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The Relationship Between CRP/Albumin Ratio and In-Hospital Mortality in Intensive Care Patients: A Retrospective Observational Study

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ABSTRACT

Introduction: Accurate prognostic assessment in intensive care units (ICUs) is crucial for early risk stratification and efficient resource allocation. The C-reactive protein to albumin ratio (CAR) has recently gained attention as a composite biomarker that reflects both systemic inflammation and nutritional status. The present study sought to determine whether CAR measured at ICU admission could predict in-hospital mortality among critically ill adults and to establish its optimal discriminatory threshold.

Methods: This single-center retrospective cohort study included 1,846 adult patients (aged ≥18 years) who were admitted to the ICU between January 2023 and June 2025. At the point of admission, demographic, clinical, comorbidity, and laboratory data were thoroughly recorded. Mortality predictors were evaluated via logistic regression methods. The capacity of CAR for discrimination was determined using receiver operating characteristic analysis.

Results: Overall in-hospital mortality was 24.2% (n=446). Non-survivors were significantly older, with lower body weight and body mass index, and with higher rates of diabetes, chronic kidney disease, malignancy, heart failure, sepsis, infection, and acute kidney injury (AKI). The CAR at admission was markedly higher in non-survivors (5.5±5.3 vs. 1.5±2.6, $p<0.001$). In multivariable logistic analysis, independent factors associated with in-hospital mortality included age, polypharmacy, heart failure, infection, AKI, and CAR. The best threshold identified for CAR was 1.715, providing 76.9% sensitivity and 73.6% specificity, while its negative predictive value reached 90.9%.

Conclusion: Admission-time CAR measurement proved to be an effective indicator of in-hospital mortality among ICU patients. Its simplicity and cost-effectiveness underscore its utility as a prognostic instrument for early risk stratification in critical care.

Keywords: CRP/Albumin ratio, prognostic marker, in-hospital mortality, intensive care, critical illness

Introduction

The precise and timely prognostic evaluation of patients in critical condition represents a cornerstone of modern critical care medicine. Conducting an accurate prognostic assessment is essential not only for tailoring therapeutic strategies but also for ensuring rational allocation of intensive care unit (ICU) resources, prioritization of clinical interventions, support of ethical decision-making processes, and enhancement of cost-effectiveness analyses. Accurate prognostic evaluation allows for the timely identification of clinical priorities in critically ill patients, facilitating appropriate decisions regarding palliative care and contributing to the reduction of both mortality and morbidity.

The use of established clinical scoring models-such as APACHE II, SAPS II, SOFA, and qSOFA-has become a cornerstone of contemporary intensive care management (1,2). Nevertheless, these indices present notable shortcomings: they depend on multiple physiological and laboratory parameters, are prone to interobserver variation due to the subjectivity of certain measurements, and typically capture a patient's status at a single point in time. Furthermore, since these systems were initially designed for specific populations, their applicability to the wider ICU cohort remains limited. Consequently, there is a growing demand for prognostic indicators that are simpler, more objective, more rapidly obtainable, and feasible for everyday clinical implementation.

In recent years, easily measurable laboratory-based biomarkers have gained prominence for predicting outcomes in critically ill patients. Several indices derived from standard hematologic and biochemical parameters-such as the neutrophil-to-lymphocyte and platelet-to-lymphocyte ratios, systemic immune-inflammation index, prognostic

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nutritional index, and hemoglobin-albumin-lymphocyte-platelet score-have been frequently studied (3-6). Among these, the ratio of C-reactive protein to albumin ratio (CAR) has drawn particular attention as it combines two physiologically distinct yet complementary indicators: C-reactive protein (CRP), which mirrors systemic inflammation, and albumin, which reflects nutritional and hepatic synthetic capacity (7). This integrated measure provides a broader representation of both inflammatory and nutritional status, often outperforming the predictive strength of each parameter alone.

Previous studies have linked elevated CAR levels with higher rates of mortality, postoperative complications, and reduced long-term survival across diverse conditions, including sepsis, acute renal injury, major surgical procedures, and other critical illnesses (7-15). However, systematic evaluation of CAR within ICUs remains limited.

