Commentary

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Is hyperchloremia following sepsis resuscitation with 0.9% saline clinically important?

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The authors of the article titled "Balanced salt solution versus normal saline solution as initial fluid resuscitation in pediatric septic shock: a randomized, double-blind controlled trial", published in Critical Care and Shock, should be congratulated for design and conduct of a randomized, double-blind clinical trial in severely unwell children with sepsis. (1)

The patient population included in the study was severely unwell: all patients enrolled went on to require inotropic therapy, and overall mortality was 24.6%. This stands in contrast to industrialized countries, where inotrope use and death from septic shock are significantly lower. The generalizability of findings between regions with different prevalence and severity of disease is an important consideration; in fluid studies the underlying pathogen (e.g. malaria or dengue hemorrhagic fever) and key characteristics (e.g. severe malarial anemia) may be important and should be reported. (2)

The authors finding of a trend towards more hyperchloremic metabolic acidosis in the group randomized to 0.9% saline raises the question of biochemical significance versus clinically importance. Though the content of maintenance fluids are not reported, it is possible that buffered solutions were used more often in the group randomized to receive 0.9% saline, reducing the effect of hyperchloremia on clinically important outcomes. Though increased blood chloride is associated with acute kidney injury, the requirement for renal replacement therapy, and mortality in children with septic shock, it remains unclear whether resuscitation with balanced fluids rather than 0.9% saline will reduce adverse outcomes. Two large retrospective studies comparing 0.9% saline with balanced fluids in children with septic shock reported different results: the first found no difference in acute kidney injury, renal replacement therapy, or death between fluid groups, (3) while the second found a 0.9% reduction in the requirement for renal replacement therapy and a 2.1% reduction in mortality in children receiving a balanced fluid. (4) With 61 patients enrolled in the study by Anantasit, et al this trial was underpowered to detect possible differences in clinically important outcomes between fluid types.

Differences in adverse safety events could also lend favor to use one intravenous fluid type over another. Such adverse events may include symptomatic electrolyte disturbances, drug or blood product interactions, and morbidity due to differential organ dysfunction. Adverse safety outcomes were not reported by Anantasit, et al.

Overall, this is an important study in severely unwell children with septic shock that furthers our understanding of the immediate biochemical effects of resuscitation with 0.9% saline versus balanced fluids. Although use of balanced fluids may improve electrolyte profiles, unnecessary abandonment of 0.9% saline will increase concerns about fluid-drug and fluid-blood product incompat-

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ibility of balanced fluids as well as administration of slightly hypotonic fluids. Large, multi-centered, international trials will be required to definitively determine the comparative efficacy and safety of initial resuscitation with 0.9% saline—as is most commonly employed in children—versus balanced fluids, and to ensure that study findings are generalizable outside of the trial setting. (5)

References

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