
ORIGINAL ARTICLE**Combined utility of injury severity score and eFAST in predicting hospital stay and intervention requirement among trauma patients: A prospective observational study**

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Abstract

Background: Major trauma significantly contributes to worldwide lifetime disability, affecting developing countries. Tools like the Injury Severity Score (ISS) and Extended Focused Assessment with Sonography for Trauma (eFAST) are standard in emergency care for assessing injury severity and guiding treatment. **Aim and Objectives:** To evaluate the combined utility of ISS and eFAST in predicting the need for interventions and hospital stay duration in trauma patients. **Material and Methods:** A prospective observational study was conducted in our hospital, enrolling 188 adult trauma patients with an ISS > 10. Patients were recruited using a consecutive sampling technique, whereby all eligible patients presenting during the study period of 18 months were included. ISS was calculated using an online tool based on the Abbreviated Injury Scale (AIS) across six body regions. eFAST examinations were performed by experienced emergency physicians to identify internal injuries. Data analysis involved univariate and multivariate logistic regression to evaluate associations between ISS, eFAST findings, and clinically relevant outcomes. Prolonged hospitalization was defined as a hospital stay exceeding 10 days, while major intervention requirements were defined as the need for blood transfusion, operative intervention, interventional radiology procedures, chest tube insertion, or intensive care unit admission. Statistical significance was considered at a $p < 0.05$. **Results:** Higher ISS values correlated significantly with extended hospital stays and increased intervention needs in both univariate ($p = 0.029$ for hospital stay; $p = 0.003$ for intervention) and multivariate analyses ($p = 0.036$ for hospital stay; $p = 0.004$ for intervention). While eFAST alone did not independently predict outcomes, its combination with ISS enhanced predictive accuracy, achieving approximately 69–71% accuracy for both prolonged hospitalization and intervention needs. **Conclusion:** The ISS was a significant indicator of prolonged hospital admission and requirement for interventions. Although eFAST alone was not independently associated with these outcomes, incorporation of eFAST with ISS produced modest improvement in predictive performance. This combined approach may aid early risk stratification and resource allocation in trauma patients.

Keywords: Length of hospital stay, e-FAST, Injury Severity Score, Trauma ultrasound, Intervention requirement

Introduction

Major injuries and trauma are the root cause of disability and deaths globally [1]. Lower economic countries contribute to 90% of disability and deaths due to major trauma [2]. The use of standardized and validated trauma scoring in the emergency room helps in clinical decision as they are objective tools which can be scored rapidly. The Injury Severity Score (ISS) which was derived from the

Abbreviated Injury Score (AIS) is the commonly used anatomical scoring systems in trauma management. Baker and colleagues in 1974 introduced the ISS for standardizing and classifying injuries in trauma, since then ISS is widely recognized to assess and assist in triage decisions and resource allocation in emergency settings [3]. Research on various trauma scoring systems

highlighted that ISS consistently outperformed AIS in predicting outcomes such as morbidity, mortality and length of hospital stay, reinforcing its relevance in both research and clinical settings [4,5].

Nearly eighty percent of trauma contribute to blunt injuries with the majority of deaths secondary to hemorrhagic shock [6]. The Extended Focused Assessment with Sonography in Trauma (eFAST) is a point of care test to detect for hemoperitoneum, hemopericardium, haemothorax and pneumothorax. The role of eFAST as a quick screening tool to rule in pneumothorax, pericardial effusion, and intra-abdominal free fluid in the trauma setting is well established [7,8]. Moreover, the procedure's non-invasive nature, portability, and rapid execution time, typically 5-7 minutes make it particularly valuable in time-critical trauma scenarios [9]. The repeatability of eFAST allows for dynamic monitoring of injury progression [10].

