ORIGINAL ARTICLE

Evaluation of clinical outcomes and comparison of prediction models in the burn population hospitalized from the emergency department: Can burn mortality scores be used in a post-conflict area such as northwest Syria?

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ABSTRACT

BACKGROUND: Burns are a global health problem, especially in low- and middle-income countries. The use of models to predict mortality is more common in developed countries. In northern Syria, internal unrest has continued for 10 years. A lack of infrastructure and difficult living conditions increase the incidence of burns. This study in northern Syria contributes to the predictions of health services provided in conflict regions. The first objective of this study specific to northwestern Syria was to assess and identify risk factors in the burn victim population hospitalized as emergencies. The second objective was to validate the three well-known burn mortality prediction scores to predict mortality: the Abbreviated Burn Severity Index (ABSI) score, Belgium Outcome of Burn Injury (BOBI) score, and revised Baux score.

METHODS: This was a retrospective analysis of the database of patients admitted to the burn center in northwestern Syria. Patients who were admitted to the burn center as emergencies were included in the study. Bivariate logistic regression analysis was performed to compare the effectiveness of the three included burn assessment systems in determining the risk of patient death.

RESULTS: A total of 300 burn patients were included in the study. Of them, 149 (49.7%) were treated in the ward, and 46 (15.3%) in the intensive care unit; 54 (18.0%) died, and 246 (82.0%) survived. The median revised Baux scores, BOBI scores, and ABSI scores of the deceased patients were significantly higher than those of the surviving patients (p=0.000). The cut-off values for the revised Baux, BOBI, and ABSI scores were set at 105.50, 4.50, and 10.50, respectively. For predicting mortality at these cut-off values, the revised Baux score had a sensitivity of 94.4% and a specificity of 91.9%, and the ABSI score had a sensitivity of 68.8% and a specificity of 99.6%. However, the cut-off value of the BOBI scale, calculated as 4.50, was found to be low (27.8%). The low sensitivity and negative predictive value of the BOBI model suggest that it was a weaker predictor of mortality than the others.

CONCLUSION: The revised Baux score was successful in predicting burn prognosis in northwestern Syria, a post-conflict region. It is reasonable to assume that the use of such scoring systems will be beneficial in similar post-conflict regions where limited opportunities exist.

Keywords: Abbreviated Burn Severity Index (ABSI); Belgian Outcome for Burn Injury (BOBI); burn injury; Revised Baux scoring (RBS); Syria.

INTRODUCTION

Burns are a global health problem and are estimated to cause more than 180,000 deaths per year, mainly in low- and middle-income countries.[1] They account for 1% of the global burden of disease and rank fourth among all injuries.[2,3]

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A negative correlation exists between income level and burn mortality.[4,5] In high-income countries, progress has been made in preventing deaths from burns.[1]

Many factors are associated with higher mortality rates in burn patients, including gender, percentage of total body surface area affected by the burn (% TBSA), burn mechanism, presence of inhalation injury, and presence of comorbidities.[6]

The incidence of survival after a burn has steadily increased in recent decades. However, burn mortality remains high. Models to predict burn mortality have been available since the mid-20th century.[7,8] These scoring systems are used in a variety of settings, such as to prioritize care and standardize the quality of care, similar to scoring systems used to estimate mortality in other diseases.[9]

The use of models to predict mortality is not completely foreign, but they are more commonly used in developed countries. The revised Baux score, Abbreviated Burn Severity Index (ABSI), and Belgian Outcome of Burn Injury (BOBI) are widely known models for estimating burn severity. These are characterized by their simplicity and provide a rapid, standardized, and accurate assessment.[10–12] Each has advantages and disadvantages. In addition, recent studies still show variable results.[13]

Grading systems that have been validated in developed countries may be subject to study in low-income and underdeveloped countries. In northern Syria, internal unrest has been ongoing for 10 years. Most people have had to be relocated, and a housing problem exists. A lack of infrastructure and difficult living conditions increase the incidence of burns.[14,15] In regions without a central health system, medical care is provided in hospitals as part of humanitarian aid.[16,17] Globally, conflict areas and the threat of war are increasing daily.[18] An assessment conducted in northern Syria could contribute to the predictions of health services provided by humanitarian aid in conflict regions. To this end, the primary objective was to assess and identify risk factors that may predict inpatient mortality outcomes in a northwestern Syrian burn victim population.

The secondary objective of this study was to validate the three well-known burn mortality prediction scores—the ABSI score, BOBI score, and revised Baux score—to predict mortality in a burn unit in northwestern Syria.

