Guideline

CCHMC Trauma Service Guideline

Title: Hypertonic Saline for Treatment of Pediatric Traumatic Brain Injury in the Emergency Department

1.0 SCOPE

1.1 Care of the Trauma Services patient at CCHMC.

2.0 DEFINITIONS

2.1. **Hypertonic saline (HTS):** 3% saline solution (concentration). HTS creates an osmotic gradient and draws water from the intracellular and extracellular spaces into the intravascular compartment. Following severe traumatic brain injury (TBI), HTS is used to restore and maintain systemic and cerebral perfusion without increasing the ICP and exacerbating cerebral edema.

2.2. **Intracranial pressure (ICP):** ICP is determined by the total force exerted by the brain, blood, and cerebrospinal fluid contained within the fixed volume of the skull. Elevated ICP, typically defined as > 20 mmHg, is a strong predictor of poor neurological outcome. Clinical signs of elevated ICP include elevated blood pressure, bradycardia, and irregular respirations.

2.3. **Lateralizing signs:** Clinical signs of herniation such as dilated pupils and decerebrate or decorticate posturing.

2.4. **Severe traumatic brain injury:** Glasgow Coma Score (GCS) 3-8.

2.5. **Hyponatremia:** Serum sodium level < 135.

3.0 GUIDELINE

3.1. Criteria for administration of HTS in the emergency department includes one or more of the following:

3.1.1 Patients with severe traumatic brain injury.

3.1.2 Patients with concern for elevated ICP.

3.1.3 Witnessed lateralizing signs in a patient with concern for head injury.

3.1.4 Patients in the ED who are actively seizing and have serum sodium < 125, refer to ED algorithm for management of hyponatremic seizures

3.2. Administration:

3.2.1 Administration via femoral/central line is recommended but may be administered peripherally if no other access is available.

3.2.2 HTS bolus administration of 4 mL/kg over 15 minutes.

3.3. If persistent concern for elevated ICP or witnessed lateralizing signs: repeat HTS bolus.

3.4. Refer to PICU guidelines for ongoing HTS administration in the PICU.

4.0 REFERENCES

4.1. Kochanek, PM, Carney, N, Adelson, PD, Ashwal, S, et al. (2012). Guidelines for the acute medical management of severe traumatic brain injury in infants, children, and adolescents, 2nd edition. *Pediatric Critical Care Medicine, 13*(1), supplement, s1-s82.

4.2. Pitfield, AF, Carroll, AB, & Kissoon, N. (2012). Emergency management of increased intracranial pressure. *Pediatric Emergency Care, 28*(2), 200-204.

4.3. Kochanek, P. M., Tasker, R. C., Bell, M. J., Adelson, P. D., Carney, N., Vavilala, M. S., ... & Reuter-Rice, K. E. (2019). Management of Pediatric Severe Traumatic Brain Injury: 2019 Consensus and Guidelines-Based Algorithm for First and Second Tier Therapies. *Pediatric Critical Care Medicine*, *20*(3), 269-279.

5.0 APPROVALS

All revisions of this guideline are approved by the Trauma Service Department. This guideline is reviewed every three years or sooner if deemed necessary. Policy authority for this document resides with the Trauma Service Department. This guideline is approved by the Trauma Services Manager and the Director of Trauma Services.

HISTORY
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