CHRD 2022: Abstract & Poster Submission Form

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Presenter Status

- ○ Undergraduate Students
- ○ Masters Student
- ○ PhD Student
- ○ Post-Doctoral Fellows
- ◉ Residents
- ○ Non-Trainee

Research Category

- ○ Basic Science
- ◉ Clinical
- ○ Community Health / Policy

Role in the project

- ☑ Design
- ☑ Perform Experiments
- ☑ Analyze Data
- ☑ Write Abstract
- ☐

Title

Dose of Isotonic Fluid Associated with Lower Risk of Serum Sodium Overcorrection in Pediatric Patients with Chronic Hypovolemic Hyponatremia

Background

Hyponatremia is the most common electrolyte disturbance in hospitalized children. If hyponatremia is chronic and serum sodium is corrected rapidly, (>10 mmol/L/24h) free water can leak out of brain cells causing irreversible neurologic injury. Despite this risk, no pediatric clinical studies address how best to correct hyponatremia. Current strategies are based on theoretical formulas which have been shown to perform poorly in practice.

Objective

We aimed to determine whether the rate of isotonic fluid administered over the 1st 24 hours is associated with rapidity of sodium correction.

Methods

In this retrospective chart review, 277 patients aged 1 month – 18 years admitted to HSC-Winnipeg Children's Hospital between 1990-2020 with a coded diagnosis of 'Hyponatremia' were screened for inclusion. Patients were excludedExclusion criteria included : who did not have chronicacute hypovolemic hyponatremia; who had neurologic, renal, cardiac or liver diseasechronic health conditions; sodium or a diuretic as a home medication; signs of cerebral edema; on presentation; or SIADH. Forty-five charts were included in the final analysis. Patients were separated into 'appropriately corrected' ("AC"; □ serum Na ≤10mmol/L/24h) and 'over-corrected' ("OC"; □ serum Na >10mmol/L/24h) groups. Tt-tests and chi-squared tests were performed to assess for differences between groups based on identified independent variablesclinical covariates.

Results

Mean fluid rate was significantly lower in the AC (2.23ml/kg/hr) compared to the OC (3.69ml/kg/hr) group ($p = 0.0028$). Other risk factors for sodium over-correction included: younger age (5.83 vs. 1.5 years; $p = 0.007$), lower pre-treatment serum Na (123 vs. 127mmol/L; $p = 0.0012$), and higher pre-treatment K (4 vs 3; $p = 0.047$). There was a trend toward higher rates of reported seizure (4 vs. 1 event) and PICU involvement (8 vs. 4 events) in the OC group.

Conclusion

Higher isotonic fluid infusion rate (>3ml/kg/hr), younger age, lower pre-treatment serum Na and higher pre-treatment K were associated with a greater risk of sodium over-correction. These results can help improve safety of hyponatremia management.

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⊙ Yes ○ No

Hyponatremia Table1.pdf

Authors

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	All Patients	Appropriately Corrected	Overcorrected	P
N	45	17	28	
Age (yrs), median (IQR)	2.5 (5.75)	5.83 (9.33)	1.5 (2.77)	0.007
Sex, n (%)				0.3384
Female	13 (28.9)	3 (17.6)	10 (35.7)	
Male	32 (71.1)	14 (82.3)	18 (64.3)	
Weight (kg), median (IQR)	13.5 (12.7)	16.5 (20.5)	11.81 (12.48)	0.05655
Pre-treatment serum Na (mmol/L), median (IQR)	125 (5)	127 (2)	123 (6)	0.001241
Pre-treatment serum K (mmol/L), median (IQR)	4 (1)	3 (1)	4 (2)	0.04694
Mean fluid rate (ml/kg/hr), median (IQR)	2.93 (2.95)	2.23 (1.6)	3.69 (2.53)	0.002781
Bolus volume given (ml/kg), median (IQR)	18.18 (21.01)	17.24 (20.29)	19.47 (29.60)	0.2599
Times fluid rate/composition changed in 24h period, median (IQR)	1 (2)	1 (2)	1 (1)	0.5591
% of total fluid given PO, median (IQR)	0 (23.31)	0 (27.97)	0 (16.10)	0.5825
Evidence of calculation used, *n* (%)				0.8372
Yes	10 (22.2)	3 (17.6)	7 (25)	
No	35 (77.8)	14 (82.4)	21 (75)	
IV treatment initiated at tertiary centre, *n* (%)				0.3316
Yes		16 (94.1)	21 (75)	
No		1 (5.9)	7 (25)	
Adverse events, *n* (%)				
Seizure (Y)		1 (5.9)	4 (14.3)	
Lasix given (Y)		12 (11.8)	0 (0)	
PICU involvement (Y)		4 (23.5)	8 (28.6)	

*P-values generated using t-tests for continuous variables and chi-squared tests for binary variables