ICUs are multidisciplinary settings in which critically ill patients are managed due to various conditions such as trauma, infection, systemic inflammation, and multiorgan failure. Prognostic assessment in this patient population requires a comprehensive approach that simultaneously accounts for the acute physiological stress response, underlying comorbidities, and the risk of complications. In this context, CAR, by integrating markers of inflammation and physiological reserve, could act as an effective indicator for anticipating early complications including sepsis, acute kidney injury (AKI), and ventilator-associated pneumonia.

The present study was designed to investigate whether the CAR obtained at the time of ICU admission could serve as a predictor of in-hospital mortality among critically ill adults. A secondary goal was to determine the most appropriate CAR threshold for mortality prediction, evaluate its discriminative capacity, and assess whether it functions independently of other prognostic indicators. Furthermore, the study aimed to explore associations between CAR and other clinical outcomes beyond mortality, with the ultimate objective of determining its potential as a practical and easily measurable marker to support early risk evaluation and guide therapeutic decision-making in intensive care practice.

Methods

This investigation was designed as a retrospective cohort analysis performed at a single tertiary-level ICU. The study cohort consisted of adult patients (aged 18 years or above) who were hospitalized between January 2023 and June 2025.

Eligibility criteria required participants to be 18 years or older, to have stayed in the ICU for a minimum of 24 hours, and to have available admission measurements of both CRP and albumin. Consecutive sampling was applied to all patients fulfilling these inclusion criteria. Individuals were excluded if they were under 18 years old, had chronic liver disorders such as hepatitis or cirrhosis that could alter albumin levels, experienced repeated ICU admissions (only the first stay was analyzed), lacked baseline laboratory or demographic data, or were transferred from another critical care facility.

All study data were retrospectively obtained from the hospital's electronic medical record system following approval by the Non-Interventional Clinical Research Ethics Committee of the University of Health Sciences Türkiye, İstanbul Training and Research Hospital (approval no: 191; date: July 25, 2025). Demographic characteristics at ICU admission and accompanying comorbidities-including hypertension, diabetes mellitus, coronary artery disease, arrhythmia, heart failure, valvular heart disease, chronic obstructive pulmonary disease, stroke, chronic kidney disease, malignancy, hypothyroidism, and polypharmacy-were documented. In addition, clinical conditions such as sepsis, pneumonia, infection, and AKI were also recorded.

Statistical Analysis

Statistical analyses were carried out using IBM SPSS Statistics software, version 27.0 (IBM Corp., Armonk, NY, USA). The normality of continuous data was evaluated with the Kolmogorov-Smirnov test. Variables showing a normal distribution were summarized as mean ± standard deviation, while variables with a non-normal distribution were presented as median values with interquartile range (minimum-maximum). Categorical variables were expressed as frequencies and percentages.

Group comparisons were performed using the Student's t-test for normally distributed continuous variables and the Mann-Whitney U test for those that did not follow a normal distribution. Associations between categorical variables were examined using the chi-square test or Fisher's exact test, where appropriate.

Predictors of mortality were evaluated using univariate logistic regression analysis. Variables with a p-value <0.05 in the univariate analyses were subsequently included in the multivariate logistic regression model. For variable selection in the multivariate analysis, the forward likelihood ratio (forward LR) method was applied. Results were reported as odds ratios (OR) with 95% confidence intervals (CI).

The predictive performance of CAR for mortality was evaluated using receiver operating characteristic (ROC) curve analysis, with the area under the curve (AUC) and 95% CI calculated. The optimal cut-off value was determined using the Youden index. For this cut-off, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated. A p-value <0.05 was considered statistically significant for all analyses.

Results

A total of 1846 patients were included in the analysis, with a median age of 65 years (range 14-102) and a mean of 63.2±17.5 years. Of these, 54.4% were male (n=1005). The median body mass index (BMI) was 26.0 (range 12.9-51.9), with a mean of 26.9±5.8 kg/m², and the median body weight was 75.0 kg (range 30.0-156.0). Polypharmacy was present in 25.4% of the cohort (n=469). Respiratory comorbidities included chronic obstructive pulmonary disease (6.9%) and pneumonia at admission (4.3%). Sepsis was diagnosed in 4.1% of patients, while overall infections other than pneumonia accounted for 14.8%. AKI occurred in 9.5% of cases. The median CAR at admission was 0.7 (range 0.0-27.0), with a mean of 2.7±3.9. During the study period, 11.4% (n=211) of patients required readmission to the ICU, and the median ICU length of stay was 2 days (range 1-243; mean 7.1±16.8 days). The overall in-hospital mortality rate was 24.2% (n=446) (Table 1).

