

Validation of Predictive Ability of Bobi Score in Burn Patients

Besnik Faskaj¹ and Monika Belba²

¹Service of Burns, University Hospital Center "Mother Teresa", Tirana

***Corresponding author**

Monika Belba, University of Medicine, Tirana, Rruga "Budi" Nr.50, Tirane, Rruga e Dibres Nr 372, Tirane, Albania

²University of Medicine, Tirana, Albania

Submitted: 20 March 2021; **Accepted:** 25 March 2021; **Published:** 05 Apr 2021

Citation: Besnik Faskaj and Monika Belba (2021) Validation of Predictive Ability of Bobi Score in Burn Patients. *Journal of Clinical Review & Case Reports* 6(4): 604-608.

Abstract

Introduction: Scoring systems have been used successfully in burn centers to predict the prognosis and take measures for careful monitoring of the burned patient. Belgium Outcome Burn Injury score is one of them which takes into consideration age, burn surface area, and presence of inhalation burn.

Objectives: This presentation aims to validate the use of the BOBI prognostic score in our patients.

Patients and Methods: The study is a retrospective analytical study that utilized the investigation of the medical charts of 1515 patients hospitalized with severe burns within the ICU of the Service of Burns in Tirana, Albania during 2010-2019.

Results: The overall mortality of our patients was 7.06% (107 deaths in 1515 patients). Up to BOBI score 6, we have noticed better mortality than prediction while there is a very good prediction up to score 10. Area Under the Curve was 0.978 ($p < 0.0001$) which is an outstanding result in being a classifier between deaths and survivors.

Conclusions: BOBI score is a very good prediction score for mortality in burn patients.

Keywords: Mortality, Burns

Introduction

Burns is a devastating issue, computing for several 180000 deaths each year with the prevalence of taking put in low- and middle-income nations [1]. Progresses inside the field of burns has been going with moved forward survival rates, diminished length of hospital stay (LOS), decreased mortality rates due to the progressions in convention utilization, control of contamination, energetic and fitting surgical treatment, early enteral and parenteral support, respiratory and hypermetabolic support. Burn mortality prognostic scores are essential in organize to triage burned patients in assertion to the reality of the issue. The bigger portion of the comparing burn prognostic scores like Baux score Revised Baux score, Abbreviated Burn Severity Index (ABSI) score, Ryan score, Belgium Outcome Burn Injury (BOBI) score are approved in various studies [2-5].

This presentation aims to validate the use of the BOBI prognostic score in our patients.

Material and Methods

The study is designed as a retrospective clinical and analytical cohort. The data utilized are accessed by the medical charts of 1515 patients hospitalized with severe burns within the ICU of the Service of Burns in Tirana, Albania during 2010-2019. This study is affirmed by the Ethics Committee at the Ministry of Health and Social Protection of Tirana.

The data are as follow:

- Age and group-ages each 10 years
- Gender (Male, Female)
- Etiology of burns (Scalds; Flame; Electrical; Chemical; Others)
- Total Body Surface Area (TBSA) (%) burned each 10% TBSA
- Degree (Partial-thickness; Full-thickness)
- Presence of Inhalation injury (Yes; No).
- Length of Hospital Stay (LOS) (days)
- Belgium Outcome in Burn Injury (BOBI) score. The BOBI

score uses absolute values of age which is divided into four groups (0-3 points), of BSA(%) which is divided into 5 groups(0-4 points), and the presence of inhalational burn(No=0 point; yes=3 points). This formula predicts mortality by total score. Based on the total score (0-10 points), predicted mortality ranges between 0.1% and 99% [5].

- Outcome (Deaths; Survivors)

Statistical Analysis

SPSS 23 software was used for the conduction of the statistical analysis. Descriptive and inferential statistics were used to give data and to conclude results. Discrete data were presented in absolute value and percentage. Tables were used to present the data. The Receiver Operator Characteristic (ROC) curve was used to test the discrimination of BOBI score. Statistical significance was defined as $p < 0.05$.

Results

In table 1 we have presented the demographic and clinical characteristics of the patients in the study. In the analyzed period (2010-2019), 1515 patients were included. Approximately half were children up to 14 years old where 47.7% were children <10 years. The mean age of the patients was 25.7 ± 3.1 years, there were 938 males and 577 females, and the male: female ratio was 1.6;1.

