**Incidence and outcomes of hyperchloremia subsequent to hypertonic saline use**

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**OBJECTIVE**Hypertonic saline (HTS) is a hyperosmolar therapy used to lower intracranial pressure (ICP) in patients with neurological injuries. HTS can be administered as continuous infusion (1.5% or 3% sodium chloride) or bolus dosing (23.4% sodium chloride). Use of a guideline to direct administration and monitoring of HTS helps maintain safe practices, yet the concentrated solution continues to introduce risk based on sodium and chloride burden. The goal of this study is to evaluate the incidence and outcomes associated with hyperchloremia secondary to HTS exposure to determine if a formulary alternative and/or guideline revision would improve patient safety.

**METHODS**
Medical records of patients admitted to the neurosciences intensive care unit of YNHH within a six month period who received HTS for ICP management were reviewed. The primary outcome evaluated was the incidence of moderate hyperchloremia (≥115 mEq/L) after HTS initiation. Additionally, the duration of HTS exposure was assessed as a secondary outcome. Safety outcomes evaluated in this study included the incidence of mortality, acute kidney injury (AKI), and metabolic acidosis due to hyperchloremia. If an absolute difference >20% amongst safety outcomes was determined between groups, consideration toward revision of a HTS use guideline, or implementation of a buffered solution alternative with sodium acetate, was evaluated.

**RESULTS**
We screened 95 patients between January 1, 2019, and June 30, 2019, of which 68 patients met inclusion criteria. The primary outcome of hyperchloremia was observed in 32.4% (n=22) of patients exposed to HTS therapy for ICP management. Acute brain injury severity on admission for the hyperchloremic and normochloremic cohorts were assessed by mean (± SD) Glasgow coma scale, 10.8 (4.7), and 13.9 (2.1), respectively. At baseline, patients were similar in age and renal function, while more females (68.2% hyperchloremic vs. 47.8% normochloremic) and hemorrhages (27.3% hyperchloremic vs. 13.0% normochloremic) were noted in those experiencing hyperchloremia. Safety endpoints of mortality, AKI, and metabolic acidosis occurred in 40.9% (n=9), 54.5% (n=12), and 50.0% (n=11), respectively, in hyperchloremic patients. The same outcomes occurred in 2.2% (n=1), 13.0% (n=6), and 41.3% (n=19), respectively, in normochloremic patients. Absolute difference >20% between group safety outcomes was observed in mortality and AKI.

**CONCLUSION**
This study demonstrates nearly one-third of patients exposed to HTS for ICP management experience hyperchloremia, which is correlated with an increased incidence of mortality and AKI to support medication use guideline revision and alternative formulary consideration.