Patients who did not survive were generally older, had lower body weight and BMI, and exhibited a higher burden of comorbidities and polypharmacy (all p<0.05). Conditions such as diabetes mellitus, chronic kidney disease, malignancy, heart failure, sepsis, infection, and AKI were significantly more prevalent among non-survivors, whereas coronary artery disease was less common in this group. Although ICU readmission rates were similar between groups, the ICU stay was notably longer and CAR levels were markedly higher in non-survivors compared with survivors (p<0.001) (Figure 1, Table 2).

In univariate analysis, older age, lower body weight and lower BMI, polypharmacy, and comorbidities such as coronary artery disease, diabetes, chronic kidney disease, malignancy, heart failure, sepsis, infection, and AKI injury were all significantly associated with in-hospital mortality (p<0.05). In the multivariate model, age (OR: 1.012, p=0.003), polypharmacy (OR: 0.989, p<0.001), heart failure (OR: 0.995, p=0.024), infection (OR: 0.992, p<0.001), AKI (OR: 0.991, p<0.001), and CAR (OR: 1.403, p<0.001) remained independent predictors of mortality (Table 3).

ROC curve analysis demonstrated that CAR had a strong discriminative ability for predicting in-hospital mortality, with an AUC of 0.828 (95% CI: 0.806-0.851, p<0.001). The optimal cut-off value determined by the Youden index was 1.715, corresponding to an AUC of 0.753 (95% CI: 0.726-0.779, p<0.001). At this threshold, the sensitivity was 76.9%, the specificity was 73.6%, the PPV was 48.2%, and the NPV was 90.9%. These findings indicate that CAR ≤1.715 reliably identified survivors, whereas values >1.715 were strongly associated with mortality risk (Figure 2, Table 4).

Discussion

In this study, we found that the CAR assessed upon admission to the ICU was a significant and independent determinant of in-hospital mortality.

Table 1. Baseline characteristics of the study population

		Min-max			Median	Mean ± SD/n-%		
Age (years)		14.0	-	102.0	65.0	63.2±17.5		
Gender	Male					1005		54.4%
	Female					841		45.6%
Height (cm)		110.0	-	193.0	167.0	166.8±8.9		
Weight (kg)		30.0	-	156.0	75.0	74.9±16.5		
BMI (kg/m^2)		12.9	-	51.9	26.0	26.9±5.8		
Polypharmacy						469		25.4%
Comorbidity								
HT						939		50.9%
CAD						189		10.2%
DM						293		15.9%
CKD						137		7.4%
Arrhythmia						68		3.7%
Stroke						29		1.6%
Malignancy						302		16.4%
Hypothyroidism						128		6.9%
COPD						130		7.0%
HF						167		9.0%
VHD						103		5.6%
Sepsis						80		4.3%
Pneumonia						25		1.4%
Infection						274		14.8%
AKI						175		9.5%
CAR		0.0	-	27.0	0.7	2.7±3.9		
ICU readmission						211		11.4%
LOS (days)		1.0	-	243.0	2.0	7.1±16.8		
Mortality						446		24.2%

Continuous variables are presented as mean ± standard deviation for normally distributed data or median (minimum-maximum) for non-normally distributed data. Categorical variables are expressed as counts (n) and percentages (%)
Min: Minimum, Max: Maximum, SD: Standard deviation; n: Number of patients. HT: Hypertension, CAD: Coronary artery disease, DM: Diabetes mellitus, CKD: Chronic kidney disease, COPD: Chronic obstructive pulmonary disease, HF: Heart failure, VHD: Valvular heart disease, AKI: Acute kidney injury, CAR: C-reactive protein to albumin ratio, LOS: Length of stay, ICU: Intensive care unit

