SUMEJ

Sumatera Medical Journal

COMPARISON OF ASSESSMENT OF ABBREVIATED BURN SEVERITY INDEX (ABSI) AND BELGIAN OUTCOME OF BURN INJURY (BOBI) AT H. ADAM MALIK GENERAL HOSPITAL

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Abstract. Background: Assessment of length of stay and mortality in patients with burn injuries is essential to support clinicians in making clinical decisions. In Indonesia, there are several scoring systems used by hospital centers to assess the mortality of burn patients, such as the Belgian Outcome of Burn Injury (BOBI) and the Abbreviated Burn Severity Index (ABSI). However, different results were obtained in studies that examined the comparison of the results of the scoring system. Method: The type of research used in this research is unpaired comparative analysis research using a cross-sectional design. The data to be used is secondary data taken from medical records. Results: Respondents with death status were found in the serious, severe, and maximum ABSI categories, $p=0.001$ ($p<0.05$) and the BOBI 50% category as many as three people and 85% as many as one person, $p=0.0001$ ($0<0.05$). Length of stay based on the ABSI score for the length of stay was 23 days with an ABSI score of 12-13 (maximum), and based on the BOBI Score, the majority was 28 days with a BOBI score of 8 (85%). ABSI in this study had a sensitivity of 100% and a specificity of 86.4%, while the use of BOBI in this study had a sensitivity of 100% and a specificity of 88.1%. Discussion: The BOBI scoring system is more accurate than the ABSI. This difference may occur due to differences in demographics and quality of service in each region. Therefore, the analysis of the validity of the scoring model before the research is carried out in a new population is considered crucial to be carried out.

Keyword: ABSI, BOBI, Length Of Stay, Mortality

1 Introduction

Burns is one of the most detrimental types of trauma; the care of patients with wounds requires special attention regarding the causes, characteristics, and severity of various prognoses that can occur (Anami et al., 2017; Smolle et al., 2017). Burn trauma can be caused by friction, cold

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temperatures, hot temperatures, radiation, chemicals, or electric currents (American Burn Association, 2019).

Although all burn trauma can cause tissue damage due to energy transfer, different causes of burns will produce different psychological and pathophysiological responses. For example, sparks and flames can cause immediate deep burns, whereas scalds (due to hot steam or hot liquids) cause more superficial burns. Alkaline chemicals cause colliquative necrosis (where the tissue transforms into a fluid, viscous mass), whereas acid burns cause coagulation necrosis (where dead tissue is found). Meanwhile, electrical trauma is very different because it will cause deep tissue damage and is more severe than it looks outside. Tissue damage in electrical trauma is related to the strength of the electric current (amperages and tissue resistance). To simplify calculations, electrical voltages are often used and are associated with the state of the wound. Trauma due to temperature can also occur in cold conditions. Frostbite is caused by several mechanisms, including direct cellular trauma from water crystallization in the tissue and indirect trauma due to ischemia and reperfusion events. This mechanism leads not only to the process of skin necrosis but also to severe tissue damage. (Nguyen et al., 2020) Frostbite is caused by several mechanisms, including direct cellular trauma from water crystallization in the tissue and indirect trauma due to ischemia and reperfusion events.

Prediction of mortality is also important in considering the health and financial aspects of patients with severe burns (Jeschke et al., 2015). In some countries, burns are the fourth leading cause of death due to trauma, with the highest incidence reported in Southeast Asia, including Indonesia (WHO, 2021). The incidence of burns is responsible for about 250,000 deaths per year, with an estimated >90% of the world's calculations coming from low-middle income countries (Herlianta et al., 2021).

