National Journal of Health Sciences, 2025, *10*, 205-211

Research Article

Big Score (Base Deficit INR, GCS) as a Mortality Predicting Score in Adult Patients with Multiple Trauma within 24HRS of Injury up to 30 Days of Mortality

Shafaq Feroz*, Shaesta Tabassum

Department of Accident and Emergency, Liaquat National Hospital, Karachi, Pakistan.

Abstract: Background: Several scoring models have been developed for assessment of traumatic injury extent. One of these trauma scoring systems, the BIG score has popularity because of its simplicity and time constraints.

Objective: To analyze the predictive ability of BIG score in identifying in-hospital mortality among multiple trauma patients presenting to emergency room (ER) in a tertiary care hospital.

Materials and Methods: This prospective observational investigation was executed by emergency department at Liaquat National Hospital during 1st April, 2022 to 31st December, 2022, after obtaining approval from ethical review committee of Liaquat National Hospital (IRB# 0736-2022-LNH-ERC). Patients presenting with multiple trauma were evaluated for BIG score upon their arrival to emergency room. Patients were kept under follow-up until their discharge or in-hospital mortality.

Result: Altogether 169 patients were studied with mean age of 27 ± 7 years. In-hospital mortality was seen in 75% of patients. GCS score on ER presentation ($p<0.001$) was substantially lesser and BIG score ($p<0.001$) was significantly higher among dead patients and as compared to survivors. Frequency of diabetes ($p=0.020$), hypertension ($p=0.016$), ischemic heart disease ($p=0.025$), intubation upon ER arrival ($p<0.001$) and blunt trauma was significantly higher among those who had in-hospital than patients who were discharged safely. AUC for BIG score was 0.877. Youden index is 18.5. At threshold of 18.5, sensitivity and specificity was 81% and 76.7% respectively. On multivariable analysis, BIG score was found to be independent predictor of in-hospital mortality.

Conclusion: The present study demonstrated the good predictive value of BIG score in classifying the high risk patients for in-hospital among multiple trauma patients presenting to emergency room.

Keywords: In-hospital mortality, Blunt trauma, Penetrating trauma, BIG score, Emergency room, GCS score.

INTRODUCTION

Trauma has the biggest effect on death and illness for all ages. Numerous trauma associated mortalities happen at the incident site or during four hours after a victim reaches at a trauma center. A prompt evaluation, timely recognition of severe traumatic injuries, and optimal management substantially impact recover profile [1-3].

Blunt trauma is a type of injury that happens when something hits the body hard. It often leads to brain injuries and broken bones. Another kind of injury is referred as penetrating trauma. This occurs when an object goes through the skin or into the body making a wound. Any injury that might cause long-lasting problems or is deep counts as major trauma to the body. When a person gets many serious injuries at once, like from falling, being attacked, or crashing, we call it multiple trauma. These injuries can cause a lot of bleeding and might harm the brain or organs such as the lungs and spleen [4].

Due to the extreme nature of traumatic injuries, we need reliable ways and signs are needed to assess these patients' outlook and guide their treatment choices [5, 6]. Trauma-related injuries claim almost 5.8 million lives each year [7-9].

Furthermore, 50-60% of pre-trauma deaths occur in the first hour [10]. Despite real advances in medical care and technology, deaths that occur on-site or in the first hour still remain significant issue to public health. One-third of deaths from trauma have a predicted prevention rate created through enhancement of trauma systems [11]. It is observed especially in lower and middle income countries, since, the burden of mortality and disability from injuries is particularly high in those settings. Those countries contribute to nearly 90% of the total burden; the proportion is enormous and by far the greatest part of the total burden [12]. In Pakistan, the first national injury survey shows the annual total incidence rate of injuries was forty-one injuries per 2000 persons; this is the highest number of recorded injuries [13].