MATERIALS AND METHODS

Study Design

This was a retrospective analysis of the burns database of patients admitted to the Turkey-managed burns center at Çobanbey Hospital in northwestern Syria between 1 January 2020 and 1 April 2021.

Before the start of the study, approval was obtained from the Ethics Committee of Hatay Mustafa Kemal University for non-interventional research (date of meetings: 06 May 2021; number of decisions: 19) and the hospital management. In addition, the study was conducted in accordance with the Declaration of Helsinki.

Location of the Study

In the north of Syria, hospitals opened by Turkey in the framework of humanitarian aid provide consultation services. Syrian doctors, nurses, and other medical staff work in these hospitals and provide care to the people of northern Syria. Çobanbey Hospital, where the study was conducted, is located near the Turkish border (Fig. 1). As one of the most comprehensive hospitals in the region, it is a referral center for burn patients. The burn center here receives patients from the hospital's emergency department, local clinics in the area, and other regional hospitals.

Selection of Patients

Patients who were admitted to the burn center of Çobanbey Hospital as emergencies were included in the study. Patients who were admitted to the emergency department with cardiopulmonary arrest, patients who died in the emergency

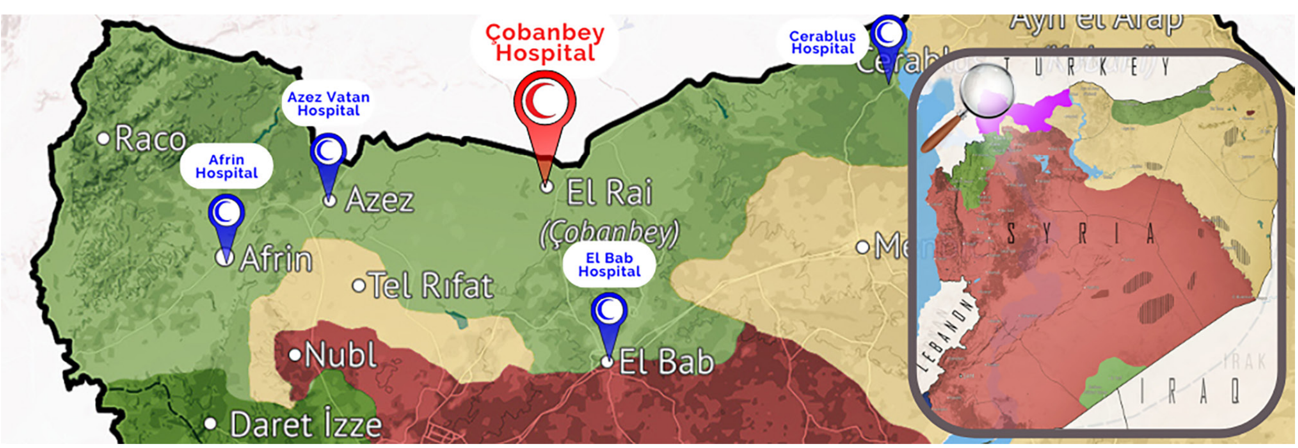

Figure 1. Turkish hospitals in the context of humanitarian aid.[23]

department, patients who were admitted to the burn unit and transferred to an external center within 24 hours, patients whose emergency care was completed but who were referred by other hospitals for further burn treatment, and patients whose clinical data could not be obtained were excluded from the study group.

Obtaining the Data

The demographics of hospitalized patients, the place of residence where the burn exposure occurred, the percentage and degree of burns, whether they had inhalation burns, and whether they required a ventilator were included in the study, using forms from hospital archives. Demographic data and medical history information were recorded in the burn center patient records. Examination and laboratory tests and prognostic data were recorded in the patients' follow-up forms. Diagnostic data for patients were prepared by the respective clinician. In this context, severe burns were defined for the patient as all partial- and full-thickness burns with a total burn surface area (TBSA) of >20%, including severe joint burns, inhalation injuries, and electrical or chemical burns. The Lund and Browder diagrams were used at the center to estimate TBSA. Inhalation injury was defined as clinical features that may include a burned eyebrow, soot in the nostrils, laryngeal edema, and facial burns suggestive of possible inhalation injury in patients who had been in an enclosed burn area in the anamnesis and examination. The indication for mechanical ventilation in patients with burns and inhalation injuries was based on clinical and blood parameters along with the clinical experience of the anesthesiologist in charge.

Collection of Patient Data and Calculation of Prognostic Scores

Variables selected to predict mortality during hospitalization included sex, age, mechanism of injury, TBSA, inhalation injury, need for mechanical ventilation, tracheostomy, and ICU stay.