Assessment of length of stay and mortality in patients with burn injuries is essential to support clinicians in making decisions, relieve individual suffering, and improve hospital resource allocation. Early assessments such as determination of survival or mortality are very effective in helping triage implement medical interventions and surgical procedures as soon as possible, which is also helpful for the patient's family regarding medical decision-making and consideration of treatment costs. This scoring system results in better care, shorter patient treatment lengths, and improved quality of life. The increase in mortality in burn injuries worldwide is attributed to several factors, including antimicrobials, early burn excision and skin grafting, multidisciplinary teams,

Predictors of mortality severity in burn injuries are crucial, so many scoring systems have been developed (Kaita et al., 2020). Recently, six burn centers in Belgium used data from 5246 patients from 1999-to 2004 and developed the Belgian Outcome of Burn Injury (BOBI), a burn mortality assessment system. There is also the Abbreviated Burn Severity Index (ABSI) scoring system created in 1982 by Tobiasen et al., which simply and effectively predicts the probability

of 25 patients surviving after burn injury, which is still the most desirable predictor of mortality (Douglas et al., 2015; Lin et al., 2018).

The Abbreviated Burn Severity Index (ABSI) scoring system relates five main factors: age, sex, body surface area affected, wound depth, and inhalation trauma, which provides a score that stratifies survival in the six groups. When applying and evaluating this index, it is evident that this assessment has high sensitivity and specificity (Douglas et al., 2015). While the Belgian Outcome of Burn Injury (BOBI) scoring system predicts mortality with only three pillars, namely age, burn surface area, and the presence of inhalation injury or not, with a total score of ten and the predicted mortality results are stated between 0.1% to 99% (Halgas, 2018).

In Indonesia, it is known that hospital centers use several scoring systems to assess the mortality of burn patients. The scoring system in question is the Rayan scoring system, Revised Baux Score, Belgian Outcome of Burn Injury (BOBI), and Abbreviated Burn Severity Index (ABSI), but in research that examines the comparison of the results of the scoring system, different results are obtained. For example, research by Risa et al. at Saiful Anwar Hospital in Malang stated that the ABSI scoring system was the most accessible to implement, while the research by Fitri et al. at Dr. Hospital. M. Djamil Padang stated that the BOBI scoring system is more accurate than other scoring systems (Douglas, 2015; Fitri, 2018; Heerlianita, 2021). Furthermore, another study by Lip et al. stated that the ABSI score was better than the BOBI score for predicting mortality in burn patients in Malaysia (5.41±2.51 vs. 1.75±2.06; 95% CI) (Lip, 2019). However, research comparing ABSI and BOBI scoring directly are still limited. Therefore, researchers are interested in comparing the outcome and mortality assessment of burn patients using the Abbreviated Burn Severity Index (ABSI) with Belgian Outcome of Burn Injury (BOBI) at H. Adam Malik Hospital, Medan.

Research methods

The type of research used in this research is unpaired comparative analysis research using a cross-sectional design. The data to be used is secondary data taken from medical records. In this study, the researcher wanted to compare the Outcome Assessment and Abbreviated Burn Severity Index (ABSI) with Belgian Outcome Of Burn Injury (BOBI) at H. Adam Malik Hospital. This research was conducted at the Haji Adam Malik General Hospital Medan. Haji Adam Malik Central General Hospital Medan was chosen as the research location because it is the Central General Hospital and Referral Hospital in North Sumatra Province. This research will be carried out from December 2021 until there is a sufficient sample.

The population in this study were all burned patients at Haji Adam Malik General Hospital Medan in 2019-2021. Therefore, the samples used in this study are all burned patients at the Haji Adam Malik Hospital in Medan from 2019-to 2021. The sample in this study was taken

using a consecutive sampling technique, where the entire population that met the inclusion and exclusion criteria was taken as a sample.

The inclusion criteria for this study were patients aged 18 years and burn patients hospitalized at H. Adam Malik Hospital from 2019-to 2021. The exclusion criteria for this study were patients with burn onset > 8 hours or electrical Burn. Then the researchers collected age, gender, inhalation trauma, full-thickness Burn, TBSA, ABSI, BOBI, outcome, length of stay, and mortality. This study used secondary data from medical records of burn patients at Haji Adam Malik General Hospital Medan in 2019-2021. The data from the medical record is recorded and grouped based on predetermined variables. Data that has been collected and grouped based on predetermined variables will then be processed and analyzed using the SPSS (Statistical Package for Social Science) ver 22 program and presented and analyzed using statistical software. The data were initially analyzed descriptively to see the frequency distribution based on the characteristics. Then, the Kolmogorov Smirnov normality test was conducted to see the distribution of the data. If the score data is normally distributed, the unpaired t-test will be used, while the Mann-Whitney test will be used if it is not normally distributed. The results were significant, with a p-value of <0.05.

