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Predictive Performance of Shock Index Derivatives for Mortality in Hospitalized Adult Burn Patients Presenting to the Emergency Department

Acil Servise Başvuran ve Hastaneye Yatırılan Erişkin Yanık Hastalarında Mortalitenin Öngörülmesinde Şok İndeksi Türevlerinin Prediktif Performansı

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Abstract

Objective: Early identification of high-risk burn patients is essential for optimizing clinical management and improving outcomes. Traditional prognostic models mainly rely on burn size and patient age; however, early physiological indicators obtained at emergency department presentation may provide additional prognostic information. This study aimed to evaluate the predictive performance of shock index (SI) derivatives and burn percentage for in-hospital mortality in hospitalized adult burn patients presenting to the emergency department.

Method: This retrospective observational study included adult burn patients who were evaluated in the emergency department and subsequently hospitalized in the burn unit of a tertiary care center. Demographic and clinical data, including burn type, burn depth, total body surface area burned (TBSA), and hospital outcomes, were obtained from electronic medical records. SI, modified shock index (MSI), age shock index (ASI), and burn age shock index (BASI) were calculated using vital signs recorded at initial emergency department presentation. Receiver operating characteristic (ROC) curve analysis was performed to evaluate the predictive performance of these parameters for in-hospital mortality.

Results: A total of 291 hospitalized adult burn patients were included in the study, of whom 33 (11.3%) died during hospitalization. Non-survivors were significantly older and had higher TBSA values than

Öz

Amaç: Yüksek riskli yanık hastalarının erken dönemde belirlenmesi, klinik yönetimin optimize edilmesi ve hasta sonuçlarının iyileştirilmesi açısından büyük önem taşımaktadır. Geleneksel prognostik modeller çoğunlukla yanık yüzdesi ve hasta yaşına dayanmaktadır; ancak acil servise başvuru sırasında elde edilen erken fizyolojik göstergeler ek prognostik bilgi sağlayabilir. Bu çalışmanın amacı, acil servise başvuran ve yanık ünitesine yatırılan erişkin yanık hastalarında şok indeksi (SI) türevleri ve yanık yüzdesinin hastane içi mortaliteyi öngörmedeki performansını değerlendirmektir.

Yöntem: Bu retrospektif gözlemsel çalışmaya acil serviste değerlendirildikten sonra üçüncü basamak bir merkezin yanık ünitesine yatırılan erişkin yanık hastaları dahil edildi. Demografik ve klinik veriler; yanık tipi, yanık derinliği, toplam yanık yüzey alanı (TBSA) ve hastane sonuçları elektronik tıbbi kayıtlardan elde edildi. SI, modifiye şok indeksi (MSI), yaş şok indeksi (ASI) ve yanık yaş şok indeksi (BASI), acil servise ilk başvuru sırasında kaydedilen vital bulgular kullanılarak hesaplandı. Bu parametrelerin hastane içi mortaliteyi öngörme performansını değerlendirmek amacıyla alıcı işletim karakteristiği (ROC) eğrisi analizi yapıldı.

Bulgular: Çalışmaya toplam 291 erişkin yanık hastası dahil edildi ve bunların 33'ü (%11,3) hastanede yaşamını kaybetti. Yaşamını kaybeden hastalar sağ kalanlara göre anlamlı derecede daha yaşlıydı ve TBSA değerleri daha yüksekti (p<0,001). İncelenen tüm

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Abstract

survivors (p<0.001). All evaluated hemodynamic indices were significantly higher among non-survivors (p<0.001). ROC analysis demonstrated that BASI had the highest predictive performance for mortality [area under the curve (AUC): 0.984; 95% confidence interval: 0.972-0.997], followed by TBSA (AUC: 0.939), MSI (AUC: 0.885), SI (AUC: 0.873), and ASI (AUC: 0.849).

Conclusion: SI derivatives and burn percentage were significantly associated with mortality in hospitalized adult burn patients. Among the evaluated parameters, BASI demonstrated the best predictive performance and may represent a practical bedside tool for early mortality risk assessment in burn patients presenting to the emergency department.