There were 213 or 14% of the total patients more than 60 years old. 40% of the total number have flame as the causative agent, while 49.3 % had scalds as the causative agent. Mean TBSA % burned was $25.6\% \pm 2.8$. The presence of inhalation injury was in 15.7% of the patients, while the presence of Full-thickness burns was in 16% of the patients. The mean length of hospital stay was 12 ± 2.1 days. The overall mortality was 7.06% (107 deaths in 1515 patients). In the children group, mortality was lower 0.9% (7 deaths of 763 patients 0-14 years), in the adults' group mortality was 7.7 % (42 deaths of 539 patients) while in the elderly population mortality was 27.2%. In patients with inhalation burn, the mortality was higher compared with patients without it (37.2% vs.1.4%).

In table 2 we have given how we predict BOBI score. As we see this score takes into consideration categorical variables like age, burn surface area TBSA (%), and presence of inhalation injury. In all burned patients, BOBI score ranged from 0 to 10 with a mean of 1.4 ± 1.9 while in deaths it had a mean of 3.8 ± 2.6 .

In table 3 we present data from the BOBI scores. Firstly, we divided patients according to their respective points of the prediction scores and we compared the expected mortality to the observed data. Up

to BOBI score 6, we have noticed better mortality than prediction while there is a very good prediction up to score 10. Validating of this score and the capacity of its discrimination is completed with Area Under the ROC curve which we have presented in figure 1. From the statistics Area Under the Curve was 0.978 ($p < 0.0001$) which is an outstanding result in being a classifier between deaths and survivors.

Discussion and Conclusions

Analyzing mortality in the burn unit creates the possibility for the understanding situation and make improvements. Taking into consideration the complexity of different prognostic scores they are very useful in everyday practice. The scores are not intending to replace clinical judging but they are useful in finding the patients which can profit from the treatment. Many scores have been created and utilized to evaluate mortality rates among burn patients. These scores offer assistance to set needs when managing burn patients, giving an arrange of treatment, and deciding whether the patient's administration was satisfactory. Each score has its specifics.

Many scoring systems were beneficial in predicting mortality in acutely burned patients. Our data for analyzing BOBI scores are by other authors [6-8]. BOBI score could be applied with a higher level of accuracy in our burn population. Although there are many factors on admission as well as during the disease which have an impact on mortality burn size, age, and inhalation burn remains the cornerstone of the problem.

Severity scoring systems have been developed also to evaluate changes in the outcome following burns [9, 10]. Major efforts for improving the prevention and treatment of burn injuries have been developed throughout the last decade in the Service of Burns. This progress corresponds with increased investments and improvements in the infrastructure of the Service of Burns. Management of burn injuries in our Burn service differs in comparison to the previous decade in the increase in the application of standardized protocols and optimization of resources. We analyzed the predictor score with Area Under the ROC and BOBI score is a very good prediction score for mortality in burn patients. If we continue to analyze mortality each year it will help the staff in increasing the burn care to our patients.

Limitations of the Study

In this study, we have validated only one prognostic score. It will be better to analyze other scores like Baux score Revised Baux score, Abbreviated Burn Severity Index (ABSI) score, and Ryan scores together with BOBI to have a more completed study.

Table 1: Demographic, clinical and burn injury characteristics 2010-2019(n=1515)

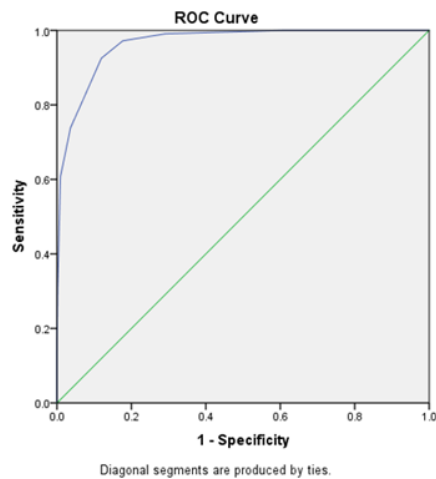
Age, mean(SD)	25.7(3.1)
Gender, % female (n)	38(577)
Group ages (years),%(n)	
<10	47.7(723)
11-19	5(76)
20-29	7.5(114)
30-39	6.1(93)
40-49	10.6(162)
50-59	8.8(134)
60-69	7.3(112)
70-79	3.9(60)
>80	2.7(41)
Etiology of burns, %(n)	
Scalds	49.3(748)
Flame	40(607)
Electrical	5.3(81)
Chemical	4.8(73)
Others	0.4(6)
BSA% burned, mean(SD)	25.6(2.8)
Full-thickness burn, %(n)	16(243)
Inhalation injury, %yes (n)	15.7(239)
Mechanical ventilation, %yes (n)	4.4(68)
LOS, mean(SD)	12(2.1)
Mortality, %(n)	7(107)
Mortality in patients with Inhalation injury,%(n)	37.2(89)
Mortality in patients without Inhalation injury,%(n)	1.4(18)
Mortality Children(0-14y),%(n)	0.9(7)
Mortality Adults(15-60y),%(n)	7.7(42)
Mortality Elderly≥60 y,%(n)	27.2(58)

