APPLICATION OF THE KAMPALA TRAUMA SCORE VERSUS INJURY SEVERITY SCORE IN PREDICTING MORTALITY AMONG ROAD TRAFFIC ACCIDENT VICTIMS IN THE EMERGENCY DEPARTMENT

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Dr. Ranjan OR[1*], Sriharsha Jagadeesh[2]
[1*]Associate Professor, Department of Emergency Medicine, Adichunchanagiri Institute of Medical Sciences, B.G.Nagar, Bellur -571448.
[2]Associate Professor Department of Emergency Medicine, JSS Medical College Mysuru.
Email: [1*]ranjangowda03@gmail.com, [2]Sriharshaj@jssuni.edu.in
Corresponding Author: Dr. Ranjan OR
Associate Professor, Department of Emergency Medicine, Adichunchanagiri Institute of Medical Sciences, B.G.Nagar, Bellur -571448.
Email: ranjangowda03@gmail.com

ABSTRACT

Background: Road traffic accidents are a major cause of trauma-related morbidity and mortality. Early identification of patients at risk of death is essential in emergency departments to guide triage, resuscitation, referral, and definitive care. The Kampala Trauma Score (KTS) is a simple clinical scoring system based on physiological and injury-related parameters, whereas the Injury Severity Score (ISS) is an anatomical score based on injury severity across body regions.

Aim: To compare the predictive performance of KTS and ISS for mortality among road traffic accident victims presenting to the emergency department during 2022–2023.

Materials and Methods: This retrospective observational study included road traffic accident victims managed in the emergency department from January 2022 to December 2023. Demographic data, road-user category, arrival time, physiological status, injury pattern, KTS, ISS, and mortality outcome were recorded. Predictive performance was assessed using receiver operating characteristic curve analysis, sensitivity, specificity, positive predictive value, negative predictive value, diagnostic accuracy, and multivariable logistic regression.

Results: A total of 356 patients were included, and mortality was recorded in 41 patients (11.5%). Non-survivors were older and more frequently had delayed arrival, hypotension, altered sensorium, ICU admission, surgical intervention, head and neck injury, chest injury, abdominal/pelvic injury, and polytrauma. KTS showed an area under the curve of 0.845, while ISS showed an area under the curve of 0.869. KTS demonstrated higher specificity and diagnostic accuracy, whereas ISS showed higher sensitivity.

Conclusion: Both KTS and ISS showed good mortality discrimination. KTS is useful for rapid bedside triage, while ISS remains valuable for anatomical severity assessment and trauma outcome reporting.

Keywords: Emergency Department, Injury Severity Score, Kampala Trauma Score, Mortality, Road Traffic Accident, Trauma Scoring.

INTRODUCTION

Road traffic accidents are a major public health problem and continue to contribute substantially to preventable trauma-related morbidity and mortality. The global burden of road traffic injury remains high, with approximately 1.19 million deaths occurring annually due to road traffic crashes. Young adults and vulnerable road users, including motorcyclists, pedestrians, and cyclists, are disproportionately affected [1]. In India, road traffic accidents continue to impose a major burden on emergency and trauma care systems, with national reports documenting a high number of accidents, injuries, and deaths each year [2].

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Emergency departments are often the first point of structured clinical care for road traffic accident victims. At presentation, patients may have unstable vital signs, altered sensorium, multiple injuries, hemorrhage, traumatic brain injury, chest trauma, abdominal injury, or fractures. Early recognition of injury severity is therefore essential for triage, resuscitation, surgical referral, intensive care planning, and inter-facility transfer. Standardized trauma scoring systems help clinicians stratify risk, compare outcomes, and evaluate trauma care quality [3].

The Injury Severity Score (ISS) is a widely used anatomical scoring system in trauma research and clinical audit. It is calculated using the Abbreviated Injury Scale scores of the three most severely injured body regions, which are squared and summed to provide a total severity score [4,5]. Although ISS is useful for anatomical classification and outcome comparison, it requires accurate injury documentation and coding. Therefore, it may not be immediately available during initial emergency assessment.

The Kampala Trauma Score (KTS) is a simpler clinical scoring system developed for trauma assessment, particularly in resource-limited settings. It includes easily obtainable variables such as age, systolic blood pressure, respiratory rate, neurological status, and number of serious injuries [6,7]. Because these parameters are available during early clinical evaluation, KTS may be suitable for rapid bedside triage before complete anatomical injury coding is possible.