Keywords: Burn age shock index, burn injury, emergency department, mortality, shock index

Öz

hemodinamik indeksler non-survivor grubunda anlamlı derecede daha yüksek bulundu (p<0,001). ROC analizi sonucunda mortaliteyi öngörmede en yüksek performansı BASI gösterdi [eğri altında kalan alan (AUC): 0,984; %95 güven aralığı: 0,972-0,997]. Bunu sırasıyla TBSA (AUC: 0,939), MSI (AUC: 0,885), SI (AUC: 0,873) ve ASI (AUC: 0,849) izledi.

Sonuç: Şok indeksi türevleri ve yanık yüzdesi, hastaneye yatırılan erişkin yanık hastalarında mortalite ile anlamlı olarak ilişkilidir. İncelenen parametreler arasında BASI en yüksek öngörü performansını göstermiş olup, acil servise başvuran yanık hastalarında erken mortalite risk değerlendirmesi için pratik bir yatak başı araç olabilir.

Anahtar kelimeler: Acil servis, mortalite, şok indeksi, yanık, yanık yaş şok indeksi

Introduction

Burn injuries remain a major cause of morbidity and mortality worldwide and represent a significant public health burden. It is estimated that millions of burn injuries occur each year globally, with a substantial proportion resulting in hospitalization and long-term disability. Severe burns may lead to complex physiological disturbances including systemic inflammatory responses, extensive fluid shifts, and circulatory instability, which may ultimately progress to organ dysfunction and death. Early identification of patients at increased risk of adverse outcomes is therefore crucial for guiding treatment strategies and optimizing clinical management in hospitalized burn patients (1,2).

Several clinical factors have traditionally been associated with mortality in burn patients. Among these, total body surface area (TBSA) burned and patient age are recognized as the most important determinants of outcome. Prognostic scoring systems such as the Baux score and the abbreviated burn severity index (ABSI) integrate these parameters and have been widely used to estimate mortality risk in burn populations (3,4). These scoring systems provide valuable prognostic information; however, they mainly rely on demographic and injury characteristics and may not fully reflect the early physiological status of patients presenting to the emergency department. Early hemodynamic alterations occurring during the initial phase of burn injury may therefore provide additional prognostic information that is not captured by conventional scoring models (5).

The shock index (SI), defined as the ratio of heart rate to systolic blood pressure, is a simple bedside indicator that reflects hemodynamic compromise and circulatory instability. Initially introduced in emergency medicine, SI has been widely investigated as a prognostic marker in trauma, sepsis, and critically ill patients (6,7). In recent years, several derivatives of the SI have been proposed in order to improve its predictive accuracy. These include the modified shock index (MSI), age shock index (ASI), and burn shock index (BASI), which incorporate additional physiological or demographic variables to enhance risk stratification (8-10). Although these indices have demonstrated prognostic value in various clinical settings, evidence regarding their predictive performance in burn patients remains limited.

In particular, few studies have evaluated the comparative performance of SI derivatives together with burn severity parameters in cohorts of hospitalized burn patients initially assessed in the emergency department. Understanding the prognostic value of these readily available indices may facilitate early risk stratification and clinical decision-making in burn care. Therefore, the present study aimed to evaluate the predictive performance of SI derivatives and burn percentage for in-hospital mortality in hospitalized adult burn patients presenting to the emergency department.

Materials and Methods

Study Design and Setting

This study was designed as a retrospective observational study conducted at a tertiary care hospital providing specialized treatment for burn injuries. The hospital functions as a regional referral center for burn care and receives patients with varying degrees of burn severity from a broad geographic area. The study population consisted of adult burn patients who were initially evaluated in the emergency department and subsequently hospitalized in the burn unit. Medical records of eligible patients were retrospectively reviewed using the hospital's electronic medical record system in order to collect demographic, clinical, and outcome-related information.

Study Population

Adult patients aged 18 years and older who were admitted to the burn unit following evaluation in the emergency department during the study period were considered eligible for inclusion. Patients were excluded if they were younger than 18 years of age, if they were discharged directly from the emergency department without hospitalization, if their medical records were incomplete, or if the vital sign measurements required for calculating SI parameters were missing. After applying these criteria, a total of 291 hospitalized adult burn patients were included in the final analysis.