According to WHO in year 2016, India had 389 deaths per 100,000 population for trauma, Sri Lanka with 313 deaths per 100,000 population for trauma, Pakistan with 262 deaths

* Address correspondence to this author at the Department of Accident and Emergency, Liaquat National Hospital, Karachi, Pakistan.
Email: dr.shafaqibrahim@gmail.com

per 100,000 population for trauma, Thailand with 370 deaths per 100,000 population for trauma, Malaysia with 211 deaths per 100,000 population for trauma, China with 184 deaths per 100,000 population for trauma, New Zealand with 95 deaths per 100,000 population trauma, Australia with 85 deaths per 100,000 for trauma, and Japan at 74 deaths for trauma [14].

Moreover, there may be clinical advantage for early mortality prediction. It is possible to begin notifying and mobilizing on-call clinical, surgical, and upstream support personnel earlier in the effort to provide careful workup and treatment to sick patients. A further efficacy of mortality prediction is that it helps patients' families prepare for potential adverse results. If the severity of sickness can be identified prior to patients' arrival into the emergency unit, these clinical advantages are compounded. Additional clinical advantages include the ability to more effectively direct trauma victims to the most appropriate medical facility which has all the relevant individuals and resources [15].

Prompt assessment and recognition of life threats, and appropriate treatment, can have a significant effect on outcomes [1]. Numerous trauma grading scales have been formulated in order for evaluation of extent of injury and monitoring of patient progress. Some trauma scoring system examples include the Glasgow Coma Scale (GCS), Revised Trauma Score (RTS), and Injury Severity Score (ISS) [16].

Within the military context, Borgman and Spinella *et al.* created the BIG score, which has since been validated in some civilian cohorts [17-21]. The components include the base deficit (BD) on presentation, international normalized ratio (INR), and Glasgow Coma Scale (GCS). There are many ways to calculate the BIG score, and all of them can be done very quickly either on the way to the hospital or on arrival to the hospital [15].

While the BIG has been shown to be valid, a gap in knowledge exists due to a lack of data comparing the model with other models, including PELOD, PIM2, and PRISM III. Recently, Muisyo and colleagues analyzed a large database of pediatric trauma patients and demonstrated that BIG was comparable to these scores. This was demonstrated by the results of their findings however, out of 45,377 patients in their study, only 152 patients had all of the three components necessary to derive their BIG score [22].

It has been shown that the BIG score is helpful in anticipating outcomes of child trauma patients. Also, prior studies have demonstrated that the BIG score is considerably more valid than other traumatic assessment indicators [23, 24]. These results are impressive. It was shown in one of the studies that mortality for patients with multiple trauma and a BIG SCORE of greater than 16 from the hospitals' records indicated a mortality rate of 87.5% [25].

There is very little research on hospital mortality rates based on BIG scores. The aim of this study is to analyze the predictive ability of BIG score in identifying in-hospital mortality among multiple trauma patients presenting to emergency room in a tertiary care hospital. This study will allow clinicians to make an early prediction of mortality in trauma patients, an arduous task with great potential benefits. The possibility of making an accurate early risk prediction of death may facilitate decisions about triage, direct therapy, and stratify patients for future care as entry criteria for clinical trials in order to match and intervene with an appropriate cohort of at-risk individuals.

MATERIALS AND METHODS

This prospective observational investigation was executed by emergency department at Liaquat National Hospital during 1st April, 2022 to 31st December, 2022. The study received approval from ethical review committee of Liaquat National Hospital (IRB# 0736-2022-LNH-ERC). Patients who were 16-60 years old and had multiple trauma (blunt or penetrating) were included in this study. Likewise, patients who arrived at the ER department over 24 hours post-trauma, had multiple traumas and chronic renal failure, illnesses affecting the liver or neurological diseases, and patients with a BIG score ≤ 16 were excluded.

The required number of patients to be studied was 169, which was prospectively calculated using WHO sample size calculator. The sample size was calculated with a 5% margin of error and with the prevalence of 87.5% [25] in-hospital mortality with BIG score estimates >16.

