ISSN NO: 2770-2936
January, 2026

Acute Kidney Injury In Children: Diagnostic Challenges And Treatment Outcomes At A Regional Pediatric Hospital

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Abstract. Acute kidney injury (AKI) in children remains a significant cause of morbidity and mortality, particularly in resource-limited regional hospitals. This prospective observational study evaluated 74 pediatric patients with AKI admitted to the Fergana Region's Multi-Specialty Children's Hospital between January 2022 and June 2025. The leading etiologies included sepsis, dehydration, cardiac surgery complications, and nephrotoxic drug exposure. Most patients (79.7%) were managed conservatively, while 20.3% required renal replacement therapy, primarily peritoneal dialysis. At discharge, 60.8% achieved complete recovery, 24.3% had partial recovery, 9.5% progressed to chronic kidney disease, and 5.4% died. These outcomes demonstrate both the potential for recovery with timely intervention and the persistent risk of poor prognosis in a subset of patients. Early recognition, standardized monitoring, nephrotoxin stewardship, and capacity building in peritoneal dialysis are essential strategies to improve pediatric AKI outcomes in regional settings.
Keywords: acute kidney injury, children, diagnosis, treatment outcomes, peritoneal dialysis

Introduction. Acute kidney injury (AKI) in children is a critical condition characterized by a sudden decline in kidney function, often leading to significant morbidity and mortality, especially in pediatric intensive care units (PICUs)[1,2]. The diagnosis of AKI in children traditionally relies on serum creatinine levels and urine output, but these markers can be delayed and insensitive for early detection. Consequently, novel biomarkers such as Cystatin C, NGAL, KIM-1, IL-18, TIMP-2, and IGFBP7 are being explored for earlier and more accurate diagnosis[3–5]. Additionally, diagnostic tools like contrast-enhanced ultrasound (CEUS) and ultra-microangiography (UMA) are being investigated for their potential to assess renal microperfusion and predict AKI development[3]. The KDIGO criteria are widely used for defining and staging AKI, although the pROCK criteria have been suggested to better predict mortality outcomes[6]. Laboratory tests such as serum creatinine, blood urea nitrogen (BUN), and novel biomarkers, alongside imaging techniques like renal ultrasound, are essential for diagnosis[7–9]. Treatment of AKI in children primarily involves supportive care, including fluid management and, in severe cases, renal replacement therapy (RRT) such as peritoneal dialysis or hemodialysis[1,4,10]. The use of specific medications like caffeine citrate for neonates and dextrose in saline for hypernatremic dehydration are part of the management strategies[10]. The etiology of AKI in children is often multifactorial, with prerenal causes like sepsis being predominant[9,10]. Long-term monitoring is crucial due to the risk of chronic kidney disease, hypertension, and proteinuria following AKI[1,7]. Enhanced awareness and integration of novel diagnostic and therapeutic approaches are essential to improve outcomes in pediatric AKI[4,8].

Materials and Methods. This prospective observational study was conducted at the Fergana Region's Multi-Specialty Children's Hospital between January 2022 and June 2025. Seventy-four children aged from one month to sixteen years who met the Kidney Disease: Improving Global Outcomes (KDIGO) criteria for AKI were included. Children with congenital kidney anomalies or pre-existing CKD were excluded. Clinical data collected included demographic variables, underlying etiologies of AKI, laboratory values, urine output measurements, exposure to nephrotoxic agents, and the type of treatment received. Outcomes were assessed at hospital discharge and classified into four categories: complete recovery, partial recovery, progression to CKD, or death. Statistical analysis was descriptive, and results were later summarized in a line graph using Microsoft Excel.

Results: Of the seventy-four patients, forty-two were male (56.8%) and thirty-two were female (43.2%). The mean age was 8.4 ± 4.2 years. Sepsis was the leading etiology, accounting for 28.3% of cases,

ISSN NO: 2770-2936
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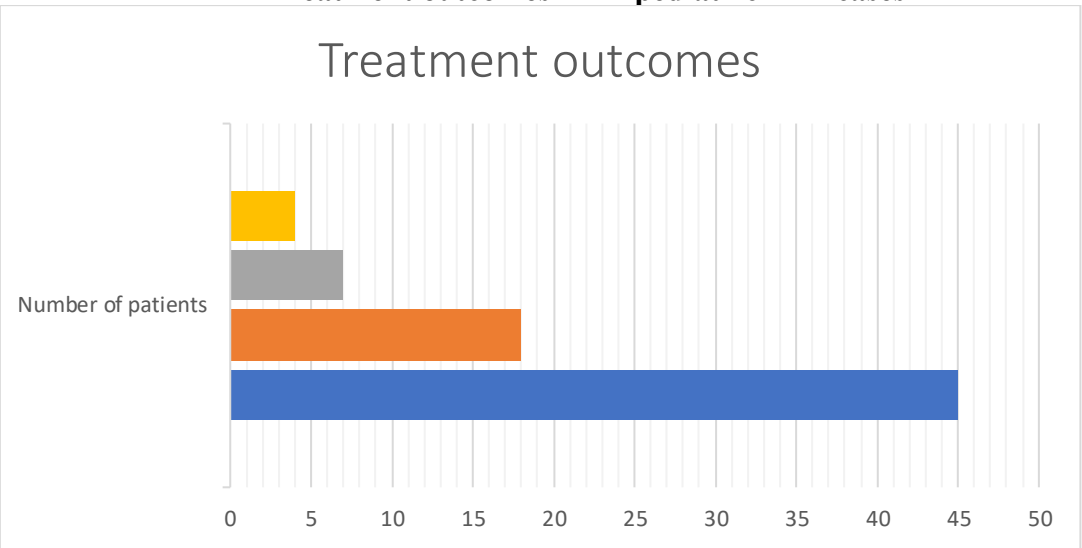
followed by dehydration secondary to gastroenteritis in 24.3%, postoperative complications following cardiac surgery in 18.9%, nephrotoxic drug exposure in 14.8%, and other miscellaneous causes in 13.7%.