ISS and eFAST are crucial tools in the rapid evaluation and triage of trauma patients. The ISS provides structured scoring system that yields an overall score for patients with polytrauma, allowing for assessing the severity and predicting mortality risk while e-FAST provides rapid diagnostic insights. The combination of ISS and eFAST helps emergency teams make rapid, objective decisions about patient disposition, whether to transfer to higher levels of care, and the need for immediate surgical intervention [11]. The integration of anatomical scoring systems with point-of-care ultrasonography is emerging as an advancement in modern trauma care. This combined approach leverages the predictive ability of the ISS with the real-time diagnostic capabilities of eFAST to give a more comprehensive and accurate trauma assessment framework [12].

The integration of anatomical scoring systems with point-of-care ultrasonography represents an evolving approach in trauma care. While the ISS provides an objective measure of injury burden, eFAST offers rapid bedside diagnostic information. Limited literature exists regarding the combined utility of these tools in predicting clinically relevant outcomes. The study was undertaken to assess the usefulness of combining the ISS and eFAST in predicting prolonged hospital length of stay in adult trauma patients; and to identify trauma patients requiring surgical intervention and/or intensive care management using the combined assessment of ISS and eFAST findings

Material and Methods

This prospective observational study was conducted at a tertiary care referral center with 1,250 inpatient beds, whose emergency department manages approximately 28,000 visits annually, of which trauma-related presentations account for nearly 30% of the caseload. The study protocol received approval from the institutional ethics committee (FMIEC/CCM/274/2022).

Sample size calculation was based on findings from Costa et al. (2010), which reported a positive e-FAST prevalence of 8% among trauma patients. Using the standard formula for estimating sample size from a single population proportion ($n = Z^2pq/E^2$), with a 95% confidence level ($Z = 1.96$), $p = 0.08$, $q = 0.92$, and an allowable margin of error of 4%, the calculated minimum sample size was 178 patients [13].

Written informed consent was obtained from every participant, or from a legally authorized representative in cases where the patient was unable to provide consent independently.

Adults aged 18 years or older who presented with a history of trauma and an ISS greater than 10 were eligible for inclusion. The trauma mechanisms considered were road traffic collisions and falls from height. Patients were excluded if they had isolated limb injuries, were pregnant at the time of injury, had sustained burns alongside their trauma, or declined to provide consent. Enrolment used a consecutive sampling strategy, capturing all eligible patients presenting between March 2022 and December 2023.

Every patient underwent primary survey management according to Advanced Trauma Life Support (ATLS) principles, following the sequential ABCDE framework: airway assessment with cervical spine immobilization, evaluation of breathing and ventilatory status, circulatory assessment with control of hemorrhage, a rapid disability check using the Glasgow Coma Scale (GCS) and pupillary examination, and finally full exposure of the patient with simultaneous measures to prevent hypothermia. Any immediately life-threatening finding identified at a given step was addressed before the survey proceeded further.

A trauma-trained assessor (Assessor 1), with three years of relevant clinical experience, calculated each patient's ISS using the validated online MDCalc tool and recorded the result directly into the study database [14]. This assessor remained blinded to both the e-FAST findings and the eventual clinical outcomes. ISS scoring evaluates six anatomical regions — head/neck, face, chest, abdomen and pelvic contents, extremities (including the pelvis), and external injuries — with each region graded on the AIS from 1 (minor) to 6 (unsurvivable/fatal) [15]. The ISS is derived by identifying the highest AIS grade within each of the six regions, selecting the three most severely

affected regions, squaring their respective AIS values, and summing these squares to yield a composite score ranging from 1 to 75. The MDCalc platform automates this calculation by allowing selection of the appropriate AIS severity code (0 = no injury through 6 = unsurvivable) from a dropdown menu for each body region, after which it computes the final score [16].

