CAUSATION

Review: hypotonic solutions increase acute hyponatraemia in children receiving standard intravenous maintenance therapy


Q In children receiving standard intravenous (IV) maintenance therapy in hospital, what is the relative safety of hypotonic and isotonic solutions?

METHODS

Data sources: Medline, EMBASE/Excerpta Medica (to 2006), Cochrane Library; Current Controlled Trials, conference proceedings and abstracts, reference lists, personal files, and experts in the field.

Study selection and assessment: controlled trials, cohort studies, and case-control studies that evaluated adverse events (acute plasma sodium derangements and their attributed morbidity) associated with use of hypotonic (containing < 0.9% sodium chloride) or isotonic (containing 0.9% sodium chloride or Ringers Lactate) IV maintenance solutions in children 1 month to 17 years of age who had been admitted to hospital for any medical or surgical condition. Patients with pre-existing hyponatraemia or comorbidities that result in sodium derangements were excluded. 6 studies (2 randomised controlled trials, 1 non-randomised controlled trial, 2 cohort studies, and 1 case-control study) (n = 404) met the selection criteria. Quality assessment of individual studies was based on criteria appropriate for the study design.

Outcomes: hyponatraemia (plasma sodium concentration <136 mmol/l), post-treatment plasma sodium concentration, mean change in plasma sodium concentration, and adverse events.

MAIN RESULTS

Children who received hypotonic IV maintenance solutions had a greater risk of hyponatraemia than those who received isotonic solutions (table). The mean post-treatment plasma sodium concentration was lower and the mean decrease in plasma sodium concentration (after treatment v before treatment) was greater in the hypotonic group than in the isotonic group (table). Seizures (1 cohort study; n = 56) and increased pulmonary interstitial fluid (1 cohort study) were reported more frequently in children receiving hypotonic solutions, but the differences were not significant because of small sample sizes.

For correspondence: Dr K Choong, Department of Paediatrics, McMaster University, Hamilton, Ontario, Canada. choongk@mcmaster.ca

Comments: The findings of the review by Choong et al. validate challenges to the current standard of practice of prescribing hypotonic solutions in children. However, given the strengths and weaknesses of the review and the individual studies, Choong et al. are correct in their conclusion that changes to this standard of practice should not be adopted until more rigorous clinical trials comparing different types of IV fluid therapy in children are completed.

Jennifer Yost, RN, MA
New York University College of Nursing
New York, NY, USA


<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Hypotonic</th>
<th>Isotonic</th>
<th>RRI (95% CI)</th>
<th>NNH (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyponatraemia</td>
<td>62%</td>
<td>8.7%</td>
<td>614 (420 to 780)</td>
<td>2 (2 to 3)</td>
</tr>
<tr>
<td>Post-treatment plasma sodium concentration (mmol/l)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change in plasma sodium concentration (mmol/l)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted mean difference (CI)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Abbreviations defined in glossary; RRI, NNH, and CI calculated from odds ratios in article using a random effects model.

CONCLUSION

In children receiving standard intravenous maintenance therapy in hospital, hypotonic solutions increase the risk of acute hyponatraemia more than isotonic solutions.
Review: hypotonic solutions increase acute hyponatraemia in children receiving standard intravenous maintenance therapy

*Evid Based Nurs* 2007 10: 59
doi: 10.1136/ebn.10.2.59

Updated information and services can be found at:
http://ebn.bmj.com/content/10/2/59

These include:

**References**
This article cites 3 articles, 3 of which you can access for free at:
http://ebn.bmj.com/content/10/2/59#BIBL

**Email alerting service**
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

**Topic Collections**
Articles on similar topics can be found in the following collections

- Metabolic disorders (164)
- Foodborne infections (2)
- Infection (gastroenterology) (2)
- Internet (396)

**Notes**

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/