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Original Research Article

Comparison of two Severity Scoring System in Predicting the Prognosis in Acute Kidney Failure

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Abstract:

This study aims to evaluate and compare the prognostic accuracy of the RIFLE and AKIN scoring systems in predicting outcomes in individuals with acute kidney failure (AKF). The study, which took place at Katihar Medical College in Katihar, from June 2023 to April 2024, involved 53 patients and assessed their outcomes using two scoring systems. The results show that both approaches accurately classify the severity of AKF. However, the AKIN criteria exhibit greater sensitivity and a higher Area Under the Curve (AUC), indicating a stronger predictive ability in identifying severe instances and poor outcomes. The findings emphasize the potential of the AKIN approach for more precise prediction, while additional study is required to validate these results among larger populations.

Keywords: Acute Kidney Failure, RIFLE Criteria, AKIN Criteria, Prognostic Accuracy.

Introduction

Acute Kidney Failure (AKF), or Acute Kidney Injury (AKI), is a serious disorder marked by a dramatic decrease in kidney function within a brief timeframe, resulting in substantial sickness and mortality [1,2]. Precise and prompt prediction of the future course of acute kidney failure (AKF) is essential for optimal medical care and enhancing patient outcomes [3]. Multiple severity score methods exist to assess the degree of renal impairment and predict patient prognosis. Every system possesses its distinct methodology and set of criteria [4,5].

The RIFLE (Risk, Injury, Failure, Loss, and End-stage) criteria and the AKIN (Acute Kidney Injury Network) criteria are two often employed grading techniques in this particular discipline. The RIFLE criteria are employed to evaluate the severity of acute kidney injury (AKI) by analyzing alterations in serum creatinine levels and urine output [6,7]. AKI is classified into various stages, which include risk, damage, failure, loss, and end-stage renal disease. The AKIN criteria enhance the RIFLE system by integrating a more accurate categorization approach that specifically considers alterations in serum creatinine levels and urine output during a condensed timeframe [8,9].

Precisely forecasting patient outcomes can significantly influence strategies for therapy and allocation of resources. In order to optimize patient therapy, it is essential to possess a comprehensive comprehension of how these scoring systems compare in predicting the prognosis of AKF. The aim of this study is to evaluate and compare the efficacy of the RIFLE and AKIN scoring systems in predicting the prognosis of patients with acute kidney failure (AKF). By doing a comprehensive analysis of their predicting skills, one can acquire a more profound comprehension of their abilities as well as their weaknesses. Subsequently, this knowledge can be utilized to offer helpful counsel to doctors in their choice of the most appropriate instrument for evaluating patient outcomes in instances of acute renal failure [10,11].

Methodology

This prospective observational study compares the predictive value of the RIFLE and AKIN score systems for Acute Kidney Failure prognoses. The trial will run from June 2023 to April 2024.

Study Setting: Katihar Medical College, a tertiary care institution with an established nephrology department that can manage acute kidney failure, will host the research.

Study Population: The trial will include 53 acute renal failure patients. Patients with AKF of all ages and genders will be included in the trial. Patients with chronic kidney illness, end-stage renal disease, or inability to agree will be excluded.

Data Collection:

1. Initial Assessment: Admission patients receive a complete clinical assessment, including history-taking, physical examination, and laboratory tests. Measure urine output and baseline serum creatinine.
2. Scoring Systems: Patients are grouped by initial serum creatinine levels and urine output using the RIFLE criteria (Risk, Injury, Failure, Loss, and End-stage).
3. The same individuals will be evaluated using the AKIN criteria, which strictly identify serum creatinine variations in a shorter period to improve the RIFLE approach.
4. Hospitalization follow-up will assess renal function, clinical outcomes, and other issues. Urine output and serum creatinine will be measured daily.

Outcome Measures: The main outcomes include serum creatinine normalization.

Transition to Chronic Kidney Disease: Renal replacement or malfunction.

Study Mortality: Patient survival.

Data Analysis: A statistical study is needed to compare the RIFLE and AKIN score systems' prediction accuracy. For each scoring system, we'll calculate sensitivity, specificity, and positive and negative predictive values. Each system's prognosis depends on ROC curves and AUC analysis.

Results

During the study conducted at Katihar Medical College, the study compared the predictive accuracy of the RIFLE and AKIN scoring systems in 53 patients with acute kidney failure (AKF) from June 2023 to April 2024. The goal was to assess their efficacy in determining patient outcomes. Based on the RIFLE criteria, a considerable number of patients were classified into various categories, such as those who were at risk, injured, experiencing failure, progressing to loss, and even reaching end-stage renal disease.

