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Neurosurgery Procedure for Weaning Hypertonic Saline

Patients in the stepdown unit (8PCU) being weaned from hypertonic saline are likely those admitted with stroke or patients with traumatic brain injury who, while in the ICU, had Na+ increased with hypertonic saline for elevated ICP. Patients are often weaned slowly from hypertonic saline to prevent rebound cerebral edema and a protocol enables the treatment team to safely and carefully carry out this weaning. Orders for hypertonic saline must be placed by the neurosurgery resident physician or mid-level provider on behalf of the faculty physician.

Patient must meet following criteria:

1. Hemodynamically stable
2. Stable neuro exam
3. No Intracranial Pressure (ICP) monitor or External Ventricular Drain (EVD)
4. Must have a central line (subclavian, internal jugular, femoral, PICC)

Neurosurgery Parameters:

- Na+ goals should be weaned not more frequently than 24 hours.
- Na+ levels should also not drop > 8 mmol/L in 24 hours.
- Ensure stability for minimum of 24 hours at each level before lowering.
- A patient may only have one sodium goal listed

Three tiers for how sodium is weaned:

Goal 145-150 mmol/L
Goal 140-145 mmol/L
Goal 135-145 mmol/L

Monitoring Parameters:

Chemistry panel every 6 hours

Bolus 3% if Na+ ***less than*** lower limit of goal range

→ if patient <50 kg, 150 ml bolus over 1 hour
→ if patient 51-100 kg, 250 ml bolus over 1 hour
→if patient >100 kg, give 500 ml over 1 hour

Consider NaCl 1g TID oral/enteral – may be increased daily in increments starting with 1g TID → 3g TID → 3g q6 hours is max

Contact Neurosurgery physician if:

- after bolus, Na+ not increasing into requested range
- Na+ level < 135 mmol/L or >155 mmol/L

Once patient has two Na+ values that are stable at 135-145 mmol/L, labs can be spaced to q8 hours x24 hours, then q12 hours x24 hours, then daily until discharge.

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Approved by Neuro-ICU Clinical Management Team: 8/2016
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Calculation reference:

3% NaCl = 513 meq Na+/L
Na+ deficit = 0.6 x weight (kg) x (change in Na+ desired)
Amount needed to increase serum Na+ by 3meq/hr = 0.6 x weight x 3
Desired rate: amount needed (meq/hr)/concentration of saline (meq/L) x 1000

To raise Na+ by 3 meq/L:
< 50 kg (using weight of 40 kg)
0.6 x 40 x (3) = 72 meq Na+ needed
To increase by 3 meq/L/hr = 0.6 x 40 x 3 = 72 meq/hr
Desired rate = 72/513 x 1000 = 140 ml/hr (rounded to 150 ml)

51-100 kg (using weight of 70 kg)
0.6 x 70 x 3 = 126 meq Na+ needed
To increase by 3 meq/L/hr = 0.6 x 70 x 3 = 126 meq/hr
Desired rate = 126/513 x 1000 = 245 ml/hr (rounded to 250 ml/hr)

>100 kg (using 120 kg)
0.6 x 120 x 3 = 216 meq Na+ needed
To increase by 3 meq/L/hr = 0.6 x 120 x 3 = 216 meq/hr
Desired rate = 216/513 x 1000 = 421 ml/hr (rounded to 500 ml/hr)

There is no absolute formula on how slowly to lower a patient's Na+ level back to normal range. However, we do know that letting Na+ levels drop too quickly can cause rebound cerebral edema. Lowering the Na+ range every 1-2 days and then ensuring normonatremia has been shown clinically to be safe.

References:

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