A second assessor, credentialed in point-of-care ultrasonography with over two years of formal training and institutional certification, performed all e-FAST examinations independently using a GE ultrasound system, following a fixed scanning sequence to limit inter-operator variability. All examinations were carried out with the patient supine. The right upper quadrant was assessed with a curvilinear probe placed in the mid-axillary line at the 10th–12th rib interspace to evaluate the hepatorenal (Morison's) pouch, the lower renal pole, and the diaphragm for evidence of pleural fluid. The left upper quadrant view was obtained with the probe in the posterior axillary line across the 8th–11th ribs, examining the splenorenal recess, subphrenic region, and left hemidiaphragm. A suprapubic transverse view assessed the bladder and the rectovesical pouch in males or the pouch of Douglas in females. Both the left upper quadrant and pelvic views were fanned through multiple planes to ensure thorough visualization. The subxiphoid window, angled toward the left shoulder, was used to evaluate for pericardial fluid and cardiac motion. Anterior chest wall views bilaterally, using a high-frequency linear probe at the 2nd–4th intercostal spaces, assessed for pneumothorax by checking for loss of lung sliding and presence of the stratosphere sign. A scan was classified as positive if it demonstrated free fluid in

the peritoneal, pericardial, or pleural cavities, or showed sonographic evidence of pneumothorax.

Study outcomes comprised duration of hospital stay and the need for any clinical intervention. Hospital stay was categorized as short (≤ 10 days) or prolonged (> 10 days), while intervention status was defined as "none" for patients managed with ward-based observation alone, versus "intervention present" for those requiring surgery or Intensive Care Unit (ICU) admission.

Statistical analysis

Although the calculated minimum requirement was 178 patients, data collection ultimately yielded a final of 188 patients. Associations between categorical variables were tested using the Chi-square test or Fisher's exact test as appropriate. Logistic regression (both univariate and multivariate) was used to estimate odds ratios and area-under-the-curve values, assessing the predictive performance of ISS and e-FAST individually and jointly. ISS was treated as a continuous variable, while e-FAST results were coded as a binary outcome (positive/negative). Consistent with institutional protocols for evaluating trauma care efficiency, length of stay was dichotomized as described above; patients who died during hospitalization were excluded from this particular analysis to avoid survival bias. Interventions were similarly coded in binary form — "0" for ward observation and "1" for major surgery or ICU admission. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) (IBM Corp.) software.

Results

The demographic variables, baseline vitals, patient and incident characteristics have been summarized in Table 1.

Use of regression models for use of eFAST and ISS on duration of stay in hospital

To identify factors predicting prolonged hospital stay, logistic regression modelling was applied using both ISS and e-FAST as candidate predictors. On univariate analysis, ISS emerged as a significant predictor of extended hospitalization (OR = 1.054, $p = 0.029$; AUC = 0.662, $p = 0.001$), while e-FAST status did not reach statistical significance ($p = 0.105$) (Table 2, Figure 1). Although e-FAST did not achieve significance in the univariable model, it was retained for inclusion in the multivariable analysis given its recognized role in trauma care and its potential to add clinically meaningful information alongside ISS during early patient assessment. When both variables were entered into the multivariable model, ISS persisted as the sole independent predictor of prolonged length of stay, whereas e-FAST failed to demonstrate independent predictive value. The combined model (ISS plus e-FAST) achieved reasonable discriminatory ability, with an AUC of 0.687, overall accuracy of 69.15%, sensitivity of 70.67%, and specificity of 63.16%. The positive predictive value was notably high, ranging from approximately 88% to 92%; however, the negative predictive value was comparatively poor (22–35%), reflecting a limited capacity of the model to correctly identify patients who would ultimately have a shorter hospital course. While the combined model's overall predictive performance was moderate, incorporating e-FAST added only marginal improvement to discrimination beyond what ISS alone provided. These results should therefore be interpreted with caution: ISS remains the primary driver of prolonged hospital stay in this cohort, with e-FAST functioning more as a clini-

cally informative adjunct than as an independent statistical predictor (Table 3).

Use of regression models for use of eFAST and ISS on interventions

The outcome variable, intervention was modelled using predictors eFAST and ISS. The univariate analysis demonstrated that ISS had a significant association with the intervention outcome (OR 1.152, $p = 0.003$) and strong discriminatory ability (AUC 0.7520, $p < 0.001$), as seen in Figure 2, whereas eFAST alone was not significant ($p = 0.373$). In the

multivariate model, including eFAST slightly enhanced predictive performance, achieving an AUC of 0.7539 ($p < 0.001$). Combining both predictors resulted in the highest accuracy (70.74%), with improved sensitivity (69.94%) and high positive predictive values (around 95%), but low negative predictive values (approximately 28%) (Tables 2 & 3). Overall, the model reliably identified intervention cases but struggled to accurately exclude non-intervention patients.