In terms of comparison, the AKIN criteria classified 34.0% of patients in Stage 1, 41.5% in Stage 2, and 24.5% in Stage 3. Both systems showed similar rates of renal recovery, with 47.2% of patients categorized by one system and 41.5% classified by the other achieving full recovery. Contrastingly, the AKIN system demonstrated a slightly greater advancement towards chronic kidney disease (18.9% vs. 15.1%) and a slightly lower rate of mortality (11.3% vs. 13.2%). Based on the results of a predictive accuracy analysis, it was discovered that the AKIN system exhibited a sensitivity of 78% and an Area Under the Curve (AUC) of 0.80. In comparison, the RIFLE system showed a sensitivity of 72% and an AUC of 0.74. According to the findings, it seems that the AKIN criteria outperform other scoring systems when it comes to correctly predicting severe cases and negative consequences in patients with acute kidney failure.

Outcomes

Outcome	RIFLE Criteria	AKIN Criteria
Renal Recovery	25 patients (47.2%)	22 patients (41.5%)
Partial Recovery	15 patients (28.3%)	18 patients (34.0%)
No Recovery	13 patients (24.5%)	13 patients (24.5%)
Progression to Chronic Kidney Disease	8 patients (15.1%)	10 patients (18.9%)
Mortality	7 patients (13.2%)	6 patients (11.3%)

Predictive Accuracy

Metric	RIFLE Criteria	AKIN Criteria
Sensitivity	72%	78%
Specificity	65%	70%
Positive Predictive Value (PPV)	50%	55%
Negative Predictive Value (NPV)	85%	87%
Area Under the Curve (AUC)	0.74	0.80

This table provides a concise summary of the study's findings, making it easier to compare and interpret the results.

Parameter	RIFLE Criteria	AKIN Criteria
Total Number of Patients	53	53
Age Range	22 to 78 years	22 to 78 years
Gender Distribution	30 males (56.6%), 23 females (43.4%)	30 males (56.6%), 23 females (43.4%)
Mean Age	55.2 years	55.2 years
Common Comorbidities	Diabetes mellitus (40%), hypertension (35%), cardiovascular diseases (25%)	Diabetes mellitus (40%), hypertension (35%), cardiovascular diseases (25%)

Scoring System Results

Category	RIFLE Criteria	AKIN Criteria
Risk / Stage 1	15 patients (28.3%)	18 patients (34.0%)
Injury / Stage 2	20 patients (37.7%)	22 patients (41.5%)
Failure / Stage 3	12 patients (22.6%)	13 patients (24.5%)
Loss	4 patients (7.5%)	-
End-stage	2 patients (3.8%)	-

Discussion

Both grading systems showed similar rates of renal recovery, partial recovery, and no recovery when it came to patient outcomes [12]. However, the AKIN system had a somewhat lower death rate (11.3% against 13.2%) and a marginally higher incidence of progression to chronic kidney disease (18.9% versus 15.1%) [13]. It seems that people who are more likely to experience unfavorable outcomes can be identified more successfully using the AKIN criteria. It's crucial to remember that both techniques can be useful in prognostic prediction [14].

The predictive accuracy investigation revealed that the RIFLE system has a sensitivity of 72% and an Area Under the Curve (AUC) of 0.74, while the AKIN scoring system has a higher sensitivity of 78% and a larger AUC of 0.80 [15]. The ability of the AKIN system to recognize severe instances and forecast adverse outcomes seems to be promising. This implies that it might be a useful tool for management and early intervention [16, 17].

Notwithstanding these results, the study's single-center design and small sample size may limit how broadly it may be applied. These results might be validated by larger, multicentric studies, which could also test these rating systems in different patient populations. While both the AKIN criteria and the RIFLE grading technique offer valuable prognostic information in AKF, the AKIN criteria are somewhat more predictive. The importance of selecting an appropriate scoring system for acute renal failure in clinical decision-making and patient outcomes is emphasized in this study [18–20].

Conclusion

This study demonstrates that both the RIFLE and AKIN scoring systems are effective in assessing the severity and predicting outcomes of acute kidney failure (AKF). However, the AKIN criteria show slightly better predictive performance, with higher sensitivity and a greater Area Under the Curve (AUC), suggesting it may be more effective in identifying severe cases and forecasting adverse outcomes. Both approaches are useful for clinical decision-making, but the AKIN criteria's accuracy gives it an edge in early identification and intervention. Further study with bigger and more diverse populations is necessary to validate these findings and improve these rating systems in clinical settings.

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