EJMA

DOI: 10.14744/ejma.260325
EJMA 2025;5(1):25–31



Research Article

Mortality and Related Factors in Patients Admitted to Intensive Care Unit

Bilgeşah Kılıçtaş,[1] Kamil Konur,[2] Teslime Ayaz[3]

[1]Department of Medical Oncology, Faculty of Medicine, Necmettin Erbakan University, Konya, Türkiye
[2]Department of Internal Medicine, Division of General Internal Medicine, Faculty of Medicine, Recep Tayyip Erdoğan University, Rize, Türkiye
[3]Department of Internal Medicine, Division of General Internal Medicine, Bakırçay University Faculty of Medicine, İzmir, Türkiye

Abstract

Objectives: Intensive care units (ICUs) provide advanced monitoring and treatment for patients with life-threatening organ failure. This study aimed to evaluate the impact of vital signs and laboratory parameters on mortality in ICU patients.

Methods: A total of 498 patients were retrospectively analyzed. Patients aged ≥18 years who were hospitalized for at least 24 hours in the internal medicine ICU were included. Trauma patients, those admitted for surgical procedures, and postoperative patients were excluded. Demographic data, comorbidities, laboratory values, vital signs, nutritional status, respiratory support, and survival outcomes were obtained from electronic medical records.

Results: Of 498 patients, 266 (53.4%) died and 232 (46.6%) survived. Mortality was significantly associated with age, chronic renal disease, respiratory disease, impaired consciousness, APACHE score, and mechanical ventilation requirement. Deceased patients had higher levels of urea, creatinine, bilirubin, ALT, AST, CRP, MPV, lactate, and potassium, and lower levels of albumin, pH, HCO_3, sodium, and calcium ($p<0.05$).

Conclusion: Age, APACHE score, urea, albumin, eosinophil count, MPV, and lactate were identified as independent predictors of mortality in ICU patients.

Keywords: Intensive care unit, Mortality, Prognostic factors, Albumin

Cite This Article: *Kılıçtaş B, Konur K, Ayaz T. Mortality and Related Factors in Patients Admitted to Intensive Care Unit. EJMA 2025;5(1):25–31*

Intensive care units (ICUs) provide advanced supportive therapies for patients with life-threatening acute or chronic organ failure and are associated with higher mortality rates compared with other hospital departments[1,2] Despite significant medical and technological advances, ICU mortality remains a major clinical challenge, particularly among elderly patients and those presenting with multiple comorbidities and severe physiological derangements.[3] Therefore, identifying reliable and easily applicable predictors of mortality at the time of ICU admission is of considerable clinical importance.[4]

Several scoring systems, including APACHE, SAPS, and MPM, have been developed to estimate mortality risk in ICU patients.[5] Although these models are useful for pop-

* This study was presented as an oral presentation at the 3rd International & 7th National Congress on Drug and Treatment (Iskele, Cyprus, TRNC; September 21–25, 2022).

Address for correspondence: Bilgeşah Kılıçtaş, MD. Department of Medical Oncology, Necmettin Erbakan University Faculty of Medicine, Konya, Türkiye
Phone: +90 506 340 16 08 **E-mail:** bilgesahkilictas@gmail.com

Submitted Date: April 11, 2026 **Accepted Date:** April 20, 2026

©Copyright 2024 by Eurasian Journal of Medical Advances - Available online at www.ejmad.org
OPEN ACCESS This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

ulation-level risk stratification and inter-institutional comparisons, their prognostic accuracy at the individual patient level is limited.[6] Moreover, many of these scoring systems were developed prior to current ICU patient profiles and treatment strategies and may not always be practical for routine clinical use.[7]

In recent years, increasing attention has been directed toward the potential prognostic value of simple clinical and laboratory parameters routinely obtained at ICU admission. Parameters such as serum albumin level, lactate, mean platelet volume (MPV), and eosinophil count reflect systemic inflammation, metabolic stress, and organ dysfunction and are readily available and cost-effective markers[8] Although these parameters have been reported to be associated with ICU mortality, their independent prognostic value in heterogeneous populations admitted to internal medicine ICUs has not been clearly established.