Informed consent was sought from all patients or from attendants. Demographic information (name, age, gender) was collected. The BIG score was determined when patients arrived at the emergency room using the equation BIG score = (admission base deficit) + (2.5 × International Normalized Ratio) + (15 – Glassgow Coma Scale) [15]. Base deficit was obtained through analysis of arterial blood gas based on pH and PaCO2, recorded in mmoI/L. The values were computed using the standard blood gas analyzer in laboratory. International Normalize ratio (INR) was calculated using the patients' prothrombin time (PT). Prothrombin time was calculated in seconds using the standard coagulation assays. These patients' data were followed throughout their stay in hospital till they were discharged or died.

The in-hospital mortality was defined as the mortality that occurred during hospitalization. The total number of hospitalization days from the day of admission to discharge or death, was regarded as total length of hospital stay. Confounding variables included diabetes mellitus for the past six months, hypertension for the past six months, and ischemic heart disease for the previous year.

STATISTICAL ANALYSIS

Data was analyzed using SPSS version 27. Frequencies and percentage were computed for categorical variable. Numerical variables were presented as mean ± standard deviation. ROC curve was computed to determine the predictive ability of BIG score through computation of area under the curve. Youden index was also computed to determine optial threshold value of the BIG score. Univariate binary logistic regression was run to determine association of BIG score with in-hospital mortality and variables with p<0.25 in unvariate analysis were entered as predictors on final regression model. P-values less than or equal to 0.05 was considered statistically significant.

RESULT

A total of 169 patients were studied with mean age of 27 ± 7 years. Above half of the patients were males (69.2%) and presented with blunt trauma (76.3%). More than half of the patients did not underwent intubation in emergency room (57.4%) Table **1**.

Table 1. Summary of Participants' Sociodemographic and Presenting Features.

Variables	Groups	Frequency	Percentage
Age	≤30 years	99	58.6
	>30 years	70	41.4
Gender	Male	117	69.2
	Female	52	30.2
Comorbidity	Diabetes	21	12.4
	Hypertension	33	19.5
	Ischemic Heart Disease	20	11.8
Trauma type	Blunt	129	76.3
	Penetrating	40	23.7
Intubated in ER	Yes	72	42.6
	No	97	57.4

The median time to ER arrival after incident was 60 minutes depicting majority of patients presented to ER within early window of critical care. Median heart rate was 98 beats/min. A respiratory rate of 18 breaths/min showing a relative stable breathing status among patients. Medain score for GCS was 8 reflecting majority of patients presented to ER in unconscious state. Median prothrombin time and INR was 11.3 minutes and 1.2 respectively. Median base deficit was 9. Median value for BIG score was 19 with range of 16.3 to 25.3 indicating serious injury among patients (Table **2**).

Table 2. Distribution of Patients' Vital and Laboratory Parameters upon their Arrival to the Emergency Room.

Parameters	Median	Q3 - Q1	Min-Max
Duration within which patient bought in ER (min)	60	55-100	45-120
Heart rate (beats/min)	98	80-121	56-131
Respiratory rate (breaths/min)	18	18-20	14-20
GCS score	8	7-9	3-10
Prothrombin time (min)	11.3	10.8-13	10.2-13.2
International normalized ratio	1.2	1.1-1.3	1.1-1.3
Base deficit	9	8-10	6-10
BIG score	19	18.3-20	16.3-25.3

In-hospital mortality was seen in 75% of patients. Median hospital stay was 6 (IQR= 4-10) days with range of 4-14 days. Table **3** displays comparison of patients' features among patients who discharged alive and those who experienced in-hospital mortalities. GCS score on ER presentation (p<0.001) was significantly lower and BIG score (p<0.001) was significantly higher among dead patients as compared to survivors. Frequency of

Table 3. Comparison of Patients' Features among those with and without in Hospital Mortality.

