Original Research

The clinical characteristics and the risk factors for mortality in Non-COVID-19 critical patients in a pandemic hospital in Turkey: a retrospective cross-sectional study

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Abstract

Background

Coronavirus disease 2019 (COVID-19) disrupted standard health policies and routine medical care, and thus, the management and treatment pathways of many clinical conditions have changed as never before. The negative impact of the pandemic rendered the systemic disease more complicated and accelerated mortality. For the last two years, clinicians have primarily focused on COVID-19 patients; however, the non-COVID-19 critically ill patients needed to be addressed from multiple perspectives. This study investigated the demographic and clinical characteristics of non-COVID-19 critical care patients admitted concurrently with a COVID-19 wave. The objective of this study was to identify the risk factors for mortality in critically ill non-COVID-19 patients.

Methods

All consecutive cases admitted to the intensive care unit (ICU) were included in the study between January 1, 2021 and July 14, 2021. All data, including age, gender, admission characteristics, patient dependency, pre-existing systemic diseases, the severity of illness (Acute Physiology and Chronic Health Evaluation –APACHE-II), predicted death rate in ICU, life-sustaining medical procedures on admission or during ICU stay, length of stay, and admission time to the ICU, were obtained from the hospital's electronic database. The Charlson Comorbidity Index (CCI) was assessed for all patients.

Results

A total of 192 patients were screened during the study period. Mortality was significantly increased in non-surgical patients, previously dependent patients, patients requiring mechanical ventilation, continuous renal replacement therapy, and patients requiring the infusion of vasoactive medications. The number of pre-existing diseases and the admission time had no impact on mortality. The mean CCI was significantly higher in non-survivors but was not a strong predictor of mortality as APACHE II.

Conclusions

In this retrospective study, the severity of illness and the need for vasoactive agent infusion were significantly higher in non-survivors confirmed by multivariate analysis as predictive factors for mortality in critical non-COVID-19 patients.

Keywords: APACHE; Comorbidity; Critical Care Outcomes; COVID-19; Intensive Care Unit

Introduction

Coronavirus disease (COVID-19) remained a global crisis for longer than two years, and the use of hospital resources mainly for COVID-19 patients posed a huge challenge to healthcare systems worldwide. COVID-19 pandemic interrupted the standard healthcare facilities in every medical discipline, and due to the reduction or cancellation of routine procedures, outpatient admissions, and elective surgical interventions, the chronic care organizations delayed or diminished in non-pandemic patients. The negative impact of lockdown measures harmed the physical and mental well-being of the entire population, particularly geriatrics, resulting in a rise in the need for critical care[1]. This "indirect health footprint of COVID-19" has resulted in higher complications and mortality[2].

Clinical investigations during the outbreak mostly focused on COVID-19 patients; however, discussions of non-COVID-19 critical patients' outcomes were limited3-5. The primary goal of the current study was to investigate the clinical characteristics and risk factors for mortality in non-COVID-19 critically ill patients in an academic hospital that worked as a pandemic hospital during the outbreak.

Materials and Methods

Setting

The first case of SARS-CoV-2 infection was reported in our country on March 11, 2020, and the Ministry of Health announced urgent restrictions to decrease routine hospital admissions. For COVID-19 patients, new units have been designed, and non-urgent or non-essential interventions have been temporarily limited. Our hospital is a university-affiliated tertiary academic hospital and served as a pandemic centre with 134 mixed medical-surgical adult intensive care unit (ICU) beds managed by the Anaesthesiology and Reanimation Department are available. We accept all patients into ICUs requiring critical care management, even those

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who are "too sick to benefit" or "do not resuscitate."

We allocated 57 beds for COVID-19 patients during the pandemic; nevertheless, the ICU bed capacity increased according to the intensity of the waves. A rotation system was created to reduce contact and diminish physical and emotional exhaustion among healthcare professionals. Throughout all shifts, the nurse-to-patient ratio of 1:2 was maintained. This study had a retrospective cross-sectional characteristic that it was conducted in an 11-bed, COVID -free adult ICU. In 2021, 439 patients were admitted to this ICU, and the overall mortality rate for this unit was 33.25%.