Based on these records, the patients' revised Baux score, ABSI score, and BOBI score were calculated. These scores were calculated based on variables registered in the burn database. The ABSI is a scoring system based on patient sex, age category, presence of inhalation injury, and TBSA parameters. It is scored between 0 and 17. Higher scores indicate a lower probability of survival.[19] The BOBI score uses categorical values for age, TBSA, and presence of inhalation injury.[20] The maximum score is 10, indicating a 99% risk of death. Finally, the revised Baux score incorporates the presence of inhalation injury, indicating the percentage of survival.[21] Details of these three scorings can be found in Table 1.[22]

Patients admitted to the hospital for mortality assessment were followed up for up to 28 days if hospitalization was required. Patients who were discharged and alive after 28 days were included in the survivor group. Patients who were in the ICU for one day or more during their hospitalization were considered to be hospitalized in the ICU. Based on the data, patients were divided into two separate groups: those who survived and those who died. The acceptance parameters and scores were analyzed using statistical methods by comparing the groups.

Statistics

Statistical analyses of the study were performed using SPSS version 28.0 software for Windows (IBM SPSS Statistics for Windows, version 28.0. Armonk, NY: IBM Corp., USA). The normality assumption for quantitative variables was tested using the Kolmogorov–Smirnov and Shapiro–Wilk tests. For univariate analysis of variables, the chi-square test, Fisher–Freeman–Halton exact test, and Mann–Whitney U test were used, depending on the type of variables and availability of assumptions. Correlations of the three burn assessment scales were tested with Spearman's rho correlation analysis. Bivariate logistic regression analysis was performed to compare the effectiveness of the three scales in determining the risk of patient death. After logistic regression analysis, ROC curve analysis was used to determine whether the scales had diagnostic value for death. In all statistical analyses, cases with a p-value of less than 0.05 were interpreted as statistically significant.

RESULTS

A total of 300 patients with burns were included in the study. Of them, 225 (75.0%) were male, and 75 (25.0%) were female; 149 (49.7%) were treated in the ward, and 46 (15.3%) were in the intensive care unit. Of all patients, 54 (18.0%) died and 246 (82.0%) survived. Most burns occurred in the age group of 18–65 years (55.7%), followed by children aged 13 years and younger (35.7%). Whereas 98.1% of patients who died were between 18 and 65 years of age, only 46.3% of surviving cases were in this age group. Only 1.9% (n=1) of children aged 13 years and younger died, and 43.1% of surviving children were in this age group. The association between age and death was statistically significant ($p<0.05$; Table 2).

Concerning the location of burn injuries, 82.0% occurred at home, 8.2% in a tent, and 10.0% at work (p=0.019). Of injuries resulting in death, 79.6% occurred at home, 1.9% in a tent, and 18.5% at work. For surviving patients, these rates were 82.5%, 9.3%, and 8.1%, respectively. For workplace injuries, 1/3 of 30 cases resulted in death (Table 2).

The median TBSA was 27.5% (4.5–91.0%). The median TBSA of patients who died was higher than that of patients who survived ($p<0.05$; Table 2).

Second-degree burns occurred in 59.3% of cases and third-degree burns in 26.7% of cases. Three patients (1%) had second-degree burns on one body part and third-degree burns on another. As shown in Table 2, these three patients were

Table 1. List of five well-known burn mortality risk scoring system

Abbreviated Burn Severity Index (ABSI)

Variable	Patient Characteristics	Score
Sex	Female	1
	Male	0
Age in years	0–20	1
	21–40	2
	41–60	3
	61–80	4
	81–100	5
Inhalation Injury	Yes	1
Full Thickness Burn	Yes	1
Total Body Surface Area burned	1–10%	1
	11–20%	2
	21–30%	3
	31–40%	4
	41–50%	5
	51–60%	6
	61–70%	7
	71–80%	8
	81–90%	9
	91–100%	10

Total Burn Score	Threat to life	Probability of survival
2–3	Very low	≥99%
4–5	Moderate	98%
6–7	Moderately severe	80–90%
8–9	Serious	50–70%
10–11	Severe	20–40%
12– 13	Maximum	≤10%

	Belgium Outcome in Burn Injury (BOBI) score					
	0	**1**	**2**	**3**	**4**	**Score**
Age (years)	<50	50–64	65–79	≥80		0–3
Burned surface area	<20	20–39	40–59	60–70	≥80	0–4
Inhalation Injury	No			Yes		0–3
Total						0-10

	Total Score										
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Predicted mortality (%)	0–1	1–5	5	10	20	30	50	75	85	95	99

Revised Baux Score Formula

Percentage of mortality	Age (years) + Total Body Surface Area Burn (percentage, %) +17 (if presence of inhalation injury)