Research result

This research is unpaired comparative analysis research using a cross-sectional design. The data used is secondary data taken from medical records. One hundred fifty subjects followed this study, but 63 people entered according to the inclusion and exclusion criteria. In this study, the researcher wanted to compare the Abbreviated Burn Severity Index (ABSI) Outcome and Mortality Assessment with the Belgian Outcome of Burn Injury (BOBI) at H. Adam Malik Hospital.

This research was conducted at the Haji Adam Malik General Hospital Medan. Haji Adam Malik Central General Hospital Medan was chosen as the research location because it is the Central General Hospital and Referral Hospital in North Sumatra Province. This research will be carried out from December 2021, with 63 respondents.

Table 1 Research Demographic Characteristics

Variable	Frequency (n, %)
Gender	
Man	39 (61.9%)
Woman	24 (38.1%)

Variable	Frequency (n, %)
Age	
18-27 years old	18 (28.6%)
28-37 years old	21 (33.3%)
38-47 years old	11 (17.5%)
48-57 years old	7 (11.1%)
58-67 years old	4 (6.3%)
68-77 years old	2 (3.2%)
Total	63 (100%)

In table 1, it can be seen that the male sex is most commonly found as many as 39 years (61.9%), and the female sex as many as 24 people (38.1%). For age, the category of 28-37 years was the most common as many as 21 people (33.3%), then 18-27 years, as many as 18 people (28.6%), 38-47 years, as many as 11 people (17.5%), 48-57 years as many as seven people (11.1%), 58-67 years as many as four people (6.3%) and 68-77 years as many as two people (3.2%).

Table 2 Characteristics of Length of Treatment

Variable	Frequency (mean+SD, min-max)
Length of Treatment	15.60+7.621 (5-34 days)
Total	63 (100%)

Table 2 shows the length of stay for 15.60+7.621 (5-34 days).

Table 3 Distribution of ABSI

ABSI	Frequency (n, %)	Length of Treatment	Mortality	
			Die	Life
2-3 (Very Low)	1(1.6%)	18 days	0 (0%)	1 (100%)
4-5 (Moderate)	13 (20.6%)	10.62+5.06 (5-23 days)	0 (0%)	13 (100%)
6-7 (Moderately Severe)	24 (38.1%)	14.29+8.41 (5-34 days)	0 (0%)	24 (100%)
8-9 (Serious)	13 20.6%)	17.15+5.64 (10-28 days)	0 (0%)	5 (100%)
10-11 (Severe)	7 (11.1%)	20.71+6.55 (10-27 days)	2 (40%)	3 (60%)
12-13 (Maximum)	5 (7.9%)	23.20+6.26 (14-30 days)	2 (40%)	3 (60%)
Total	63 (100%)		4 (6.3%)	59 (93.7%)

In table 3, the frequency distribution of Abbreviated Burn Severity Index (ABSI) shows that ABSI Very Low is one person (1.6%), Moderate is 13 people (20.6%), Moderately Severe is 24 people (38.1%), Serious is 13 (20.6%) %), Severe as many as seven people (11.1%) and Maximum as many as five people (7.9%).

Length of stay based on ABSI score on length of stay, with the majority of respondents being treated for 23 days with an ABSI score of 12-13 (Maximum), followed by 20 days of hospitalization with an ABSI score of 10-11 (Severe), Followed by respondents with an average length of stay of 18 days with an ABSI score of 2-3 (Very Low), followed by a length of stay of 17 days with an ABSI score of 8-9 (Serious), followed by patients with a length of stay of 14 days with an ABSI score of 6-7 (Moderately Severe), followed by patients with a length of stay of 10 days with a score of 4-5 (Moderate). It can be seen that respondents with death status were found in the serious, severe, and maximum ABSI categories. Meanwhile, the status of live mortality was primarily found in moderately severe with 24 respondents and moderate with 13 respondents.