The aim of this study was to evaluate the relationship between admission clinical characteristics, routine laboratory parameters, and mortality in patients admitted to an internal medicine intensive care unit and to identify independent predictors of mortality using multivariate analyses.

Methods

Study Design and Population

This retrospective observational study included a total of 498 patients who were admitted to the internal medicine intensive care unit (ICU) of our institution between January 1, 2016, and December 31, 2019. Ethical approval for the study was obtained from the local Ethics Committee on August 28, 2019 (protocol number: 2019/144). The study was conducted in accordance with the principles of the Declaration of Helsinki, and informed consent was obtained from all participants or their legal representatives in accordance with institutional policy.

Patients aged 18 years and older who were hospitalized in the internal medicine ICU for at least 24 hours were eligible for inclusion. Patients admitted for trauma, those hospitalized for perioperative monitoring, patients prepared for elective surgical procedures, and individuals followed postoperatively were excluded from the study.

Data Collection

Demographic characteristics (age and sex), comorbid conditions, laboratory parameters, complete blood count results, arterial blood gas values, vital signs, nutritional status, respiratory support modalities, and survival outcomes were retrospectively retrieved from the hospital's electronic medical record system. All data were collected using a standardized data extraction approach to ensure consistency.

Statistical Analysis

Statistical analyses were performed using SPSS software for Windows, version 22.0 (SPSS Inc., Chicago, IL, USA). Continuous variables were presented as median and interquartile range (IQR), while categorical variables were expressed as frequencies and percentages.

The normality of continuous variables was assessed using both visual methods (histograms and probability plots) and analytical methods (Kolmogorov-Smirnov test). Comparisons between two independent groups were conducted using the Mann-Whitney U test for variables that were not normally distributed. Categorical variables were compared using the Pearson chi-square test or Fisher's exact test, as appropriate.

Multivariate logistic regression analysis was performed to identify independent predictors of mortality. Variables that were clinically relevant or showed significance in univariate analyses were included in the regression model. Statistical significance was defined as a two-sided p-value <0.05.

Artificial intelligence-assisted technology (ChatGPT, OpenAI, GPT-5.3) was used only for language editing and formatting purposes. No AI tool contributed to study design, data analysis, or scientific conclusions.

Results

A total of 498 patients admitted to the internal medicine intensive care unit were included in the analysis. The overall mortality rate was 53.4% (n=266), while 46.6% of patients survived (n=232).

The most common reasons for ICU admission were pneumonia (18.1%), sepsis (14.7%), respiratory failure (14.1%), cardiac arrest (10.8%), cerebral infarction (7.0%), pulmonary edema (7.0%), gastrointestinal bleeding (5.4%), acute renal failure (3.6%), acute coronary syndrome (2.8%), and pulmonary embolism (2.4%), while intracranial hemorrhage accounted for 2.0% and other causes accounted for 12.0% of admissions.

Significant differences were observed between deceased and surviving patients with respect to age, level of consciousness, APACHE score, need for mechanical ventilation, presence of chronic renal disease, and respiratory system disease ($p<0.05$). Patients who died were significantly older and had higher APACHE scores compared with survivors. Mortality was significantly higher in patients with chronic renal disease, whereas it was lower in patients with underlying respiratory diseases. In addition, mortality was significantly higher among patients presenting with impaired consciousness and those requiring mechanical ventilation (Table 1).