Table 2. Descriptive statistical results on demographic characteristics, burn injury characteristics, ventilation need, and scoring values in the general, deceased, and surviving patient groups

	Total (n=300)	Deceased (n=54)	Surviving (n=246)	p
Sex, n (%)				
Male	225 (75.0)	43 (79.6)	182 (80.9)	0.386[1]
Female	75 (25.0)	11 (20.4)	64 (26.0)	
Age, n (%)				
<13	107 (35.7)	1 (1.9)	106 (43.1)	0.000[2]
13-17	21 (7.0)	0 (0.0)	21 (8.5)	
18-65	167 (55.7)	53 (98.1)	114 (46.3)	
>65	5 (1.7)	0 (0.0)	5 (2.0)	
Location, n (%)				
Home	246 (82.0)	43 (79.6)	203 (82.5)	0.019[2]
Tent	24 (8.0)	1 (1.9)	23 (9.3)	
Work	30 (10.0)	10 (18.5)	20 (8.1)	
Burn percentage median value (min-max)	27.5 (4.5–91.0)	81.0 (64.0–91.0)	27.0 (4.5–81.0)	0.000[3]
Burn grade, n (%)				
1	39 (13.0)	0 (0.0)	39 (15.9)	0.000[2]
2	178 (59.3)	17 (31.5)	161 (65.4)	
2 and 3	3 (1.0)	0 (0.0)	3 (1.2)	
3	80 (26.7)	37 (68.5)	43 (17.5)	
Inhalation burn, n (%)				
Yes	44 (14.7)	15 (27.8)	29 (11.8)	0.003[1]
No	256 (85.3)	39 (72.2)	217 (88.2)	
Ventilation need, n (%)				
Yes	56 (18.7)	29 (53.7)	27 (11.0)	0.000[1]
No	244 (81.3)	25 (46.3)	219 (89.0)	
Revised Baux score				
Median value (min-max)	58.0 (3.0–157.0)	117.5 (99.0–135.0)	46.5 (3.0–157.0)	0.000[3]
BOBI score				
Median value (min-max)	1.0 (0.0–7.0)	4.0 (4.0–7.0)	1 (0.0–6.0)	0.000[3]
ABSI score				
Median value (min-max)	5.5 (2.0–14.0)	12.0 (10.0–14.0)	5.0 (2.0–13.0)	0.000[3]

[1]Chi-square; [2]Fisher Freeman Halton Exact; [3]Mann-Whitney U test.

evaluated separately in grading the degree of burns.

Of patients who died, 68.5% (n=80) had third-degree burns, and 65.4% (n=161) of survivors had second-degree burns ($p<0.05$). Additionally, 27.8% of patients who died had burns from inhalation, which decreased to 11.8% in survivors (p=0.003). The need for ventilators was higher in patients who died (53.7%) than in surviving patients (11.0%; $p<0.05$).

The median revised Baux score of the patients was 58.0 (3.0–157.0). The median revised Baux scores, BOBI scores, and ABSI scores of the deceased patients were significantly higher than those of the surviving patients (p=0.000). The descriptive statistics of the variables and group comparisons are shown in Table 2.

Spearman's rho correlation coefficients of the three burn scales are shown in Table 3. A strong positive correlation was found between the revised Baux score and BOBI score ($\rho=0.879^{**}$, p=0.000), between the revised Baux score and ABSI score ($\rho=0.938^{**}$, p=0.000), and between the BOBI score and ABSI score ($\rho=0.897^{**}$, p=0.000).

Bivariate logistic regression analysis was performed to compare the effectiveness of the three burn scoring systems in determining the patient's risk of death. The coefficients

Table 3. Spearman's rho correlation coefficient

	revised Baux	BOBI	ABSI
revised Baux	1.000	.879**	.938**
BOBI		1.000	.897**
ABSI			1.000

BOBI: Belgian Outcome of Burn Injury; ABSI: Abbreviated Burn Severity Index.

Table 4. Results of bivariate logistic regression analysis

	β	SE	Sig	OR	95% CI	
					Lower	Upper
Revised Baux	0.112	0.019	0.000	1.119	1.078	1.161
BOBI	0.873	0.114	0.000	2.394	1.914	2.996
ABSI	1.434	0.241	0.000	4.195	2.615	6.731

OR: Odds ratio; SE: Standard error; CI: Confidence interval.

resulting from the bivariate logistic regression analysis are shown in Table 4. The effects of the revised Baux, BOBI, and ABSI models in determining the risk of death were statistically significant. Their ORs were determined to be 1.119, 2.394, and 4.195, respectively.