Table 1: Demographic variables, baseline vitals, patient and incident characteristics

Variable		Frequency
Age (years)	18 to 35 years	82
	36 to 50 years	55
	More than 50 years	51
Gender	Males	157
	Females	31
Month of accident	January to June	73
	July to December	115
Time duration taken to arrive to the emergency room	Less than 4 hours of accident	108
	More than 4 hours of accident	80
Time of accident	Morning – 6 am to 6 pm	158
	Night – 6 pm to 6 am	30
Mechanism of injury	Associated with a 2 wheeler vehicle	59
	Associated with a 4 wheeler vehicle	58
	Associated between 2 and 4 wheeler vehicle	30
	Fall from height	41

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Comorbidity	None	158
	Hypertension	13
	Diabetes Mellitus	7
	COPD	1
	Diabetes mellitus and hypertension	5
	Seizure disorder	4
Glasgow Coma Scale	8 and less	15
	9 and more	173
Injury severity score	Mean $\pm$ Standard deviation	20.79 $\pm$ 11.9
eFAST	Negative	162
	Fluid in thorax	11
	Free fluid in abdomen	10
	Pneumothorax	3
	Pneumothorax with fluid collection	2
Interventions done	Observation in ward	21
	Orthopaedics surgery	65
	Plastic surgery	23
	Neuro-observation in ICU	43
	Surgical ICU Observation	2
	General surgery	7
	Neurosurgery intervention	22
	Intercostal drain placement	4
	Interventional radiology	1
Length of stay in hospital	Less than 3 days	37
	4 – 10 days	79
	11 – 20 days	50
	More than 20 days	15
	Died in hospital	7

COPD – Chronic obstructive pulmonary disease; eFAST – Extended focused assessment with sonography for trauma; ICU – Intensive care unit

Table 2: Logistic regression model of predictor variable – eFAST and ISS on duration of stay in hospital and intervention

Outcome variable	Predictor variable	OR (95% CI)	<i>p</i>	AUC (95% CI)	<i>p</i>
Univariate Model					
DOS Hospital	eFAST	3.429 (0.773, 15.202)	0.105 (NS)	0.5537 (0.5072, 0.6002)	0.0441*
DOS Hospital	ISS	1.054 (1.005, 1.104)	0.029*	0.6618 (0.5578, 0.7659)	0.0010*
Multivariate Model					
DOS Hospital	eFAST	3.168 (0.707, 14.188)	0.132 (NS)	0.6913 (0.5947, 0.7879)	0.0005*
DOS Hospital	ISS	1.050 (1.003, 1.099)	0.036*		
Univariate Model					
Intervention	eFAST	1.986 (0.439, 8.974)	0.373 (NS)	0.5336 (0.4729, 0.5944)	0.1837 (NS)
Intervention	ISS	1.152 (1.049, 1.282)	0.003*	0.7520 (0.6502, 0.8538)	<.001*
Multivariate Model					
Intervention	eFAST	1.481 (0.313, 7.017)	0.620 (NS)	0.7539 (0.6498, 0.8579)	<.001*
Intervention	ISS	1.148 (1.045, 1.261)	0.004*		

DOS – Duration of stay in hospital; ISS – Injury severity score; eFAST – Extended focused assessment with sonography for trauma; OR – odd ratio; CI – confidence interval; NS- Not significant; *significant at $p < 0.05$