Several studies have reported that KTS can predict mortality and may perform comparably with more complex trauma scoring systems [8-10]. Recent evidence has further supported the usefulness of KTS in emergency trauma settings, including road traffic crash populations [11-14]. However, the relative performance of KTS and ISS may vary according to case mix, injury pattern, prehospital delay, clinical documentation, and emergency care resources. Local comparison of these scoring systems is therefore important.

This study was conducted to compare KTS and ISS in predicting mortality among road traffic accident victims presenting to the emergency department during 2022–2023.

Aim and Objectives

Aim

To compare the Kampala Trauma Score and Injury Severity Score in predicting mortality among road traffic accident victims presenting to the emergency department.

Objectives

1. To describe the demographic and clinical profile of road traffic accident victims.
2. To assess the anatomical injury pattern among survivors and deaths.
3. To classify trauma severity using KTS and ISS.
4. To compare mortality across KTS and ISS severity categories.
5. To evaluate the predictive accuracy of KTS and ISS using ROC curve analysis.
6. To identify independent predictors of mortality among road traffic accident victims.

MATERIALS AND METHODS

Study Design

This was a retrospective observational study conducted among road traffic accident victims presenting to the emergency department during a two-year study period. The study was designed and reported according to the principles of observational clinical research reporting, with emphasis on transparent eligibility criteria, defined variables, outcome measurement, statistical analysis, and ethical approval [3].

Study Setting

The study was conducted in the emergency department of a tertiary-care hospital providing emergency trauma assessment, resuscitation, stabilization, admission, surgical referral, intensive care referral, and inter-facility transfer services for road traffic accident victims.

Study Period

The study included patients managed between January 2022 and December 2023.

Study Population

The study population consisted of all road traffic accident victims presenting to the emergency department during the study period. Patients were evaluated from emergency department records, trauma registers, admission records, and mortality records.

Sample Size and Sampling Technique

A census sampling method was used. All eligible road traffic accident victims during the study period were screened. A total of 428 records were reviewed, and 356 patients fulfilled the eligibility criteria and were included in the final analysis. No separate sample-size calculation was performed because the study included all eligible records from the defined two-year period.

Eligibility Criteria

Patients were included in the study if they presented with road traffic accident-related trauma during the defined study period and had complete demographic, physiological, clinical, and anatomical injury details required for calculation of both the Kampala Trauma Score and Injury Severity Score. Only patients with clearly documented outcome status, either survived or died, were included in the final analysis. Patients were excluded if the trauma was unrelated to road traffic accidents, such as falls, assaults, burns, or occupational injuries. Records were also excluded if they had incomplete scoring data for KTS or ISS, duplicate documentation, unclear or unavailable outcome status, or if the patient was brought dead without emergency department clinical assessment.

Data Sources

Data were extracted from emergency department records, trauma registers, admission files, clinical notes, operative records, ICU records, discharge summaries, and mortality registers. A structured data extraction sheet was used to ensure uniformity of data collection.

Study Workflow

The methodological workflow of the study is presented in Figure 1. The figure summarizes the sequence followed during the study, beginning with screening of emergency department road traffic accident records, application of eligibility criteria, exclusion of incomplete or non-eligible records, extraction of demographic, clinical, physiological, and anatomical injury data, calculation of the Kampala Trauma Score and Injury Severity Score, classification of patient outcomes as survived or died, and final comparative statistical analysis. This workflow ensured a systematic and uniform approach to patient selection, trauma score

Assessment, mortality classification, and evaluation of the predictive performance of both scoring systems.

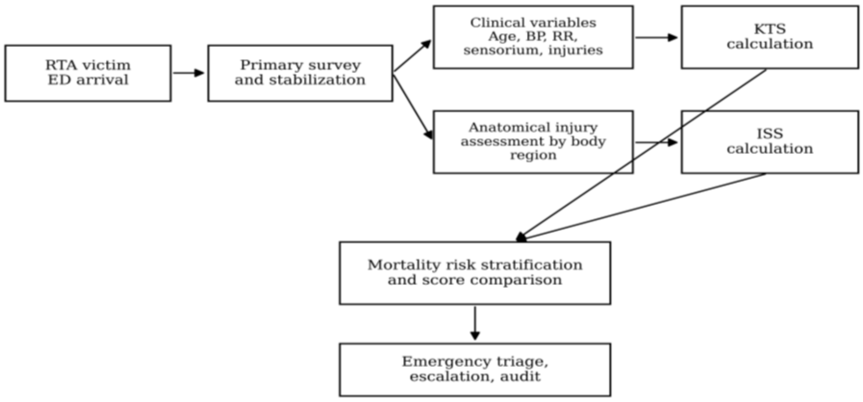

Figure 1: Study Workflow for KTS and ISS-Based Mortality Prediction in Road Traffic Trauma