Data Collection

Demographic and clinical data were obtained from electronic hospital records and patient charts. The collected variables included age, sex, burn type, burn depth, burn percentage, presence of inhalation injury, presence of additional trauma, admission location, hospital length of stay, and in-hospital mortality. Burn types were classified as thermal, electrical, chemical, or cold injury according to the mechanism of injury documented in the medical records. Burn depth was categorized based on standard clinical burn classifications and included superficial second-degree burns, deep second-degree burns, third-degree burns, and fourth-degree burns.

Burn severity was quantified using TBSA, which was determined according to standard burn assessment methods documented in the patient charts. The presence of inhalation injury and additional traumatic injuries accompanying the burn event were also recorded. The hospitalization location was documented as either ward admission or intensive care unit admission.

Vital signs obtained at the time of the initial emergency department evaluation were used for the calculation of hemodynamic indices. These measurements included heart rate, systolic blood pressure, and diastolic blood pressure, which were recorded during the first clinical assessment in the emergency department.

Calculation of SI Derivatives

Several hemodynamic indices were calculated using the recorded vital signs and demographic variables in order to evaluate their prognostic value in hospitalized burn patients. The SI was calculated as the ratio of heart rate to systolic blood pressure (SI = heart rate/systolic blood pressure). The MSI was calculated as the ratio of heart rate to mean arterial pressure (MSI = heart rate/MAP), where mean arterial pressure was calculated using the standard physiological formula MAP = (SBP + 2 × DBP) / 3. The ASI was obtained by multiplying the SI by the patient's age (ASI = age × SI). The BASI incorporated burn severity into this calculation by multiplying the patient's age, burn percentage expressed as TBSA, and the SI value (BASI = age × TBSA × SI). All indices were calculated using the initial vital signs recorded at the time of emergency department presentation.

Outcome Measures

The primary outcome of the study was in-hospital mortality. Patients were classified as survivors or non-survivors based on their hospital outcomes. Additional analyses evaluated the relationship between SI derivatives and burn characteristics, including burn depth and burn percentage, in order to assess the clinical relevance of these indices in different burn severity groups.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics software (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean values with standard deviations, whereas categorical variables were presented as frequencies and percentages. Baseline demographic and clinical characteristics of the study population were summarized descriptively. Comparisons between survivors and non-survivors were performed using the independent samples Student's t-test for continuous variables. The relationship between SI derivatives and burn depth groups was analyzed using One-Way Analysis of Variance when appropriate.

Receiver operating characteristic (ROC) curve analysis was performed to evaluate the predictive performance of SI derivatives and burn percentage for in-hospital mortality. The area under the curve (AUC) was calculated for each parameter, and optimal cut-off values were determined using the Youden index. Sensitivity and specificity values corresponding to these cut-off points were calculated in order to assess the diagnostic performance of each parameter. A p-value of less than 0.05 was considered statistically significant for all analyses.

Ethics Approval

The study protocol was approved by the Institutional Ethics Committee of University of Health Sciences Turkey, İstanbul Bağcılar Training and Research Hospital (decision no: 2025/01/93/003, date: 17.01.2025), and the study was conducted in accordance with the principles of the Declaration of Helsinki. Because of the retrospective nature of the study and the use of anonymized patient data, the requirement for informed consent was waived by the ethics committee.

Results

Study Population and Baseline Characteristics

A total of 291 adult burn patients who were hospitalized after evaluation in the emergency department were included in the study. Of these patients, 215 (73.9%) were male and 76 (26.1%) were female. Thermal burns constituted the most common type of injury (85.9%), followed by electrical burns (7.2%), chemical burns (6.2%), and cold injuries (0.7%). Regarding burn depth, the majority of patients had deep second-degree burns (70.1%), while 24.4% had third-degree burns and 5.2% had superficial second-degree burns. Only one patient (0.3%) had a fourth-degree burn. Inhalation injury was identified in 13 patients (4.8%), and additional trauma was present in 15 patients (5.2%). In terms of hospitalization location, 155 patients (53.3%) required admission to the intensive care unit (ICU), whereas 136 patients (46.7%) were admitted to the ward (Table 1).