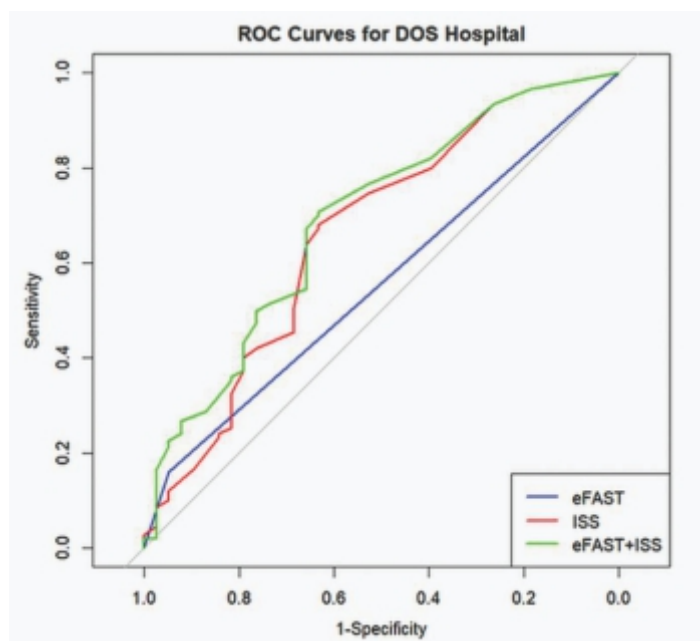


Figure 1: Receiver-operating characteristic curve – duration of stay in hospital

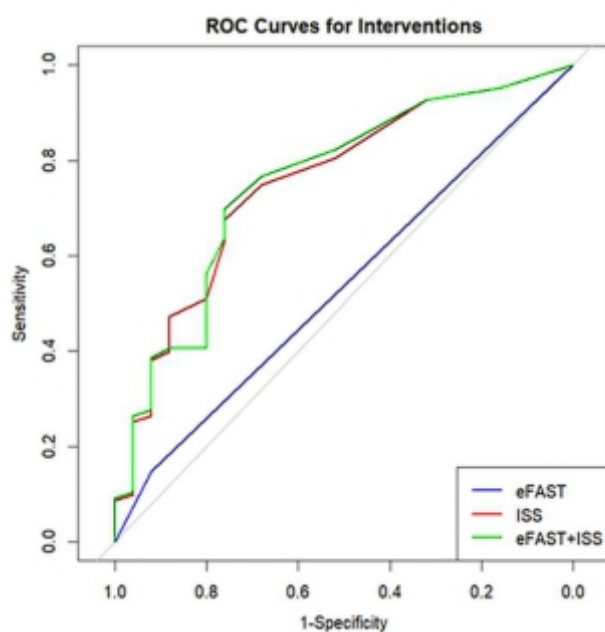


Figure 2: Receiver-operating characteristic curve – interventions

Table 3: Utility of outcome:

Duration of stay in hospital	eFAST	ISS	eFAST + ISS
Accuracy	0.3192	0.6702	0.6915
Sensitivity	0.1600	0.6800	0.7067
Specificity	0.9473	0.6316	0.6316
Positive predictive value	0.9231	0.8793	0.8833
Negative predictive value	0.2222	0.3333	0.3529
Intervention			
Accuracy	0.2500	0.6862	0.7074
Sensitivity	0.1472	0.6748	0.6994
Specificity	0.9200	0.7600	0.7600
Positive predictive value	0.9231	0.9483	0.9500
Negative predictive value	0.1420	0.2639	0.2794

eFAST – Extended focused assessment with sonography for trauma; *ISS* – Injury severity score

Patients who died in the hospital

Out of 188 patients, we encountered 7 deaths during the stay in hospital, 2 of them were young adults and 4 were elderly patients, mechanism of injury included 4 victims of car versus bike, one fall from height, 2 bike accidents. GCS score ranged from 3 to 15 and ISS from 17 to 45. Vital parameters of HR and BP were normal in 4 patients. Six out of 7 victims had severe traumatic brain injury, 1 patient had grade 5 liver laceration. Length of stay in hospital varied from 1 day to maximum of 44 days. Out of the 7 patients, 3 had a positive eFAST findings.

