Acute kidney injury and renal replacement therapy independently predict mortality in neonatal and pediatric noncardiac patients on extracorporeal membrane oxygenation.

OBJECTIVE: To determine the independent impact of acute kidney injury (AKI) and renal replacement therapy (RRT) in infants and children who receive extracorporeal membrane oxygenation. Despite continued expertise/technological advancement, patients who receive extracorporeal membrane oxygenation have high mortality. AKI and RRT portend poor outcomes independent of comorbidities and illness severity in several critically ill populations.

DESIGN: Retrospective cohort study. The primary variables explored are AKI (categorical complication code for serum creatinine > 1.5 mg/dL or International Statistical Classification of Diseases and Related Health Problems, Revision 9 for acute renal failure), and RRT (complication/Current Procedural Terminology code for dialysis or hemofiltration). Multiple variables previously associated with mortality in this population were controlled, using logistic stepwise regression. Decision tree modeling was performed to determine optimal variables and cut points to predict mortality.

PATIENTS: Critically ill neonates (0-30 days old) and children (> 30 days but < 18 yrs old) in the
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Extracorporeal Life Support Organization registry.

INTERVENTIONS: None.

MEASUREMENTS AND MAIN RESULTS: Neonatal mortality was 2175 (27.4%) of 7941. Nonsurvivors experienced more AKI (413 [19%] of 2175 vs. 225 [3.9%] of 5766, p < .0001), and more received RRT (863 [39.7%] of 2175 vs. 923 [16.0%] of 5766, p < .0001) than survivors. Pediatric mortality was 816 (41.6%) of 1962. Pediatric nonsurvivors similarly experienced more AKI (264 [32.3%] of 816 vs. 138 [12.0%] of 1146, p < .0001) and RRT (487 [58.9%] of 816 vs. 353 [30.8%] of 1146, p < .0001) than survivors. After adjusting for confounding variables, the adjusted odds ratio for neonatal group was 3.2 (p < .0001) post AKI and 1.9 (p < .0001) given RRT. Similarly, the pediatric adjusted odds ratio for mortality was 1.7 (p < .001) post AKI and 2.5 (p < .0001) given RRT. AKI and RRT were essential in the neonatal and pediatric mortality decision trees.

CONCLUSIONS: After adjusting for known predictors of mortality, AKI and RRT independently predict mortality in neonates and children, who receive extracorporeal membrane oxygenation. Ascertainment of AKI risk factors, testing novel therapies, and optimizing the timing/delivery of RRT may positively impact survival.

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