Table 1. Distribution of some descriptive and clinical features by mortality status

	(n=498)	Status		
		Survived (n=232)	Deceased (n=266)	p
Age (years)	75(64-84)	72(60-81)	77(67-85)	**<0.001[a]****
Gender				0.060[b]
Female	222(44.6)	93 (40.1)	129(48.5)	
Male	276(55.4)	139(59.9)	137(51.5)	
Presence of comorbidity	459(92.2)	212(91.4)	247(92.9)	0.540[b]
Comorbid disease				
Hypertension	193(38.8)	90 (38.8)	103(38.7)	0.987[b]
Cardiovascular disease	137(27.5)	55 (23.7)	82 (30.8)	0.076[b]
Neurological disease	118(23.7)	52 (22.4)	66 (24.8)	0.530[b]
Diabetes mellitus	112(22.5)	57 (24.6)	55 (20.7)	0.299[b]
Chronic renal disease	107(21.5)	39 (16.8)	68 (25.6)	0.018[b]*
Malignity	104(20.9)	41 (17.7)	63 (23.7)	0.100[b]
Respiratory disease	53 (10.6)	32 (13.8)	21 (7.9)	0.033[b]*
Hemodialysis	23 (4.6)	11 (4.7)	12 (4.5)	0.903[b]
Hepatobiliary tractus disease	13 (2.6)	9(3.9)	4(1.5)	0.157[c]
Presence of infection	312(62.7)	137(59.1)	175(65.8)	0.121[b]
Consciousness				
Coma	73 (14.7)	28 (12.1)	45 (16.9)	
Conscious	143(28.7)	94 (40.5)	49 (18.4)	
Confusion	193(38.8)	81 (34.9)	112(42.1)	<0.001[b]**
Lethargia	50 (10.0)	19 (8.2)	31 (11.7)	
Stupor	39 (7.8)	10 (4.3)	29 (10.9)	
APACHE score				
Mechanical ventilation				
NIMV	43 (8.6)	27 (11.6)	16 (6.0)	

#Continuous variables are presented as "median (interquartile range (IQR))" and categorical variables as "number (percent of column)"; a Mann-Whitney U test; b Pearson chi-square test; c Fisher's exact test; *p<0.05; ** p<0.01

No statistically significant association was found between mortality and sex, hypertension, cardiovascular disease, neurological disease, diabetes mellitus, hepatobiliary disease, hemodialysis, infection development, duration of ICU stay, or presence of malignancy (p>0.05) (Table 1).

Laboratory analyses demonstrated significant differences between survivors and non-survivors in terms of blood urea, creatinine, albumin, total bilirubin, direct bilirubin, alanine aminotransferase (ALT), aspartate aminotransferase (AST), and C-reactive protein (CRP) levels (p<0.05). Deceased patients had significantly higher urea, creatinine, bilirubin, ALT, AST, and CRP levels, while albumin levels were significantly lower. No significant differences were observed for blood glucose or magnesium levels (Table 2).

Hematological parameters also differed significantly between groups. White blood cell count, neutrophil count, and mean platelet volume (MPV) were significantly higher in deceased patients, whereas eosinophil count and platelet count were significantly higher among survivors (p<0.05). No significant differences were found in lymphocyte, monocyte, basophil, red blood cell counts, hemoglobin, hematocrit, or mean corpuscular volume values (p>0.05) (Table 3).

Coagulation parameters, including activated partial thromboplastin time (APTT), prothrombin time (PT), and international normalized ratio (INR), were significantly higher in patients who died compared to survivors (p<0.05).

Arterial blood gas and electrolyte analyses revealed significant associations between mortality and pH, partial pres-