After logistic regression analysis, a ROC analysis was performed to determine whether a diagnostic cut-off value existed in assessing mortality risk in burn case assessment. The parameters of the ROC analysis are summarized in Table 5.

When examining the ROC curve (Fig. 2) and the Table 5 values of the revised Baux, BOBI, and ABSI models, the areas under the ROC curve were statistically significant ($p<0.05$). In the analyses for these models, the cut-off values for the revised Baux, BOBI, and ABSI scores were set at 105.50, 4.50, and 10.50, respectively. The sensitivity (94.4%) and specificity (91.9%) of the revised Baux score and the sensitivity (68.8%) and specificity (99.6%) of the ABSI score and the diagnostic values were found for these cut-off values in predicting mortality. However, the cut-off value of the BOBI scale, calculated as 4.50, was found to be low (27.8%; Table 5).

As shown in Table 5, the negative predictive value (NPV) of the cut-off value calculated for the revised Baux scale was 0.987, and the positive predictive value (PPV) was 0.718. The NPV of the cut-off value calculated for the BOBI scale was 0.441, and the PPV was 0.853. The NPV of the cut-off value of the ABSI scale was 0.688, and the PPV was 0.996.

According to the results of the ROC analysis, the low sensitivity and NPV of the BOBI model suggest that it was a weaker predictor of mortality in patients with burns compared with the other two models. However, the high NPV and PPV of the cut-off values obtained for the revised Baux and ABSI scales suggest that they were successful in predicting the mortality of burn cases.

Table 5. Diagnostic performance assessment of revised Baux, BOBI, and ABSI scales to predict mortality

Scale	AUC±SE	95% CI Lower–upper	Sensitivity	Specificity	p	NPV	PPV	Cut-off value
Revised Baux	0.959±0.010	0.939–0.979	0.944	0.919	0.000	0.987	0.718	>105.50
BOBI	0.912±0.016	0.880–0.944	0.278	0.923	0.000	0.441	0.853	>4.50
ABSI	0.969±0.009	0.952–0.987	0.981	0.902	0.000	0.688	0.996	>10.50

AUC: Area under the curve; SE: Standard error; CI: Confidence interval; NPV: Negative predictive value; PPV: Positive predictive value.

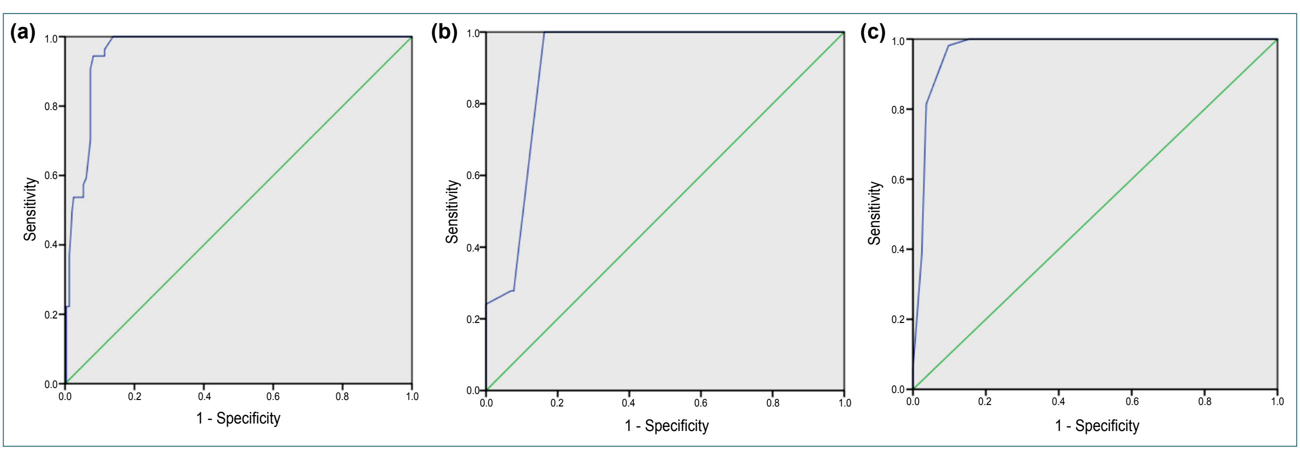

Figure 2. ROC curves graphics. **(a)** ROC curves for Revised Baux. **(b)** ROC curves for BOBI. **(c)** ROC curves for ABSI.