Participants and data processing

All consecutive patients admitted to the ICU between January 1, 2021 and July 14, 2021 were recruited for the study. All data was retrieved from the hospital's electronic database of patients' medical records.

Demographics (age, gender), admission context (surgical or non-surgical reasons), time of admission on day [8 am-5 pm] or night [5 pm-8 am], weekends, and public holidays) shifts, dependency of patients, pre-existing systemic diseases, the severity of illness (Acute Physiology and Chronic Health Evaluation –APACHE-II and estimated Prediction of Death Rate –PDR), route of admission (emergency department or ward), life-sustaining medical procedures (mechanical ventilation, vasoactive medications, continuous renal replacement therapy, and blood transfusion) at admission or during ICU stay, the length of stay, and the time of death in ICU (day or night shifts, weekends, and public holidays) were the variables of interest. According to our institutional standards of health care quality, APACHE II is routinely used as a screening tool for assessing the severity of disease and predicting mortality in critical patients. APACHE II scores of patients were collected from the hospital's electronic medical database. The Charlson Comorbidity Index (CCI) was estimated using an online calculator (https://www.mdcalc.com/charlson-comorbidity-index-cci). Patients were divided into two groups based on their outcomes: survivors (Group I) and non-survivors (Group II).

Statistical analysis

To conduct statistical analyses, a Statistical Package for the Social Sciences (IBM® SPSS Statistics for Windows, Version 23.0, Armonk, NY, USA) was used.

The quantitative variables were expressed as mean, maximum (max), and minimum (min) values using descriptive statistics. For categorical variables, frequency (%) was used. The distributions were determined by Kolmogorov-Smirnov analysis. A Student t-test was used to compare the means of continuous variables. Pearson's chi-square was used to test categorical variables; however, if the sample size was small (≤ 5), Fisher's exact test was used for analysis. The Mann-Whitney U test was used to evaluate nonparametric continuous variables reported as medians. Inter-Quantile Range (IQR) results were also given for the values recorded as the median.

The correlation between APACHE II and CCI was examined by Spearman's rank correlation, and the correlation coefficient (R2) was calculated. R2 < 0.2 indicated no correlation; R2 between 0.2 and 0.4 indicated a weak correlation; R2 between 0.4-0.6 indicated a moderate correlation, and R2 > 0.6 indicated a strong correlation between study groups.

Multivariate analysis was performed using the variables found to affect mortality in univariate analysis, and independent risk factors that affected mortality were identified. The Kaplan-Meier method was used to estimate survival, and survival was based on the study-specific 28-day mortality. Statistical significance was defined as a p-value of < 0.05.

Ethics Approval and Consent to Participate

The Institutional Ethics Committee reviewed and approved the study protocol (Approval No. 2020/514/192/9). The study was conducted in accordance with the Guidelines of Good Clinical Practice and the ethical principles of the Declaration of Helsinki. Because all recorded data and laboratory tests were performed as part of standard clinical practice, informed consent was waived.

Results

A total of 192 patients were screened and analyzed in this study.

Patients' characteristics and outcome measures

The male/female ratio was 46.9/53.1% (90 males vs. 102 females). Most patients were over 65 years old (66.7 %, 128/192) with a median age of 72 years (IQR, 16-101). Non-surgical reasons were more common than surgical reasons (67.7 %). On admission, 90.6% of all patients had at least one pre-existing systemic disease. Mortality was significantly higher in non-surgical patients ($p = 0.003$), previously dependent patients ($p < 0.001$), patients requiring mechanical ventilation ($p < 0.001$), continuous renal replacement therapy ($p = 0.004$), and patients requiring the infusion of vasoactive medications ($p < 0.001$).

The number of patients who received blood transfusions was significantly higher in survivors ($p = 0.004$) than in those who died in the study population. Non-survivors had significantly higher APACHE II scores and PDRs ($p < 0.001$). Furthermore, the mean CCI score of non-survivors was significantly higher than that of survivors ($p = 0.009$). The data related to demographics, clinical characteristics, and admission variables based on the patient's outcomes were shown in Table 1.

