**Fluid overload and renal angina index at admission are associated with worse outcomes in critically ill children**

*Anshika Khare1, Sidharth Kumar Sethi2, Veena Raghunathan2, Vinod Krishnappa3, Maninder Dhaliwal2, Jitendra Sharma2, Pranaw Jha2, Maneesh Kumar2, Sravanthi Paluri4, Shyam Bansal2, Maroun Mhanna5, Rupesh Raina3, 6*

1Northeast Ohio Medical University, Rootstown, Ohio, USA

2Kidney and Urology Institute and Pediatric Intensive Care, Medanta, The Medicity Hospital, Gurgaon, Haryana, India,

3Akron Nephrology Associates/Cleveland Clinic Akron General, Akron, Ohio, USA

4Interfaith Medical Center, NY, USA

5Department of Pediatrics. Metrohealth Medical Center, Cleveland , Ohio, USA

6Department of Pediatric Nephrology, Akron Children Hospital, Akron, Ohio, USA

**Objectives:** This prospective study was done to investigate the relationship between fluid overload and oxygenation plus their resultant effects on duration of ventilation, total ICU stay, and mortality. Additionally, we assessed whether the renal angina index (RAI) at admission can predict mortality or acute kidney injury (AKI) on day 3 of hospitalization.

**Methods:** 102 critically ill children in the PICU of a tertiary hospital who needed invasive mechanical ventilation for > 24 hours and had an indwelling arterial catheter were studied for their oxygenation index, fluid overload percent (daily, cumulative), RAI at admission and pediatric logistic organ dysfunction (PELOD) score. Additional data such as the use of vasopressors, mechanical ventilation, percent fluid overload, and change in kidney function (measured by estimated creatinine clearance) were obtained to calculate the RAI. RAI values of > 8 were used as the cutoff to predict mortality and/or AKI on day 3.

**Results:** Fluid overload predicted the oxygenation index in this population and it was independent of age, gender, and PELOD score (p < 0.05). After controlling these variables, it was found that fluid overload was associated with a longer duration of mechanical ventilation, PICU length, and total hospital stay (p < 0.05). On day 3, patients with an RAI of > 8 had higher AKI rates, as evidenced by the receiver operating characteristic analysis showing a greater area under the curve. An RAI of < 8 had a high negative predictive value (80-95%) for predicting day 3 AKI. This study showed that RAI was superior to traditional markers of pediatric severity of illness (PELOD) for prediction of AKI on day 3 of hospitalization.

**Conclusion:** Fluid overload adversely affects intensive care in critically ill children. Furthermore, this study showed that the RAI prediction model might optimize treatment and ultimately improve the clinical prediction of AKI.