

Nephrotoxic-associated AKI in children

Acute kidney injury in pediatric cancer patients

- 52.6% of pediatric cancer patients developed AKI.
- 22.6% of cancer survivors had long-term renal impairment.

➤ Park PG, Hong CR, Kang E, et al. Acute Kidney Injury in Pediatric Cancer Patients. *The Journal of Pediatrics*, 2019;208:243-250.e3. doi: 10.1016/j.jpeds.2018.12.023

Drug-induced acute kidney injury in children

- Up to 25% of AKI cases in the PICU are believed to be the result of pharmacotherapy with cancer chemotherapeutics among the most common offenders.
- Drugs and/or drug classes, which are known to cause AKI in children, include cancer chemotherapeutics, non-steroidal anti-inflammatory drugs and antimicrobials.

➤ Faught LN, Greff MJ, Rieder MJ, Koren G. Drug-induced acute kidney injury in children. *Br J Clin Pharmacol*. 2015;80(4):901-909. doi:10.1111/bcp.12554

Nonsteroidal anti-inflammatory drugs are an important cause of acute kidney injury in children

- 6.6% of children receiving NSAIDs developed AKI even though 75% received doses in the recommended range.
- During 11.5 years of study, a minimum total of \$375,293 was spent at our institution on the care of patients with NSAID-associated AKI; markedly underrepresented as billing data from specialists was not available.

➤ Misurac JM, Knoderer CA, Leiser JD, Nailescu C et al. Nonsteroidal Anti-Inflammatory Drugs Are an Important Cause of Acute Kidney Injury in Children. *The Journal of Pediatrics*, 2013;162(6):1153-1159.e1 DOI: <https://doi.org/10.1016/j.jpeds.2012.11.069>

Nephrotoxicity as a cause of acute kidney injury in children

- Nephrotoxic drugs account for about 16% of all AKIs.
- Children with AKI caused by nephrotoxic agents have a significant risk for chronic renal injury.

➤ Patzer L. Nephrotoxicity as a cause of acute kidney injury in children. *Pediatr Nephrol*. 2008;23:2159-2173 <https://doi.org/10.1007/s00467-007-0721-x>

Acute kidney injury associated with high nephrotoxic medication exposure leads to chronic kidney disease after 6 months

- Six months after NTMx-AKI, 70% of patients had evidence of residual kidney damage.
- CKD, hypertension, and proteinuria were more common in the AKI cohort than in controls.
- [The authors] suggest systematic comprehensive follow-up in children after NTMx-AKI.

➤ Menon S, Kirkendall ES, Nguyen H, Goldstein S. Acute Kidney Injury Associated with High Nephrotoxic Medication Exposure Leads to Chronic Kidney Disease after 6 Months. *The Journal of Pediatrics*. 2014;165(3):522-527.e2 DOI: <https://doi.org/10.1016/j.jpeds.2014.04.058>

Urine biomarkers of acute kidney injury in noncritically ill, hospitalized children treated with chemotherapy

- Conclusion: Urine NGAL and IL-18 show promise as early AKI diagnostic tests in children treated with ifosfamide and may have a potential role in drug toxicity monitoring.

➤ Sterling M, Al-Ismaïli Z, McMahon KR, et al. Urine biomarkers of acute kidney injury in noncritically ill, hospitalized children treated with chemotherapy. *Pediatr Blood Cancer*. 2017; 64:e26538. <https://doi.org/10.1002/pbc.26538>

Urinary neutrophil gelatinase associated lipocalin as a biomarker in ifosfamide induced chronic renal failure

- The 24-hour urine NGAL cut-off level for demonstrating CRF was found to be 1.065 ng/mL/24 hours. The sensitivity and specificity for this cut-off value were 83% and 77%, respectively.
- Conclusion: Elevated NGAL levels may be a good option in determining CRF.

➤ Kesik V, Demirkaya E, Buyukpamukcu M, Urinary neutrophil gelatinase associated lipocalin as a biomarker in ifosfamide induced chronic renal failure. *Eur Rev Med Pharmacol Sci* 2015;19(24):4851-4857

Detection of early renal injury in children with solid tumors undergoing chemotherapy by urinary neutrophil gelatinase-associated lipocalin

- Among critically ill cancer patients (CICPs), 12-49% experience ARF and 9-32% require renal replacement therapy during their time at an intensive care unit (ICU).
- uNGAL was highly predictive with an AUC of 0.847.
- Depending only on the creatinine level for detecting AKI will markedly delay the diagnosis.

➤ Almalky MA, Hasan SA, Hassan TH, et al. Detection of early renal injury in children with solid tumors undergoing chemotherapy by urinary neutrophil gelatinase-associated lipocalin. *Mol Clin Oncol*. 2015;3(6):1341-1346. doi:10.3892/mco.2015.631