Discussion

Patient demographics and injury characteristics

The study was dominated by younger male patients, most commonly injured through motor vehicle collisions or falls from height — a pattern consistent with the population typically most exposed to high-energy trauma mechanisms. This mirrors prior

literature linking the elevated trauma burden in young men to greater occupational exposure and risk-taking tendencies, such as unsafe driving and inconsistent use of protective equipment like helmets and seatbelts [17,18]. The predominance of injuries occurring during daytime hours, alongside early arrival at the hospital, likely reflects heavier traffic volumes during working hours combined with better availability of emergency medical services — a pattern also noted by Antony *et al.* (2021) [19]. Falls from height in this study were largely occupational in nature, particularly involving construction work or climbing trees during arecanut and coconut harvesting, aligning with observations made by Turgut *et al.* (2018) [20]. Together, these demographic and mechanistic patterns underscore the importance of targeted prevention efforts addressing both road safety and occupational risk.

Physiological parameters and clinical status

The majority of patients had stable physiological parameters on presentation, likely a reflection of prompt post-injury arrival combined with the relatively young age of the study and correspondingly preserved physiological reserve. As a result, neither baseline vital signs, GCS score, nor comorbid conditions showed an association with prolonged hospital stay or need for intervention. This differs from the work of Sarang *et al.* (2021), who found that baseline neurological status and comorbidities were linked to outcomes [21]; this discrepancy may be attributable to differences in the study populations, since that cohort contained a substantially higher proportion of elderly patients with pre-existing disease. The association identified here between injury mechanism and length of stay is physiologically sensible, since higher-energy mechanisms tend to produce more complex injury patterns requiring more prolonged treatment — a pattern echoed in the work of Kashkooe *et al.* (2020) [22].

Role of ISS and e-FAST in predicting outcomes

ISS emerged as a consistent predictor of both prolonged hospitalization and need for intervention in this study, reinforcing its utility as an objective marker of overall injury burden. In contrast to e-FAST, which is designed for rapid detection of specific life-threatening thoracoabdominal injuries, ISS accounts for the cumulative severity of injury across several anatomical regions, giving it a broader reflection of the physiological toll of trauma and subsequent resource demands [23]. This likely accounts for its stronger predictive performance in the current analysis, a finding that aligns with earlier works where ISS was similarly identified as a dependable predictor of trauma outcomes [8,24–26].

While e-FAST continues to play an essential role in rapid bedside diagnosis and early decision-making in trauma care, its ability to independently predict prolonged hospital stay or intervention need was limited in this study. This is not entirely surprising, given that e-FAST functions primarily as a diagnostic rather than a prognostic tool, with its greatest value lying in the rapid identification of free intraperitoneal or thoracic fluid requiring urgent management. Additionally, because this study enrolled patients with a broad range of injury mechanisms rather than being restricted to thoracoabdominal trauma specifically, the prognostic value of e-FAST may have been diminished as a result. Even so, e-FAST was retained in the multivariable models given its well-recognized clinical importance during initial trauma assessment and its capacity to supplement the information provided by ISS. Although combining ISS and e-FAST yielded modest gains in certain performance metrics, e-FAST did not remain an independent predictor of either outcome once adjustment was performed. Accordingly, any incremental value from the combined model warrants cautious interpretation, with ISS continuing to serve as the dominant predictor of both prolonged stay and intervention requirement. Comparable findings regarding the value of pairing complementary clinical assessment tools have been described by Omar *et al.* (2021) and Kahloul *et al.* (2014) [12,27].

From a practical standpoint, these results support the continued reliance on ISS for early risk stratification, resource planning, and anticipating hospital resource utilization among trauma patients. e-FAST, meanwhile, remains a core element of the primary trauma survey owing to its speed and bedside feasibility in flagging injuries needing

urgent intervention — but its role should be viewed as complementing, rather than substituting for, established anatomical severity scores when the goal is predicting downstream clinical outcomes.