Study Variables

The study variables included demographic characteristics, clinical presentation details, injury-related parameters, trauma severity scores, and outcome status. Demographic variables included age and sex. Road traffic-related variables included road-user category and the time interval from accident occurrence to emergency department arrival. Clinical variables recorded at presentation included systolic blood pressure and neurological status. Treatment-related variables included ICU admission and the requirement of surgical intervention. Injury-related variables included the anatomical region involved and the presence or absence of polytrauma. Trauma severity was assessed using the Kampala Trauma Score and Injury Severity Score. The primary outcome variable was mortality status, recorded as survived or died.

Operational Definitions

Road traffic accident victim: A patient sustaining trauma as a rider, passenger, pedestrian, cyclist, car occupant, heavy vehicle occupant, or other road user involved in a road traffic accident.

Survivor: A patient who remained alive during the recorded emergency department or hospital outcome period.

Death: A patient with documented mortality following road traffic accident-related trauma during the recorded emergency department or hospital outcome period.

Delayed arrival: Arrival at the emergency department after 6 hours from the time of accident.

Hypotension: Systolic blood pressure below 90 mmHg at presentation.

Altered sensorium: Reduced level of consciousness documented clinically or by Glasgow Coma Scale/AVPU assessment at presentation.

Polytrauma: Injury involving multiple anatomical regions or multiple clinically significant injuries requiring emergency trauma evaluation.

Kampala Trauma Score Assessment

The Kampala Trauma Score (KTS) was calculated for each patient using five clinical parameters: age, systolic blood pressure, respiratory rate, neurological status, and number of serious injuries. The score was used as an early clinical measure of trauma severity, with lower KTS values indicating more severe injury and a higher risk of mortality [6–8]. Based on the calculated KTS values, patients were classified into three injury severity categories: mild injury for scores of 14–16, moderate injury for scores of 11–13, and severe injury for scores of 5–10.

Injury Severity Score Assessment

The Injury Severity Score was calculated using the highest Abbreviated Injury Scale score from each of the three most severely injured anatomical body regions. These three scores were squared and then summed to obtain the final ISS value [4,5]. A higher ISS indicated greater anatomical injury severity. For severity classification, patients were grouped into four categories: minor injury for ISS scores of 1–8, moderate injury for ISS scores of 9–15, severe injury for ISS scores of 16–24, and very severe injury for ISS scores of 25 or above.

Outcome Variable

The primary outcome variable was mortality among road traffic accident victims. Mortality was analyzed as a binary outcome: survived or died.

Missing Data Handling

Records with missing essential variables required for KTS or ISS calculation, duplicate records, or unclear mortality outcome were excluded before final analysis. The number of excluded records and reasons for exclusion were documented in the patient selection flow diagram.

Bias Control

Selection bias was minimized by screening all emergency department road traffic accident records during the two-year study period. Information bias was reduced by using predefined operational definitions and a structured data extraction format. Misclassification bias was minimized by applying uniform severity categories for KTS and ISS. Records with incomplete scoring data or unclear outcome status were excluded from the final analysis.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 26.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were expressed as frequency and percentage. Comparisons between survivors and deaths were performed using the chi-square test or Fisher's exact test for categorical variables and the independent sample t-test for continuous variables. Receiver operating characteristic curve analysis was used to assess the mortality-prediction performance of the Kampala Trauma Score and Injury Severity Score. Area under the curve, 95% confidence interval, sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy were calculated. Multivariable logistic regression was performed to identify independent predictors of mortality, and adjusted odds ratios with 95% confidence intervals were reported. A p-value less than 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted after institutional ethical approval. As this was a retrospective record-based study using anonymized patient data, waiver of informed consent was obtained according to institutional policy. Patient confidentiality was maintained throughout the study.