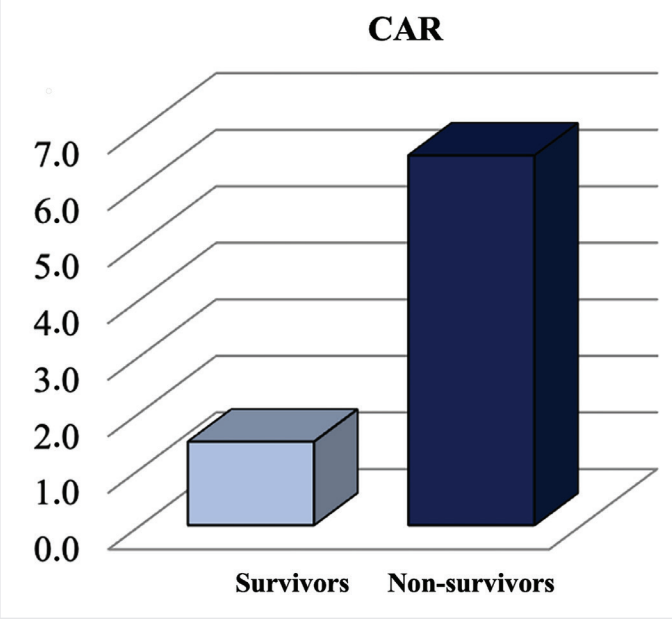

Figure 1. Distribution of C-reactive protein to albumin ratio in survivors and non-survivors
CAR: C-reactive protein to albumin ratio

This finding underscores the clinical importance of CAR as a practical prognostic tool in critically ill patients. Individuals who did not survive were generally older, exhibited lower body weight and BMI, and had multiple comorbidities alongside extensive medication use. Conditions such as diabetes, renal dysfunction, malignancy, heart failure, sepsis, and AKI were more frequent among non-survivors, whereas coronary artery disease occurred less often in this group. Moreover, CAR levels were markedly elevated in patients who died and correlated with longer ICU stays. Multivariate logistic regression further identified age, polypharmacy, heart failure, infection, AKI, and CAR as independent predictors of mortality risk.

As a prognostic indicator, the CAR captures the balance between systemic inflammatory activity and the patient's nutritional and physiological reserves. CRP reflects the dynamic and rapid response of the acute-phase reaction, serving as a marker of inflammatory status, whereas serum albumin, a negative acute-phase reactant, reflects nutritional reserves, hepatic synthetic function, and overall physiologic capacity (7). CAR, as a composite index, reflects both inflammatory activity and impaired physiologic reserve, granting it considerable prognostic value in identifying patients at risk for organ dysfunction, infection-related complications, and suboptimal recovery. In our study, the combination of lower body weight and BMI, a higher comorbidity load, polypharmacy, and the increased incidence of infection and AKI in the non-survivor group provide strong support for the underlying pathophysiological framework reflected by CAR. This conceptual framework reflects the notion that integrated biomarker indices, capturing both systemic inflammation and nutritional/physiologic reserve, demonstrate superior prognostic accuracy compared to isolated markers, as has been consistently documented in critical care.

To better delineate the clinical implications of our results, it is essential to compare them with previously published reports. In comparison with the study by Abdou et al. (16) conducted in septic patients, both investigations consistently demonstrated that older age and multiple comorbidities are strongly associated with mortality. the organ support requirements attributable to heart failure and polypharmacy emerge as recurrent factors associated with adverse outcomes. A striking contribution of our study is the remarkably high NPV (90.9%), which indicates that patients with lower CAR values have a substantially greater likelihood of survival, thereby providing practical utility for the early identification of low-risk patients. Similarly, Liu and Lv (9), in their study of patients with AKI, reported that CAR outperformed CRP or albumin alone in predicting 365-day mortality and remained an independent predictor in multivariate analysis. The fact that CAR values were significantly higher in non-survivors, and that these elevated levels were associated with long-term mortality in Cox regression, correspond well with our results. Across both studies, the consistent association of advanced age, heart failure, and AKI with mortality further reinforces the high-risk patient profile reflected by CAR.