Limitations

Taken together, this study confirms ISS as a significant predictor of clinical outcomes, while e-FAST alone showed limited predictive value on its own. Although combining ISS with e-FAST produced a modest gain in predictive performance, e-FAST did not function as an independent predictor once other variables were accounted for, and was retained largely due to its recognized clinical role in early trauma assessment. Because the study population encompassed all trauma mechanisms rather than being limited to thoraco-abdominal injury, the true utility of e-FAST may have been underestimated relative to studies with a narrower focus. Several limitations should be acknowledged: the single-center design, the skew toward younger male patients, the inherent operator-dependence of e-FAST, the absence of a consistent gold-standard comparator (such as computed tomography) across all patients, lack of blinding in certain aspects of assessment, and the

absence of external validation — all of which may constrain how broadly these findings can be generalized. Future multicenter studies incorporating more diverse populations and formal external validation would help clarify the complementary role e-FAST may play alongside ISS in predicting trauma outcomes.

Conclusion

This study shows that the ISS is a significant predictor of both prolonged hospital stay and the need for intervention among trauma patients. While e-FAST on its own was not independently associated with these outcomes, its addition alongside ISS produced a modest improvement in overall predictive performance. These findings suggest e-FAST may be best regarded as a complementary bedside adjunct to anatomical injury scoring systems, supporting early risk stratification and resource allocation decisions in trauma care.

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References

1. Søreide K. Epidemiology of major trauma. *Br J Surg* 2009; 96(7):697-8.
2. Bath MF, Hobbs L, Kohler K, Kuhn I, Nabulyato W, Kwizera A, et al. Does the implementation of a trauma system affect injury-related morbidity and economic outcomes? A systematic review. *Emerg Med J* 2024; 41(7):409-14.
3. Baker SP, O'Neill B, Haddon W Jr, Long WB. The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. *J Trauma* 1974; 14(3):187-96.
4. Khavandegar A, Salamati P, Zafarghandi M, Rahimi-Movaghar V, Sharif Alhoseini M, Fakharian E, et al. Comparison of nine trauma scoring systems in prediction of inhospital outcomes of pediatric trauma patients: a multicenter study. *Sci Rep* 2024; 14(1):7646.
5. Garcia MF, Gomes RT, Pugliesi EC, Santos JPVD, Martino F, Gomes KHV, et al. Comparison between Injury Severity Score (ISS) and New Injury Severity Score (NISS) in predicting mortality of thoracic trauma in a tertiary hospital. *Rev Col Bras Cir* 2024; 51:e20243652.