DISCUSSION

With the COVID-19 pandemic, political and geopolitical tensions have increased,[24] and the number of war and conflict zones continues to grow.[18,25–27] Time is needed for the conflicts in these regions to subside, for organized and stable political governance to be established,[28–30] and for these to affect health services. In this case, humanitarian crises in these regions may worsen even if the conflicts subside.[31] The hospital where the study was conducted is one of the most comprehensive and advanced that accepts referrals from other hospitals in the region.[32,33] The burn center in this hospital is the top center that also accepts referrals for all burn cases in northwestern Syria. In addition to assessing burn patients, this study investigated the applicability of the scoring systems used in the literature for burns in this region. If the applicability of these scoring systems can be demonstrated in similar conflict areas, it can be expected that the few medical professionals in these regions will be able to work more effectively with critical patient predictions and gain more benefit from humanitarian resources.

No study of burn patients following the internal unrest and terrorism in northern Syria after 2010 was found in the literature. Among research conducted in other countries, a study that evaluated 221 patients hospitalized in burn centers in South Africa between 2011 and 2013 found that the rate of male patients was 68.8%.[34] In the study by Cohen-Manheim et al.[35] that evaluated patients in five burn centers in Israel, the rate of male patients was 67.3% between 1997 and 2003, and in the same study, it was 68.0% between 2004 and 2010. In northern Iran, 69.6% of all burn patients and 64.2% of burn patients who died were male.[36] In our study, 75% of the patients were male, which is slightly more than reported in the literature. Of the burn patients who died, 79.6% were male. We think that the high rate of male burn patients is not surprising because women play a smaller role in social life in developing countries.

When burn patients are studied by age group, the literature shows that pediatric patients are not very rare compared to the general patient population. Studies have found that the proportion of pediatric burn patients among burn patients of all ages was 25% in Lithuania,[37] 39% in Egypt,[38] and up to 50% in Brazil, the Ivory Coast, and India.[39] Children under 15 years of age were found to account for 51%[40] of all burn referrals in Israel and 60%[41] of all burn referrals in Seoul. The geriatric group accounts for less than 5% of burns in South Asian and Middle Eastern countries. While geriatric burns are rare in developing countries, they have been observed to account for approximately 20% of burns in economically developed countries such as the United States, Australia, New Zealand, and Scandinavian countries.[42,43] In our study, similar to Lithuania and Egypt, pediatric patients (<13 years) accounted for 35.7% of all burn patients, and geriatric patients (>65 years) accounted for less than 5%, similar to the Middle East and South Asia.[43] Possible reasons for the lower rates of geriatric burn victims are the fact that the proportion of the elderly population is lower in northwestern Syria than in underdeveloped countries and that they are less active in daily life. Differences exist in the rates of pediatric patients according to family structure and social life.

In the study by Cohen-Manheim et al.[35] that evaluated all burn cases in Israel, workplace-related injuries were found to comprise 13.2–15.4%. In a study conducted in Bangladesh, 78.6% of burn patients were found to be injured at home.[44] In a study by McInnes et al.[45] evaluating adult burn injuries from burn center records in Australia and New Zealand, work-related injuries made up 17%. In the study by Aitbenlaassel et al.[46] on the epidemiology of burns in Marrakech, 75% of burn injuries were caused by accidents at home and 20% by accidents at work. In our study, 82.0% were injured at home, 8.2% were injured in a tent, and 10.0% were injured at work. The reason for the variation in the rates of work or home location of burn accidents in the studies may be that some of the studies are epidemiologic or based on burn center applications. However, examining the unemployment rates and the level of development in the countries where the studies were conducted, the differences in the importance given to occupational injuries could be the reason for the variability in burn injuries.

In the study of Demirel et al.[47] of patients hospitalized in the burn unit in Ankara, 60.8% of the patients had second-degree burns, and 39.2% had third-degree burns. In our study, more than half of the patients (59.3%) who were hospitalized in the burn unit had second-degree burns, one quarter (26.7%) had third-degree burns, and two thirds (68.5%) of the patients who died had third-degree burns. In the study by Çobanoğlu Ercan et al.,[48] which evaluated patients hospitalized in burn intensive care units, the average TBSA in discharged patients was 30.5%, and the average TBSA in patients who died was 55.7%. In a study by Herlianita et al.[49] in Indonesia, the median TBSA in living patients was 14%, and the median TBSA in patients who died was 52%. In the studies conducted by Bailey et al.[44] in Bangladesh, the median TBSA in living and deceased patients was 14% and 39.5% in children and 14.9% and 48.3% in adults, respectively. In our study, the median TBSA was three times higher in deceased patients (81%) than in surviving patients (27%). In general, the area and degree of burn were higher in deceased patients than in surviving patients, which is consistent with the literature. The difference in TBSA is likely due to differences in geography and living conditions.

