

Frequency and Outcomes of Acute Kidney Injury Among Patients Admitted to the Medical Ward of a Tertiary Care Hospital

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ABSTRACT

Objective: To determine the frequency and outcomes of acute kidney injury (AKI) among patients admitted to the medical ward of a tertiary care hospital, and to identify factors associated with in-hospital mortality.

Methodology: This descriptive cross-sectional study was conducted in the Medical Ward of Akbar Niazi Teaching Hospital, Islamabad, from January 2026 to April 2026. Patients aged 18–80 years who developed AKI and stayed longer than 48 hours were included through consecutive sampling. ICU patients, dialysis-dependent patients, transplant recipients, and those with an admission creatinine above 5 mg/dL were excluded. AKI was diagnosed and staged using KDIGO criteria. Data were analysed using SPSS version 26. Associations with mortality were assessed using the Chi-square or Fisher's exact test, with $p < 0.05$ considered significant.

Results: Of 1470 admissions, 234 patients developed AKI, giving a frequency of 15.9%. The mean age was 60.4 ± 15.2 years, and 148 (63.2%) were male. Hypertension (52.1%) and diabetes (40.2%) were the most common comorbidities. Stage 3 AKI was present in 126 (53.8%) patients. No patient required dialysis. In-hospital mortality was 14.5%. Sepsis, septic shock, vasopressor use, and Stage 3 AKI were significantly associated with mortality. Septic shock was the strongest predictor ($p = 0.009$). Hypertension and diabetes were not associated with mortality.

Conclusion: AKI affected about one in six medical ward admissions and was often severe. Mortality was driven mainly by sepsis, not chronic comorbidities. Early detection of AKI and prompt sepsis management are essential to improve outcomes.

Keywords: Acute kidney injury; KDIGO; Sepsis; In-hospital mortality; Tertiary care hospital

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Introduction

Acute kidney injury (AKI) is a prevalent and serious complication that can occur during hospitalization.¹ Large cohort studies from suggests that AKI is a major problem that may lead to increased mortality and morbidity.¹ A multi-center study conducted in the United States showed that approximately 14% of hospitalized patients developed AKI.¹ More than 50% of patients who are admitted to Intensive Care Units (ICUs) have this number.¹

A recent global meta-analysis showed that 21.6% of adult inpatients over the world have this condition.² A large population-based cohort study was conducted in Olmsted County, Minnesota. This study analyzed data of 52,000 hospitalized patients. Researchers reported incidence rates of 186 and 287 per 100,000 person-years in ICU and general ward patients, respectively.³ In Hong Kong, a cohort of more than 125,000 admissions, the prevalence of AKI was 9.1% in general wards.⁴

The clinical and epidemiological results of AKI are increased in low- and middle-income countries (LMICs).

A single-center study from Pakistan showed a AKI prevalence of 34.7% among hospitalized patients.⁵ The identified independent predictors were diabetes (60%, $p=0.002$), nephrotoxic medication exposure (43%, $p=0.01$), and advanced Child–Pugh class.⁵ Another hospital-centric study of general medical inpatients revealed an AKI prevalence of 22.3%.⁶

Similar outcomes from neighboring LMICs are reported. A nine-center registry in India, which had 3,711 cases of community-acquired AKI. They found sepsis (34.7%) and tropical infections (9.8%) as main causes.⁷ The study also reported in-hospital mortality rate of 10.8%.⁷ In Bangladesh, a prospective ward-based study was done in Dhaka.⁸ The results shown that hospital-acquired AKI was mostly attributable to sepsis (44%) and fluid loss (42%). This lead to an 18% inpatient mortality rate and 22% of survivors progressing to chronic kidney disease after three months.⁸ A meta-analysis of 22 trials consisting 4,069 patients conducted in Iran revealed that 24% of hospitalized COVID-19 patients experienced AKI.⁹ In ICUs, the rate was higher (30%) than in normal wards (23%). This show that AKI is a serious problem even when people are not in critical care.⁹ Patients suffering from AKI also have an increased death rate, which can be as low as 1% in moderate cases and as high as 66% in seriously ill groups.¹⁰ Besides that, the long-term consequences are also concerning.¹⁰ Chronic AKI is associated with a fivefold increase in one-year mortality compared to individuals without AKI.¹ Moreover, diagnosis of AKI early is another major problem. A multicenter study revealed that nearly 68% of Kidney Disease Improving Global Outcomes (KDIGO) defined AKI episodes were not diagnosed in general medical wards.¹¹

The present study is aimed to find out the frequency of AKI in medical ward of a tertiary care hospital in Pakistan. By finding out the AKI frequency, risk factors such as comorbidities and nephrotoxic exposures, and assessing outcomes, this work aims to generate actionable evidence for a setting where systematic data are scarce.