Except for the APACHE II and PDRs of patients, the findings of non-survivors grouped according to the death time did not reach statistical significance. There was a significant difference between APACHE II scores (median 25.0, IQR 4.2 vs. median 27.0, IQR: 8.0) and the PDRs (median 53.3, IQR 15.4% vs. median 60.5, IQR 26.5%) based on the admission time ($p = 0.02$) (Table 2).

The 28-day survival rate was 37.4% (median 20 days). Admissions were 41.9 % and 33.8% during the day and night shifts, respectively ($p = 0.465$). The day shift mortality rate was 18.2% and the night shift mortality was 16.7% ($p = 0.821$). The overall mortality rate of the study group was 47.9%. The vast majority of patients were admitted during the night shifts (76.1 %). In all patients, 28.3% ($n = 26$) died on the day shift, while the majority (71.7%, $n = 66$) died on the night shift. These findings indicated that the admission time had no effect on 28-day survival and there was no relationship between the time of admission and death (Figure 1).

Assessment of mortality predictors

The logistic regression model was used to investigate eight potential mortality predictors (cause of admission, dependency of patients, need for MV, duration of MV, APACHE II score, CCI, CRRT, and usage of vasoactive

Table 1. Demographic and clinical data of the patients

Variables	Group I (n=100)	Group II (n=92)	p
Age (y), median (IQR)	69.5 (24.75)	74.5 (20.50)	0.118[a]
Gender, n (%)			
Female	55 (55.0)	45 (48.9)	0.587[b]
Male	45 (45.0)	47 (51.1)	
Cause of admission, n (%)			
Surgical	42 (42.0)	20 (21.7)	0.003**[b]
Non-surgical	58 (58.0)	72 (78.3)	
Admission time, n (%)			
Day shift	31 (31.0)	22 (23.9)	0.272[b]
Night shift	69 (69.0)	70 (76.1)	
Dependency of patients, n (%)	3 (3.0)	36 (39.1)	<0.001***[b]
Pre-existing disease, n (%)	89 (89.0)	85 (92.4)	0.421
The number of pre-existing diseases, n (%)			
0-1	34(34)	21(22.8)	
2-3	46(46)	56(60.9)	0.06[b, c]
>3	20(20)	15(16.3)	0.243[b,d]
Need of MV, n (%)	27 (27.0)	55 (59.8)	<0.001***[b]
Duration of MV (hrs), median (IQR)	0.0(55.5)	123.0(327.2)	<0.001***[a]
Route of admission, n (%)			0.173[b]
Ward	41 (41.0)	29 (31.5)	
Emergency department	59 (59.0)	63 (68.5)	
APACHE II score on admission, median(IQR)	17.0 (8.0)	27.0 (6.0)	<0.001***[a]
PDR in ICU (%),median (IQR)	26.2 (22.9)	60.5 (25.6)	<0.001***[a]
CCI, median (IQR)	6(4.7)	7(3.7)	0.009**[a]
Blood transfusion, n (%)	40 (40.0)	19 (20.7)	0.004**[b]
CRRT, n (%)	11 (11.0)	20 (21.7)	0.04*[b]
Vasoactive drug infusions, n(%)	11 (11.0)	81 (88.0)	<0.001***[b]
Length of stay in ICU (days),median (IQR)	6.0(9.0)	8.0(21.0)	0.133[a]

IQR: interquartile range; APACHE: acute physiology and chronic health evaluation; PDR: predicted death rate; CCI: Charlson Comorbidity Index; CRRT: continuous renal replacement therapy; ICU: intensive care unit; MV: mechanical ventilation; hrs: hours; y: years; n: number; *p<0.05: statistically significant; **p<0.01: statistically very significant; ***p<0.001: extremely significant. [a]Mann-Whitney U, [b] Chi-Square, and Fisher's exact test if the sample size is small (≤5), [c] between-group comparison of 0-1 versus 2-3 pre-existing diseases, [d] between-group comparison of 2-3 versus >3 pre-existing diseases.