Table 4. Frequency Distribution of Frequency Distribution, Length of Treatment, and Mortality based on Belgian Outcome of Burn Injury (BOBI)

| BOBI	Frequency (n, %)	Length of Treatment		Mortality	
				Die	Life
0 (0.1%)	12 (19%)	10.58+5.60	(5-23 days)	0 (0%)	12 (100%)
1 (1.5%)	18 (28.6%)	12.83+7	(6-34 days)	0 (0%)	18 (100%)
2 (5%)	13 (20.6%)	17.08+7.44	(7-31 days)	0 (0%)	13 (100%)
3 (10%)	5 (7.9%)	15.40+6.58	(5-22 days)	0 (0%)	5 (100%)
5 (30%)	4 (6.3%)	21+5.48	(15-27 days)	0 (0%)	4 (100%)
6 (50%)	8 (12.7%)	20.88+7.61	(10-30 days)	3 (37.5%)	5 (62.5%)
7 (75%)	2 (3.2%)	23.50+2.12	(22-30 days)	0 (0%)	2 (100%)
8 (85%)	1 (1.6%)	28 days		1 (100%)	0 (0%)
Total	63 (100%)			4 (6.3%)	59 (93.7%)

In table 4, the frequency distribution of Belgian Outcome of Burn Injury (BOBI) shows that the 0.1% category is 12 people (19%), 1.5% is 18 people (28.6%), 5% is 12 people (20.6%), 10% is 5 people (7.9%), 30% as many as 4 people (6.3%), 50% as many as 8 people (12.7%), 75% as many as 2 people (3.2%) and 85% as many as 1 person (1.6%).

It can be seen that respondents with death status were found in the BOBI 50% category as many as three people and 85% as many as one person. On the other hand, for live mortality status, the most found in the BOBI 1.5% category by 18 people, 0.1% as many as 12 people, and 5% as many as 13 people.

Length of stay based on the BOBI Score, with the majority of respondents having a length of stay of 28 days with a BOBI score of 8 (85%), followed by patients with a length of stay of 23 days with a BOBI score of 7 (75%), then followed by patients with a length of stay 21 days with a BOBI score of 5 (30%), followed by patients with a length of stay of 20 days with a BOBI score of 6 (50%), followed by patients with a length of stay of 17 days with a BOBI score of 2 (5%), then followed by patients with a length of stay of 15 days with a BOBI score of 3 (10%), followed by patients with a length of stay of 12 days with a BOBI score of 1 (1.5%), then followed by patients with a length of stay of 10 days with a BOBI score of 0 (0.1%)

The median ABSI score in burn patients who died was 11 (10-13), while the median ABSI score in living burn patients was 7 (3-12). There was a significant difference between the

ABSI scores of dead and surviving patients. The median BOBI score in burn patients who died was 6 (6-8), while the median BOBI score in living burn patients was 1 (0-7); there was a significant difference between the BOBI scores of patients who died and those who survived.