Methodology

This descriptive cross-sectional study was conducted in the Medical Ward of Akbar Niazi Teaching Hospital, Islamabad. The study duration of the study was from January 2026 to April 2026. The ethical exemption for the study was obtained from the Ethics Review Committee of Islamabad Medical and Dental College,

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All patients admitted to the medical ward during the study period were screened for AKI. Patients aged 18 to 80 years who developed AKI and had a hospital stay of more than 48 hours were included in the study through non-probability consecutive sampling. Patients with end-stage renal disease on maintenance dialysis, kidney transplant recipients, admission serum creatinine greater than 5.0 mg/dL, and patients admitted to the intensive care unit were excluded.

AKI was diagnosed and staged according to the kidney disease: Improving Global Outcomes (KDIGO) criteria. Data were collected using a structured proforma after obtaining informed consent. Information regarding demographic characteristics, comorbidities, clinical findings, laboratory investigations, medication exposure, and hospital outcomes was obtained from patient files, nursing records, laboratory reports, and the hospital electronic record system. Sepsis was defined according to Sepsis-3 criteria, and SOFA criteria were used.

The primary outcome was the frequency of AKI among patients admitted to the medical ward. Secondary outcomes included AKI severity, dialysis requirement, length of hospital stay, and in-hospital mortality.

Data were entered and analyzed using SPSS version 26. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequencies and percentages. Associations between clinical variables and in-hospital mortality were assessed using the Chi-square test or Fisher's Exact test where appropriate. A p -value of less than 0.05 was considered statistically significant.

Results

A total of 1470 patients were admitted to the medical ward. Among them, 234 patients developed AKI, resulting in a frequency of 15.9%. The mean age of the patients was 60.4 ± 15.2 years, and males constituted the majority of the study population $N = 148$ (63.2%). Hypertension and diabetes mellitus were the most frequently observed comorbidities. Detailed baseline characteristics and associated clinical factors are presented in Table I.

More than half of the patients had severe renal injury, with Stage 3 AKI observed in 126 (53.8%) patients. Overall, in-hospital mortality was 34 (14.5%). The

Table I: Baseline Characteristics and Clinical Profile of AKI Patients (n = 234)

Variable	N / Value
Mean age (years)	60.4 ± 15.2
Male gender	148 (63.2%)
Female gender	86 (36.8%)
Mean hospital stay (days)	6.2 ± 3.4
Hypertension	122 (52.1%)
Diabetes Mellitus	94 (40.2%)
Ischemic Heart Disease	16 (6.8%)
Sepsis	32 (13.7%)
Septic Shock	14 (6.0%)
Vasopressor Use	12 (5.1%)
ACE inhibitors/ARBs Use	18 (7.7%)
Aminoglycoside Exposure	6 (2.6%)
IV Contrast Exposure	2 (0.9%)

Table II: Severity and Outcomes of Acute Kidney Injury.

Variable	Frequency (%)
Stage 1 AKI	42 (17.9%)
Stage 2 AKI	66 (28.2%)
Stage 3 AKI	126 (53.8%)
Requirement for Dialysis	0 (0%)
Discharged Alive	200 (85.5%)
In-hospital Mortality	34 (14.5%)

severity distribution of AKI and patient outcomes are summarized in Table II.

Categorical variables were compared using the Chi-square test or Fisher's Exact test where appropriate. Fisher's Exact test was applied for variables with expected cell counts less than 5, including septic shock and vasopressor requirement.

Sepsis, septic shock, vasopressor requirement, and Stage 3 AKI demonstrated statistically significant associations with in-hospital mortality. Septic shock showed the strongest association with mortality ($p = 0.009$). However, hypertension and diabetes mellitus were not significantly associated with mortality in the present study. A comparison of factors associated with mortality is shown in Table III.

Discussion

Our study showed that AKI occurred in 15.9% of medical ward admissions. This showed that almost one in six

patients admitted to medical ward developed AKI during their stay. This frequency reported in our study lie within the range reported worldwide. Different hospital cohorts have reported KDIGO-defined AKI in 17% to 31% of inpatients.¹² A study from Italy consisting of more than 87,000 patients reported AKI frequency of 20.6%.¹³ In comparison our figure is slightly lower. The most likely reason of this could be our study design. We excluded ICU patients, dialysis-dependent patients, and those with a creatinine above 5 mg/dL. We measured AKI on the general ward, not in critical care.