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Table 2. Clinical features of non-survivors according to the death time

Variables	DS (n=26)	NS (n=66)	p
Age (y), median (IQR)	73.5 (16.0)	74.5 (21.75)	0.671[a]
Gender, n (%)			0.552[b]
Female	12 (46.2)	31 (47.0)	
Male	14 (53.8)	35 (53.0)	
Cause of admission, n (%)			0.449[b]
Surgical	7 (26.9)	13 (19.7)	
Non-surgical	19 (73.1)	53 (80.3)	
Admission time, n (%)			0.229[b]
Day shift	4 (15.4)	18 (27.3)	
Night shift	22 (84.6)	48 (72.7)	
Dependency of patients, n (%)	7 (26.9)	29 (43.9)	0.132[b]
Pre-existing disease, n (%)	24 (92.3)	61 (92.4)	0.985[b]
Need of MV, n (%)	14 (53.8)	41 (62.1)	0.466[b]
Duration of MV (hrs), median (IQR)	93.0 (195.0)	145.0 (329.2)	0.393[a]
Route of admission, n (%)			0.274[b]
Ward	6 (23.1)	23 (34.8)	
Emergency department	20 (76.9)	43 (65.2)	
APACHE II score on admission, median(IQR)	25.0 (4.2)	27.0 (8.0)	0.02*[a]
PDR in ICU (%), median (IQR)	53.3 (15.4)	60.5 (26.5)	0.02*[a]
CCI, median (IQR)	7.5(4.0)	6.0(3.2)	0.115
Blood transfusion, n (%)	7 (26.9)	12 (18.2)	0.351[b]
CRRT, n (%)	6 (23.1)	14 (21.2)	0.845[b]
Vasoactive drug infusions, n (%)	22 (84.6)	59 (89.4)	0.525[b]
Length of stay in ICU (days),median (IQR)	5.5 (21.2)	9.0 (21.5)	0.633[a]

DS: day shift; NS: night shift; IQR: interquartile range; APACHE: acute physiology and chronic health evaluation; PDR: predicted death rate; CCI: Charlson Comorbidity Index; CRRT: continuous renal replacement therapy; ICU: intensive care unit; MV: mechanical ventilation; hrs: hours; y: years; n: number; *p<0.05: statistically significant; [a]Mann-Whitney U, [b] Chi-Square, and Fisher's exact test if the sample size is small (≤5).

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Table 3. Multivariate Cox model for risk factors associated with mortality*

Factors	Odds Ratio	CI95%		P
		Lower	Upper	
Reason for admission	1.231	0.318	4.764	0.763
Dependency of patients	2.701	0.555	13.152	0.219
Need of MV	1.685	0.495	5.738	0.404
Duration of MV	1.002	0.999	1.005	0.823
APACHE II score	1.454	1.217	1.737	<0.001**
CCI	0.958	0.809	1.133	0.614
CRRT	0.293	0.070	1.220	0.090
Vasoactive drug infusions	26.560	7.527	93.270	<0.001**

MV: mechanical ventilation; APACHE II: acute physiology and chronic health evaluation; CRRT: continuous renal replacement therapy; CI: confidence intervals*Multivariate analysis of variables significant with univariate analysis**p <0.001: extremely significant

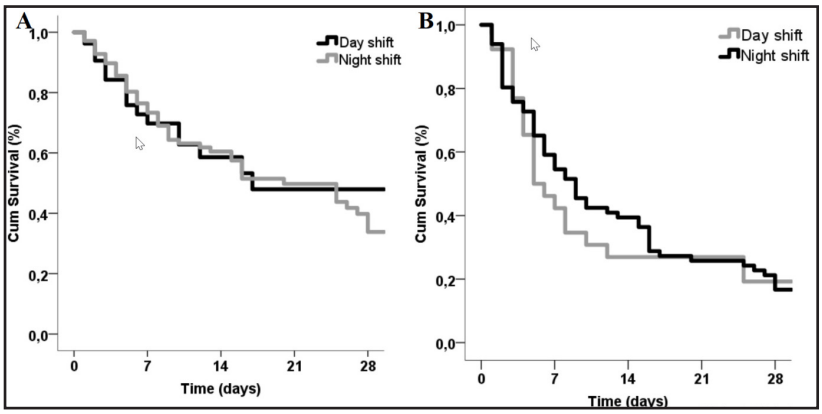

Figure.1: Kaplan-Meier curves of the 28-day survival of the patients (A) according to the admission time to the intensive care unit. (B) The time of death of the non-survivors.