In the study by Esen et al.[50] that evaluated patients in burn centers, inhalation burns accounted for 8.9% of all burns. Approximately 7% of patients in burn centers in New Zealand and Australia had inhalation burns.[45] A study conducted in Israel found that the application rate for inhalation burns was 1.9–2.7%.[35] In a study evaluating patients hospitalized in the burn intensive care unit in Iran, the inhalation rate was 62.5% in surviving patients and 76.5% in deceased patients.[51] In our study, the rate of inhalation burns was around 2.5 times higher in deceased patients (27.8%) than in surviving patients (11.8%). Because inhalation burns are associated with major burns and direct damage to the respiratory system, it follows that most of the deceased patients belonged to this group.

Many burn scoring systems exist in the literature. However, these scorings must be simple and usable. In our study, the BOBI, revised Baux score, and ABSI were evaluated. In the retrospective study by Wardhana et al.[10] validating the BOBI in Indonesia, its AUC value was reported to be 0.964 in the ROC analysis. In another study by Herlianita et al.[49] in Indonesia, the revised Baux score sensitivity and specificity were reported to be 77.6 and 93.6, respectively, and the AUC value was 0.89±0.03. In the same study, the sensitivity and specificity of the BOBI were 73.1 and 91.8, while the AUC was 0.90±0.04, and the sensitivity and specificity of the ABSI were 81.6 and 92.5, while the AUC was 0.93±0.03. In the study on patients in six burn centers in Belgium, a strong correlation between the BOBI model and mortality was found in the univariable logistic regression analysis (OR 2.7). In the ROC analysis, the AUC was reported to be 0.94.[20] In the study conducted by Salehi et al.[51] in Tehran comparing burn scoring systems, the AUC values for the BOBI, revised Baux score, and ABSI were 76.4, 84.0, and 85.9, respectively. In the study by Wardhana et al.,[10] with a cut-off value of 7.5 for the ABSI, the AUC value was 0.84, the sensitivity was 87.7%, and the specificity was 66.9%; the mean ABSI score was 6.77 in survivors and 8.95 in the deceased. In the same study, with a cut-off value of 2.5 for the BOBI, the AUC was 0.79, the sensitivity was 82.5%, and the specificity was 73%; the mean score was 2.23 in survivors and 3.53 in the deceased. In the study by Hassan et al.[52] in Kuwait, the AUC value for the BOBI, FLAMES, and revised Baux scores was greater than 0.90 in all cases.

The study by Prasad et al.[53] compared the qSOFA and revised Baux scoring. According to the ROC analysis, the predictive value for death was 48% and 32%, and the specificity was 92% and 100%, whereas the AUC values were 0.73 and 0.99 for the qSOFA and revised Baux scores, respectively. The optimal revised Baux cut-off score for mortality was 85; the sensitivity for this score was 100%, the specificity was 94%, the NPV was 100%, and the OOV was 27%. In this study, the revised Baux score was found to have better a predictive value than qSOFA.

Another study compared five different scores in Malaysia: the Baux, ABSI, Ryan, BOBI, and revised Baux scores. The mean scores for all were higher in deceased patients than in living patients. The optimal cut-off values for mortality were 54 for Baux, 5.41 for ABSI, 0.48 for Ryan, 1.75 for BOBI, and 59.08 for revised Baux.[22]

According to the results of Spearman's rho correlation in our study, a strong positive correlation existed between the revised Baux and BOBI scores, the revised Baux and ABSI scores, and the BOBI and ABSI scores. The bivariate logistic regression analysis was statistically significant, and the ORs for determining the mortality risk of the revised Baux, BOBI, and ABSI models were 1.119, 2.394, and 4.195, respectively. In the ROC analysis of the revised Baux, BOBI, and ABSI scores, the values under the ROC curve were statistically significant, and the cut-off values were set at 105.50, 4.50, and 10.50, respectively. With these cut-off values, the sensitivity (94.4%) and specificity (91.9%) of the revised Baux score and the sensitivity (68.8%) and specificity (99.6%) of the ABSI score were diagnostically valuable for predicting mortality. However, when the cut-off value of the BOBI scale was set at 4.50, the calculated value for sensitivity (27.8%) was low.

According to the results of the ROC analysis, the low sensitivity and NPV of the BOBI model suggest that the prediction of mortality of burn patients was weaker than the other two models. However, the high NPV and PPV of the cut-off values obtained for the revised Baux and ABSI scales indicate that they were successful in predicting mortality in burns.

Considering all these analysis results, the revised Baux scale was the most successful of the three scales used in the assessment of burn cases in our study population, and the BOBI scale was the most unsuccessful. The revised Baux scale proved more accurate than the other scales in determining the mortality of patients who presented to the emergency department with a burn. Although no inconvenience was associated with the use of the ABSI scale, the BOBI scale has been found to lack sensitivity in assessing patient mortality in burn cases.