Variables	Groups	In Hospital Mortality		OR (95% CI)	P-Value
		Yes	No		
Age	≤30 years	73(57.9)	26(60.5)	0.90 (0.4-1.8)	0.771
	>30 years	53(42.1)	17(39.5)	Reference category	
Gender	Male	99(78.6)	18(41.9)	5.1 (2.4-10.7)	<0.001*
	Female	27(21.4)	25(58.1)	Reference category	
Comorbidity	Diabetes	20(15.9)	1(2.3)	7.9(1.1-60.9)	*0.047
	Hypertension	30(23.8)	3(7)	4.2(1.2-14.4)	*0.024
	Ischemic Heart Disease	19(15.1)	1(2.3)	7.4(0.9-57.4)	0.054
Trauma type	Blunt	105(83.3)	24(55.8)	3.9(1.8-8.4)	<0.001*
	Penetrating	21(16.7)	19(44.2)	Reference	
Intubated in ER	Yes	71(56.3)	1(2.3)	54.2(7.2-406.3)	<0.001*
	No	55(43.7)	42(97.7)	Reference category	
Duration within which patient bought in ER (min)	-	60(45)	60(45)	0.9(0.9-1.1)	0.382
Heart rate (beats/min)	-	98(41)	98(23)	0.9(0.9-1.2)	0.057
Respiratory rate (breaths/min)	-	18(2)	18(0)	0.9(0.7-1.3)	0.975
BIG Score	-	19.75(1.6)	17.25(1.2)	4.5(2.7-7.2)	<0.001*

*p<0.05.

Diabetes (p=0.020), Hypertension (p=0.016), Ischemic heart disease (p=0.025), intubation upon ER arrival (p<0.001) and blunt trauma was significantly higher among those who had in-hospitalmortality than patients who were discharged safely.

Fig. (**1**) displays ROC curve for BIG score. AUC was 0.877 (95% CI: 0.82-.93, p<0.001). Youden index is 18.5.

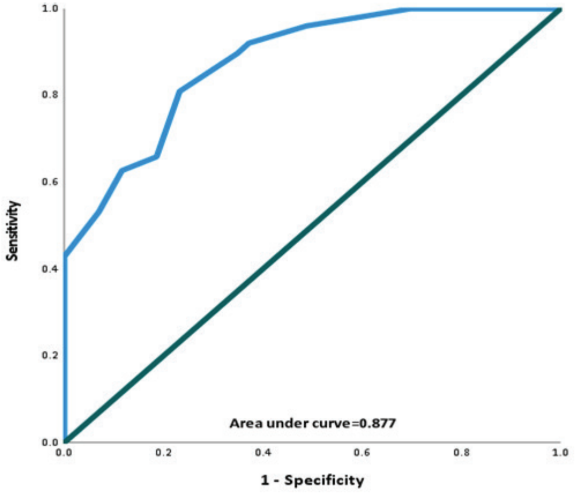

Fig. (1). ROC Curve of BIG Score for Predicting in-Hospital Mortality.

Table **4** displays multivariable association of BIG score with in-hospital mortality. Increasing BIG score was found to be significantly associated with increased risk of in-hospital mortality even after adjusting effects of other covariates.

Table 4. Multivariable association of BIG Score with in-Hospital Mortality.

Variables	Groups	Adjusted OR (95% CI)	p-value
Gender	Male	5.4 (0.7-12.4)	0.541
	Female	Reference category	-
Comorbid	Diabetes	4.2 (0.1-18.8)	0.896
	Hypertension	0.3 (0.1-8.2)	0.423
	Ischemic Heart Disease	9.4(0.3-14.6)	0.468
Trauma type	Blunt	2.1 (0.1-5.4)	0.148
	Penetrating	Reference category	
Intubated in ER	Yes	6.8 (1.4-11.7)	*0.030
	No	-	-
Heart rate (beats/min)	-	(0.9-1.1)	0.969
BIG score	-	4.3 (1.9-9.3)	*<0.001

*p<0.05.