Table 1. Baseline characteristics of hospitalized adult burn patients

Category	Variable	n (%)
Demographics	Total patients	291 (100)
	Male	215 (73.9)
	Female	76 (26.1)
Burn type	Thermal burn	250 (85.9)
	Chemical burn	18 (6.2)
	Electrical burn	21 (7.2)
	Cold injury	2 (0.7)
Burn depth	2nd degree superficial	15 (5.2)
	2nd degree deep	204 (70.1)
	3rd degree	71 (24.4)
	4th degree	1 (0.3)
Clinical features	Additional trauma present	15 (5.2)
	Inhalation injury present	13 (4.8)
Admission location	Ward admission	136 (46.7)
	ICU admission	155 (53.3)

Data are presented as n (%). Percentages were calculated based on the total study population (n=291). ICU: Intensive care unit

Comparison According to in-hospital Mortality

Among the study population, 33 patients died during hospitalization, while 258 patients survived. Non-survivors were significantly older than survivors (53.21±18.36 vs. 39.00±14.99 years, p<0.001). However, length of hospital stay did not differ significantly between the two groups (16.30±13.35 vs. 13.39±16.62 days, p=0.335). All evaluated hemodynamic indices were significantly higher in non-survivors compared with survivors. The SI was significantly elevated in non-survivors (0.921±0.162) compared with survivors (0.711±0.147, p<0.001). Similarly, the MSI was higher in non-survivors (1.302±0.233) than in survivors (0.985±0.210, p<0.001). The ASI also demonstrated a marked difference between the groups (48.55±17.34 vs. 27.68±12.25, p<0.001). The largest difference was observed for the BASI, which was substantially higher among non-survivors (2785.95±1179.24) compared with survivors (568.99±379.14, p<0.001). Additionally, the burn percentage (TBSA) was significantly greater in non-survivors (60.61±20.87%) than in survivors (20.89±11.10%, p<0.001) (Table 2).

SI Derivatives According to Burn Depth

When patients were stratified according to burn depth, significant differences were observed in SI derivatives

Table 2. Clinical variables according to in-hospital mortality

Variable	Non-survivors (n=33) Mean ± SD	Survivors (n=258) Mean ± SD	p-value
Age (years)	53.21±18.36	39.00±14.99	<0.001
Length of hospital stay (days)	16.30±13.35	13.39±16.62	0.335
Shock index	0.921±0.162	0.711±0.147	<0.001
Modified shock index	1.302±0.233	0.985±0.210	<0.001
Age shock index	48.55±17.34	27.68±12.25	<0.001
Burn age shock index	2785.95±1179.24	568.99±379.14	<0.001
Burn percentage (TBSA, %)	60.61±20.87	20.89±11.10	<0.001

Values are presented as mean ± standard deviation (SD). Continuous variables were compared between non-survivors and survivors using the independent samples Student's t-test. Statistical significance was defined as p<0.05, TBSA: Total body surface area burned and burn percentage. The SI increased with burn severity, from 0.695±0.090 in superficial second-degree burns to 0.789±0.181 in third-degree burns (p=0.008). A similar trend was observed for the MSI, which increased from 0.959±0.132 to 1.102±0.259 across burn depth categories (p=0.005). The ASI and BASI also demonstrated significant increases with increasing burn depth (p=0.002 and p<0.001, respectively). Likewise, the burn percentage (TBSA) was significantly higher in patients with deeper burns (p<0.001) (Table 3). Interpretation of findings related to the fourth-degree burn subgroup should be made cautiously, as only one patient was included in this category. Therefore, measures of variability could not be reliably calculated and statistical comparisons involving this subgroup may not be stable.

ROC Analysis for Prediction of Mortality

ROC curve analysis was performed to evaluate the predictive performance of SI derivatives and burn percentage for in-hospital mortality. Among the evaluated parameters, the BASI demonstrated the highest predictive performance with an AUC of 0.984 [95% confidence interval (CI): 0.972-0.997]. The optimal cut-off value for BASI was 1510.93, yielding a sensitivity of 90.9% and specificity of 96.9%. The burn percentage (TBSA) also showed excellent predictive ability with an AUC of 0.939 (95% CI: 0.889-0.988) and an optimal cut-off value of 37.5%, corresponding to 87.9% sensitivity and 90.7% specificity. Other indices also demonstrated good predictive performance. The MSI had an AUC of 0.885, followed by the SI with an AUC of 0.873, and the ASI with an AUC of 0.849. All ROC analyses were statistically significant (p<0.001) (Table 4, Figure 1).