Diagonal segments are produced by ties.
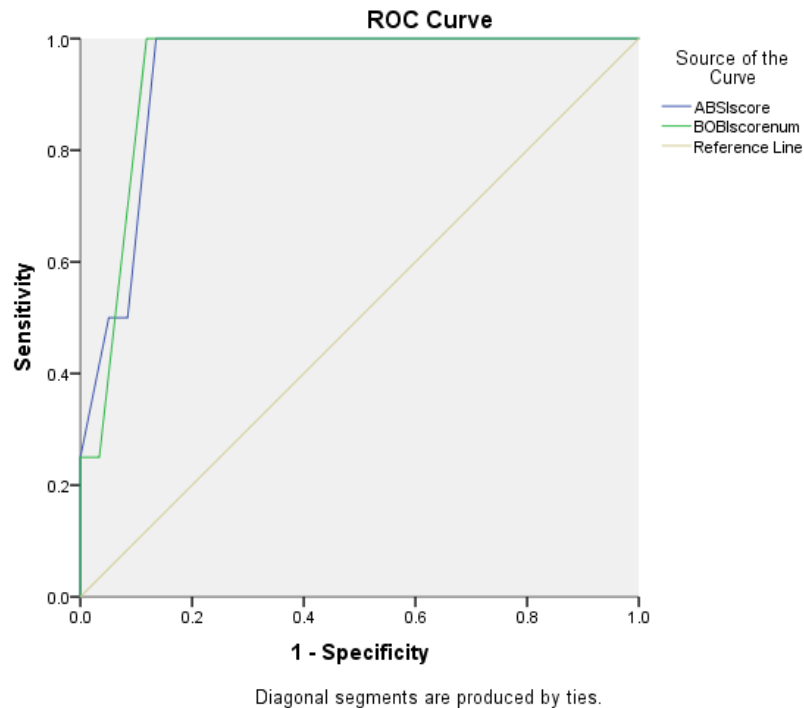
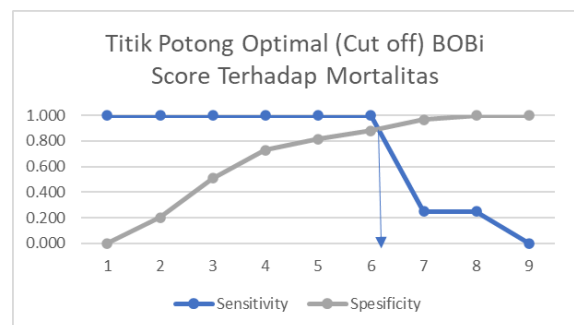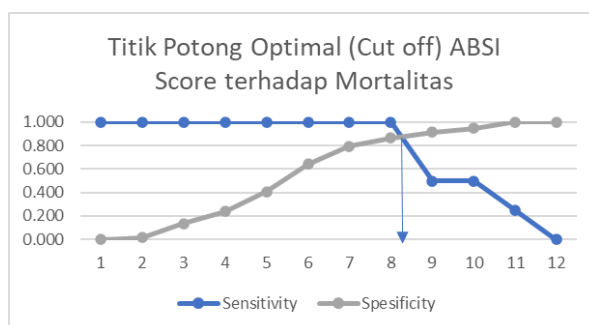| ABSI Score, AUC (95% CI)	BOBI AUC Score (95% CI)
0.939 (95% CI 0.869-1,000; p value=0.004)	0.943 (95% CI 0.881-1,000; p value=0.003)
Cut off ABSI : 9.50 (Sen 100%,Spe 86.4%)	*Cut off* BOBI: 5.50 (Sen 100%, Spe 88.1%)

Figure 1. ROC curve and AUC value of ABSI score and BOBI score on mortality of burn patients

At the cut-off point, the ABSI score of 9.5 means that burn patients with an ABSI score of 9.5 have a mortality probability of 100% sensitivity, 86.4% specificity, and 33.3% positive predictive value (PPV), and negative predictive value (NPV) 100%.

Table 5. Value of sensitivity, specificity, positive predictive value, and negative predictive value of ABSI in predicting mortality in burn patients

Scoring	Die	Life	Total
ABSI≥9.5	4 (33.3)	8 (66.7)	12 (100.0)
ABSI < 9.5	0 (0,0)	51 (100.0)	51 (100.0)
Total	4 (33.3)	59 (66.7)	63 100,0)

Sensitivity: 100%

Specificity 86.4%

At the cut-off point, the BOBI score of 5.50 means that polytrauma patients with a BOBI score of 5.50 have a mortality probability of 100% sensitivity, 88.1% specificity, and 36.4% positive predictive value (PPV), and negative predictive value (NPV).) 100%.

Table 6. The value of sensitivity, specificity, positive predictive value, and negative predictive value of the BOBI score in predicting mortality in burn patients.

