Risk of Electrolyte Disorders in Acutely Ill Children Receiving Commercially Available Plasmalike Isotonic Fluids A Randomized Clinical Trial

JAMA Pediatr. 2021 Jan 1;175(1):28-35

Background : The use of isotonic fluid therapy is currently recommended in children, but there is limited evidence of optimal fluid therapy in acutely ill children.

Objectives: To evaluate the risk for electrolyte disorders, including hyponatremia, hypernatremia, and hypokalemia, and the risk of fluid retention in acutely ill children receiving commercially available plasmalike isotonic fluid therapy

Design: Randomized clinical trial from October 3, 2016, through April 15, 2019.

Eligibility: 614 study subjects between 6 months and 12 years of age

Interventions: Acutely ill children were randomized to receive commercially available plasmalike isotonic fluid therapy (140 mmol/L of sodium and 5 mmol/L potassium in 5% dextrose) or moderately hypotonic fluid therapy (80 mmol/L sodium and 20 mmol/L potassium in 5% dextrose)

Main outcomes and measures: The primary outcome was the proportion of children with any clinically significant electrolyte disorder, defined as hypokalemia less than 3.5 mmol/L, hypernatremia greater than 148 mmol/L, or hyponatremia less than 132 mmol/L during hospitalization due to acute illness. The main secondary outcomes were the proportion of children with severe hypokalemia and weight change.

ACADEMIC P.E.A.R.L.S

Pediatric Evidence And Research Learning Snippet

Electrolyte Disorders while using Plasma like isotonic fluid in PICU

Results

There were 614 total study subjects (mean [SD] age, 4.0 [3.1] years; 315 children were boys [51%] and all 614 were Finnish speaking [100%]). Clinically significant electrolyte disorder was more common in children receiving plasmalike isotonic fluid therapy (61 of 308 patients [20%]) compared with those receiving moderately hypotonic fluid therapy (9 of 306 patients [2.9%]; 95% CI of the difference, 12%-22%; P < .001). The risk of developing electrolyte disorder was 6.7-fold greater in children receiving isotonic fluid therapy. Hypokalemia developed in 57 patients (19%) and hypernatremia developed in 4 patients (1.3%) receiving plasmalike isotonic fluid therapy. Weight change was greater in children receiving isotonic, plasmalike fluid therapy compared with those receiving mildly hypotonic fluids (mean weight gain, 279 vs 195 g; 95% CI, 16-154 g; P = .02).

Conclusions and Relevance

In this randomized clinical trial, commercially available plasmalike isotonic fluid therapy markedly increased the risk for clinically significant electrolyte disorders, mostly due to hypokalemia, in acutely ill children compared with previously widely used moderately hypotonic fluid therapy containing 20 mmol/L of potassium.

EXPERT COMMENT

Balanced isotonic fluid like plasmlyte can be used as both a resuscitation and maintenance fluid. Due to its physiochemical properties electrolyte abnormalities like hypocalcemia, hypermagnesemia and hyperkalemia can occur. But significant hypokalemia (<3mmol/l) despite potassium in it alongwith with a risk of hypernatremia in susceptible patients can also occur which needs vigilance. This study addressed the need to add appropriate amount of potassium in acutely ill paediatric patients to avoid hypokalemia even while receiving isotonic plasmalyte solution.

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With warm regards,

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Reference

Risk of Electrolyte Disorders in Acutely Ill Children Receiving Commercially Available Plasmalike Isotonic Fluids. A Randomized Clinical Trial. Lehtiranta S ;Honkila M ; Kallio M et al . JAMA Pediatr. 2021 Jan 1;175(1):28-35