The predictive significance of the CAR has likewise been highlighted in patients requiring postoperative intensive care. Oh, and colleagues (11) reported that CAR measured at the time of ICU admission served as an independent determinant of both short-term (30-day) and longer-term (1-year) mortality. Their analysis identified threshold values of 1.75 and 1.58 for 30-day and 1-year mortality, respectively, with higher CAR levels corresponding to substantially poorer survival outcomes. The cut-off value identified in our study (1.715) is consistent with this range, demonstrating comparable prognostic sensitivity. Within this investigation, advanced age and malnutrition emerged as principal determinants of mortality, consistent with the profile of our non-survivor group. However, while ischemic heart disease remained a significant risk factor for mortality in their study, our analysis paradoxically revealed a lower prevalence of coronary artery disease among non-survivors. Such a discrepancy may arise from selection biases inherent in specific intensive care populations, or reflect differing pathophysiological roles of cardiovascular comorbidities under variable patient characteristics. Notably, a study conducted in 2024 on a sepsis population also reported that coronary artery disease alone did not increase sepsis-related in-hospital mortality, a finding that lends support to the paradoxical observation in our cohort (17).

A retrospective analysis conducted by Oh et al. (18), demonstrated that an elevated CAR was shown to be an independent determinant of 30-day mortality among patients admitted to the ICU. However, the prognostic strength of CAR in that study was reported to be inferior to established scoring systems such as APACHE II, the Charlson Comorbidity index, and serum albumin levels. In our cohort, CAR maintained its role as an independent determinant of mortality in multivariate analysis, with prognostic power exceeding that of both age and heart failure. In particular, an OR of 1.403 with a narrow CI highlights that CAR may serve as a more robust predictor of mortality than age and comorbidities. This finding enhances the clinical applicability of CAR and suggests its potential use as a simple, complementary tool to complex scoring systems.

Ranzani et al. (8) provided valuable insights into the prognostic relevance of CAR in septic ICU patients by examining its association with mortality at both admission and discharge.

Table 2. Comparison of baseline demographic and clinical characteristics between survivors and non-survivors

		Survivors (n=1400)			Non-survivors (n=446)			p
		Mean ± SD/n-%		Median	Mean ± SD/n-%		Median	
Age (years)		62.2±17.7		65.0	66.6±16.4		68.0	**0.000**
Gender	Male	755	53.9%		250	56.1%		0.433
	Female	645	46.1%		196	43.9%		
Height (cm)		166.8±9.1		166.0	166.8±8.6		167.0	0.923
Weight (kg)		75.6±16.4		75.0	72.5±16.7		72.0	**0.000**
BMI (kg/m^2)		27.2±5.7		26.2	26.1±6.1		25.3	**0.000**
Polypharmacy		277	19.8%		192	43.0%		**0.000**
Comorbidity								
HT		714	51.0%		225	50.4%		0.839
CAD		155	11.1%		34	7.6%		**0.036**
DM		199	14.2%		94	21.1%		**0.001**
CKD		88	6.3%		49	11.0%		**0.001**
Arrhythmia		56	4.0%		12	2.7%		0.201
Stroke		19	1.4%		10	2.2%		0.191
Malignancy		193	13.8%		109	24.4%		**0.000**
Hypothyroidism		103	7.4%		25	5.6%		0.205
COPD		97	6.9%		33	7.4%		0.735
HF		110	7.9%		57	12.8%		**0.002**
VHD		81	5.8%		22	4.9%		0.494
Sepsis		38	2.7%		42	9.4%		**0.000**
Pneumonia		19	1.4%		6	1.3%		0.985
Infection		145	10.4%		129	28.9%		**0.000**
AKI		82	5.9%		93	20.9%		**0.000**
CAR		1.5±2.2		0.4	6.5±5.3		5.5	**0.000**
ICU readmission		159	11.4%		52	11.7%		0.861
LOS (days)		6.0±16.7		1.0	10.4±16.8		6.0	**0.000**

Continuous variables are presented as mean ± standard deviation and median (interquartile range), while categorical variables are expressed as number (n) and percentage (%). Comparisons between survivors and non-survivors were performed using the Student's t-test or Mann-Whitney U test for continuous variables, depending on distribution, and the chi-square (χ^2) test for categorical variables

Min: Minimum, Max: Maximum, SD: Standard deviation; n: Number of patients. HT: Hypertension, CAD: Coronary artery disease, DM: Diabetes mellitus, CKD: Chronic kidney disease, COPD: Chronic obstructive pulmonary disease, HF: Heart failure, VHD: Valvular heart disease, AKI: Acute kidney injury, CAR: C-reactive protein to albumin ratio, LOS: Length of stay, BMI: Body mass index

They reported that elevated CAR levels at either point were linked to higher mortality, with discharge measurements showing stronger predictive power, likely due to prolonged systemic inflammation. Similarly, our results align with these findings, demonstrating that admission-time CAR maintains significant prognostic value in critically ill patients, supporting its role as an early indicator of adverse clinical trajectories across different stages of critical illness.