Discussion

The present study provides three main findings. First, all SI derivatives were significantly associated with in-hospital mortality among hospitalized adult burn patients. Second, burn percentage demonstrated strong predictive performance for mortality. Third, and most importantly, BASI showed the highest discriminative ability among all evaluated parameters. These findings suggest that the integration of age, burn extent, and early hemodynamic status may provide valuable prognostic information during the initial assessment of burn patients in the emergency department.

The prognostic importance of burn size and age has long been recognized in burn care. Classical mortality models such as the Baux score and the ABSI are largely based on these variables and remain widely used in clinical practice (3,4).

Table 3. Shock index derivatives and burn percentage according to burn depth

Variable	2nd degree superficial Mean ± SD	2nd degree deep Mean ± SD	3rd degree Mean ± SD	4th degree	p-value
Shock index	0.695±0.090	0.719±0.157	0.789±0.181	0.792±NA	0.008
Modified shock index	0.959±0.132	0.997±0.227	1.102±0.259	1.018±NA	0.005
Age shock index	24.462±8.378	28.503±13.666	35.726±16.378	24.552±NA	0.002
Burn age shock index	294.337±122.210	639.807±547.345	1455.064±1356.119	491.040±NA	<0.001
Burn percentage (TBSA, %)	12.67±5.63	21.97±11.61	38.01±26.12	20±NA	<0.001

Values are presented as mean ± standard deviation (SD). Comparisons between burn depth groups were performed using One-Way Analysis of Variance for normally distributed variables or the Kruskal-Wallis test for non-normally distributed variables. A p-value <0.05 was considered statistically significant. Standard deviation could not be calculated for the 4th-degree burn group due to the presence of a single patient. Because only one patient had a fourth-degree burn, statistical estimates for this subgroup should be interpreted cautiously and were not considered reliable for subgroup inference, TBSA: Total body surface area burned

Table 4. ROC analysis for predicting in-hospital mortality

Parameter	AUC	95% CI	Cut-off	Sensitivity (%)	Specificity (%)	p-value
Shock index	0.873	0.821-0.924	0.796	90.9	76.4	<0.001
Modified shock index	0.885	0.834-0.936	1.076	93.9	79.5	<0.001
Age shock index	0.849	0.774-0.925	35.53	84.8	76.7	<0.001
Burn age shock index	0.984	0.972-0.997	1510.93	90.9	96.9	<0.001
Burn percentage (TBSA, %)	0.939	0.889-0.988	37.50	87.9	90.7	<0.001

ROC: Receiver operating characteristic, AUC: Area under the curve, TBSA: Total body surface area burned, CI: Confidence interval. Optimal cut-off values were determined using the Youden index. Sensitivity and specificity correspond to the values obtained at the optimal cut-off point. A p-value <0.05 was considered statistically significant

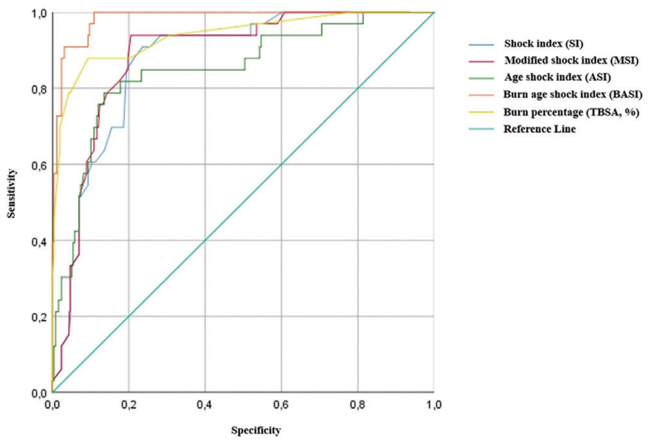

Figure 1. Receiver operating characteristic curves demonstrating the predictive performance of shock index derivatives (SI, MSI, ASI, BASI) and burn percentage for mortality in hospitalized adult burn patients presenting to the emergency department