DISCUSSION

This research was performed in order to assess the BIG score predictive ability of mortality in a cohort of individuals with multiple traumas. The ability to accurately and promptly predict mortality risk might significantly impact triage decisions, affect treatment options, or classify patients for a potential transfer of care as entry criteria for a clinical trial in order to engage the proper at-risk intervention. Findings indicated that age was associated with death while hospitalized with regard to trauma patients, with younger patients (age at median = 28) having greater mortality than survivors (age at median = 30). The statistically significant difference (p-value 0.009) cast doubt that younger patients may be at a higher risk for severe trauma leading to death (reason what could be cause?). Furthermore, the study depicts gender representation determined that males were more likely to experience in-hospital mortality compared to females (78.6% male mortality, vs. 21.4% female mortality rate), with a statistically significant value p-value of less than 0.001. Intubation status was also a key indicator of in-hospital mortality in the study, as patients who were intubated had a significantly higher mortality (56.3%) via intubation than non-intubated patients (43.7%) – with a p-value less than 0.001. Based on the findings of research, it has found that pre-existing conditions; Diabetes mellitus, Hypertension, and Ischemic heart disease, were all heavily correlated with higher rates of death inside the hospital.

This research reveals that trauma type had a significant impact on mortality, with blunt trauma being the majority in the mortality group (83.3%) compared to penetrating trauma (16.7%). The mortality group had a significantly different BIG score, with a median score of 19.75, compared to the survival group, whose median BIG score was 17.25 (p < 0.001). It can be inferred from the results that higher BIG scores correlate with increased mortality, which is an important aspect of the BIG score when considering predicting outcomes in trauma patients. The association of BIG score was remain significant even after controlling the effects of other covariates. The BIG score analysis section presented data for cutoff points. The cutoff point per BIG score analysis in our study was 18.50. The Youden Index significantly improved at 18.50 with sensitivity (81.0%) and specificity (76.7%); thus the Youden Index was 0.577 at the cutoff point. As such, the BIG score is an appropriate tool for predicting in-hospital mortality with higher scores being associated with increased risk.

Various alike investigations have established that the BIG score is better than other traumatic scores in correctly classifying pediatric traumatic extent and prognosis. Due to the little research performed, its value in adult trauma is unknown [26-28].

A study tested the BIG score to envisage death in individuals who had sustained multiple trauma injuries. The BIG score was found to be a determinant of death in adult population who sustained multiple traumas with a threshold greater than 10.65 depicting a sensitivity and specificity of 67.7% and 86.5% respectively. Lastly, a BIG score of 15 represented an approximate fifty percent predicted risk of death, and a BIG score of 20 represented an eighty percent predicted risk of death [1]. The study also illustrated that the soring tool can forecast adult in-hospital mortality after both superficial and deep penetration injuries, with AUC of 0.847 [1].

Brockamp *et al.* first assessed BIG score in adult populace and analyzed the tool showed good predictive power [29]. Park *et al.* even discovered a higher predictive value in adult trauma. This was demonstrated in a study that focused on 5,605 adult patients who had sustained injuries from a traumatic event [5]. Compared with other scoring systems, the author of a previous study found the BIG score to have a greater PPP and NPV than scoring systems [1]. This means that the BIG score is useful for detecting patients at high risk of death, but also useful to correctly predict survivorship conditions.

The BIG score has less emphasis on anatomical and hemodynamic measures but is more reliant on the INR, GCS and BD, which simplifies assessment. These parameters may be easily evaluated in the emergency room and do not require complicated calculations or other information. It is crucial to validate trauma mortality scores in trauma populations with serious injuries to ensure accurate mortality evaluation. This was further supported by other studies demonstrating that the BIG score was death predictor in the adult trauma populace. Furthermore, the predictive ability of BIG scoring tool with respect to death was much better [5]. Hoke *et al.* conducted a different study that compared the predictive ability of BIG score to mortality. The final AUROC value was 0.87 (0.84–0.90) [24].

LIMITATIONS

The research also had some limitations. Because the study was conducted in one location and has small sample size, it is plausible that our findings cannot be generalized to a larger population. In addition, the cases that were excluded for lack of data or other reasons may have introduced bias in the sample of patient selection.

CONCLUSION

The present study demonstrated the good predictive value of BIG score in classifying the high risk patients for in-hospital among multiple trauma patients presenting to emergency room.

ABBREVIATIONS

AUC: Area under the Curve.

BIG: Base Deficit, International Normalized Ratio, Glasgow Coma Scale.

BD: Base Deficit.

GCS: Glasgow Coma Scale.

INR: International Normalized Ratio.

