

PHARMACY PRACTICE NEWS

EHR-based screen addresses ‘epidemic’ of kidney toxicity

‘NINJA’ Program Helps Prevent Pediatric AKI



ANAHEIM, CALIF.—Dubbed NINJA, or Nephrotoxic Injury Negated by Just-in-time Action, a new solution enables real-time identification and monitoring of pediatric patients at risk for acute kidney injury (AKI) from exposure to nephrotoxic drugs.

So far, the program appears to be putting a significant dent in the problem—a greater than 40% reduction in AKI, which the authors contend has reached epidemic proportions in the nation’s hospitals.

Nephrotoxic medication exposure is one of the most common causes of AKI in children. “We know that children need nephrotoxins. These are lifesaving medications,” said Stuart L. Goldstein, MD, the director of the Center for Acute Care Nephrology at Cincinnati Children’s Hospital Medical Center and primary developer of NINJA. “But children should only get the nephrotoxic medications they need for the duration they need them.

“Next to handwashing, this is the most ubiquitous environmental exposure a patient experiences,” he added during a presentation at the ASHP 2018 Midyear Clinical Meeting.

Dr. Goldstein and his colleagues published a pair of studies in 2011 detailing the use of nephrotoxic agents and the development of AKI in noncritically ill children admitted to the hospital (*Nephrol Dial Transplant* 2011;26[1]:144-150). They found that patients who had AKI were 70% more likely to be exposed to a nephrotoxin (*Clin J Am Soc Nephrol* 2011;6[4]:856-863). “When they went from two to three nephrotoxins, the risk of AKI doubled,” he said.

The team also found that serum creatinine, a measure of kidney injury, was collected at least once every four days only half of the time for patients on multiple nephrotoxic medications. “If you’re not looking at creatinine, you’re not going to find it,” Dr. Goldstein added.

Recognizing a potentially modifiable adverse safety event, he decided to develop an electronic health record (EHR)-based AKI screening intervention. The real-time rule engine analyzes every medication administration and lab value for patients at Cincinnati Children’s. It then creates an automated list of all pediatric patients who have, within the last 48 hours, met the criteria for nephrotoxic exposure or other AKI risk factors such as evidence of injury based on their serum creatinine levels. Patients are considered exposed if they received three or more nephrotoxic drugs on the same day or an aminoglycoside for three or more days.

Hospital pharmacists then spend about 20 minutes validating these daily reports. Depending on the results, Dr. Goldstein explained, they may provide suggestions for serum creatinine screening or a switch to a less nephrotoxic medication.

In its first year of using NINJA, Cincinnati Children’s saw a 42% reduction in days of AKI per 100 patient-days of exposure (*Pediatrics* 2013;132[3]:e756-e767), as previously reported in *Pharmacy Practice News* (bit.ly/2slNz6i). “Now instead of one in four kids developing AKI, one in six do,” Dr. Goldstein said. “Meanwhile, we saw no increasing infection rates,” he added. “The medications stopped did not cause any harm.”

Kristen Nichols, PharmD, an associate professor of pharmacy practice at Butler University, in Indianapolis, noted the lack of information on how frequently to monitor for various drugs in pediatric patients or how to deal with the interplay of multiple factors that could put a patient at risk for AKI. “With the realities of health care, resources and funding these days, pharmacists may be responsible for a large number of patients,” said Dr. Nichols, who is not involved in NINJA. She added that identifying patients with multiple risk factors for AKI can be particularly difficult and time-consuming. “This is a great step toward adding strong guidance,” Dr. Nichols said.

