentra, vitamin K
- Educate family on why it’s being reversed; this can be especially challenging when they’ve been told by their physician for years how important their blood thinner is and now they’re not getting it
- If you have a mechanical valve who had a hemorrhagic stroke, they will be taken off their blood thinner - you must recognize the big risks with this
  - Cardiology and neurology will be working together to figure out what’s best because they’re stuck between a rock and a hard place (risk another hemorrhagic stroke, or risk a ischemic stroke or pulmonary embolism due to the mechanical valve)

Antiepileptics
Know your indications

If you have Lorazepam ordered for seizures, do not give it for agitation. Call and get another order

Diagnostics

- MRI vs. CT
  - Related FreshRN Podcast Episode - Diagnostics
- EEG - electroencephalogram
  - Most likely due to seizure activity
  - Educating family/patient is critical
    - Families think that an EEG will tell you very detailed aspects of brain function (what they can/cannot understand, if they can hear and understand what's going on around them, etc.)
    - It shows the electrical activity, not structure
    - Think of it like an ECG shows the electrical activity of the heart and an echocardiogram shows the structural components while an EEG shows the electrical activity of the brain and a CT/MRI shows the structures
  - Continuous versus spot EEG
    - Just because you
  - Don't document if you see the patient having a seizure; you can't say definitively say someone is having a seizure without the EEG to confirm it
    - Chart “rhythmic twitching” or whatever it is that you see
  - The children's book we talked about, written by a nurse, to explain to his kid what he does working as a nurse: Daddy, the Amazing Nurse! By Donald Jacobsen, RN
- Brain death testing
  - EEG, apnea testing, cold caloric testing

Surgeries/Procedures

Thrombectomy

- Neurovascular procedure; similar to a heart cath but in the brain
- Catheter placed through femoral artery up to the brain, administer contrast, so they can identify the clot and remove it to open up a blocked artery in the brain
- Only done for large vessels - so think any artery in the Circle of Willis
- This is done when there is clear indication for it because it is an invasive procedure with very real risks; most patients have had a CTA first
- Video animation of a of thrombectomy: https://www.youtube.com/watch?v=7TcUoBQqkac
Please note, this shows only 1 device and was published in 2013. He states that they use tPA or this procedure. Now, both can be done to the same patient to perfuse the brain.

- Remember your post-procedure care; similar to a patient who just had a cardiac cath with a femoral approach (lay flat for 6 hours, pressure and monitoring insertion site, watch for a hematoma/retroperitoneal bleeds)

**Craniotomy**
- Removing part of the skull to get to the brain to do something (remove a tumor, clip an aneurysm, remove a hematoma, and many more reasons)
- Typically incisional pain not necessarily all up in my brain pain - not as many pain receptors in the brain so it's not as painful as other surgeries

**Craniectomy**
- Removing part of the skull and leaving it off to allow room for edema
- Can be stored in a freezer or in the patient’s abdominal cavity

*New articles we discussed*
- [Meet Your Newest Organ: The Mesentery](#)
- [Important Link between Brain and Immune System Found](#)

**External ventricular drains**
- Draining CSF and/or blood to relieve pressure
- Drains via gravity, so it must be leveled correctly
  - Similar to an arterial line
  - Anatomical landmark - foramen of Monro
  - Tragus or lateral canthus
  - MUST follow precisely - a change of head of bed can fatal
    - Educate families and other healthcare team members not to move the head of bed without checking with the nurse
  - Can be hooked up to ICP monitoring

**Monitoring**

**ICP monitoring**
- 7-15 mmHg = normal
- 20+ mmHg = uhhh… you need to do something
- Can be done with an EVD or a bold

**Cerebral perfusion pressure (CPP)**
- MAP-ICP = CPP
- Basically, the blood pressure of the brain
• You want to maintain CPP, even in the event of increased intracranial pressure because you want to ensure the brain is getting the blood flow it requires otherwise additional damage/compromise can occur
• 60-70 typically good
• 50 or less, you are going to have brain issue because the brain is not being adequately perfused with blood
• Just because the CPP is high doesn’t mean it’s great either
  ○ May have other issues like ARDS
• It’s a balancing act

Body temp
• This is so important guys!
• For every degree of increase in body temp, the increase in oxygen demand increases 10%
• Aggressively treat fevers
  ○ Know your orders!
• Neuro changes can occur with increased body temp
• If you’ve got neuro changes, check a body temp to see if it’s increased. This could explain your neuro changes.
• Combination of Fever, Neurological Injury Strongly Linked to Poorer Outcomes

Encouragement
• This is a lot of information
• Get better each day
• Stick with it
• If you’re not sure, pull another set of eyes in to look at the patient
• There are no stupid questions
• Join your professional organizations
  ○ American Nurses Association, American Association of Neuroscience Nurses, American Association of Critical Care Nurses

More neuro resources

FreshRN Podcast episodes specifically related to neuro:
• Episode 013 Neuro Nurse Tips for Newbies, Part 1: When to Worry, Disease Processes
• 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