Regarding treatment, fifty-nine children (79.7%) were managed conservatively with interventions that included fluid resuscitation, electrolyte correction, and withdrawal of nephrotoxic medications. Fifteen children (20.3%) required renal replacement therapy. Among these, nine underwent peritoneal dialysis, four received intermittent hemodialysis, and two were treated with continuous renal replacement therapy.

Figure 1

Treatment outcomes in 74 pediatric AKI cases



The overall treatment outcomes revealed that forty-five children (60.8%) achieved complete recovery with normalization of renal function and urine output, while eighteen children (24.3%) demonstrated partial recovery characterized by improved but not normalized renal function. Seven children (9.5%) progressed to chronic kidney disease requiring long-term follow-up, and four children (5.4%) died despite supportive care. These outcomes were summarized into an Excel dataset for visualization.

Discussion. This study underscores the significant burden of acute kidney injury in hospitalized children within a regional care setting. Although a majority of patients recovered fully following conservative therapy, a notable proportion either progressed to chronic kidney disease or died. Mortality in this cohort was comparable with international data from similar resource-limited healthcare centers. The outcomes highlight the importance of early recognition and standardized management protocols to reduce morbidity and mortality.

One of the major diagnostic challenges encountered was the reliance on serum creatinine and urine output. Serum creatinine is highly dependent on age and muscle mass, leading to delays in recognition of kidney injury, particularly in malnourished children. Urine output monitoring, while useful in the intensive care setting, was less reliable on general wards due to practical limitations. Advanced biomarkers such as urinary neutrophil gelatinase-associated lipocalin (NGAL) and serum cystatin C have shown great promise in early detection of AKI; however, their use remains limited in regional hospitals due to cost and laboratory constraints.

Treatment strategies centered on conservative management in most cases, with renal replacement therapy reserved for those with refractory fluid overload, severe electrolyte imbalances, metabolic acidosis, or overt uremic complications. Peritoneal dialysis emerged as a feasible and lifesaving modality for unstable children in this setting, aligning with global recommendations for resource-limited hospitals. Nonetheless, the limited availability of pediatric-sized hemodialysis equipment and consumables, as well as delayed referral to tertiary centers for continuous therapy, continue to restrict optimal care delivery.

This study supports international evidence that protocol-driven management, nephrotoxin stewardship, and structured urine output monitoring are essential in reducing the incidence and severity of AKI. Importantly, the findings emphasize the need for capacity building in peritoneal dialysis, staff training in early AKI recognition, and the gradual introduction of cost-effective biomarkers to improve diagnostic accuracy.

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Conclusion. Acute kidney injury in children represents a considerable clinical challenge in regional hospitals. While the majority of affected children can recover fully with timely conservative therapy, a significant proportion continue to experience long-term complications or mortality. The experience at Fergana Region's Multi-Specialty Children's Hospital suggests that the introduction of structured AKI risk assessments, consistent monitoring protocols, nephrotoxin stewardship programs, and strengthening of peritoneal dialysis capacity are practical strategies to improve patient outcomes. Future efforts should also include the establishment of a local AKI registry and the gradual integration of affordable biomarker assays to enhance early detection.

References:

1. Matjaž Kopač. Acute Kidney Injury in Children: Classification, Recognition and Treatment Principles // Children (Basel). 2024. Т. 11, № 11. С. 1308–1308.
2. Ishan Kapil, Anil Kumar Goel, Manas Ranjan Sahoo. Profile of Acute Kidney Injury in the Pediatric Age Group in a Tertiary Care Hospital: A Prospective Observational Study // Cureus. 2024.
3. Ogorevc N. и др. Contrast-Enhanced Ultrasound (CEUS) and Ultra-Microangiography (UMA) in Critically Ill Children with Acute Kidney Injury // Children. Multidisciplinary Digital Publishing Institute, 2024. Т. 11, № 10. С. 1205.
4. Giulio Rivetti и др. Acute Kidney Injury in Children: A Focus for the General Pediatrician // Children (Basel). 2024. Т. 11, № 8. С. 1004–1004.
5. С. В. Байко, Е Н Кулакова. Острое повреждение почек у детей: определение, классификация, эпидемиология, диагностика (обзор литературы). Часть 1. 2023.
6. Kuai Y.X. и др. [Comparison of diagnostic criteria for acute kidney injury in critically ill children] // Zhonghua Er Ke Za Zhi. 2023. Т. 61, № 11. С. 1011–1017.
7. Lea Maria Merz, Katalin Dittrich. Update akutes Nierenversagen bei Kindern // Kinder- und Jugendmedizin. 2024. Т. 24, № 05. С. 319–329.
8. Байко С.В., Кулакова Е.Н. Острое повреждение почек у детей: определение, классификация, эпидемиология, диагностика (обзор литературы). Ч. 1. 2024.
9. Arife Uslu Gökçeoğlu, Ahmet Aslan. Acute Kidney Injury In Children // Acta medica alanya. 2024.
10. Virgin V. A. Karundeng, Valentine Umboh, Rocky Wilar. Gangguan Ginjal Akut pada Anak: Faktor Risiko dan Tatalaksana Terkini // e-Clinic: Jurnal Ilmiah Kedokteran Klinik. 2023. Т. 12, № 1. С. 77–86.