Park et al. (19) reported CAR as an independent predictor of 28-day mortality in ICU patients, although with limited discriminatory capacity (AUC 0.594). Notably, our findings demonstrated superior prognostic performance for CAR, with an AUC of 0.828. These effects may be further compounded by differences in outcome definitions across studies: Park and colleagues assessed the prognostic role of CAR with respect to 28-day mortality, whereas our analysis examined its association with in-hospital mortality. Such variation in endpoints, together with the influence of fluid resuscitation and capillary leakage on albumin levels, may offer a potential explanation for the observed differences in prognostic performance (20).

CAR carries significant implications for clinical practice, particularly for early risk assessment, efficient ICU resource management, and as a complement to established severity indices. The easily derived measurement at ICU admission provides a practical indicator for early triage, corroborated by consistent reports identifying CAR as an independent predictor of mortality across varied ICU populations. Consistent with recent findings, calibration analyses of CAR-based models in sepsis populations have demonstrated excellent agreement between predicted and observed outcomes, highlighting their reliability and translational relevance in critical care (21).

Table 3. Univariate and multivariate logistic regression analyses of factors associated with in-hospital mortality

	Univariate analysis					Multivariate analysis				
	OR	95% CI			p	OR	95% CI			p
Age (years)	1.015	1.009	-	1.022	**0.000**	1.012	1.004	-	1.020	**0.003**
Weight (kg)	0.988	0.982	-	0.995	**0.001**					
BMI (kg/m^2)	0.967	0.948	-	0.986	**0.001**					
Polypharmacy	0.989	0.986	-	0.991	**0.000**	0.989	0.986	-	0.992	**0.000**
CAD	1.004	1.000	-	1.008	**0.038**	1.006	1.001	-	1.011	**0.013**
DM	0.995	0.992	-	0.998	**0.001**					
CKD	0.994	0.990	-	0.998	**0.001**					
Malignancy	0.993	0.990	-	0.996	**0.000**					
HF	0.994	0.991	-	0.998	**0.002**	0.995	0.991	-	0.999	**0.024**
Sepsis	0.987	0.982	-	0.991	**0.000**					
Infection	0.987	0.985	-	0.990	**0.000**	0.992	0.989	-	0.996	**0.000**
AKI	0.985	0.982	-	0.989	**0.000**	0.991	0.987	-	0.995	**0.000**
CAR	1.435	1.382	-	1.491	**0.000**	1.403	1.348	-	1.459	**0.000**
LOS (days)	1.014	1.007	-	1.020	**0.000**					

Variables with p<0.05 in univariate analysis were included in the multivariate model (forward LR method)
OR: Odds ratio, CI: Confidence interval, BMI: Body mass index, CAD: Coronary artery disease, DM: Diabetes mellitus, CKD: Chronic kidney disease, HF: Heart failure, AKI: Acute kidney injury, CAR: C-reactive protein to albumin ratio, LOS: Length of stay, BMI: Body mass index