Table 2. Distribution of biochemical parameters by mortality status

	(n=498)	Status		p[a]
		Survived (n=232)	Deceased (n=266)	
	Median (IQR)	Median (IQR)	Median (IQR)	
Glucose (g/dL)	142(112.0-204.2)	140(113.5-211.5)	146.5(109-202.2)	**0.269**
Urea (mg/dL)	85(47.0-136.5)	63(39-121)	98(63.8-156.5)	**<0.001****
Creatinine (mg/dL)	1.45(0.82-2.86)	1.12(0.75-2.20)	1.80(1.00-3.37)	**<0.001****
Albumin (g/dL)	2.9(2.5-3.5)	3.0(2.7-3.7)	2.8(2.4-3.3)	**<0.001****
Total bilirubin (mg/dL)	0.90(0.56-1.60)	0.80(0.50-1.34)	0.92(0.60-1.90)	**0.004****
Direct bilirubin (mg/dL)	0.40(0.20-0.74)	0.36(0.20-0.60)	0.48(0.28-1.00)	**0.001****
ALT (U/L)	22(13-45)	20.0(12.0-37.0)	24.0(14.0-54.2)	**0.008****
AST (U/L)	29(20-64)	26.0(17.0-52.0)	36.0(22.0-89.0)	**<0.001****
Magnesium (mEq/L)	1.91(1.70-2.20)	1.90(1.60-2.14)	1.98(1.70-2.21)	0.051
CRP (mg/L)	7.4(3.0-14.0)	5.4(2.0-12.2)	9.8(4.0-16.0)	**<0.001****

n: Number of patients; IQR: Interquartile range; a Mann-Whitney U test; *p<0.05; **p<0.01

sure of oxygen (pO_2), bicarbonate (HCO_3), base excess (BE), lactate, sodium, potassium, and calcium levels (p<0.05). Deceased patients exhibited higher pO_2, BE, lactate, and potassium levels, while pH, HCO_3, sodium, and calcium levels were significantly lower. No significant differences were observed for partial pressure of carbon dioxide (pCO_2), oxygen saturation (SO_2), or chloride levels.

Vital signs also differed significantly between groups. Body temperature and heart rate were significantly higher in deceased patients, whereas systolic and diastolic blood pressure values and oxygen saturation were significantly lower (p<0.05).

Regarding nutritional support, most deceased patients were fed via nasogastric tube (86.1%), followed by closed oral intake (8.3%), oral feeding (2.6%), PEG feeding (2.6%), and total parenteral nutrition (0.4%). Among survivors, 69.0% received nasogastric feeding, 10.8% had closed oral intake, 15.5% were orally fed, and 4.7% received PEG feeding. Nasogastric feeding was significantly more common among survivors (p<0.05).

In multivariate logistic regression analysis, age, APACHE score, blood urea, albumin, eosinophil count, MPV, and lactate levels were identified as independent predictors of

Table 3. Distribution of complete blood count parameters by mortality status

	(n=498)	Survived (n=232)	Deceased (n=266)	p[a]
	Median (IQR)	Median (IQR)	Median (IQR)	
WBC (/mcL)	11.7(7.5-15.5)	10.9(7.0-15.4)	12.1(8.4-16.0)	**0.046***
Lymphocyte (/mcL)	1.00(0.60-1.60)	1.08(0.60-1.60)	0.90(0.57-1.60)	0.272
Monocyte (/mcL)	0.53(0.31-0.85)	0.54(0.33-0.80)	0.52(0.30-0.90)	0.858
Neutrophil (/mcL)	9.6(5.8-13.0)	8.6(5.0-13.0)	10.0(6.4-13.6)	**0.035***
Eozinophil (/mcL)	0.02(0-0.09)	0.03(0-0.11)	0.02(0-0.7)	**0.005****
Basophil (/mcL)	0.02(0-0.03)	0.01(0.01-0.03)	0.02(0-0.04)	0.831
Red blood cell (/mcL)	3.5(3.0-4.2)	3.6(3.1-4.3)	3.5(3.0-4.2)	0.223
Hemoglobin (g/dL)	10.0(8.8-12.0)	10.0(8.8-12.2)	10.0(8.7-12.0)	0.225
Hematocrit (%)	31.4(27.0-37.0)	31.8(27.4-38.0)	89.0(85.0-94.0)	0.381
MCV (fL)	89(85-93)	88.1(85-92)	89(85-94)	0.150
PLT (/mcL)	201.0(135.8-280.2)	216.5(155.2-295.0)	186.0(120.5-264.8)	**0.009****
MPV (fL)	9.4(8.6-10.4)	9.2(8.4-10.2)	9.6(8.7-10.7)	**<0.001****

n: Number of patients; IQR: Interquartile range; aMann-Whitney U test; *p<0.05; **p<0.01

