Review Article

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Clinical Characteristics and Results of Hospital-Acquired Acute Kidney Injury in Noncritical Care Settings

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Abstract

Australian statistics on the prevalence and prognosis of noncritically unwell patients' hospital-acquired acute kidney injury (HA-AKI) are scarce. The purpose of this study was to define HA-AKI and evaluate how nephrology visits affected the results. All noncritically unwell patients with HA-AKI who were hospitalised to a major tertiary hospital in 2018 were followed up from the time of admission until they were discharged. The Kidney Disease Improving Global Outcomes (KDIGO) criteria were used to define HA-AKI. The clinical characteristics of individuals who developed HA-AKI and the variations in these characteristics according to nephrology consultation were the study's main findings. The study included 222 noncritically ill patients in total. The included patients had a mean age of 74.8 15.8 years, and 57.2% of them were female. While the majority of patients (92%) were classified as having KDIGO stage 1, 14% had nephrology consultations, and 80% had recovered their kidney function completely or in part by the time they were discharged. Receiving nephrology consultation was linked to lower recovery rates (65% versus 83%), longer hospital stays (10 versus 5 days), and higher blood creatinine values at release (152 versus 101 mol/L). Between those who had nephrology consultations and those who did not (13% versus 11%, P = 0.754), there was no difference in mortality rates. Our research shows that a sizable fraction of noncritically ill patients develop mild AKI during hospitalisation and recover their renal function well, Despite the fact that the severity of AKI and length of hospitalisation were linked to nephrology therapies, a larger study is needed to fully grasp how these interventions affect clinical outcomes like hospital readmission and mortality.

Keywords: acute kidney injury • electronic alert • pediatric nephrology • nephrology therapies

Introduction

Globally, the frequency of acute kidney injury (AKI), a prevalent clinical condition among hospitalised patients, is rising. Reduced renal perfusion as a result of hypotension, hypovolemic, medicines, recent surgery, radiographic contrast agents, or infection is frequently the reason. Clinically, AKI is identified by an increase in serum creatinine (SCr) and/or a decline in urine output, both of which are brought on by a sudden decrease in the glomerular filtration rate (GFR) [1].

Acute kidney injury (HA-AKI) acquired in a hospital has been independently linked to longer hospital stays, higher healthcare expenses, a higher chance of developing chronic kidney disease (CKD), early and long-term mortality, and the requirement for on-going post-hospitalization care. In Australia, HA-AKI is the seventh most frequent hospital acquired complication, with an estimated additional cost of $56,000 for each hospitalisation including HA-AKI. In 2015–16, roughly 980 people in Australian public hospitals experienced severe AKI that required haemodialysis, which is equivalent to 2.2 per 10,000 hospitalisations, according to a national snapshot taken between 2012 and 2013 that showed 1.6% of hospitalisations were caused by AKI as the principal and/or an additional diagnosis [2].

Numerous studies have proven the importance of lowering the risk of developing HA-AKI and enhancing

results and prognosis. Although the general hospitalised population accounts for the bulk of inpatient AKI cases, the intensive care unit (ICU) setting is where the majority of AKI studies are carried out. ICUs in Australian hospitals typically follow the closed ICU model, where the intensive care specialists who have received training and expertise in managing this condition are in charge of all patient decision-making. The need to comprehend HA-AKI in the non-ICU setting, with a view to identifying scope for future interventions, is supported by the difference in the kind and amount of care received by patients in the ICU compared to those outside. This is significant because patients who are hospitalised may experience better clinical outcomes as a result of early diagnosis of AKI episodes. Additionally, the lack of information on HA-AKI in Australia highlights the need of comprehending its characteristics and the role that nephrology plays in enhancing patient outcomes. We predicted that, especially with early intervention by nephrologists, HA-AKI in non-ICU settings would be mild, mainly avoidable, and reversible as well as related with shorter hospital stays and a reduced rate of in-hospital morality [3].

Therefore, the primary goals of this study are to identify the clinical features of HA-AKI and evaluate the severity of the condition in adult patients who are not critically ill. The study also intends to assess how nephrology consults affect AKI recovery, hospital stay, and death while in the hospital. Data from patients admitted to a sizable tertiary care university teaching hospital in New South Wales, Australia, between January 1 and December 31, 2018, were included in this retrospective audit. The study comprised adult patients (18 years) who were admitted to a hospital for more than 24 hours and who had at least two SCr assessments within a week of one another. According to the Duff and Murray's conceptual model of the proposed retrospective staging of AKI on admission, patients were excluded if they had kidney failure, were on any type of kidney replacement therapy, were managed conservatively (including palliative care), were diagnosed with AKI on admission, had their first SCr on admission be greater than 300 mol/L, or were suspected of having community-acquired AKI. Patients were additionally disqualified if initial screening revealed that the differences in their SCr values came from two distinct hospital admissions, they were younger than 18 years old, their estimated GFR was still above 90 mL/min/1.73 m2, and their 50% increase from the initial SCr measurement on admission exceeded the KDIGO AKI definition within seven days. The Institutional Human Ethics Committee gave its approval for this investigation [4].

