

Acute Kidney Injury in Intensive Care: Clinical Profile, Prognosis, and Factors Associated with Renal Replacement Therapy.

Abstract

Background: Acute kidney injury (AKI) affects 30 to 60% of critically ill patients, particularly in intensive care units, leading to significant acute morbidity and mortality while extending its impact beyond the acute phase.

Objective: The primary objective of our study is to characterize the clinical and biological profile of patients with AKI in intensive care and to identify the factors associated with the need for renal replacement therapy (RRT).

Methods: This is a prospective, single-center study on cases of AKI occurring in the Surgical Intensive Care Unit, Pavilion 17, CHU Ibn Rochd, Casablanca, over a one-year period in 2023. Data were collected and analyzed using SPSS. Patients who stayed in intensive care for less than 24 hours and those with incomplete records were excluded.

Results: During the study period, 1090 patients were admitted, of whom 358 (32.8%) developed AKI. A total of 320 eligible patients were included. The median age was 61 years [46–72 years], with 166 men (51.8%). The leading cause of admission was shock ($n=135$, 42.2%). The severity of illness at admission was assessed using SOFA and APACHE II scores, with median values of 6 [3–8] and 16 [12–22], respectively. RRT was required in 73 patients (22.7%), and the overall mortality rate was 61.8%. Factors associated with the need for RRT included history of chronic kidney disease ($OR = 3.0$, $p = 0.004$), AKI at admission ($OR = 3.0$, $p = 0.006$), and multiorgan failure ($OR = 2.0$, $p = 0.02$). Among survivors, 36% did not recover renal function.

Conclusion: AKI is a common cause of morbidity and mortality in intensive care, often requiring RRT. Prevention and early detection of AKI and its predisposing factors are crucial, as well as ensuring long-term follow-up for survivors to improve outcomes.

Keywords: Acute Kidney Injury; Intensive Care; Renal Replacement Therapy; Prognosis; Surgical ICU; Casablanca.

INTRODUCTION

Acute kidney injury (AKI) affects 30 to 60% of critically ill patients, particularly in intensive care units, leading to significant acute morbidity and mortality while extending its impact beyond the acute phase. The occurrence of AKI is often a consequence of severe underlying conditions such as sepsis, shock, or major surgery, and it acts as an independent risk factor for mortality.

In the intensive care setting, the management of AKI frequently requires renal replacement therapy (RRT) when conservative measures fail to maintain fluid, electrolyte, and acid-base

balance. The decision to initiate RRT and the identification of patients at high risk of requiring it remain critical challenges for intensivists.

The primary objective of our study is to characterize the clinical and biological profile of patients with AKI in the surgical intensive care unit and to identify the factors associated with the need for RRT. Secondary objectives include evaluating the overall mortality and assessing renal recovery among survivors.

METHODS

Study Design and Setting

This was a prospective, single-center, descriptive, and analytical study conducted at the Surgical Intensive Care Unit, Pavilion 17, CHU Ibn Rochd, Casablanca, Morocco. The study spanned a one-year period in 2023.

Study Population

The study included patients admitted to the surgical ICU during the study period who developed AKI. Patients who stayed in the ICU for less than 24 hours and those with incomplete medical records were excluded from the analysis.

Data Collection

Data were collected using a standardized form. Variables included demographic characteristics (age, sex), comorbidities (diabetes, hypertension, cardiac diseases, chronic kidney disease), admission diagnosis, severity scores (SOFA, APACHE II), need for RRT, and patient outcome (survival, death, renal recovery).

Statistical Analysis

Qualitative variables were expressed as frequencies and percentages. Quantitative variables were presented as medians with interquartile ranges (IQR) or means $\pm$ standard deviations. Univariate and multivariate logistic regression analyses were performed to identify factors associated with the need for RRT. A p-value < 0.05 was considered statistically significant. Statistical analysis was performed using SPSS software.

RESULTS

Epidemiological and Clinical Characteristics

During the study period in 2023, 1090 patients were admitted to the ICU, of whom 358 (32.8%) developed AKI. A total of 320 eligible patients were included in the analysis. The median age of the patients was 61 years [46–72 years], with 166 men (51.8%).

