

Acute Kidney Injury and the Center for Acute Care Nephrology



ACUTE KIDNEY INJURY AT CINCINNATI CHILDREN'S BY THE NUMBERS

21%

Of 177 AKI survivors enrolled in a longitudinal research study, 21% show signs of Chronic Kidney Disease.

98%

In a one-year study including 1,575 PICU admissions, RAI and NGAL show a 98% NPV and 64% PPV in predicting the presence of severe AKI on PICU days 2–4. This combination allows us to determine who is truly at risk for severe AKI.

Early intervention for acute kidney injury (AKI) is critical in preserving long-term organ function and saving lives. Nephrologists at Cincinnati Children's Hospital Medical Center work proactively with other pediatric specialists to identify children at risk for AKI and/or diagnose AKI early to provide timely therapy through initiatives such as frequent creatinine surveillance and careful fluid management. Our clinical and translational research allows us to improve risk stratification and achieve optimal outcomes for pediatric patients who are at high risk for this devastating condition.

WHAT SETS US APART

The Center for Acute Care Nephrology (CACN) utilizes a collaborative approach that has led to its status as a world leader in AKI clinical care, research and education. The overall leadership of director Stuart Goldstein, MD, is complemented by the vision of three co-directors from the neonatal, pediatric and cardiac intensive care units. This collaboration across specialties has led to a further expertise within each specific patient population.

Cincinnati Children's was the first in the United States to use the CARPEDIEM dialysis system, the only such device FDA approved for the treatment of AKI in patients weighing less than 10 kilograms. The CACN was also the first group in the world to successfully treat an infant on extracorporeal membrane oxygenation (ECMO) with CARPEDIEM.

The CACN strives to be at the forefront of new therapies to improve outcomes of children with AKI. This is demonstrated through participation in drug and device trials, including the selective cytopheretic device (SCD) providing immunomodulatory benefits to critically ill children with AKI on continuous kidney replacement therapy (CKRT).

WHAT MAKES EARLY DIAGNOSIS OF AKI DIFFICULT TO ACHIEVE?

Many hospitalized pediatric patients who are at high risk for AKI are taking nephrotoxic drugs to treat diseases such as cancer, cystic fibrosis and liver disease. Our most critically ill patients often have other significant risk factors such as hypoxia and hypoperfusion. In addition, some institutions have no standard approach to using a serum creatinine level and urinary biomarkers to systematically monitor kidney function and detect AKI early in children with significant risk factors.

HOW DOES CINCINNATI CHILDREN'S ENCOURAGE EARLIER DIAGNOSIS OF AKI?

In our pediatric ICU, we have validated Renal Angina Index (RAI) to identify patients at risk for AKI early on in the PICU stay. RAI score is automatically calculated for all patients in the PICU and resulted into the electronic medical record. Once the patients RAI hits a certain threshold, a novel kidney biomarker, NGAL, is ordered to further stratify patients for risk. Management of AKI and fluid overload in the PICU is guided by the RAI and NGAL results as part of a new clinical pathway.



FLUID MANAGEMENT

At Cincinnati Children's, we are changing the fluid management paradigm by analyzing dose, timing and composition of fluids used in hospitalized patients. By preventing fluid overload, we can avoid the need for acute dialysis in some patients. Standardized early acute dialysis therapy could potentially preserve kidney function and save lives.

CACN LEADERSHIP

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Katja Gist, DO
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For urgent issues, or to speak with the specialist on call 24/7, call the Physician Priority Link® at 1-888-987-7997.

www.cincinnatichildrens.org

HOW CAN OTHER SPECIALISTS UTILIZE THE RENAL ANGINA INDEX?

We received a Cincinnati Children's Innovation Fund Award and a grant from the National Institutes of Health to develop the platforms for commercialization and dissemination of the Renal Angina Index algorithm to other children's hospitals.

WHAT IS YOUR TEAM'S APPROACH TO FLUID MANAGEMENT AMONG HOSPITALIZED PATIENTS?

Fluid is a drug, and as such it needs to be dosed, timed and composed properly. High cumulative doses of fluid are associated with serious outcomes, including death. Our investigators performed pioneering studies whose data support the concept that excessive fluid overload is associated to mortality in critically ill patients with AKI. At Cincinnati Children's, we are leveraging our novel AKI risk stratification strategies noted above with real time clinical decision support to standardize fluid management in order to dose and time fluid appropriately, and developing ways to standardize the initiation of acute dialysis therapy.

WHAT IS THE ACUTE KIDNEY INJURY SURVIVOR PROGRAM AT CINCINNATI CHILDREN'S?

The AKI Survivor Program provides long-term clinical follow up for patients who are at risk for chronic kidney disease. Identifying these patients is now possible through the use of data in the electronic medical record. Our clinical and research teams use the data to identify high-risk patients and, through collaboration with specialists hospital-wide, provide follow-up in the clinic setting.

Since most of these patients do not have a primary diagnosis of renal disease, we usually see them in different specialty clinics during their scheduled appointments. We check their blood pressure and take blood and urine samples to look for evidence of renal damage. We also enroll them in research studies in hopes of identifying novel markers to identify those whose renal injury might progress to chronic kidney disease. This approach is unique; national data indicate that less than 30% of hospitalized patients receive long-term follow-up care for chronic kidney disease.

We enrolled 228 patients in the AKI survivor cohort that we will follow as part of a research study for 5 years after their AKI episode. We continue to accept new patients, outside of the study cohort, into the AKI Survivor Program.

HOW DOES YOUR TEAM ADVANCE RESEARCH IN AKI?

The clinical research staff within the Center for Acute Care Nephrology serve as the coordinating center for several multi-center research projects. We initiate, participate in, and manage trials studying different aspects of AKI—including risk stratification, early identification, treatments, and long term sequelae. These include investigator initiated, NIH funded, multi-center, and industry sponsored studies.

We have the experience and expertise to serve as the Clinical Research Organization (CRO) and Site Management Organization (SMO) for clinical trials. Currently, we are serving in that role for an industry sponsored device trial, managing everything from contracts to training to enrollment to data management.