TBSA: Total body surface area burned

In our cohort, non-survivors were significantly older than survivors and had substantially larger burned body surface areas, which is consistent with the established literature on burn mortality. The strong predictive ability of burn percentage observed in our study also supports the continued clinical relevance of TBSA as one of the most important determinants of outcome in burn patients. Similar findings have been reported in previous burn studies demonstrating that TBSA is strongly associated with mortality risk (11).

Severe burn injury is associated with extensive fluid shifts, systemic inflammatory activation, and circulatory instability, particularly in patients with larger burns (2). For this reason, physiological indices derived from routine vital signs may capture early deterioration that is not fully reflected by anatomical burn characteristics alone. The SI has been widely studied in emergency medicine as a simple marker of hemodynamic compromise. In trauma populations, elevated SI values have been associated with hypovolemic shock, transfusion requirement, and increased mortality risk. Mutschler et al. (12) demonstrated that SI can serve as a rapid indicator of transfusion requirement in injured patients. In addition, a systematic review and meta-analysis by Vang et al. (13) showed that higher SI values were significantly associated with mortality in trauma populations. Dai et al. (14) also reported that different SI derivatives have significant predictive value for early mortality in trauma patients.

In our study, both SI and MSI were significantly higher in non-survivors, indicating that early circulatory stress is closely related to adverse outcomes in burn patients. MSI may be particularly useful because it incorporates mean arterial pressure and therefore may reflect tissue perfusion more comprehensively than systolic blood pressure alone. Although the literature specifically evaluating MSI in burn cohorts remains limited, its performance in our study suggests that it may represent a clinically relevant marker in this population.

Among all evaluated parameters, BASI demonstrated the highest predictive performance. BASI integrates three major determinants of burn prognosis: Patient age, burn extent, and early hemodynamic status. From a clinical perspective, this combined structure may provide a more comprehensive assessment of physiological stress than isolated variables. Older patients typically have lower physiological reserve, extensive burns impose greater metabolic and inflammatory burden, and abnormal vital signs reflect early circulatory compromise. When these components are combined into a single index, prognostic accuracy may improve.

From a practical bedside perspective, BASI may provide clinicians with a rapid and easily applicable adjunct for early risk stratification at the time of emergency department presentation, as it relies solely on routinely available clinical variables without requiring additional laboratory testing. In contrast to established prognostic models such as the Baux score and the ABSI, which are primarily based on demographic characteristics and burn severity, BASI additionally incorporates early physiological status through the SI and may therefore better reflect acute circulatory stress during the initial phase of burn injury. However, BASI should be considered complementary to established prognostic tools rather than a replacement and should always be interpreted within the broader clinical context and clinical judgment (4,6,15).

Recent studies evaluating SI derivatives in burn patients have reported similar findings. Içer et al. (15) demonstrated that BASI had the highest predictive performance among several shock index-based parameters for mortality prediction in burn patients. In another study conducted by the same research group, the prognostic value of indices such as ASI was shown to vary according to the age distribution of the study population, particularly when pediatric patients were included (16). Since our cohort consisted exclusively of hospitalized adult patients, the strong predictive performance of BASI observed in our study is consistent with these previous findings.

The epidemiological characteristics of our cohort were also largely compatible with previously published burn studies. Male predom Özçetin et al. (17) reported that 59% of burn patients were male in their cohort, while Şakrak et al. (18) found that inance among burn patients has been reported in several national and international cohorts. Özçetin et al. (17) 60.2% of hospitalized burn patients were male. Günay et al. (19) reported a male predominance of approximately 70%, and Çınal and Barın (20) observed that 59.7% of burn cases were male. Similar findings have also been reported internationally; Kobayashi et al. (21) documented a male predominance in Japan, while Akerlund et al. (22) reported comparable results in Sweden. In our study, the proportion of male patients was slightly higher than many previous reports, which may be related to the metropolitan and industrial environment of our center where occupational exposure to burn injuries may be more common among men.