The main comorbidities included diabetes (n=87, 27.3%), hypertension (n=84, 26.2%), and cardiac diseases (n=91, 28.4%). Chronic kidney disease (CKD) was present in 36 patients

(11.3%), with an average estimated glomerular filtration rate (eGFR) of 41.4 ± 22.3 ml/min/1.73m².

Table 1: Patient demographics and comorbidities

Characteristics	Value
Median Age (years) [IQR]	61 [46–72]
Male Sex, n (%)	166 (51.8%)
Diabetes, n (%)	87 (27.3%)
Hypertension, n (%)	84 (26.2%)
Cardiac Diseases, n (%)	91 (28.4%)
Chronic Kidney Disease, n (%)	36 (11.3%)

Severity at Admission

The leading cause of admission was shock, observed in 135 patients (42.2%). The severity of illness at admission was high, assessed using the SOFA and APACHE II scores, with median values of 6 [3–8] and 16 [12–22], respectively.

Table 2: Admission diagnosis and severity scores

Parameter	Value
Shock as main admission cause, n (%)	135 (42.2%)
SOFA Score, median [IQR]	6 [3–8]
APACHE II Score, median [IQR]	16 [12–22]

Renal Replacement Therapy and Associated Factors

Renal replacement therapy (RRT) was required in 73 patients (22.7%). Intermittent hemodialysis (IHD) was the modality used in almost all cases. Multivariate analysis identified several factors independently associated with the need for RRT.

Table 3: Factors associated with the need for RRT

Factor	Odds Ratio (OR)	95% CI	P-value
History of Chronic Kidney Disease	3.0	1.41–6.56	0.004
AKI present at admission	3.0	1.40–6.70	0.006
Multiorgan Failure	2.0	1.10–3.80	0.020

Outcomes

The overall mortality rate in the study population was high, reaching 61.8%. Among the survivors, the evolution of renal function was marked by a lack of recovery in 36% of cases. Furthermore, only a small proportion of patients (16.8%) received nephrological follow-up after discharge.

DISCUSSION

Our study highlights the significant burden of AKI in the surgical intensive care unit, with an incidence of 32.8% among admitted patients. This is consistent with literature reporting that AKI affects up to 60% of critically ill patients. The high median severity scores (APACHE II of 16)

and the predominance of shock as the admission diagnosis underscore the critical condition of this population.

RRT was necessary for 22.7% of the patients, aligning with data indicating that approximately 20% of ICU patients with AKI require such intervention. We identified preexisting chronic kidney disease, the presence of AKI at admission, and multiorgan failure as strong independent predictors for the need for RRT. Recognizing these factors early can help clinicians anticipate the need for dialysis resources and tailor patient management.

The mortality rate of 61.8% reflects the severe prognosis associated with AKI in the ICU setting. Importantly, among survivors, 36% did not fully recover their renal function. The transition from AKI to chronic kidney disease is a well-documented phenomenon, yet only 16.8% of our patients had a nephrological follow-up. This points to a critical gap in post-ICU care.

CONCLUSION

AKI is a frequent and severe complication in the Surgical Intensive Care Unit at CHU Ibn Rochd, associated with high mortality. A significant proportion of patients require renal replacement therapy, driven by preexisting kidney disease, early onset of AKI, and multiorgan failure. Prevention, early detection, and optimization of predisposing factors are crucial. Furthermore, ensuring long-term nephrological follow-up for survivors is essential to mitigate the progression to chronic kidney disease.

REFERENCES

1. Ezzouate, A. (2025). L'insuffisance rénale aigue en réanimation : profil et pronostic. Thèse de Doctorat en Médecine, Université Abdelmalek Essaâdi.
2. Hoste, E. A., et al. (2015). Epidemiology of acute kidney injury in critically ill patients: the multinational AKI-EPI study. *Intensive Care Medicine*, 41(8), 1411-1423.
3. Uchino, S., et al. (2005). Acute renal failure in critically ill patients: a multinational, multicenter study. *JAMA*, 294(7), 813-818.
4. Bellomo, R., et al. (2012). Acute kidney injury. *The Lancet*, 380(9843), 756-766.
5. Chawla, L. S., et al. (2014). Acute kidney injury and chronic kidney disease as interconnected syndromes. *New England Journal of Medicine*, 371(1), 58-66.