Table 4. Independent effect of some possible predictors on mortality status *(Multivariate logistic regression analysis)*

	B	SE	Waldχ2	sd	OR (95 CI)	p
Age	0.020	0.008	7.2	1	1.020(1.005-1.036)	**0.007**
APACHE score	0.042	0.014	9.6	1	1.043(1.016-1.071)	**0.002**
Urea	0.004	0.002	6.0	1	1.004(1.001-1.007)	**0.014**
Albumin	-0.392	0.165	5.6	1	0.676(0.489-0.935)	**0.018**
CRP	0.025	0.013	3.8	1	1.026(1.000-1.052)	0.051
Eosinophil	-1.420	0.716	3.9	1	0.242(0.059-0.983)	**0.047**
MPV	0.122	0.065	3.5	1	1.130(0.995-1.284)	**<0.001**
Lactate	0.166	0.037	20.2	1	1.181(1.098-1.270)	**<0.001**
Fever	0.278	0.167	2.8	1	1.320(0.952-1.830)	0.095
Heart rate	0.004	0.004	0.9	1	1.004(0.995-1.013)	0.350

B: Regression coefficient; SH: Standard error; sd: degrees of freedom; OR: odds ratio; CI: Confidence interval Cox & Snell R: 0.22; Nagel kerke R: 0.29; Hosmer-Lemeshow χ2: 10.2, p=0.254

mortality (p<0.05). CRP, body temperature, and heart rate did not retain independent significance in the multivariate model (Table 4).

Discussion

Age has long been discussed as a prognostic factor in intensive care unit (ICU) patients, although its independent impact on mortality remains controversial. Kölgelier et al.[9] reported that advanced age was a significant factor affecting mortality, supporting our findings. Similarly, Nicolas et al.[10] demonstrated that mortality rates were more than twofold higher in patients over 65 years of age compared with those younger than 45 years, concluding that age is an important prognostic indicator, albeit less influential than disease severity.

In contrast, Chelluri et al.[11] suggested that age alone is not a reliable independent predictor of long-term survival or quality of life in critically ill patients. In our study, age emerged as a strong predictor of mortality. The discrepancies between these findings may be attributed to differences in disease severity at ICU admission, variations in patient populations, and heterogeneity in admission criteria across ICUs.

Mechanical ventilation is a well-established marker of disease severity and poor prognosis in ICU settings. Ünal et al. reported that 44.1% of patients required mechanical ventilation for an average of 12.7±13.5 days, with a mortality rate of 85.7%.[2] Our findings regarding mechanically ventilated patients were consistent with previously published data. Moreover, our ICU frequently provided care to patients with poor prognostic profiles due to severe comorbidities or those receiving palliative support, which may have contributed to the higher mortality observed among mechanically ventilated patients.

The relatively low rate of non-invasive mechanical ventilation (NIMV) in our cohort also warrants consideration. Patients who tolerated NIMV were predominantly managed in hospital wards and were transferred to the ICU only in cases of clinical deterioration. This practice pattern likely resulted in a lower proportion of NIMV use within the ICU population.

Severity scoring systems such as APACHE II are commonly used to predict outcomes in critically ill patients. Uysal et al.[12] reported higher-than-expected mortality rates across all APACHE II subgroups, emphasizing that while these scoring systems are valuable for comparing study populations, their predictive accuracy decreases in ICUs with heterogeneous patient profiles. They recommended recalibration of scoring systems according to unit-specific characteristics. Delayed initiation of organ-supportive therapies prior to ICU admission and the time elapsed before ICU transfer, factors not fully captured by scoring systems, may partially explain these discrepancies.