PELOD: Pediatric Logistic Organ Dysfunction Score.

PIM 2: Pediatric Index of Mortality 2.

PRISM III: Pediatric Risk of Mortality III Score.

AUTHORS' CONTRIBUTION

Shafaq Feroz: Conceptualization, Study design, Methodology, Data analysis and interpretation, Writing draft, Final approval, final proof to be published.

Shaesta Tabassum: Study design, Methodology, Data analysis and interpretation, Critical review and revision the manuscript, Final approval, final proof to be published.

ACKNOWLEDGEMENTS

Declared none.

DECLARATIONS

Data Availability

Data will be available from the corresponding author upon a reasonable request.

Ethical Approval

The study was commenced with the approval of Institutional Review Board of Liaquat National Hospital (App#0736-2022-LNH-ERC).

Consent to Participate

All the study participants were enlisted with their written informed consent.

Consent for Publication

All authors give consent for the publication of this work.

Conflict of Interest

Declared None.

Competing Interest/Funding

Declared None.

Use of AI-Assisted Technologies

The authors declare that no generative artificial intelligence (AI) or AI-assisted technologies were utilized in the writing of this manuscript, in the creation of images/graphics/tables/captions, or in any other aspect of its preparation.

REFERENCES

[1] Az A, Söğüt Ö, Özçömlekçi M, Doğan Y, Akdemir T. Predicting mortality in adults hospitalized with multiple trauma: Can the BIG score estimate risk?. Ulus Travma Acil Cerrahi Derg 2025; 31(1): 66-74.

[2] GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: A systematic analysis for the global burden of disease study 2019. Lancet 2020; 396: 1204-22. Erratum in: Lancet 2024; 396: 1562.

[3] Demetriades D, Kimbrell B, Salim A, Velmahos G, Rhee P, Preston C, *et al.* Trauma deaths in a mature urban trauma system: Is "trimodal" distribution a valid concept? J Am Coll Surg 2005; 201: 343-8.

[4] Nasrullah M, Xiang H. The epidemic of injuries in Pakistan--a neglected problem. J Pak Med Assoc 2008; 58(8): 420.

[5] Park S, Wang J, Yeom SR, Park SW, Cho SJ, Yang WT, *et al.* Usefulness of the BIG score in predicting massive transfusion and in-hospital death in adult trauma patients. Hindawi Emer Med Int 2023; 2023:5162050.

[6] Colnaric JM, Sibai RHE, Bachir RH, Sayed MJE. Injury severity score as a predictor of mortality in adult trauma patients by injury mechanism types in the United States: A retrospective observational study. Medic (Baltimore) 2022; 101(28): e29614.

[7] Az A, Orhan C. Which scoring system is better in predicting mortality in multiple trauma patients: Revised trauma score or Glasgow coma scale. Glob Emerg Crit Care 2024; 3(1): 1-6.

[8] World Health Organization. The global burden of disease: 2004 update 2008. Geneva: WHO Press 2008; Available from: https://iris.who.int/bitstream/handle/10665/43942/9789241563710_eng.pdf?sequence=1

[9] World Health Organization. Injuries and violence: The facts. 2010; Available from: https: //www.who.int/news-room/fact-sheets/detail/injuries-and-violence

[10] Demetriades D, Murray J, Charalambides K, Alo K, Velmahos G, Rhee P, *et al.* Trauma fatalities: Time and location of hospital deaths. J Am Coll Surg 2004; 198: 20-6.

[11] Mock C, Joshipura M, Arreola-Risa C, Quansah R. An estimate of the number of lives that could be saved through improvements in trauma care globally. World J Surg 2012; 36: 959-63.

[12] Brockamp T, Maegele M, Gaarder C, Goslings JC, Cohen MJ, Lefering R, *et al.* Comparison of the predictive performance of the BIG, TRISS, and PS09 score in anadult trauma population derived from multiple international trauma registries. Crit Care 2013; 17(4): 1-9.