RESULTS

Patient Selection

A total of 428 emergency department records of road traffic accident victims were screened for eligibility. Of these, 72 records were excluded because of incomplete scoring data, non-road traffic trauma, duplicate documentation, or unclear outcome status. Therefore, 356 patients were included in the final analysis. Mortality was documented in 41 patients (11.5%), while 315 patients (88.5%) survived. The patient selection process is presented in Figure 2.

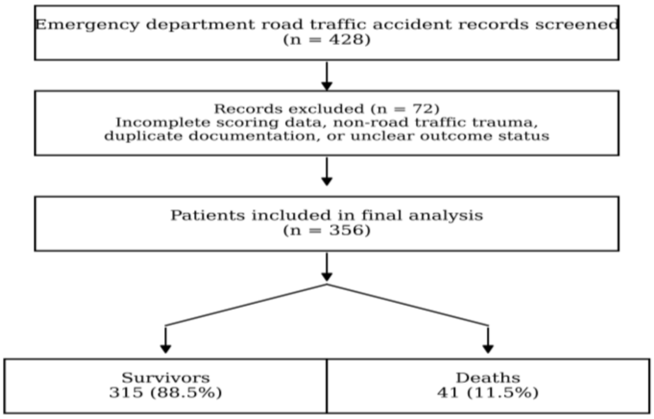

Figure 2: Patient Selection Flow Diagram for the 2022–2023 Emergency Department Road Traffic Accident Cohort

Baseline Demographic and Clinical Profile

The baseline demographic and clinical characteristics of the study population are shown in Table 1. The mean age of the total cohort was 35.2 ± 14.7 years. Patients who died were significantly older than survivors, with a mean age of 44.3 ± 17.5 years compared with 34.0 ± 13.9 years among survivors (p=0.001). Males constituted the majority of the cohort, accounting for 262 patients (73.6%). However, sex was not significantly associated with mortality (p=0.381).

Two-wheeler riders represented the largest road-user group, comprising 171 patients (48.0%), followed by pedestrians, car occupants, pillion passengers, and other road users. Road-user category did not show a statistically significant association with mortality in this cohort (p=0.463). In contrast, delayed arrival was significantly associated with death. Only 31.7% of deaths arrived within 1 hour, compared with 52.4% of survivors, while arrival after 6 hours was more frequent among deaths than survivors (39.0% vs. 16.5%; p=0.002).

Clinical indicators of physiological compromise were strongly associated with mortality. Systolic blood pressure below 90 mmHg was documented in 53.7% of deaths compared with 5.4% of survivors (p<0.001). Altered sensorium was present in 75.6% of deaths and 14.9% of survivors (p<0.001). ICU admission and requirement of surgical intervention were also significantly more frequent among patients who died, indicating that mortality was concentrated among patients with severe physiological and anatomical injury burden.

Table 1: Baseline Demographic and Clinical Profile of Road Traffic Accident Victims

Variable	Total (n=356)	Survivors (n=315)	Deaths (n=41)	p-value
Total patients	356 (100.0)	315 (88.5)	41 (11.5)	-
Age, years, mean ± SD	35.2 ± 14.7	34.0 ± 13.9	44.3 ± 17.5	0.001
Male sex	262 (73.6)	229 (72.7)	33 (80.5)	0.381
Female sex	94 (26.4)	86 (27.3)	8 (19.5)	
Two-wheeler rider	171 (48.0)	147 (46.7)	24 (58.5)	0.463
Pillion passenger	42 (11.8)	38 (12.1)	4 (9.8)	
Pedestrian	61 (17.1)	52 (16.5)	9 (22.0)	
Car occupant	44 (12.4)	42 (13.3)	2 (4.9)	
Other road users	38 (10.7)	36 (11.4)	2 (4.9)	
Arrival within 1 hour	178 (50.0)	165 (52.4)	13 (31.7)	0.002
Arrival between 1–6 hours	110 (30.9)	98 (31.1)	12 (29.3)	
Arrival after 6 hours	68 (19.1)	52 (16.5)	16 (39.0)	
Systolic BP <90 mmHg	39 (11.0)	17 (5.4)	22 (53.7)	<0.001
Altered sensorium	78 (21.9)	47 (14.9)	31 (75.6)	<0.001
ICU admission	92 (25.8)	59 (18.7)	33 (80.5)	<0.001
Surgery required	114 (32.0)	88 (27.9)	26 (63.4)	<0.001

BP: blood pressure; ICU: intensive care unit; SD: standard deviation.

