Association Between Fluid Balance and Outcomes in Critically Ill Children A Systematic Review and Meta-analysis.

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Background & Objectives:

- Evidences suggest that fluid accumulation after initial resuscitation may exert hazard for major morbidity and mortality which highlights the importance of daily evaluation of fluid status in critically ill children for avoidable fluid accumulation.
- **To describe the methods to measure fluid balance, define fluid overload, and evaluate the association between fluid balance and outcomes in critically ill children**

Methods: Studies of children admitted to pediatric intensive care units that described fluid balance or fluid overload and reported outcomes of interest were included.No language restrictions were applied.All stages were conducted independently by 2 reviewers.Data extracted included study characteristics, population, fluid metrics, and outcomes. Risk of bias was assessed using the Newcastle-Ottawa Scale. Narrative description of fluid assessment methods and fluid overload definitions was done. When feasible, pooled analyses were performed using random-effects models. Mortality was the primary outcome. Secondary outcomes included treatment intensity, organ failure, and resource use.

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

Pediatric Evidence And Research Learning Snippet

Is there an association between fluid balance & outcomes in critically ill children admitted to PICU?

Results:

•Fluid overload, however defined, was associated with increased in-hospital mortality (17 studies [n = 2853]; odds ratio [OR], 4.34[95% CI, 3.01-6.26]; I2 = 61%). Survivors had lower percentage fluid overload than nonsurvivors(22 studies [n = 2848]; mean difference, −5.62 [95% CI, −7.28 to −3.97]; I2 = 76%).

• After adjustment for illness severity, there was a 6% increase in odds of mortality for every 1% increase in percentage fluid overload (11 studies [n = 3200]; adjusted OR, 1.06 [95% CI, 1.03-1.10];I2 = 66%).

•Fluid overload was associated with increased risk for prolonged mechanical ventilation (>48 hours) (3 studies [n = 631]; OR, 2.14 [95% CI, 1.25-3.66]; I2 = 0%) and acute kidney injury (7 studies [n = 1833]; OR, 2.36 [95% CI, 1.27-4.38]; I2 = 78%)

Conclusions: Fluid overload is common among critically ill children and exerts a strong negative association with outcomes. The findings of our systematic review and meta-analysis support the hypothesis that a threshold may exist beyond which fluid accumulation becomes unhelpful or frankly harmful.

Key message: Fluid overload is common and is associated with substantial morbidity and mortality in critically ill children.

EXPERT COMMENT

“Clinicians should monitor fluid balance and consider the hazards associated with fluid overload. We must develop optimal strategies early in the course for fluid management among critically ill children, specifically aimed at avoiding and mitigating iatrogenic or avoidable fluid overload.”

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With warm regards,

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Reference
Alobaidi R, Morgan C, Basu RK, Stenson E, Featherstone R, Majumdar SR, Bagshaw SM. Association Between Fluid Balance and Outcomes in Critically Ill Children: A Systematic Review and Meta-analysis. JAMA Pediatr. 2018 Mar 1;172(3):257-268. doi: 10.1001/jamapediatrics.2017.4540