

PEDIATRICS

Weighing the options: assessing fluid overload in children

Results from a new study indicate that weight-based determination of fluid overload is a suitable and practical alternative to the gold standard of calculating fluid overload based on fluid balance.

Fluid overload at initiation of continuous renal replacement therapy (CRRT) is associated with increased mortality. Fluid overload status in children is usually calculated using the difference between fluid input (including blood products, intravenous fluids, medications and nutritional support) and fluid output (including urine output, blood loss, stool volume and wound drainage). However, this method is labor-intensive and prone to error. The aim of the recently published study by David Selewski and colleagues was twofold: to investigate the association between fluid overload and outcome in a pediatric population undergoing CRRT, and to determine how a weight-based method compares with the fluid balance technique in terms of predictive value and correlation.

Data from 113 children (median age 19 months) undergoing CRRT were used in this retrospective study. “We performed this study in the broadest pediatric population reported to date, which included 50 patients requiring extracorporeal life support (ECLS),”



comments Selewski. Weight was recorded at hospital admission, at admission to the intensive care unit (ICU), and at CRRT initiation. Fluid intake and output were recorded every day from admission to the ICU until initiation of CRRT.

On univariate analysis, fluid overload at CRRT initiation was significantly associated with mortality, regardless of whether the fluid balance method was used or whether weight-based methods using change in weight from hospital admission or from ICU admission were used. Fluid overload also showed a trend towards predicting mortality on

multivariate logistic regression analysis. The weight-based definitions of fluid overload yielded similar findings to the gold standard of calculating fluid overload based on fluid balance. “A subgroup analysis of patients requiring ECLS found that increasing fluid overload at CRRT initiation was associated with increased mortality, which is the first time this result has been demonstrated in this population,” adds Selewski.

Weight-based methods do have some disadvantages, including potential for inaccuracy related to the use of differing scales and techniques for weighing patients. Limitations specific to this study included not being able to stratify for severity of illness or multiple organ dysfunction, as well as the study being underpowered owing to the heterogeneity of the patient population. “To gain further insight into the impact of fluid overload on outcomes, we are starting a prospective trial in a general pediatric critical care population,” says Selewski.

Helene Myrvang

Original article Selewski, D. T. *et al.* Weight-based determination of fluid overload status and mortality in pediatric intensive care unit patients requiring continuous renal replacement therapy. *Intensive Care Med.* doi:10.1007/s00134-011-2231-3