Anatomical Injury Pattern and Trauma Score Distribution

The anatomical injury pattern and trauma score distribution are presented in Table 2. Extremity and pelvic girdle injuries were the most common injuries overall, affecting 170 patients (47.8%), followed by head and neck injuries in 138 patients (38.8%). External injuries were documented in 215 patients (60.4%), while polytrauma was present in 99 patients (27.8%).

Mortality was significantly more frequent among patients with head and neck injury, chest injury, abdomen or pelvis injury, and polytrauma. Head and neck injuries were present in 61.0% of deaths compared with 35.9% of survivors (p=0.003). Chest injury was observed in 41.5% of deaths and 14.3% of survivors (p<0.001), while abdomen or pelvis injury was observed in 34.1% of deaths and 12.1% of survivors (p<0.001). Polytrauma showed a strong association with mortality, being present in 70.7% of deaths compared with 22.2% of survivors (p<0.001). The mean KTS was significantly lower among deaths than survivors (8.8 ± 3.0 vs. 12.8 ± 2.4; p<0.001), indicating greater clinical severity among non-survivors. Conversely, the mean ISS was significantly higher among deaths than survivors (26.0 ± 10.7 vs. 11.8 ± 7.2; p<0.001), reflecting higher anatomical injury severity among patients who died.

Table 2: Anatomical Injury Pattern and Trauma Score Distribution.

Variable	Total (n=356)	Survivors (n=315)	Deaths (n=41)	p-value
Head and neck injury	138 (38.8)	113 (35.9)	25 (61.0)	0.003
Facial injury	53 (14.9)	50 (15.9)	3 (7.3)	0.225
Chest injury	62 (17.4)	45 (14.3)	17 (41.5)	<0.001
Abdomen/pelvis injury	52 (14.6)	38 (12.1)	14 (34.1)	<0.001
Extremity/pelvic girdle injury	170 (47.8)	153 (48.6)	17 (41.5)	0.490
External injury	215 (60.4)	203 (64.4)	12 (29.3)	<0.001
Polytrauma	99 (27.8)	70 (22.2)	29 (70.7)	<0.001
KTS, mean ± SD	12.4 ± 2.8	12.8 ± 2.4	8.8 ± 3.0	<0.001
ISS, mean ± SD	13.5 ± 8.9	11.8 ± 7.2	26.0 ± 10.7	<0.001

ISS: Injury Severity Score; KTS: Kampala Trauma Score; SD: standard deviation.

Mortality According to KTS and ISS Severity Categories

Mortality according to KTS and ISS severity categories is shown in Table 3 and Figure 3. A clear graded increase in mortality was observed across worsening severity groups in both scoring systems. Among patients classified using KTS, mortality was lowest in the mild injury group, with 1 death among 154 patients (0.6%). Mortality increased to 13 deaths among 138 patients (9.4%) in the moderate injury group and 27 deaths among 64 patients (42.2%) in the severe injury group ($p<0.001$).

A similar trend was observed for ISS categories. Mortality was 0.8% in the ISS minor injury group and 4.5% in the ISS moderate injury group. Mortality increased markedly to 19.1% in the ISS severe injury group and 58.3% in the ISS very severe injury group ($p<0.001$). These findings demonstrate that both KTS and ISS were able to stratify mortality risk across clinically meaningful injury severity categories.

Table 3: Mortality According To KTS and ISS Severity Categories.

Severity category	Total patients	Deaths, n (%)	Survivors, n (%)	p-value
KTS mild injury (14–16)	154	1 (0.6)	153 (99.4)	<0.001
KTS moderate injury (11–13)	138	13 (9.4)	125 (90.6)	
KTS severe injury (5–10)	64	27 (42.2)	37 (57.8)	
ISS minor injury (1–8)	120	1 (0.8)	119 (99.2)	<0.001
ISS moderate injury (9–15)	132	6 (4.5)	126 (95.5)	
ISS severe injury (16–24)	68	13 (19.1)	55 (80.9)	
ISS very severe injury (≥25)	36	21 (58.3)	15 (41.7)	

