Reviewer’s report

Title: Undercorrection of hypernatremia is frequent and associated to mortality.

Version: 2 Date: 6 January 2014

Reviewer: Austin Stack

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General Remarks.
The authors have made some modifications in the re-submitted manuscript which have improved the study. Enhanced formatting, improved clarity of the text and the tables has improved the readability of the paper. The inclusion of the univariate and multivariate analysis has also been helpful. However, notwithstanding these improvements, this reviewer continues to have residual concerns regarding the internal validity of the study and the final take home message.

In essence, this is a subgroup analysis of all patients with hypernatremia admitted to a regional emergency centre and highlights heterogeneity in management and outcomes. In general the outcomes are similar to those of recently published studies which the authors cite. I have residual concerns regarding the robustness of the analysis, the final conclusions with respect to the rate of sodium correction and external validity. My previous critique continues to hold.

Major Compulsory Issues

1. Limited sample size
The analysis is limited to 85 patients who are old and frail with serum sodium concentrations of > 150 mmol/L. Consequently the analysis lacks power to make a clinically meaningful conclusion regarding mortality risk factors and the contribution of the speed of correction of serum sodium to mortality.

2. Univariate and Multivariable analysis
I have residual concerns with the validity of this statistical analysis.
Serum sodium was not significantly associated with mortality in the univariate analysis, most certainly due to small sample size. It appears that serum sodium was then not included in the multivariate model as it was correlated with another explanatory variable. From my reading of the analyses, the variable no natremia improvement (yes vs no) was included in the final model and its significance increased from P=0.02 to P< 0.001. In other words the final model did not adjust for baseline serum sodium on admission to ER. I suspect this is why the no natremia improvement variable is so significant despite the small sample size. I also note that the rate of correction of serum sodium was not significant in the univariate mode (p=0.1).
3. Missing Data
Perfusion speed of correction was missing in 74% of patients as highlighted by the authors on page 12

4. The conclusions are overstated. The lack of natremia improvement is not the same as a slow correction speed. Why wasn’t the mean speed of correction included in the final model if the authors want to make a robust statement regarding the correction speed?

Minor Esssential Revisions

5. Redundancy
I am not sure that manuscript benefits from inclusion of Figure 1a, b and c

6. Additional suggestions
1. I would delete objective (2) on page 5 as it is already covered in objective (1).
2. There is duplication in the results section as the descriptive narrative duplicates the message in the Tables.
3. Replace sequels with sequelae on page 12
4. The narrative description provided on page 8-9 appears excessive and appears to duplicate the findings presented in the Tables. The authors should consider either a brief text description where the Table itself is self-explanatory. A more focused narrative on the results and subsequent discussion would be beneficial.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:
'I declare that I have no competing interests'