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REVIEW

Balanced Versus Unbalanced Fluid in Critically Ill Children: Systematic Review and Meta-Analysis

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Fluid bolus therapy is a common practice in pediatrics, especially in volume resuscitation of seriously ill children. However, due to limited evidence in this age group, there is no consensus over the fluid choice. Unbalanced solutions, such as 0.9% saline, are widely disseminated in clinical practice. However, they have been associated with hyperchloremic metabolic acidosis and acute kidney injury.

A systematic review published in March 2022[1], which included 13 studies (nine of which were randomized controlled) and 11,848 patients, compared the effects of fluid resuscitation with unbalanced (0.9% saline) and balanced (primarily Ringer's lactate) fluid bolus therapy on serum bicarbonate and pH levels within 24 hours of administration in critically ill children aged 28 days to 18 years.

Three randomized controlled trials had adequate data to evaluate the primary endpoint. They enrolled 162 patients diagnosed with severe gastroenteritis, severe sepsis, septic shock, diabetic ketoacidosis, and dengue shock syndrome. Serum bicarbonate levels were measured after volume replacement (at 4, 6, and 6-12 h), with improved bicarbonate levels and higher pH in patients given balanced fluids.

The review also evaluated secondary endpoints such as hyperchloremia, acute kidney injury, renal replacement therapy, need for vasopressor amines, length of stay in the pediatric intensive care unit (PICU) and hospital, and death. However, no statistically significant differences were found between balanced and unbalanced solutions.

In conclusion, the systematic review indicated that patients given balanced solutions had improved pH and bicarbonate levels. Differences in secondary endpoints were not significant. This study suggests using balanced fluids over unbalanced ones, a recommendation in line with the new guidelines for volume replacement in pediatric sepsis and septic shock. Further studies are needed to strengthen the evidence favoring balanced solutions.

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