Scalable, Customizable Software

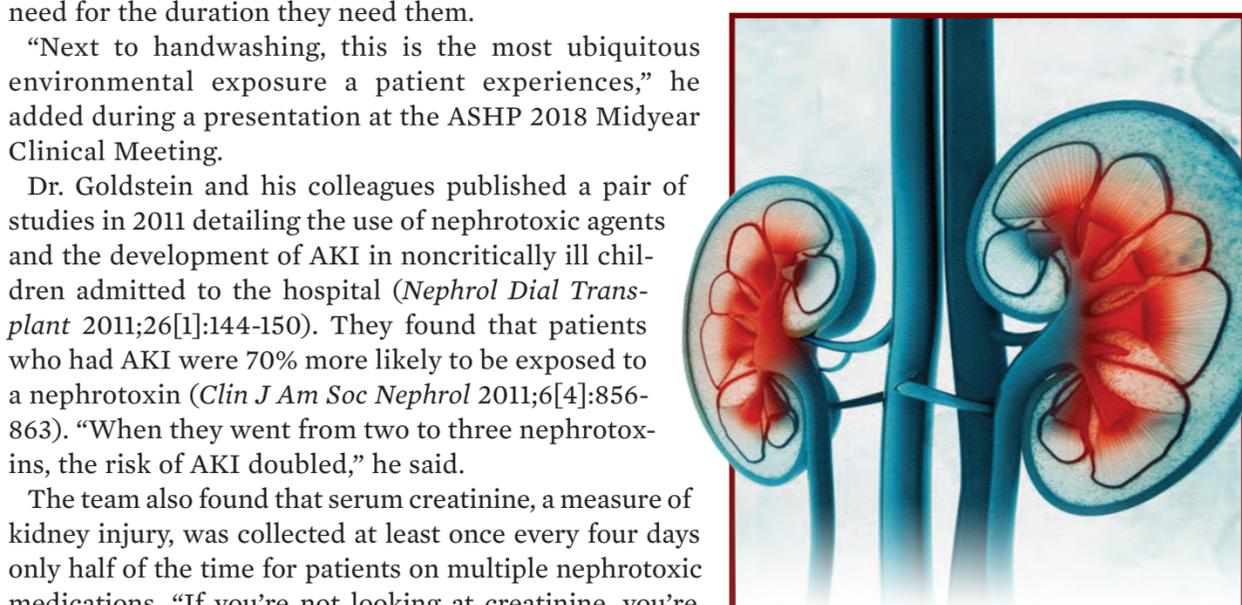
VigiLanz, a digital health care intelligence firm, has scaled the NINJA algorithm to be functional and customizable for any hospital, regardless of EHR platform. As a result, the program is being rolled out in other pediatric hospitals across the United States—from Boston to Seattle. The Children’s Hospitals’ Solutions for Patient Safety (box) recently adopted NINJA and aims to implement it in its network of 140 children’s hospitals by 2020.

Dr. Goldstein suggested that every hospital’s goal should be approximately seven nephrotoxic exposures per 1,000 patient-days, and about 1.2 AKI episodes per 1,000 patient-days. “If you’re not doing that well, this program can help you track the effect of interventions to decrease unnecessary nephrotoxic medication exposure and associated AKI,” he said.

Dr. Goldstein also underscored the urgency. Overall, his team found that the rate of AKI per nephrotoxic exposure ranges between 15% and 25%. At Cincinnati Children’s, before NINJA was implemented, AKI rates had been 10-fold higher than the rate of catheter-associated urinary tract infections and three-fold higher than catheter-associated bloodstream infections.

“This is an epidemic,” he added. “It is something that hospitals have to look at.”

—Lynne Peebles



Signs of Trouble

- Patients with AKI are 70% more likely to be exposed to a nephrotoxin.
- The risk for AKI doubles in patients who go from 2 to 3 nephrotoxin exposures.
- Adequate AKI screening is done in only 50% of patients.

Source: *Nephrol Dial Transplant* 2011;26(1):144-150; *Clin J Am Soc Nephrol* 2011;6(4):856-863.

Dr. Goldstein received travel support to ASHP and a portion of NINJA licensing fees from VigiLanz. Dr. Nichols reported no relevant financial relationships.

North American Network Makes Its Mark in Pediatric Patient Safety

The Children’s Hospitals’ Solutions for Patient Safety (SPS) National Children’s Network is an effort by more than 130 children’s hospitals in the United States and Canada “to create a universally safe and healing environment for all children who are in our care,” according to a description of the initiative posted on the SPS website (bit.ly/2GKPDOF).

The initiative, funded in part by the Cardinal Health Foundation, the Children’s Hospital Association and the federal Partnership for Patients initiative, is aimed at reducing harm by preventing hospital readmissions, serious safety events and the following hospital-acquired conditions (HACs):

1. Adverse drug events (ADEs)
2. Catheter-associated urinary tract infections (CAUTIs)
3. Central line-associated bloodstream infections (CLABSIs)
4. Injuries from falls and immobility
5. Peripheral IV infiltration and extravasation
6. Pressure injuries
7. Surgical site infections (SSIs)
8. Ventilator-associated events
9. Venous thromboembolism
10. Unplanned extubations
11. *Clostridioides difficile* (formerly *Clostridium difficile*) infections
12. Nephrotoxic acute kidney injury

Since 2012, the Children’s Hospitals’ SPS effort has prevented serious harm in 10,206 children and led to an estimated savings of more than \$173 million, with an upward trend in harm prevented every month (as of July 2018), according to its developers. Overall reductions in the following HAC outcomes attest to the program’s success, they noted:

- ADEs, 64%
- CAUTIs, 59%
- SSIs, 31%
- CLABSIs, 8.7%
- Seven-day hospital readmissions, 4.5%

—PPN Staff