6. Teixeira PG, Inaba K, Hadjizacharia P, Brown C, Salim A, Rhee P, et al. Preventable or potentially preventable mortality at a mature trauma center. *J Trauma* 2007; 63(6):1338-46.
7. Sodhi K, Khasne RW, Chanchalani G, Jagathkar G, Kola VR, Mishra M, et al. Practice Patterns and Management Protocols in Trauma across Indian Settings: A Nationwide Cross-sectional Survey. *Indian J Crit Care Med* 2023; 27(1):38-51.
8. Basnet S, Shrestha SK, Pradhan A, Shrestha R, Shrestha AP, Sharma G, et al. Diagnostic performance of the Extended Focused Assessment with Sonography for Trauma (EFAST) patients in a tertiary care hospital of Nepal. *Trauma Surg Acute Care Open* 2020; 5(1):e000438.
9. Adelin T, Kofi-Mensa S, Charles Frederic T, G E Wilfred, N D G Marie, A S Alexandre. Contribution of EFAST Ultrasound in the Management of Chest and Abdomen's Blunt Trauma in the City of Parakou, Benin. *Open J Anesthesiol* 10:388-407.
10. Bloom BA, Gibbons RC. Focused Assessment With Sonography for Trauma. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023 Jul 24.
11. Hamada SR, Delhay N, Kerever S, Harrois A, Duranteau J. Integrating eFAST in the initial management of stable trauma patients: the end of plain film radiography. *Ann Intensive Care* 2016; 6(1):62.
12. Omar A, Winkelmann M, Liodakis E, Clausen JD, Graulich T, Omar M, et al. Applicability of Anatomic and Physiologic Scoring Systems for the Prediction of Outcome in Polytraumatized Patients with Blunt Aortic Injuries. *Diagnostics (Basel)* 2021; 11(11):2156.
13. Costa G, Tierno SM, Tomassini F, Venturini L, Frezza B, Cancrini G, et al. The epidemiology and clinical evaluation of abdominal trauma. An analysis of a multidisciplinary trauma registry. *Ann Ital Chir* 2010; 81(2):95-102.
14. MDCalc. Injury Severity Score (ISS) [Internet]. MDCalc; [cited 2026 Aug 4]. Available from: <https://www.mdcalc.com/injury-severity-score-iss>
15. Peitzman AB, Rhodes M, Schwab CW, Yealy DM, Fabian TC. The Trauma Manual. Hagerstown, MD: Lippincott Williams & Wilkins; 2002. p. 29-30.
16. Cassagnol A, Marmin J, Cotte J, Cardinale M, Bordes J, Pauly V, et al. Correlation between field triage criteria and the injury severity score of trauma patients in a French inclusive regional trauma system. *Scand J Trauma Resusc Emerg Med* 2019; 27(1):71.
17. Harna B, Arya S, Bahl A. Epidemiology of Trauma Patients Admitted to a Trauma Center in New Delhi, India. *Indian J Crit Care Med* 2020; 24(12):1193-7.
18. Singaram M, G SV, Udhayakumar RK. Prevalence, pattern, etiology, and management of maxillofacial trauma in a developing country: a retrospective study. *J Korean Assoc Oral Maxillofac Surg* 2016; 42(4):174-81.
19. Antony J, Jayaseelan V, Olickal JJ, Alexis J, Sakthivel M. Time to reach health-care facility and hospital exit outcome among road traffic accident victims attending a tertiary care hospital, Puducherry. *J Educ Health Promot* 2021; 10:429.
20. Turgut K, Sarihan ME, Colak C, Güven T, Gür A, Gürbüz S. Falls from height: A retrospective analysis. *World J Emerg Med* 2018; 9(1):46-50.
21. Sarang B, Bhandarkar P, Raykar N, O'Reilly GM, Soni KD, Wärnberg MG, et al. Associations of On-arrival Vital Signs with 24-hour In-hospital Mortality in Adult Trauma Patients Admitted to Four Public University Hospitals in Urban India: A Prospective Multi-Centre Cohort Study. *Injury* 2021; 52(5):1158-63.
22. Kashkooe A, Yadollahi M, Pazhuheian F. What factors affect length of hospital stay among trauma patients? A single-center study, Southwestern Iran. *Chin J Traumatol* 2020; 23:176-80.
23. Sauter TC, Hoess S, Lehmann B, Exadaktylos AK, Haider DG. Detection of pneumothoraces in patients with multiple blunt trauma: use and limitations of eFAST. *Emerg Med J* 2017; 34:568-72.
24. Stewart N, MacConchie JG, Castillo R, Thomas PG, Cipolla J, Stawicki SP. Beyond Mortality: Does Trauma-related Injury Severity Score Predict Complications or Lengths of Stay Using a Large Administrative Dataset. *J Emerg Trauma Shock* 2021; 14(3):143-7.
25. Tamim H, Al Hazzouri AZ, Mahfoud Z, Atoui M, El-Chemaly S. The injury severity score or the new injury severity score for predicting mortality, intensive care unit admission and length of hospital stay: experience from a university hospital in a developing country. *Injury* 2008; 39(1):115-20.

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26. Crawford R, Kruger D, Moeng M. Shock index as a prognosticator for emergent surgical intervention and mortality in trauma patients in Johannesburg: A retrospective cohort study. *Ann Med Surg (Lond)* 2021; 69:102710.
27. Kahloul M, Bouida W, Boubaker H, Toumi S, Grissa MH, Jaafar A, et al. Value of anatomic and physiologic scoring systems in outcome prediction of trauma patients. *Eur J Emerg Med* 2014; 21(2):125-9.
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