Scoring	Die	Life	Total
BOBI 5,50	4 (33.3)	7 (63.6)	11 (100.0)
BOBI < 5.50	0 (0,0)	52 (100.0)	52 (100.0)
Total	4 (33.3)	59 (66.7)	63 100,0)

Sensitivity: 100%

Specificity 88.1%

From table 7, it can be seen that the ABSI and BOBI scores have r values of 0.494 and 0.524, respectively, which means that the ABSI and BOBI scores have a weak correlation with length of stay. On the other hand, each p-value was found to be 0.0001, meaning ABSI and BOBI significantly related to the length of stay. The regression equation model was obtained with constant and variable coefficients in the Unstandardized Coefficients column B. Based on this table, the regression equation model is obtained:

ABSI on length of stay: Y =3.961 + 1.595 X1

BOBI on length of stay: Y =11,396 + 1,779 X1

It can be interpreted that if the ABSI variable is constant, then the length of stay is 3,961. If the BOBI variable is constant, then the length of stay is 11,396. If the ABSI variable increases by 1 unit, it will increase the length of stay variable by 1,595. If the BOBI variable increases by 1 unit, it will increase the length of stay variable by 1.779

Table 7. Correlation between ABSI and BOBI on Length of Treatment

Variable	r value	Constant Beta Coefficient	Beta Coefficient	p Nilai value
ABSI	0.494	3,961	1.595	0.0001
BOBI	0.524	11,396	1,779	0.0001

Table 8. Table of Comparison of Length of Care and Mortality of ABSI with BOBI at H. Adam Malik Hospital Medan

Variable	ABSI		BOBI	
	9.5	<9.5	5,50	<5.50
Life	8	51	7	52
Die	4	0	4	0
Length of Treatment	21.75+6.27 (10-30 days)	14.16+7.22 (5-34 days)	22+6.78 (10-30 days)	14.25+7.13 (5-34 days)

Discussion

In this study, it can be seen that the male sex is most commonly found as many as 39 years (61.9%), and the female sex as many as 24 people (38.1%). This study's results align with Lip et al.'s research, which stated that the majority of male patients were 325 people (70.2%) compared to 138 women (29.8%). The results of this study differ from those of Gurbuz et al., who examined the characteristics of burns in patients in Turkey and found that there were 38 men and 66 women in the study group. However, the men and women ratio was different in survivors and non-survivors. with 1.00:2.07, and 1.25:1.00, respectively. Age and gender were not efficient variables for mortality in this study (p=0.329 and p=0.226, respectively)(Lip et al., 2019; Gürbüz & Demir, 2022).

Several retrospective clinical studies on burns have focused on gender differences and their effect on outcomes after burns. Most of these research reports indicate a lower proportion of injuries and less severity in women than men. Karimi et al. reported that of 334 adult patients with TBSA >20%, female patients accounted for only 18% with smaller wound sizes. Lam et al. also reported that women accounted for only 30.7% of cases. No significant differences between the male and female groups in age, time lag to hospitalization, and burn characteristics were found. Differences in the proportion of wounds and severity are related to sex hormones. (Lam, Duc, and Hung, 2020)

Research by Burn et al. in mice also supports this hypothesis. Burns et al. reported that burns cause an increase in estrogen levels in rats, and high estrogen levels may exert an immunosuppressive effect. It is suspected that in female rats, there is immunosuppression due to high estrogen levels. In male rats, estrogen levels are the same as in female rats without burns, and there is an immunostimulatory effect. In addition to estrogen, other hormones are also reported to play an important role. Prostaglandin E2 plays a role in mediating cellular immune responses by inhibiting T cell proliferation and macrophage antigen presentation. Prostaglandin E2 was reported to be elevated in female rats with burns but not in male rats ten days after injury. (Barrett et al., 2019)

However, in contrast to trauma cases, it was found that the mortality rate from burns was higher in women than in men. Research by McGwin et al. reported that the female mortality rate was more than twice the male mortality rate (odds ratio = 2.3) with similar causes and timing of death. Summers et al. concluded that women are more likely to suffer from organ failure and poor outcomes than men. However, this result is also controversial because Kobayashi et al. reported that gender was not a risk factor for high mortality in all age groups. Conflicting clinical reports on the impact of sex on survival could be due to differences in study design, sample size, and other factors that influenced the outcome. (Lam, Duc, and Hung, 2020)