The computerised medical records were mined for demographic data, comorbidities, and pertinent clinical data, including the main causes of AKI risk factors. Based on the 10th edition of the International Classification of Diseases, relevant comorbid medical problems were categorised (ICD-10). The Anatomical Therapeutic Chemical (ATC) categorization method was used to classify medications. The Kidney Disease Improving Global Outcomes (KDIGO) criteria based on the SCr were used to stage AKI for severity [5]. When patients were discharged from the hospital, the degree of kidney function improvement, along with any in-hospital fatalities were all noted. The cause for hospital admission, the length of the stay, the interval between admission and the onset of AKI, and the interval between the development of AKI and discharge were all noted. The treating team (classified as medical or surgical) at the time AKI developed and the surgical procedures carried out while hospitalised were documented. Time spent on any nephrology consultations while in the hospital was also noted. The major cause of AKI was documented, including whether it was single or multivariate, as well as the requirement for dialysis either while the patient was hospitalized or after discharge [6].

Discussion

This retrospective study examined outcomes and variables related to critically ill AKI patients receiving IHD at a tertiary care facility with a low income. Our research revealed that IHD procedures were comparable to those described in the literature. However, our mortality was higher than that reported in better income nations and differed somewhat from studies conducted in comparable circumstances. Our research population was comparable to previously documented populations in comparable contexts and was, on average, younger than that in HICs. The reduced mortality than that seen in the Indian environment may have been a result of this, However, malaria sepsis emerged as

an unexpected cause of AKI in our population, assumed to be endemic and so imparting active immunity. The causes of AKI were consistent with established aetiology. There was a strong correlation between ARDS and the necessity for mechanical ventilation. This might be the case because, despite the fact that the mechanism is not entirely clear, high PEEP levels have been linked to AKI [7].

Hypotension in this study made IHD more difficult. In patients with CKD, this is a common complication of IHD. The dialyzable nature of the vasopressors utilised, however, may have led to worse outcomes when used to treat septic shock. There were no cardiac arrests during the research period. Septic shock, ARDs, and the necessity for mechanical ventilation were all significant death predictors. A known cause of mortality in our population, sepsis-induced AKI is common. The study's participant population demonstrated how a suitable modified IHD practise might be tailored to the clinical requirements of ICU patients with AKI. In settings with resource limitations, it assisted in achieving reasonable clinical outcomes. Centers with a situation akin to ours have modified their procedures to reduce difficulties. Our patient population's age distribution and the range of AKI cases were comparable to those found in ICUs in underdeveloped countries. The increased rate of multiorgan failure in our series was caused by a high proportion of sepsis [8].

IHD is the favoured option in our context, despite the fact that RRT modality selection differs between facilities internationally. It is frequently prescribed to CKD patients. When used, peritoneal dialysis (PD) is a rare treatment for AKI in paediatric patients. RRT was chosen because CRRT is labour-and money-intensive. The lack of ICU beds and dialysis equipment in this location makes the situation worse. The aforementioned problems severely restrict the use of CRRT in Uganda and other low resource settings. In ICUs in underdeveloped nations, modifications to conventional IHD such persistent low efficiency dialysis, brief daily dialysis, and isolated ultrafiltration have been demonstrated to produce good patient outcomes [9]. The study's retrospective design precluded consideration of other significant side events, such as newly developing infections through access, significant bleeding, and transitory cardiac arrhythmias. For patients in the ICU, poor hemodynamic tolerance of IHD was a typical issue. In this study's IHD sessions, hypotension developed in 22.5% of the cases. This goes beyond what other studies have reported. The key finding was that patient survival rates in our study were comparable to those reported in wealthy nations. This fact might imply that we did not overlook significant negative impacts when we reviewed the data. Our work is the first to provide RRT characteristics in an African context, but it has certain limitations due to its retrospective design, lost patient records, inadequate dosage information, ambiguous vasopressor use duration, and potential underreporting of side effects [10].

Conclusion

Our study has offered proof for the epidemiology and features of HA-AKI in noncritical patients, which is currently being used in clinical practise. We found high rates of mortality with HA-AKI in patients who were not critically sick, which strongly supports the need for a carefully planned, controlled trial examining the impact of nephrologist engagement on outcomes, such as death, duration of stay, and restoration of kidney function. Overall, our findings provide preliminary support for creating and implementing systematic surveillance programmes, such as electronic AKI alerts systems with automated nephrologist consultation on AKI identification or real-time prognostic models.

Conflicts of Interest

None

Acknowledgments

None

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