Impact of Early Fluid Overload on Mortality in Critically Ill Children

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Introduction

- Fluid accumulation and fluid overload are commonly seen in critically ill patients and frequently associated with severe AKI.
- Multiple retrospective studies in critically ill patients with AKI identified an association between fluid overload and ICU outcomes such as mortality.
- But the impact of pattern of fluid accumulation, especially early fluid overload, on outcomes in critically ill patients remains to be established.

Objectives and Study Design

Objectives:
- Determine the impact of early fluid overload parameters on mortality in critically ill children.

Study Design:
- Retrospective Cohort Study.
  - Included children with ICU admission diagnosis of shock states or sepsis.
  - Excluded children with ICU stay < 48 hours.

Methods

- We performed a retrospective chart review of critically ill children in a tertiary level pediatric ICU, admitted between September 1, 2009 and March 31, 2010 with sepsis and/or shock as one of the admitting diagnoses.
- Cumulative fluid accumulation was measured daily for up to 7 days after ICU admission. Fluid overload was defined as cumulative fluid accumulation > 10%.
- Survivors and non-survivors were compared with respect to fluid accumulation parameters – maximum cumulative fluid accumulation, presence of fluid overload and duration of fluid overload during the initial 7 days of ICU admission.
- The two groups were compared with respect to other covariates using univariable and multivariable logistic regression analysis.
- Cox proportional hazards analysis was performed to compare survival between patients with fluid overload and those with no fluid overload.

Results

- In our cohort of critically ill children with sepsis and/or shock states, maximum fluid accumulated, presence of fluid overload and duration of fluid overload during the initial 7 days have significant impact on mortality.
- Most of the fluid accumulation in the non-survivors occurs during the initial 3 days after ICU admission.

References

3. Jose Bouchard, Sharon B. Soroko1, Glenn M. Chertow, Jonathan Himmelfarb, T. Alp Ozler, Emil P. Pagirani and Ravindra L. Mehta; Program to Improve Care in Acute Renal Disease (PICARD) Study Group; Fluid accumulation, survival and recovery of kidney function in critically ill patients with acute kidney injury
4. Scott M. Sutherland, MD, Michael Zappitelli, MD, MSc, Steven R. Aleksander, MD; Fluid Overload and Mortality in Children Receiving Continuous Renal Replacement Therapy: The Prospective Pediatric Continuous Renal Replacement Therapy Registry
5. Selvakum DT, Cornell TT, Blatt NB, Han YV, Mattes T, Komnared M; Gaires MG; Arrick GM; Kershaw DB; Shankley TP, Heung M; Fluid overload and fluid removal in pediatric patients on extracorporeal membrane oxygenation requiring continuous renal replacement therapy. Crit Care Med. 2012; 40(9):2694-9