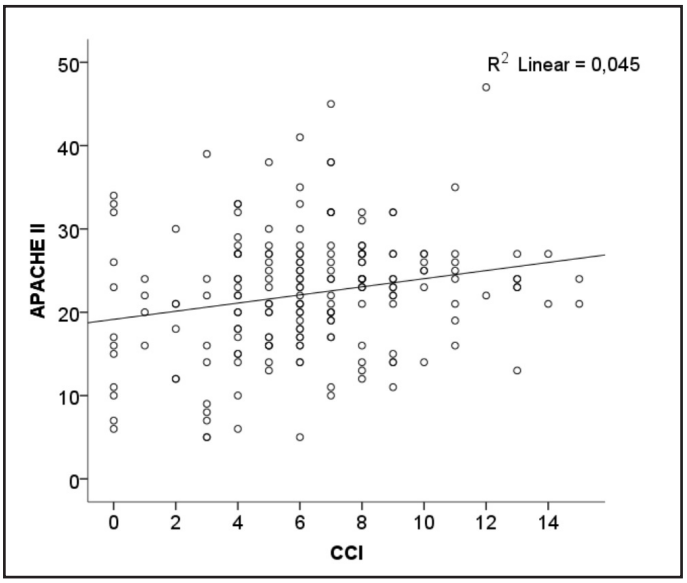

Figure 2: Spearman's correlation analysis between APACHE II and CCI (R^2= 0.045). APACHE II, Acute Physiology and Chronic Health Evaluation; CCI, Charlson Comorbidity Index

drugs). The adjusted model revealed that the APACHE II score and the vasoactive drug infusions ($p < 0.001$) increased the risk of death in critically ill patients (Table 3).

APACHE II and CCI as outcome predictors

In Spearman's rank analysis, APACHE II and CCI showed a poor positive correlation ($p = 0.002$, $R2 = 0.219$) with a prediction power of 4.5% (Figure 2).

Discussion

This study evaluated the demographic and clinical characteristics of non-COVID-19 critical patients and the risk factors for mortality during the pandemic because of the large number of severely ill COVID-19 patients requiring critical care facilities. In terms of the cause of admission, APACHE II scores, predicted death rate in ICU, CCI, previous dependency, the need for and the duration of mechanical ventilation, CRRT requirement, and vasoactive drug infusions, there was a significant difference between survivors and non-survivors. The CCI alone did not predict ICU mortality as well as the APACHE II score. A high APACHE II score and the need for vasoactive drug infusions were confirmed as independent risk factors for mortality in critical non-COVID-19 patients.

The impact of the pandemic on the usual ICU case mix and mortality was a controversial issue. A propensity score-matched retrospective study found that the clinical outcomes of non-COVID-19 patients did not differ during the pandemic compared with the situation before the pandemic[3]. In contrast, a recent report indicated that the outcomes of non-COVID-19 critical patients deteriorated significantly during the pandemic[6]. The context of curfews, restrictive measures, and public concerns about the virus transmission resulted in significant reductions in hospital admissions and delayed diagnosis and treatment onset for many diseases. During the pandemic, for example, cardiovascular emergency admissions decreased but in-hospital mortality increased[7].

Despite the prioritisation of oncologic patients, delayed operations and disruptions in chemotherapy or radiotherapy

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treatments resulted in the impairment of the clinical conditions of these patients[8]. The admission SOFA (Sequential Organ Failure Assessment) score and the 30-day mortality in non-COVID-19 septic patients were significantly higher than before the pandemic period. This result indicated that the clinical condition of the septic patients had been negatively affected by the pandemic[9]. The mortality rate of the recruited patients in the current study was high compared to the overall mortality of this unit (47.9 % vs. 33.25 %). This was most likely due to the concurrent arrival of one of the COVID-19 waves. Because each COVID-19 wave differs from the next, the admission characteristics and severity scores of critical patients may differ. This assumption, however, was not the study's goal, and further comparative studies may be more enlightening.

