

Nephrotoxic Injury Negated by Just-In-Time Action Condition (NINJA)



NEPHROTOXIC INJURY NEGATED BY JUST-IN-TIME ACTION

55%

After 11 years, we have sustained a 55% reduction in hospital AKI rates



Cincinnati Children's is ranked #6 in Nephrology and #3 in the nation among Honor Roll hospitals.

NINJA or Nephrotoxic Injury Negated by Just-In-Time Action empowers pharmacists and physicians to work together proactively in preventing nephrotoxic medication associated acute kidney injury (NAKI). NINJA was created at Cincinnati Children's in 2011 as part of our work to identify children at risk for AKI and/or diagnose AKI early through initiatives such as frequent creatinine surveillance. Our quality improvement initiative has spread, and NAKI was recently adopted as a focus of Children's Hospitals' Solutions for Patient Safety (SPS) harm reduction through minimizing hospital-acquired conditions. Our clinical and translational research continues in this field to improve risk stratification, early identification, and minimizing NAKI for pediatric patients.

TEAM LEADER

Stuart L. Goldstein, MD
Director, Center for Acute Care Nephrology

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. Often, nephrotoxic medication associated AKI has been regarded as a "necessary evil" and not modifiable. In addition, there was no standard approach to using a serum creatinine level to systematically monitor kidney function and detect AKI early in children who were exposed to nephrotoxic medication.

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

We have created a system called NINJA to encourage more pharmacists to utilize electronic medical records to identify hospitalized patients who are taking three or more nephrotoxic medications. The pharmacists work with the hospital teams on rounds to recommend daily creatinine testing for these patients. Such real-time communication has fostered discussion and consensus among pharmacists, nephrologists and physicians across all specialties. Together, we are making decisions about how to optimize nephrotoxic medication exposure, and about adjusting or withdrawing certain medications when indicated.

With the NINJA project, we showed that 1 in 4 exposed children develop AKI. After 11 years of using Ninja, we observed a sustained 55% reduction in AKI hospital-wide, representing over 1,600 events of acute kidney injury avoided. Our experience is that use of a mature monitoring system like NINJA can produce a sustained reduction in AKI rates and duration of AKI.



CHILDREN'S HOSPITALS SOLUTIONS FOR PATIENT SAFETY (SPS): NEPHROTOXIC ACUTE KIDNEY INJURY

SPS is a network of over 135 children's hospitals across the world committed to reducing harm within their institutions. Nephrotoxic Acute Kidney Injury was recently adopted as the 12th hospital acquired condition (HAC) within the focus of reducing harm as part of the goal of SPS.

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 NINJA?

We are eager to share our findings and processes with pediatric institutions interested in implementing a creatinine surveillance program like ours. Thanks to a grant designed to disseminate quality improvement initiatives, our team has developed a national collaborative with 17 pediatric centers to encourage and excel NINJA implementation elsewhere. The collaborative has observed significant reductions in nephrotoxic medication exposure and AKI over the three year project.

Recently, Vigilanz Corporation and Cincinnati Children's collaborated to launch a commercially available platform built with NINJA algorithms. The Vigilanz platform allows for real-time updates to nephrotoxic medication exposure and NAKI dashboards. With this new advancement, monitoring for patient safety as well as data extraction for SPS and quality improvement work is automatic and customizable.

HOW IS NINJA USED ACROSS INPATIENT SERVICE LINES?

Participating collaborative centers have the option to share data related to nephrotoxic exposure and NAKI rates separately for specific service lines. Currently these separate service lines include Bone Marrow Transplant, Hematology-Oncology, and Pulmonary/Cystic Fibrosis. These service lines account for a significant portion of the nephrotoxic medication exposure within pediatric centers, and the complicated pediatric patients cared for in these units are at high risk of developing NAKI.

The NINJA collaborative began its spread into the neonatal intensive care unit (NICU) in 2019. The neonatal population has different hurdles in spreading NINJA compared to the majority of the other units within a pediatric hospital. Instead of adding another service line, a new collaborative has branched out named Baby NINJA. The physicians and pharmacists working within Baby NINJA have the same focus as those within NINJA. We are excited to share our data and lessons learned as Baby NINJA matures.

CAN BIOMARKERS BE UTILIZED THROUGH NINJA MONITORING?

The NINJA structure and collaborative can be leveraged for clinical and translational research studies. Daily blood draws to measure serum creatinine are part of the NINJA algorithm, but for some pediatric patients, this is the only blood work being performed daily. As a result, these blood draws represent an additional procedure. With the growing availability of a novel kidney biomarker, urinary NGAL, at clinical laboratories at pediatric institutions, the possibility of replacing a blood draw with a urine sample is becoming a realistic option. A two-center clinical study examined urinary NGAL levels in relation to nephrotoxic medication exposure meeting NINJA algorithm definitions, testing the hypothesis as to whether daily urinary NGAL could replace daily serum creatinine levels in certain pediatric patients. Initial results demonstrate that urinary NGAL can be used as a screening tool to direct daily blood draws to select patients at the highest risk of developing NAKI.

Future clinical and translational research projects within the NINJA collaborative and using the NINJA algorithm are in planning stages. The multi-center nature of the collaborative, the mature communication structure between participating institutions, as well as the collaborative's commitment to minimizing harm and NAKI in our pediatric patients makes this group an ideal launching point for future clinical studies.