ISS: Injury Severity Score; KTS: Kampala Trauma Score

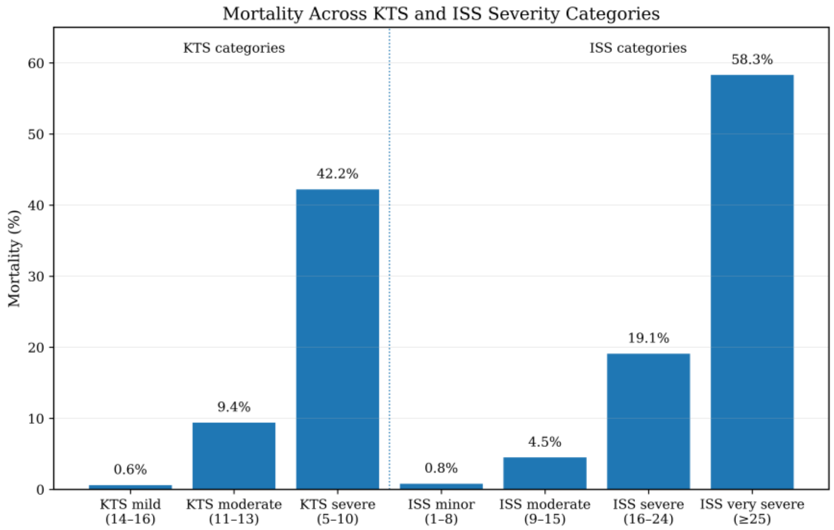

Figure 3: Mortality Percentage across Kampala Trauma Score and Injury Severity Score Severity Categories

Predictive Performance of KTS and ISS

Receiver operating characteristic curve analysis demonstrated clinically useful mortality discrimination for both scoring systems. The ROC curves comparing KTS and ISS are shown in Figure 4. KTS had an area under the curve of 0.845, while ISS had an area under the curve of 0.869. These findings indicate that both scoring systems had good ability to distinguish between survivors and non-survivors.

At the selected cut-off of KTS <11, the sensitivity was 65.9%, specificity was 88.3%, positive predictive value was 42.2%, negative predictive value was 95.2%, and diagnostic accuracy was 85.7%. At the selected cut-off of ISS >15, sensitivity was higher at 82.9%, while specificity was 77.8%. The positive predictive value for ISS was 32.7%, negative predictive value was 97.2%, and diagnostic accuracy was 78.4%. The diagnostic performance of both scores is summarized in Table 4.

Table 4: Predictive Accuracy and Adjusted Association of KTS and ISS with Mortality

Parameter	KTS	ISS
Cut-off used	KTS <11	ISS >15
AUC (95% CI)	0.845 (0.778–0.905)	0.869 (0.800–0.930)
Sensitivity	65.9%	82.9%
Specificity	88.3%	77.8%
Positive predictive value	42.2%	32.7%
Negative predictive value	95.2%	97.2%
Diagnostic accuracy	85.7%	78.4%

AUC: area under the curve; aOR: adjusted odds ratio; CI: confidence interval; ISS: Injury Severity Score; KTS: Kampala Trauma Score.

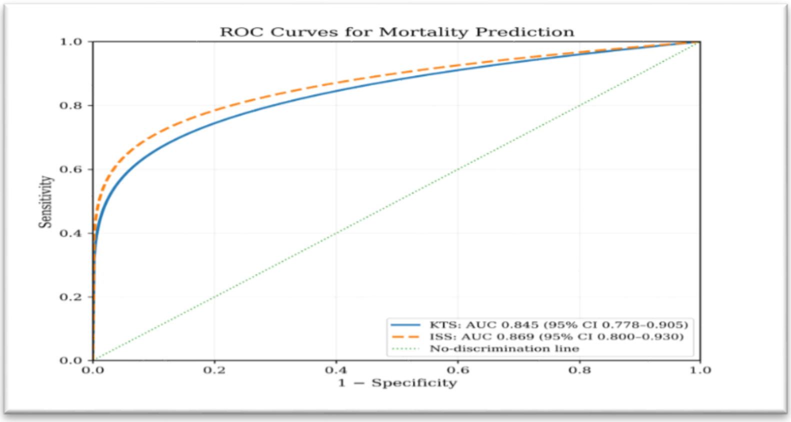

Figure 4: Receiver Operating Characteristic Curves Comparing Kts and Iss For Mortality Prediction

Adjusted Predictors of Mortality

In adjusted logistic regression, both trauma scores remained independently associated with mortality. KTS showed an inverse association with mortality, with each one-point increase in KTS associated with lower odds of death (aOR 0.68, 95% CI 0.57–0.81; p<0.001). ISS showed a positive association with mortality, with each one-point increase in ISS associated with higher odds of death (aOR 1.11, 95% CI 1.05–1.17; p<0.001).