Comorbidities have also been variably associated with ICU mortality. Ceylan et al. reported that although most patients had underlying diseases, no significant association was observed between mortality and comorbidity burden or length of ICU stay.[13] Conversely, the EPIC study identified organ failure, malignancy, and diabetes as mortality risk factors in univariate analysis, with cancer remaining significant in multivariate models.[14] In our cohort, mortality was significantly higher in patients with chronic renal disease, whereas patients with respiratory diseases demonstrated lower mortality. Subgroup analyses according to multiple comorbidities were not performed, and our cohort consisted exclusively of patients admitted to an internal medicine ICU, which may explain these findings.

Biochemical parameters provided important prognostic information in our study. Higher levels of blood urea, creatinine, total and direct bilirubin, ALT, AST, and CRP, along with lower serum albumin levels, were significantly associated with mortality. Serum bilirubin has been described as a stable and reliable marker of hepatic dysfunction and is incorporated into several prognostic scoring systems.[15,16] Kramer et al.[17] demonstrated that even mild elevations in bilirubin were associated with significantly reduced survival, findings that strongly support our results.

Hypoalbuminemia is frequently observed in the early stages of critical illness and has been linked to prolonged ICU stay, mechanical ventilation, infection development, and increased mortality.[18–20] Similarly, elevated serum creatinine has consistently been associated with adverse outcomes. Akkoç et al.[7] reported increased mortality with higher creatinine levels at admission, and multiple studies have shown that even small increases in creatinine are linked to increased mortality risk.[21] Acute renal failure remains a major contributor to ICU mortality, with reported mortality rates ranging from 40% to 60%.[22,23] In our study, elevated urea and creatinine were associated with mortality; however, the absence of baseline creatinine values and urine output data represents a limitation.

Inflammatory markers also played a significant role. CRP, a widely used acute-phase reactant, was significantly associated with mortality in our cohort. Lobo et al. demonstrated that elevated CRP levels at ICU admission were associated with increased risk of organ failure and death.[24] Although procalcitonin has been reported to outperform CRP in predicting outcomes in septic shock,[25] it was not routinely available during the study period. Nonetheless, CRP showed strong prognostic value in our population.

Hematological parameters further contributed to mortality prediction. Higher white blood cell count, neutrophil count, and mean platelet volume (MPV), together with lower eosinophil and platelet counts, were observed in deceased patients. Previous studies, including those by Zhang et al., have shown that elevated MPV and thrombocytopenia are associated with increased mortality, consistent with our findings.[26]

Finally, disturbances in acid-base balance, electrolytes, and lactate levels were significantly associated with mortality. Elevated lactate, reflecting tissue hypoxia and impaired microcirculation, has been repeatedly shown to be a strong predictor of mortality, particularly when present at ICU admission.[27,28] Base deficit, an indirect marker of lactic acidosis, has similarly been associated with poor outcomes in critically ill patients.[29]

Conclusion

Based on the findings of this study, age, APACHE score, blood urea, serum albumin, eosinophil count, mean platelet volume (MPV), and lactate levels were identified as independent predictors of mortality in patients admitted to the intensive care unit. These results highlight the prognostic value of routinely available clinical and laboratory parameters in critically ill patients. Incorporation of these variables into mortality risk assessment models may improve prognostic accuracy and assist clinicians in early risk stratification, clinical decision-making, and resource allocation in intensive care settings.

Disclosures

Acknowledgement: This study was presented as an oral presentation at the 3rd International & 7th National Congress on Drug and Treatment (Iskele, Cyprus, TRNC; September 21–25, 2022).

Ethics Committee Approval: The ethics committee approval has been granted by Recep Tayyip Erdogan University on 28/08/2019 and protocol number: 2019/144. The study complied with the Declaration of Helsinki.