The factor thought to play a role in this difference is mast cells. Mast cells are effector cells of allergic reactions by stimulating a Th2-type response. Animal studies by Mackey et al. showed that gene expression on mast cells differed significantly between women and men. In female mice, mast cells have an increased capacity for mediator synthesis and contain more histamine, tryptase, and chyme in the granules. These substances will then be released during periods of stress and produce vasodilation, vascular permeability, and reactive oxygen species (ROS) production. The increased activation in female rats after burns is thought to result in a poor outcome. (Barrett et al., 2019)

The results of this study differ from those of Gurbuz et al.. The mean age was 70.9±8.5 (60.0–92.0) years for all patients, 70.5±8.5 (60.0–92, 0) for survivors, and 72.7±8.4 (62.0–90.0) years for non-survivors; in addition, the mean age was 69.0 (64.0-77.5) years for all patients, 68.0 (63.0-78.0) years for survivors, and 72.0 (65.0 -76.0) years for non-survivors. Regarding onset,

the respondents obtained an average of 6.198+2.2870 (0.5-8 hours), and the length of stay was 15.60+7.621 (5-34 days). This is in line with Gurbuz et al., which stated that in the study period of 4 years, 18 of 104 older adult patients died with a mortality rate of 17.3%. Approximately 51.2% of the patients were discharged and 61 (Lip et al., 2019; Gürbüz & Demir, 2022).

Length of stay (LOS) or length of hospital stay is an outcome that is difficult to predict; the review found that the studied model could only explain 15-75% of population variation in LOS. The investigators' univariate regression analysis revealed an established mortality index to be a significant predictor of LOS, consistent with previous studies. The 'LOS=1 day/%TBSA' rule was able to explain 81.2% of the variation in the LOS of the study population, surpassed only by the LOS model and Ho et al. We found that increasing the serum albumin concentration to TBSA increased predictive efficiency and the ability to explain variations in LOS to 83.2%. The investigators looked at the anatomic location of the Burn to predict LOS; burns involving the perineal region were significantly correlated with longer LOS and increased TBSA, similar to Frugoni et al.(O'Dea et al., 2016; Yamamoto et al., 2020).

Burns involving the lower limbs were observed to significantly increase the likelihood of delayed recovery, similar to the observations of Sanderson et al. Peripheral arterial disease, relative vascular insufficiency of large adipose tissue deposits, complications of premature weight gain and delayed ambulation, and poor patient and family compliance with demands for physiotherapy are all limiting factors for healing of lower extremity burns. However, the investigators observed a weak significant correlation ($p = 0.09$) between lower extremity burns with comorbidities diagnosed in the study population; Further studies are needed to clarify its predictive value. In addition, the female sex association with prolonged LOS has been observed previously (Fransén et al., 2022).

Abbreviated Burn Severity Index (ABSI) frequency distribution shows that ABSI Very Low as many as one person (1.6%), Moderate as many as 13 people (20.6%), Moderately Severe as many as 24 people (38.1%), Serious as many as 13 (20.6%), Severe as many as seven people (11.1%) and Maximum as many as five people (7.9%). This is in line with research by Lip et al. which also stated an average ABSI score of 5.41+2.51. Another study found that during the ABSI assessment if the threat to life was low, there were no deaths but more than 93% mortality when the life threat was predicted to be very serious. (Angulo et al., 2020).

As can be observed, Rahmanita et al. showed that the survival rate was almost the same as the previously reported cases or even higher in cases scoring below 10. However, our study's survival rate was lower than that reported in previous studies. . in case of score > 10(Brusselaers, Agbenorku, and Hoyte-Williams, 2013; Knowlin et al., 2016). In addition, Rahmani et al. also found significant differences between the two groups of patients in terms of percentage of burns, full-thickness burns, length of stay, length of stay in ICU, BOBI score, and ABSI score (P<0.0001). (Herlianita et al., 2021).