Additional independent predictors of mortality included systolic blood pressure below 90 mmHg, altered sensorium, delayed arrival after 6 hours, and polytrauma. These findings indicate that mortality was influenced not only by trauma score classification but also by early physiological instability, neurological impairment, delayed access to emergency care, and multi-region injury.

Table 5: Multivariable Logistic Regression Analysis of Independent Predictors of Mortality

Predictor	Adjusted odds ratio	95% CI	p-value
KTS, per 1-point increase	0.68	0.57–0.81	<0.001
ISS, per 1-point increase	1.11	1.05–1.17	<0.001
Systolic BP <90 mmHg	4.71	2.21–10.03	<0.001
Altered sensorium	6.44	3.01–13.77	<0.001
Arrival after 6 hours	2.36	1.12–4.96	0.024
Polytrauma	3.08	1.47–6.44	0.003

BP: blood pressure; CI: confidence interval; ISS: Injury Severity Score; KTS: Kampala Trauma Score.

DISCUSSION

This study compared the Kampala Trauma Score and Injury Severity Score for mortality prediction among road traffic accident victims presenting to the emergency department during 2022–2023. Both scoring systems demonstrated good mortality discrimination. KTS showed higher specificity and overall diagnostic accuracy at the selected cut-off, while ISS showed slightly higher sensitivity and a marginally higher AUC. These findings suggest that KTS may be clinically useful for rapid early bedside triage, whereas ISS remains valuable for anatomical injury documentation, trauma audit, and outcome comparison.

The demographic findings showed that mortality was higher among older patients. This is clinically relevant because older trauma patients may have reduced physiological reserve, higher frequency of comorbidities, and poorer tolerance of hemorrhage, traumatic brain injury, and multi-system injury. Although males formed the majority of the cohort, sex was not significantly associated with mortality. This finding suggests that mortality in this cohort was more strongly related to injury severity, delayed presentation, and physiological compromise than to sex distribution.

Two-wheeler riders represented the largest road-user group. This is consistent with the road traffic injury pattern commonly observed in India, where two-wheelers form a major proportion of road traffic and riders are highly vulnerable to direct impact injuries. However, road-user category was not significantly associated with mortality in this study. This may indicate that once injury severity and physiological status are considered, mortality is determined more by the severity and pattern of trauma than by road-user category alone.

Delayed arrival was significantly associated with mortality. Patients arriving after 6 hours had a higher proportion of deaths compared with survivors. This finding emphasizes the importance of timely prehospital transport, early resuscitation, rapid imaging, hemorrhage control, and definitive trauma care. Delayed arrival may worsen outcomes by prolonging shock, hypoxia, intracranial hypertension, bleeding, or untreated organ injury. Similar findings have been reported in studies of road traffic accident victims, where delays in presentation and severity of injury were associated with early mortality [11].

Physiological instability was one of the strongest mortality indicators in this study. Systolic blood pressure below 90 mmHg and altered sensorium were significantly more common among deaths. Hypotension in trauma may reflect hemorrhagic shock, neurogenic shock, cardiac injury, or severe systemic compromise. Altered sensorium may indicate traumatic brain injury, hypoxia, shock, metabolic disturbance, or combined injury burden. These findings support the value of early physiological assessment in emergency trauma triage.

The anatomical injury profile showed that head and neck injury, chest injury, abdomen or pelvis injury, and polytrauma were significantly associated with mortality. Head injury is a major cause of death among road traffic accident victims, particularly among two-wheeler riders and pedestrians. Chest trauma may contribute to mortality through respiratory failure, hemothorax, pneumothorax, pulmonary contusion, or major vascular injury. Abdominal and pelvic injuries may cause occult hemorrhage and delayed shock. Polytrauma increases mortality risk because multiple organ systems are affected simultaneously.

The findings are consistent with the conceptual difference between KTS and ISS. KTS is a rapid clinical score that incorporates age, systolic blood pressure, respiratory rate, neurological status, and serious injury count [6-8]. These variables are generally available during the initial emergency department assessment and directly reflect acute physiological compromise. Therefore, KTS is useful in emergency settings where rapid triage decisions must be made before complete imaging, operative findings, or formal anatomical injury coding are available.