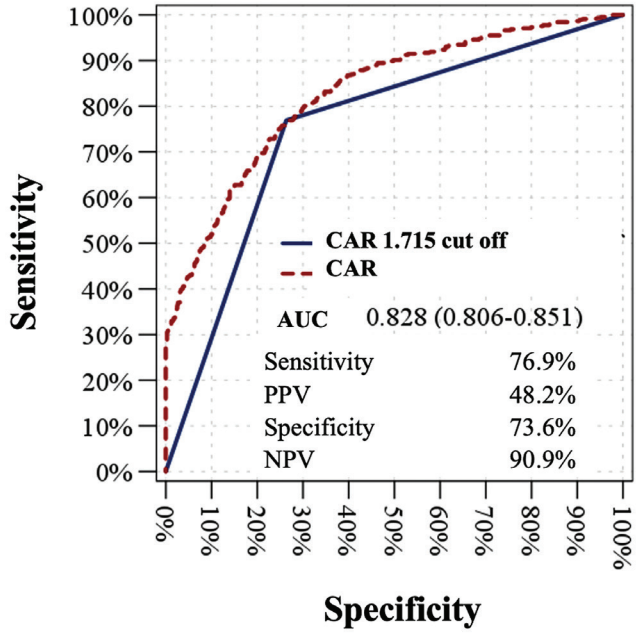

Figure 2. Receiver operating characteristic curve of the C-reactive protein to albumin ratio for predicting in-hospital mortality, with a cut-off value of 1.715
CAR: C-reactive protein to albumin ratio, AUC: Area under the curve, CI: Confidence interval, PPV: Positive predictive value, NPV: Negative predictive value

In the context of ICU resource management, ensuring vigilant surveillance, timely implementation of comprehensive infection control measures, and strategies for nutritional optimization in patients with elevated CAR appear clinically warranted. Conversely, a low CAR, owing to its strong NPV, enables reliable identification of low-risk patients and supports more efficient allocation of resources. Consistent with this view, Siwach and Chintamani (22) underscored that the prognostic relevance of CAR extends beyond mortality prediction, as its integration into early risk stratification models may help guide appropriate allocation of ICU beds, monitoring intensity, and supportive interventions.

The prognostic role of CAR is most appropriately understood as complementary to established indices such as APACHE, PRISM, and the Charlson Comorbidity index, serving to refine and enhance their predictive accuracy. Notably, evidence from pediatric critical care populations has demonstrated that CAR discriminates mortality with high accuracy, performing comparably to PRISM-III, thereby reinforcing its role as an adjunctive tool across diverse age groups (23). The accumulating evidence positions CAR not merely as a prognostic marker but as a clinically actionable adjunct, capable of strengthening risk stratification and guiding efficient resource allocation beyond traditional severity scores. Such a role underscores its translational potential, highlighting that CAR may enhance both prognostic accuracy and operational decision-making across varied critical care contexts.

Study Limitations

The retrospective design of this study entails inherent limitations, including the limited capacity to adjust for unmeasured confounding factors, reliance on a single-center dataset, and the use of only admission-time CAR values. Future research should evaluate temporal changes in CAR dynamics and validate these findings through prospective, multicenter investigations.

Table 4. Diagnostic performance of the C-reactive protein to albumin ratio for predicting in-hospital mortality

		AUC		95% CI			p
CAR		0.828		0.806	-	0.851	**0.000**
CAR 1.715 cut-off		0.753		0.726	-	0.779	**0.000**
		Survivors	Non-survivors				%
CAR	≤1.715	1031	103	Sensitivity			76.9%
	>1.715	369	343	PPV			48.2%
				Specificity			73.6%
				NPV			90.9%

Values are presented as area under the receiver operating characteristic curve (AUC) with 95% confidence intervals (CI), sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). The optimal cut-off value was determined using the Youden index
CAR: C-reactive protein to albumin ratio

Conclusion

CAR measured at ICU admission emerged as an independent and robust indicator of in-hospital mortality. The identified cut-off value of 1.715 is clinically relevant, particularly due to its high NPV, which enables reliable early identification of low-risk patients. The simplicity, cost-effectiveness, and integrative capacity of CAR to combine both inflammation and physiological reserve into a single metric make it a valuable adjunct to traditional scoring systems. Taken together, the presence of sepsis, severe infections, and systemic inflammatory responses appears to amplify its predictive capacity, thereby reinforcing CAR's role as a simple yet powerful prognostic tool with direct applicability in critical care practice.

Ethics

Ethics Committee Approval: The study was approved by the Non-Interventional Clinical Research Ethics Committeeof University of Health Sciences Türkiye, İstanbul Training and Research Hospital (approval no: 191, date: 25.06.2025).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions: Surgical and Medical Practices- G.Ç.; Concept - G.Ç., A.T.; Design - G.Ç.; Data Collection or Processing - A.T.; Analysis or Interpretation - A.T.; Literature Search - G.Ç., A.T.; Writing - G.Ç.

Conflict of Interest: No conflict of interest was declared by the authors.

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