Informed Consent: Written consent was obtained from all participants.

Conflict of Interest: The authors declare that they have no competing interests.

Financial Disclosure: There is no specific funding related to this research.

Use of AI for Writing Assistance: Artificial intelligence-assisted technology (ChatGPT, OpenAI, GPT-5.3) was used only for language editing and formatting purposes. No AI tool contributed to study design, data analysis, or scientific conclusions.

Authorship Contributions: Concept – BK, KK; Design – BK, KK; Supervision – TA; Materials –BK; Data collection and/or processing –BK; Analysis and/or interpretation –BK, KK; Literature search –BK; Writing –BK; Critical review –KK, TA.

Peer-review: Externally peer-reviewed.

References

1. Çevik B, Geyik FD. Prolonged Stay in Intensive Care Unit: Retrospective Analysis of Predisposing Factors and Outcome. Turk J Intensive Care 2019;17(2):96–101. [CrossRef]
2. Unal AU, Kostek O, Takir M, Caklili O, Uzunlulu M, Oguz A. Prognosis of patients in a medical intensive care unit. North Clin Istanb 2015 Dec 31;2(3):189–95.
3. Cakır, E, Kocabeyoğlu, G, Gürbüz Ö, Baltacı Özen S, Mutlu NM, Özkoçak Turan I, et al. Evaluation of mortality rate and risk factors in intensive care unit. Ankara Eğitim ve Araştırma Hastanesi Tıp Dergisi 2020;53:20–4. [CrossRef]
4. Siddiqui S. Mortality profile across our Intensive Care Units: A 5-year database report from a Singapore restructured hospital. Indian J Crit Care Med 2015;19(12):726–7. [CrossRef]