ISS, in contrast, is an anatomical injury severity score. It is calculated from the highest Abbreviated Injury Scale scores in the three most severely injured body regions, which are then squared and summed [4,5]. Because ISS depends on detailed anatomical injury documentation, it is highly useful for trauma registries, outcome comparison, research, and audit. However, it may be less practical during the first few minutes of emergency assessment when full anatomical evaluation is not yet complete.

The graded mortality pattern observed in Table 3 supports the clinical validity of both scoring systems. Mortality increased from 0.6% in the KTS mild category to 42.2% in the KTS severe category. Similarly, mortality increased from 0.8% in the ISS minor category to 58.3% in the ISS very severe category. This progressive rise in mortality indicates that both scoring systems can stratify patients into clinically meaningful risk groups.

The ROC findings shown in Figure 4 further support the usefulness of both scoring systems. KTS achieved an AUC of 0.845, while ISS achieved an AUC of 0.869. Although ISS showed slightly higher sensitivity and AUC, KTS demonstrated higher specificity and diagnostic accuracy at the selected cut-off. This difference has practical implications. A more sensitive score is useful for identifying high-risk patients who require early escalation, while a more specific score may reduce unnecessary over-triage. Therefore, the two scores may be complementary rather than mutually exclusive.

Recent evidence supports the continued relevance of KTS in trauma outcome prediction. Hakimzadeh et al. reported that KTS had mortality discrimination comparable to estimated ISS among multi-trauma patients, with AUC values of 0.923 for KTS and 0.910 for estimated ISS [12]. Damulira et al. compared New Trauma Score with KTS II among road traffic crash patients and found that mortality prediction varied according to score performance, sensitivity, and injury severity classification [13]. Kamabu et al. reported that 24-hour mortality among road traffic accident victims was associated with injury severity assessed by KTS II, supporting the role of clinical trauma scoring in early mortality prediction [11]. These findings emphasize the importance of validating trauma scoring systems within local emergency care settings.

The present study also supports a practical two-stage approach to trauma assessment. KTS can be calculated during the initial primary survey because it requires only bedside clinical information. Patients with low KTS values can be prioritized for immediate resuscitation, airway support, imaging, surgical consultation, blood product preparation, ICU referral, and transfer to higher trauma care when required. ISS can then be calculated after complete anatomical assessment to support final severity classification, documentation, trauma audit, and outcome research.

This study has important implications for emergency departments managing road traffic accident victims. In high-volume trauma settings, particularly where resources are limited, a simple score such as KTS may help standardize early decision-making. However, ISS should not be replaced, because it provides detailed anatomical injury severity assessment and remains useful for comparing outcomes across trauma populations. The combined use of KTS and ISS may provide a practical balance between early clinical triage and definitive anatomical severity assessment.

The strengths of this study include the two-year study period, inclusion of emergency department road traffic accident cases, comparison of a bedside clinical score with an anatomical severity score, and use of ROC analysis and multivariable logistic regression. These methods provide a structured assessment of both diagnostic performance and independent mortality association.

This study also has limitations. First, the retrospective design depends on the completeness and accuracy of emergency department documentation. Missing physiological variables or incomplete anatomical injury recording may affect score calculation. Second, ISS calculation requires accurate AIS-based injury classification, and under-documentation may lead to underestimation of anatomical injury severity. Third, this was a single-center study and the findings may not be generalizable to all trauma systems. Fourth, mortality prediction may vary depending on whether the endpoint is emergency department mortality, 24-hour mortality, in-hospital mortality, or 30-day mortality.

Overall, the findings suggest that both KTS and ISS are useful for mortality prediction among road traffic accident victims. KTS appears particularly suitable for rapid early triage because of its clinical simplicity, while ISS remains important for anatomical injury severity documentation and trauma audit. A combined scoring approach may improve emergency department risk stratification and support timely escalation of care for high-risk trauma patients.

CONCLUSION

Both Kampala Trauma Score and Injury Severity Score demonstrated good mortality discrimination among road traffic accident victims presenting to the emergency department. ISS showed slightly higher sensitivity and AUC, whereas KTS showed higher specificity and diagnostic accuracy at the selected cut-off. KTS may be useful as a rapid bedside triage tool during initial emergency assessment, while ISS remains valuable for definitive anatomical injury classification and trauma outcome reporting. Integrating both scores into emergency trauma workflow may improve early risk stratification, escalation of care, and trauma audit.

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Conflict of Interest

The authors declare no conflict of interest.

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Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to institutional ethics approval and patient confidentiality requirements.

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