Thermal burns were the most common mechanism of injury in our cohort, which is consistent with the epidemiological pattern described in the literature. Previous studies have similarly reported that thermal burns constitute the majority of burn injuries (19,20). The mean burn percentage in our study was also higher than that reported in many general burn series. Previous epidemiological studies have reported average TBSA values ranging approximately between 8% and 14% (23-25). The higher mean TBSA observed in our cohort is most likely explained by the fact that our study included only hospitalized burn patients rather than minor cases treated in outpatient settings.

Another important observation was that SI derivatives and burn percentage increased significantly with burn depth. Deeper burns are generally associated with more extensive tissue injury, greater inflammatory burden, and more severe physiological stress. Previous studies have similarly reported that deeper burns are associated with more complicated clinical courses and prolonged treatment periods (26,27). These findings suggest that burn depth may also be closely related to the physiological instability reflected by shock index-based parameters.

The clinical implications of these findings are noteworthy. In the emergency department, early risk assessment is crucial for determining the level of monitoring, the need for burn unit admission, and the intensity of resuscitative care. SI derivatives can be calculated rapidly from routinely obtained vital signs and basic clinical information. In this context, BASI may serve as a practical adjunct for early bedside risk assessment in hospitalized adult burn patients. However, these indices should be considered complementary to clinical evaluation and established burn severity models rather than replacements for them.

Study Limitations

This study has several limitations. Its retrospective single-center design may limit generalizability and introduces the possibility of documentation bias. Some patients were excluded because of incomplete records, which may have influenced cohort composition. In addition, causes of death during hospitalization may not always have been clearly distinguishable from burn-related complications in retrospective records. Despite these limitations, the study also has important strengths, including the evaluation of multiple SI derivatives in hospitalized adult burn patients and the direct comparison of these indices with burn percentage. Nevertheless, the present study provides valuable data by focusing specifically on hospitalized adult burn patients and by directly comparing multiple SI derivatives with burn percentage in the same cohort. An additional limitation should be acknowledged regarding burn-depth subgroup analyses. Only one patient in the study population had a fourth-degree burn, which limited the statistical robustness of comparisons across burn depth categories. Although this patient was retained to preserve cohort completeness, results related to this subgroup should be interpreted cautiously.

Conclusion

In conclusion, SI derivatives and burn percentage were all associated with mortality in hospitalized adult burn patients presenting to the emergency department, and BASI demonstrated the best predictive performance among the evaluated parameters. These findings suggest that BASI may represent a useful and easily applicable tool for early mortality risk assessment in adult burn patients. Further large-scale prospective multicenter studies are required to validate these findings and to determine the role of SI derivatives in routine burn prognostication. From a clinical perspective, the use of simple bedside indices such as BASI may help emergency physicians identify high-risk burn patients earlier and prioritize intensive monitoring or aggressive resuscitation strategies when necessary. However, external validation studies are needed before routine implementation of BASI in clinical practice.

Ethics

Ethics Committee Approval: The study protocol was approved by the Institutional Ethics Committee of University of Health Sciences Turkey, İstanbul Bağcılar Training and Research Hospital (decision no: 2025/01/93/003, date: 17.01.2025).

Informed Consent: The retrospective nature of the study and the use of anonymized patient data, the requirement for informed consent was waived by the ethics committee.

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During the preparation of this manuscript, the authors used an AI-assisted language editing tool to improve the clarity, grammar, and readability of the text. After using this tool, the authors carefully reviewed and edited the manuscript and take full responsibility for the content of the published article.

Footnotes

Authorship Contributions

Surgical and Medical Practices: M.K., E.U., B.D., A.C., M.Y., Concept: M.K., E.U., B.D., A.C., M.Y., Design: M.K., E.U., B.D., A.C., M.Y., Data Collection or Processing: M.K., E.U., B.D., A.C., M.Y., Analysis or Interpretation: M.K., E.U., B.D., A.C., M.Y., Literature Search: M.K., E.U., B.D., A.C., M.Y., Writing: M.K., E.U., B.D., A.C., M.Y.

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