5. Patel PA, Grant BJ. Application of mortality prediction systems to individual intensive care units. Intensive Care Med 1999;25(9):977–82. [CrossRef]
6. Bae SJ, Lee JH, Choi YH. Comparison of predictive scoring systems in assessing risk for intensive care unit admission and in-hospital mortality in patients with urinary tract infections. J Crit Intensive Care 2022;13:25–31. [CrossRef]
7. Akkoc İ, Alpay N, Toptaş M, İşitemiz İ, Sunul H, Cebecci E, et al. Effect of Baseline datas on the survival of intensive care unit patients. Medical Bulletin of Haseki 2017;55(2):106–10. [CrossRef]
8. Craven DE, Kunches LM, Lichtenberg DA, Kollisch NR, Barry MA, Heeren TC, et al. Nosocomial infection and fatality in medical and surgical intensive care unit patients. Arch Intern Med 1988;148(5):1161–8. [CrossRef]
9. Kölgelier S, Küçük A, Demir NA, Özçimen S, Demir LS. Nosocomial infections in intensive care units: Etiology and predisposing factors. Kafkas J Med Sci 2012;2(1):1–5. [CrossRef]
10. Nicolas F, Le Gall JR, Alperovitch A, Loirat P, Villers D. Influence of patients' age on survival, level of therapy and length of stay in intensive care units. Intensive Care Med 1987;13(1):9–13. [CrossRef]
11. Chelluri L, Pinsky MR, Donahoe MP, Grenvik A. Long-term outcome of critically ill elderly patients requiring intensive care. JAMA 1993;269(24):3119–23. [CrossRef]
12. Harrison DA, Brady AR, Parry GJ, Carpenter JR, Rowan K. Recalibration of risk prediction models in a large multicenter cohort of admissions to adult, general critical care units in the United Kingdom. Crit Care Med 2006;34(5):1378–88. [CrossRef]
13. Ceylan E, İtil O, Arı G, Ellidokuz H, Akkoçlu A. Factors affecting mortality and morbidity in patients followed in medical intensive care unit. Thorac Res Pract 2001;2(1):6–12.
14. Vincent JL, Bihari DJ, Suter PM, Bruining HA, White J, Nicolas-Chanoin MH, et al. The prevalence of nosocomial infection in intensive care units in Europe. Results of the European Prevalence of Infection in Intensive Care (EPIC) Study. EPIC International Advisory Committee. JAMA 1995;274(8):639–44. [CrossRef]
15. Moseley RH. Sepsis and cholestasis. Clin Liver Dis 2004;8(1):83–94. [CrossRef]
16. Bernard GR. Quantification of organ dysfunction: seeking standardization. Crit Care Med 1998;26(11):1767–8. [CrossRef]
17. Kramer L, Jordan B, et al. Austrian Epidemiologic Study on Intensive Care, ASDI Study Group. Incidence and prognosis of early hepatic dysfunction in critically ill patients--a prospective multicenter study. Crit Care Med 2007;35(4):1099–104. [CrossRef]
18. Nicholson JP, Wolmarans MR, Park GR. The role of albumin in critical illness. Br J Anaesth 2000;85(4):599–610. [CrossRef]
19. Rabi R, Alsaid RM, Matar AN, Dawabsheh Y, Abu Gaber D. The role of serum albumin in critical illness, predicting poor outcomes, and exploring the therapeutic potential of albumin supplementation. Sci Prog 2024;107(3):368504241274023. [CrossRef]
20. Klonoff-Cohen H, Barrett-Connor EL, Edelstein SL. Albumin levels as a predictor of mortality in the healthy elderly. J Clin Epidemiol 1992;45(3):207–12. [CrossRef]
21. Chertow GM, Burdick E, Honour M, Bonventre JV, Bates DW. Acute kidney injury, mortality, length of stay, and costs in hospitalized patients. J Am Soc Nephrol 2005;16(11):3365–70. [CrossRef]
22. Avasthi G, Sandhu JS, Mohindra K. Acute renal failure in medical and surgical intensive care units--a one year prospective study. Ren Fail 2003;25(1):105–13. [CrossRef]
23. de Mendonça A, Vincent JL, Suter PM, Moreno R, Dearden NM, Antonelli M, et al. Acute renal failure in the ICU: risk factors and outcome evaluated by the SOFA score. Intensive Care Med 2000;26(7):915–21. [CrossRef]
24. Lobo SM, Lobo FR, Bota DP, Lopes-Ferreira F, Soliman HM, Mélot C, et al. C-reactive protein levels correlate with mortality and organ failure in critically ill patients. Chest 2003;123(6):2043–9. [CrossRef]
25. Suberviola B, Castellanos-Ortega A, González-Castro A, García-Astudillo LA, Fernández-Miret B. Valor pronóstico del aclaramiento de procalcitonina, PCR y leucocitos en el shock séptico [Prognostic value of procalcitonin, C-reactive protein and leukocytes in septic shock]. Med Intensiva 2012;36(3):177–84. [Spanish] [CrossRef]
26. Zhang Z, Xu X. Lactate clearance is a useful biomarker for the prediction of all-cause mortality in critically ill patients: a systematic review and meta-analysis. Crit Care Med 2014;42(9):2118–25. [CrossRef]
27. Fuchs L, Chronaki CE, Park S, Novack V, Baumfeld Y, Scott D, et al. ICU admission characteristics and mortality rates among elderly and very elderly patients. Intensive Care Med 2012;38(10):1654–61. [CrossRef]
28. Maillet JM, Le Besnerais P, Cantoni M, Nataf P, Ruffenach A, Lessana A, et al. Frequency, risk factors, and outcome of hyperlactatemia after cardiac surgery. Chest 2003;123(5):1361–6. [CrossRef]
29. Husain FA, Martin MJ, Mullenix PS, Steele SR, Elliott DC. Serum lactate and base deficit as predictors of mortality and morbidity. Am J Surg 2003;185(5):485–91. [CrossRef]