During the pandemic, one of the main suggestive issues was whether the heavy workload of healthcare workers affected the quality of care. Physical and emotional exhaustion negatively impacted the quality of the work-life balance of healthcare providers due to increased work demands, shift overload, and the risk of infection for themselves and their families during the pandemic[10-11]. Previous ICU studies attempted to identify the 'time effect', 'off-hour effect' or the 'weekend effect' on mortality; however, the conflicting results prevented a definitive conclusion[12-15]. A multicenter prospective study revealed that the most patients died at night or on weekends (58%), and that 64% of these deaths were unexpected[16]. In this study, there was an expectation of increased mortality associated with the admission time to the ICU due to pandemic conditions. The results, however, did not reach statistical significance and thus did not confirm this hypothesis. This finding demonstrated the importance of hospital reorganisation in providing adequate therapeutic and diagnostic interventions not only to COVID-19 patients but also to non-COVID-19 patients during the pandemic. With the announcement of the first case in our country, the hospital authority collaborated with the Coronavirus Scientific Advisory Board of our hospital, which created multidisciplinary algorithms for patient flow arrangement, and health services, including ICUs, were adapted without prioritisation of COVID-19 patients. The timetables of ICU staff were not significantly altered to maintain healthcare quality. This point should not be underestimated by institutional policymakers.

Despite advances in modern medical care and health technology, mortality remains the endpoint of many ICU clinical trials. The COVID-19 pandemic, in particular, reminded us of the importance of ICU mortality. The disparity in national general health policies, institutional approaches, inter-clinician variability, ICU characteristic, sociodemographic changes, and comorbidities of the population made determining the exact causes of death difficult. Age, dehydration, tube feeding, and the use of anticonvulsive medications were found to be mortality predictors in critically ill patients in a recent study[17]. Rather than in-hospital mortality, the length of stay in the ICU was found to be an independent risk factor for long-term mortality[18-19]. Death in the ICU was classified as either unexpected or anticipated, with cardiovascular and neurological impairment being the most common reasons for admission[16].

According to a recent systematic review, mortality in ICUs has a wide range due to the heterogeneity between study groups. Age and comorbidity were independent risk factors for the long-term mortality; however, the severity score, diagnosis on admission, and need for mechanical ventilation were independent factors for ICU mortality[20]. Comorbidity adjustment is critical for clinical outcomes, and the CCI is a widely used assessment tool for predicting long-term mortality in various populations. However, because of its ability to assess diagnostic and prognostic differences between subgroups of patients with the same clinical diagnosis, it may be used to predict in-hospital mortality in some critical settings[21]. In ICU outcome studies, the predictive power of CCI was not found to be as strong as that of the APACHE II scoring system[17,22-25]. The APACHE II scores and the CCIs were significantly higher in non-survivors in the current study; the adjusted model confirmed the association between the severity of illness and ICU mortality but not the CCI alone. Pre-existing disease severity was more predictive of ICU mortality than the number of diseases. Time spent on patients with symptoms similar to COVID-19 in whom a negative infection must be ruled out is critical. In our hospital, the most commonly used clinical methods are awaiting the swab culture result and/or evaluating the chest-computed tomography. These methods, however, are time-consuming and result in ICU admission delays. This may have a negative impact on the severity scores at the time of admission. Nonetheless, this subject has yet to be addressed in the existing literature.

The transfusion of erythrocytes and blood products is a common life-saving treatment in the ICU, but studies on transfusion-induced mortality have failed to produce strong evidence[26]. Individual-based transfusion decisions and the assessment of risk-to-benefit ratios appear to be the most appropriate approaches for anaemic critical patients today. The number of blood transfusions and surgical patients were significantly higher in survivors in this study. This was due to differences in distribution between groups caused by the study's retrospective nature. For this reason, whether this parameter is a mortality predictor or not, multivariate analysis did not apply to it.