[13] Breugel JM, Niemeyer MJ, Houwert RM, Groenwold RH, Leenen LP, Wessem KJ. Global changes in mortality rates in polytrauma patients admitted to the ICU—a systematic review. World J Emerg Surg 2020; 15(1): 1-3.

[14] Franklin RC, Peden AE, Hamilton EB, Bisignano C, Castle CD, DingelsZV, *et al.* The burden of unintentional drowning: Global, regional and national estimates of mortality from the Global Burden of Disease 2017 Study. Inj Prevent 2020; 26(Supp 1): i83-95.

[15] Bolstridge J, O'Neil ER, Aden JK, Muisyo T, Spinella PC, Borgman MA. Use of the BIG score to predict mortality in pediatric trauma. Am J Emerg Med 2021; 45: 472-5.

[16] Höke MH, Usul E, Özkan S. Comparison of trauma severity scores (ISS, NISS, RTS, BIG Score, and TRISS) in multiple trauma patients. J Trauma Nurs 2021; 28: 100-6.

[17] Borgman MA, Maegele M, Wade CE, Blackbourne LH, Spinella PC. Pediatric trauma BIG score: Predicting mortality in children after military and civilian trauma. Pediatrics 2011; 127: e892. 18.

[18] Brockamp T, Maegele M, Gaarder C, Goslings JC, Cohen MJ, Lefering R, *et al.* Comparison of the predictive performance of the BIG, TRISS, and PS09 score in an adult trauma population derived from multiple international trauma registries. Crit Care 2013; 17: R134.

[19] Davis AL,Wales PW, Malik T, Stephens D, Razik F, Schuh S. The BIG score and prediction of mortality in pediatric blunt trauma. J Pediatr 2015: 167(3): 593-8.e1.

[20] El-Gamasy MA, Elezz AA, Basuni AS, Elrazek ME. Pediatric trauma BIG score: Predicting mortality in polytraumatized pediatric populations. Indian J Crit Care Med 2016; 20: 640-6.

[21] Grandjean-Blanchet C, Emeriaud G, Beaudin M, Gravel J. Retrospective evaluation of the BIG score to predict mortality in pediatric blunt trauma. CJEM 2018; 20: 592-9.

[22] Muisyo T, Bernardo EO, Camazine M, Colvin R, Thomas KA, Borgman MA, *et al.* Mortality prediction in pediatric trauma. J Pediatr Surg 2019; 54: 1613-6.

[23] Brockamp T, Maegele M, Gaarder C. Comparison of the predictive performance of the BIG, TRISS, and PS09 score in an adult trauma population derived from multiple international trauma registries. Criti Care 2013; 17(4): R134.

[24] Hoke MH, Usul E, Ozkan S. Comparison of trauma severity scores (ISS, NISS, RTS, BIG score, and TRISS) in multiple trauma patients. J Traum Nurs 2021; 28(2): 100-06.

[25] El-Gamasy MA, Elezz AA, Basuni AS, Elrazek ME. Pediatric trauma BIG score: Predicting mortality in polytraumatized pediatric patients. Indian J Crit Care Med 2016; 20(11): 640-6.

[26] Borgman MA, Maegele M, Wade CE, Blackbourne LH, Spinella PC. Pediatric trauma BIG score: Predicting mortality in children after military and civilian trauma. Pediatrics 2011; 127: e892-7.

[27] Bolstridge J, O'Neil ER, Aden JK, Muisyo T, Spinella PC, Borgman MA. Use of the BIG score to predict mortality in pediatric trauma. Am J Emerg Med 2021; 45: 472-5.

[28] El-Gamasy MA, Elezz AA, Basuni AS, Elrazek ME. Pediatric trauma BIG score: Predicting mortality in polytraumatized pediatric patients. Indian J Crit Care Med 2016; 20: 640-6.

[29] Brockamp T, Maegele M, Gaarder C, Goslings JC, Cohen MJ, Lefering R, *et al.* Comparison of the predictive performance of the BIG, TRISS, and PS09 score in an adult trauma population derived from multiple international trauma registries. Crit Care 2013; 17: R134.

Received: July 03, 2025 Revised: September 04, 2025 Accepted: September 07, 2025