Table 2-Belgium Outcome in Burn Injury (BOBI) score

	0	1	2	3	4	Score					
Age (years)	<50	50-64	65-79	≥80		0-3					
Total 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

Table 3: Predicted deaths during 2010- 2019(n=1515)

BOBI score	SURVIVE	DEAD	TOTAL	MORTALITY	MORTALITY	DEATHS		
				Observed(%)	Predicted(%)	Predicted(%)		
						from	to	Average
0	550	0	550	0	0-1	0	5.5	2.75
1	448	1	449	0.22	1-5	4.49	22.45	13.47
2	161	2	163	1.23	5		8.15	8.15
3	81	5	86	5.81	10		8.6	8.6
4	64	11	75	14.67	20		15	15
5	53	9	62	14.52	30		18.6	18.6
6	38	14	52	26.92	50		26	26
7	10	32	42	76.19	75		31.5	31.5
8	3	20	23	86.96	85		19.55	19.55
9	0	11	11	100	95		10.45	10.45
10	0	2	2	100	99		1.98	1.98
TOTAL	1408	107	1515				167.78	156.05



Area Under the Curve

Test Result Variable(s): BOBI SCORE

Area	Std. Error ^a	Asymptotic Sig. ^b	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.965	.007	.000	.952	.978

The test result variable(s): BOBI SCORE has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased.

a. Under the nonparametric assumption
 b. Null hypothesis: true area = 0.5

Figure 1-AUC of BOBI score and mortality

References

- World health organization (2021) Fact-sheet Burns. <https://www.who.int/en/news-room/fact-sheets/detail/burns>.
- Osler T, Glance LG, Hosmer DW (2010) Simplified estimates of the probability of death after burn injuries: extending and updating the Baux score. J Trauma 68: 690-697.
- Tobiasen J, Hiebert JM, Edlich RF (1982) The abbreviated burn severity index. Ann Emerg Med 11: 260-262.
- Ryan CM, Schoenfeld DA, Thorpe WP, Robert LSH (1998) Objective estimates of the probability of death from burn injuries. N Engl J Med 38: 362-366.
- Belgian Outcome in Burn Injury Study Group (2009) Development and validation of a model for prediction of mortality in patients with acute burn injury. Br J Surg 96: 111-117.
- Jeschke MG, Pinto R, Costford SR (2016) Threshold age and

-
- burn size associated with poor outcomes in the elderly after burn injury. *Burns* 42: 276-281.
7. Salehi SH, As'adi K, Abbaszadeh-Kasabi A (2017) Comparison of six outcome prediction models in an adult burn population in a developing country. *Annals of Burns and Fire Disaster* 30: 13-17.
 8. Lip HTC, Idris MAM, Imran F (2019) Predictors of mortality and validation of burn mortality prognostic scores in a Malaysian burns intensive care unit. *BMC Emerg Med* 19: 66.
 9. Sheppard NN, Hemington-Gorse S, Shelley OP, Philp B, Dziewulski P (2011) Prognostic scoring systems in burns: a review. *Burns* 37: 1288-1295.
 10. Brusselsaers N, Juhasz I, Erdei I, Monstrey S, Blot S (2009) Evaluation of mortality following severe burns injury in Hungary: external validation of a prediction model developed on Belgian burn data. *Burns* 35: 1009-1014.

Copyright: ©2021 Monika Belba, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.