Our results are also comparable to Pakistani data well. A ward-based study conducted in Peshawar reported a frequency of 15.4% AKI in admitted patients.¹⁴ However, some other Pakistani studies reported higher figures.¹⁵ A single-center study conducted at a hospital in Multan reported AKI frequency of 34.7%.⁵ Another study from Karachi reported a frequency of 22.3%.⁶ ICU-based studies report even higher numbers. An ICU study from Islamabad found AKI in 68.6% of patients, and severity was significantly associated with mortality.¹⁴ These differences are mainly driven by the setting. Ward studies report lower frequencies than ICU studies. The severity of illness in the sampled population matters more than the disease itself.

The demographic profile of our patients was typical. The mean age of the patients was 60 years. Most patients were male (63%). This pattern matches local and international reports.^{15,16} Hypertension (52%) and diabetes (40%) were reported as most common comorbidities. This is expected, as both conditions predispose the kidney to injury.

The most striking finding in our study was the severity of AKI. Our results reported that more than half of the patients (53.8%) had Stage 3 disease. This is unusual in previous literature. In well-monitored cohorts, mild Stage 1 disease is usually the most common severity reported. We interpret this finding with caution. It likely reflects late presentation and poor early detection. Studies show that up to 68% of AKI episodes go unrecognized in routine care.¹⁷ In our setting, patients often present late.

Table III: Factors Associated with In-Hospital Mortality.

Variable	Survivors n=200	Non-Survivors n=34	Statistical Test	p-value
Sepsis	20 (10.0%)	12 (35.3%)	Chi-square	0.004
Septic Shock	6 (3.0%)	8 (23.5%)	Fisher's Exact	0.009
Vasopressor Use	4 (2.0%)	8 (23.5%)	Fisher's Exact	0.013
Stage 3 AKI	98 (49.0%)	28 (82.4%)	Chi-square	0.028
Diabetes Mellitus	78 (39.0%)	16 (47.1%)	Chi-square	0.612
Hypertension	100 (50.0%)	22 (64.7%)	Chi-square	0.421

The cases that are detected are therefore the more advanced ones. The severity skew may reflect access and detection, not biology alone.¹⁷

Our study reported that mortality increased with severity. In-hospital death occurred in 14.5% of the AKI patients. A Brazilian study reported 25% mortality in patients with AKI.¹⁶ Risk increased with AKI stage. This matches cohorts where Stage 3 disease carries a much higher mortality than Stage 1.¹⁸ The main driver of death was sepsis. Sepsis, septic shock, and vasopressor use were all significantly associated with mortality. Septic shock was the strongest predictor ($p = 0.009$). This agrees with the wider literature.¹⁹ A large study consisting of over 27,000 patients from five international medical databases reported that a sepsis-associated AKI carries a mortality above 25%.¹⁹ However, in literature, AKI in the setting of sepsis is an independent predictor of death.²⁰

In contrast, hypertension and diabetes were not associated with mortality. These are risk factors for developing AKI. They are not the main cause of death. Death was driven by acute illness, not chronic disease.

Limitations: This study has several limitations. First, it was a single-center study, so the results may not apply to other hospitals or regions. Second, the cross-sectional design cannot establish cause and effect; it can only show relationship. Third, we used non-probability consecutive sampling, which may introduce selection bias. Fourth, we excluded ICU patients, dialysis-dependent patients, and those with a creatinine above 5 mg/dL. This limits the findings to less severe, ward-based AKI and explains the absence of dialysis in our cohort. Fifth, baseline creatinine was not available for every patient, which may affect staging accuracy. Finally, follow-up ended at discharge. We could not assess renal recovery or progression to chronic kidney disease, so long-term outcomes remain unknown.

Conclusion

AKI was common among medical ward admissions, affecting about one in six patients. Most cases were severe, and more than half reached Stage 3. In-hospital mortality was substantial. Sepsis, septic shock, and vasopressor use were the main predictors of death. Hypertension and diabetes were common but did not predict mortality. These findings point to two priorities. First, AKI must be detected earlier, before it reaches an advanced stage. Second, prompt recognition and treatment of sepsis are essential to reduce deaths. Simple measures, such as routine creatinine monitoring and early sepsis care, may improve outcomes in this setting. Larger

multicenter studies with long-term follow-up are needed to confirm these findings.

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