Conclusion

Post-conflict areas have insufficient medical personnel and facilities. Nevertheless, prioritizing the care of patients with severe traumatic injuries such as burns is important. Prognostic predictions are important to make the right treatment decisions at the right time when limited options exist. We found that scoring systems, particularly the revised Baux score, were successful in predicting burn prognosis in northwestern Syria, a post-conflict region. It is reasonable to assume that the use of these scoring systems will be beneficial in similar post-conflict regions with limited opportunities, and conducting scoring system research in other post-conflict regions will be important for validating these.

Limitations

In this study, patients hospitalized in a burn center in Syria were evaluated. however, a small number of patients referred to Turkey were not included in the study.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Acil servisten hastaneye yatırılan yanık popülasyonunda klinik sonuçların değerlendirilmesi ve tahmin modellerinin karşılaştırılması: Kuzeybatı Suriye gibi çatışma sonrası bir bölgede yanık ölüm skorları kullanılabilir mi?

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AMAÇ: Yanıklar, özellikle düşük ve orta gelirli ülkelerde görülen küresel bir sağlık sorunudur. Mortaliteyi tahmin etmek için modellerin kullanımı gelişmiş ülkelerde daha yaygındır. Kuzey Suriye'de iç huzursuzluk 10 yıldır devam etmektedir. Altyapı eksikliği ve zor yaşam koşulları yanık vakalarını artırmaktadır. Kuzey Suriye'deki bu çalışma, çatışma bölgelerinde sunulan sağlık hizmet öngörülerine katkıda bulunacaktır. Kuzeybatı Suriye'ye özgü bu çalışmanın ilk amacı, acil olarak hastaneye kaldırılan yanık mağduru popülasyonundaki risk faktörlerini değerlendirmek ve belirlemektir. İkinci amaç, mortaliteyi tahmin etmek için iyi bilinen üç yanık mortalite tahmin skorunu bölge özelinde doğrulamaktı: Kısaltılmış Yanık Şiddeti İndeksi (ABSI) skoru, Belçika Yanık Yaralanmasının Sonucu (BOBI) skoru ve revize edilmiş Baux skoru.
GEREÇ VE YÖNTEM: Bu çalışmada, kuzeybatı Suriye'deki yanık merkezi veri tabandan yanık merkezine başvuran hastaların geriye dönük bir analizi yapıldı. Acil olarak yanık merkezine başvuran hastalar çalışmaya dahil edildi. Dahil edilen üç yanık değerlendirme sisteminin hastanın ölüm riskini belirlemedeki etkinliğini karşılaştırmak için iki değişkenli lojistik regresyon analizi yapıldı.
BULGULAR: Çalışmaya toplam 300 yanık hastası dahil edildi. Bunlardan 149'u (%49.7) serviste, 46'sı (%15.3) yoğun bakımda tedavi edildiği gördü; 54'ü (%18.0) öldü ve 246'sı (%82.0) hayatta kaldı. Ölen hastaların ortanca revize edilmiş Baux skorları, BOBI skorları ve ABSI skorları yaşayan hastalara göre anlamlı derecede yüksekti (p=0.000). Revize edilmiş Baux, BOBI ve ABSI puanları için cut-off değerleri sırasıyla 105.50, 4.50 ve 10.50 olarak belirlendi. Bu cut-off değerlerinde mortaliteyi öngörmek için, revize edilmiş Baux skorunun duyarlılığı %94.4 ve özgüllüğü %91.9 ve ABSI skorunun duyarlılığı %68.8 ve özgüllüğü %99.6 idi. Ancak BOBİ ölçeğinin 4.50 olarak hesaplanan cut-off değeri (%27.8) düşük bulundu. BOBI modelinin düşük duyarlılığı ve negatif öngörü değeri, diğerlerine göre mortalitenin daha zayıf bir öngörücüsü olduğunu göstermekteydi.
TARTIŞMA: Revize edilmiş Baux skoru, çatışma sonrası bir bölge olan kuzeybatı Suriye'de yanık prognozunu tahmin etmede başarılı oldu. Sınırlı fırsatların olduğu benzer çatışma sonrası bölgelerde bu tür puanlama sistemlerinin kullanılmasının faydalı olacağı varsayılabilir.
Anahtar sözcükler: Abbreviated Burn Severity Index (ABSI); Belgian Outcome for Burn Injury (BOBI); burn injury; Revised Baux scoring (RBS); Suriye; yanık yaralanması.

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