Rahmani et al.'s study explained that logistic regression was used to investigate the effect of burn percentage, full-thickness burn percentage, ABSI score, and BOBI in predicting mortality and the need for ICU care in burn patients. Investigation of the variation in odds per unit variation in each index showed that the odds ratio for death was 5.17 times and the odds ratio for ICU admission was increased by 3.33 times by keeping the other variables constant with a one-unit increase in the ABSI score and keeping the other variables constant, the ratio the odds of mortality and ICU admission increased by 1.29 and 1.21, respectively, increasing the percentage of full-thickness burns by one percent. (Suleman Bajwa et al., 2020).

Available systems for determining the prognosis in burn patients include ABSI, BOBI, Ryan, Baux, and FLAMES models and the Roi Index. We can currently estimate the burn patient's risk level using ABSI. This index is simple and derived from logistic regression. By increasing the numerical value of this score, the mortality rate increases. Survival rates on the following scores were estimated as: 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% so the calculated survival rate for scores of 12 and above is less than 10%. Harbord et al. showed that the percentage of burned body surface and age were mostly associated with poor prognosis in patients. Lionel et al. also showed that the percentage of full-thickness burns was mostly associated with mortality. Salehi et al. concluded that ABSI is the best index for predicting mortality among burn patients. The role of age and percentage of burns and their impact on patient mortality was mentioned in other studies(Boissin et al., 2019; Dinh et al., 2020).

As stated, predicting burn mortality can help find suitable solutions to reduce mortality and resuscitate the patient. The results showed that the burn percentage index, burn full-thickness, BOBI, and ABSI scores could predict burn patients' mortality rate. In addition, the index comparison shows that the ABSI index and the BOBI score have more value in terms of the odds ratio in mortality(Angulo et al., 2020).

ABSI scores and BOBI scores have differences in their assessment, and in this study, the average score for ABSI found that mortality was severe and maximum. In contrast, BOBI scores found mortality at a score of 50% (moderate). In addition, there are differences in the assessments assessed in the ABSI and BOBI scores, where the ABSI points for the presence of inhalation trauma are given a value of 1. In contrast, the BOBI for the assessment of inhalation trauma is given a value of 3, and one of the differences again in ABSI is that an assessment of gender is also carried out. In contrast, in BOBI, it is not assessed.

In research conducted by Rahmani et al., it was found in this study that ABSI had a cut-off score of 8.5, while in the study conducted by Wardhana, A. et al., an ABSI score with a cut-off of 7.5 was found. . In this study, the ABSI cut off was found to be 9.5 with a total sample of 63 people. While the research conducted by Rahmani et al. with a cut-off of 8.5, the number of samples tested was 250 people, while the research conducted by Wardhana et al. with a cut-off of

7.5 with a sample of 220 people. This is what underlies the difference in the cut-off on ABSI. Likewise, with the BOBI score, in Wardhana et al.'s study, the BOBI cut-off was 2.5 with a sample of 220, while in this study, the cut-off for BOBI was 5. 5 with a sample of 63 people. (Rahmani et al, 2021; Wardhana et al, 2021).

Conclusion

This study found respondents with death status in the serious, severe, and maximum ABSI categories. The p-value was found to be 0.001 (p<0.05), meaning a significant relationship exists between ABSI and mortality. Respondents with death status were found in the BOBI 50% category as many as three people and 85% as many as one person. For living status, the most found in the BOBI 1.5% category by 18 people, 0.1% as many as 12 people, and 5% as many as 13 people. The p-value was found to be 0.0001 (0<0.05), meaning a significant relationship exists between mortality and the BOBI score.

Length of stay based on ABSI score on length of stay, with the majority of respondents being treated for 23 days with an ABSI score of 12-13 (Maximum). Length of stay was based on the BOBI Score, with most respondents having a length of stay of 28 days with a BOBI score of 8 (85%). ABSI and BOBI scores have r values of 0.494 and 0.524, respectively, which means that ABSI and BOBI have a weak correlation with length of stay. If the ABSI variable increases by 1 unit, it will increase the length of stay variable by 1,595. If the BOBI score variable increases by 1 unit, it will increase the length of stay variable by 1,779. The method using ABSI in this study had a sensitivity of 100% and a specificity of 86.4%. In comparison, the use of BOBI in this study had a sensitivity of 100% and a specificity of 88.1%.

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