There are subcomponents to the relationship between the need for mechanical ventilation and patient mortality. The patient's condition when the mechanical ventilation was started, the presence of acute lung injury or acute respiratory distress syndrome, pre-existing pulmonary diseases, and the severity of illness were identified as the major predictors of mortality in mechanically ventilated patients[27]. Many clinical studies have been conducted to demonstrate the relationship between the two variables, and a remarkable finding of international multicenter studies was a significant decrease in critical patient short-term mortality with the implementation of mechanical ventilation in ICUs. This result was the consequence of developing changes in mechanical ventilators, updates on mechanical ventilator strategies, improved successful weaning from mechanical ventilation, lower rates of sepsis, and length of stay in ICU[28]. According to the findings of our study, the number of patients and duration of mechanical ventilation were significantly higher in non-survivors. However, these parameters did not predict mortality. We did not evaluate the leading causes of mechanical ventilation or the systemic factors that influence weaning success. This topic needs to be considered in future studies.

Inotropic and/or vasopressor agents are frequently used to treat circulatory shock in critically ill patients. On the other hand, high medication doses have been linked to ICU mortality[29]. Patients treated with vasoactive medications were older and had more severe clinical presentations, according to the FROG-ICU (French and European Outcome reGistry in Intensive Care Unit) study group. The use of these drugs strongly predicted short-term mortality in a Cox proportional hazards model[30]. Our findings showed that non-survivors required significantly more vasoactive support, which was a strong predictor of mortality.

The end-point of this study was the in-hospital outcome of the critical patients. However, recently, the term "Post-intensive care syndrome" (PICS) has been introduced into clinical terminology to describe changes in the physical, cognitive, or mental health status of ICU survivors. Due to differences in the assessment tools used to diagnose it, its exact prevalence is unknown. PICS is frequently associated with decreased health-related quality of life (HRQOL), cognitive decline, and psychological dysfunction. According to a recent review, the COVID-19 pandemic exacerbated the problem and increased the risk of PICS development31. Because of the limited data, additional clinical studies on the long-term post-intensive care follow-up of ICU survivors may help expand our knowledge about the impact of the pandemic on critical patients following ICU discharge.

This study has some limitations. This study is a retrospective time-limited study; so, it's unblinded and non-randomized nature. A single-centre design with a small sample size may prevent findings from being extrapolated to the entire population. Further studies with large patient groups are needed to observe the pandemic's relevant effects on non-COVID-19 critical patients. We extracted only a few parameters to evaluate the mortality factors; however, many factors may play a role in predicting mortality in ICUs. Therefore, future studies with larger recruitment data sets may be more beneficial. The study was conducted at a tertiary academic hospital that admits more severely ill critical patients. Thus, the interpretation of the results may show variability in studies concerning ICU mortality with different patient populations having dissimilar disease severity. The medical records of the patients were extracted retrospectively from the hospital's electronic database. Therefore, the comorbidity data may be missing or misreported. The APACHE II scoring system was used to determine the severity of the patient's conditions. Therefore, the potential limitations of this scoring system must be considered in the interpretation of the findings. The doses and duration of vasoactive drugs were at the discretion of the physicians on duty and were disregarded in this study. Inter-physician differences and subgroup analysis were also waived. For this reason, these findings need to be validated by larger prospective studies.

Conclusion

Rather than the CCI, the APACHE II scoring system has clinical utility for predicting the mortality of critically ill patients, and the vasoactive drug administration has been identified as a predictor of mortality in the ICU. The negative impact of the pandemic on critically ill patients is unclear and needs to be evaluated. This effect can vary greatly across the globe, depending on various factors. As a result, further clinical studies from different countries, both during the pandemic and compared to the pre-pandemic period, may be warranted to determine whether COVID-19 affected the outcomes of non-COVID-19 critical patients.

Data availability

The datasets used and/or analyzed in the current study are available upon reasonable request from the corresponding author.

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Author Contributions

BC and KTS contributed to the study design. BC and BK contributed to data collection. BC analyzed the data, searched literature and wrote the manuscript. EB, KTS provided help and advice. All authors have read and approved the final version of the manuscript.

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