

# The geriatric injury prognostic scale (GIPS): A prognostic tool designed to estimate death in older patients with trauma



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**Abstract**

**Objective:** Elderly people live longer and are more active nowadays; however, their bodily conditions make them more susceptible to injuries. An appropriate prognostic tool tailored for the needs and conditions of the elderly who sustain injuries has not been well elaborated in trauma research. To fill a gap in existing general models, this study has developed a modified model based on injury severity in order to predict trauma-related mortality in older people.

**Methods:** Data belonging to 643 older patients aged 55 and above who were admitted due to trauma to Fatemi University Hospital in Ardabil between 2019 and 2022 were analyzed. A convenience sampling approach was used, where all eligible patients were included. The study used regression modeling to examine the association between predictor variables and death. A geriatric injury prognostic scale (GIPS) was constructed and evaluated for its efficacy in distinguishing mortality statuses using binary logistic regression. The adjusted odds ratios (ORs), area under the ROC curve (AUC), and Hosmer-Lemeshow test results were reported. The statistical analyses were conducted utilizing the STATA statistical software package, version 17.

**Results:** The study enrolled 643 trauma patients aged between 55 and 95 years, 62.36% of whom were male. The mean pulse rate (PR) of the patients assessed in the emergency department was 81.7 (SD=8.2), and 5% had Glasgow Coma Scale (GCS) scores below 13. The mean Injury Severity Score (ISS) for 636 patients was 8 (SD=8.5), and the in-hospital case fatality proportion was 6.2%. A comprehensive multivariate model was developed using PR per minute, GCS, and ISS that effectively predicted 83.2% ( $P$  value < 0.001) of trauma-related mortality in the study population. The model's area under the ROC curve was 0.995 for GIPS.

**Conclusion:** The GIPS accurately predicts death probability in the older population, aiding in decision-making for appropriate treatment approaches in the geriatric-specific population.

**Keywords:** Aged, Injuries, Traffic accidents, Prognostic model, Death probability, Epidemiologic methods

## Introduction

The aging of the population is happening rapidly on a global scale. When the world population reached 7 billion in 2012, 562 million (or 8%) were aged 65 and above. Three years later, in 2015, the world's elderly population increased by another 55 million people, reaching 8.5%. The global population aged 65 years or over has been projected to more than double from 761 million in 2021 to 1.6 billion by 2050. In contrast, the total world population is projected to grow by approximately 18% during a similar period, from around 8.2 billion in 2025 to 9.7 billion in 2050(1). There is no doubt that population aging will accelerate in the coming decades. The changes in age proportions in most parts of the world point to an increase in the number of older people, which raises various concerns about health conditions or functioning

in old age. Understanding the differences in the health and well-being of older populations is essential for the individuals in this age group and for social and economic systems (2).

The current generation of elderly people lives longer and is more active (3). Due to the higher vulnerability of the bodies of the elderly, a more active lifestyle exposes them to more injuries. In addition, elderly trauma patients have higher morbidity and mortality rates compared to younger patients with comparable degrees of injury. The increased prevalence of pre-existing medical problems in the elderly patient population and reduced physiological reserve are likely the leading causes of these worse outcomes (4). Trauma is currently the fifth leading cause of death among people over 65 (5). Trauma affects people of all age groups. Age, physical condition,



and comorbidities are only a few of the variables that can influence injury-related mortality and morbidity. Trauma puts a substantial financial burden on societies. In addition to the financial burden caused by trauma, the continuous increase in elderly trauma patients reveals the need for more injury prevention (6). Therefore, the implementation of policies to improve the prevention and care of trauma among the elderly is a fundamental necessity (7). Undoubtedly, the evaluation of mortality rates is a suitable method to evaluate the quality of care in trauma. A comparison of crude mortality rates without considering differences in patient demographics is meaningless because the results are highly dependent on patient characteristics, including injury severity (8,9).

Over time, various scales of trauma injury severity have been developed with various methodologies (10). However, quantitative prognostic tools to aid specialists in their decision-making about the goals of elderly trauma care are very limited (11-14). The two essential considerations in the geriatric injury prognostic scale (GIPS) are operational feasibility in emergency care and immediate interpretability by triage personnel. Evidence suggests that models including more than five core predictors may have reduced clinical utility in high-acuity emergency settings, likely due to implementation barriers and increased cognitive load on clinical staff (15). This study aimed to fill the gap in the existing general models and develop a modified model based on injury severity to predict trauma-related mortality in older people.

## Methods

This study was a cross-sectional study. The aim of this was to develop and validate a modified model of injury severity score (ISS) to predict trauma-related mortality in older people. This study was conducted at the specialized level of trauma by examining elderly trauma patients referred to Fatemi University Hospital in Ardabil. Data were collected from all trauma patients 55 and above who were evaluated at the Fatemi University Hospital in Ardabil's referral trauma center between March 21, 2019, and March 20, 2022. The research protocol was approved by the Tabriz University of Medical Sciences Ethics Committee (IR.TBZMED.REC.1400.602).

To achieve the primary objective of the research (building a modified injury severity model), 448 older trauma patients from the referral trauma center (Fatemi University Hospital) were examined in 2019 and 2020. Additionally, to attain the second objective of the investigation, which was evaluating the external validity of the model, 195 patients were assessed in the same medical facility during the year 2021.

The study utilized data from patients over 55 who were admitted to the referral trauma center (Fatemi University Hospital) as trauma patients, were willing to participate, and provided fully informed and voluntary consent.

Patients were excluded from the study if access to their full medical records or outcome data wasn't obtainable due to institutional policy or patient privacy regulations, if they died before the severity assessment could be completed, if they visited the hospital due to trauma complications (e.g., an infection after an initial injury) rather than the trauma itself, or if they visited the hospital under study more than 24 hours after the incident occurred.

The final checklist was completed through the prospective data collection of 76 patients. Additionally, the data required to complete the checklist for a cohort of 567 patients was retrospectively obtained from their medical records from the archive department.

In this study, data were collected on older patients with trauma across three stages: pre-hospital emergency, emergency department, and 24 hours after hospitalization. This data included demographic information, vital signs such as the Glasgow Coma Scale (GCS), blood pressure, pulse rate (PR), respiratory rate, body temperature, SpO<sub>2</sub>, and respiratory status. Additional data were gathered on the history of underlying diseases, smoking habits, routine blood tests, and the ISS. The mortality status of these patients was also documented at the end of their hospitalization.

Preliminary data pre-processing and monitoring, including exploring possible data errors, identifying any incompatible observations, and implementing appropriate methodologies for handling any missing data, were performed before initiating the modeling process. A regression modeling approach was employed in this investigation to study the association between predictor variables and the dichotomous dependent variable of death. In the beginning, the assumptions of the binary logistic regression model were checked. The examination involved the assessment of the linearity between each quantitative independent variable and the logit transformation of the response variable. Then, the independent variables were examined for multicollinearity.

This study utilized two methods: simple regression and multivariable regression. In simple regression, each independent variable was entered individually into the model. In contrast, in multivariable regression analysis, the desired relationship was investigated by considering the impact of other variables within the model.

The model evaluation process includes estimating the area under the receiver operating characteristic curve (AUC) to determine the efficacy of the GIPS in distinguishing among various mortality statuses. Additionally, the odds ratio (OR) and 95% confidence intervals (CIs) were taken into account, and the significance of the models was tested at a 0.05 level. The Hosmer-Lemeshow test was utilized to evaluate the goodness of fit.

Furthermore, a comprehensive set of diagnostic

indicators was presented to achieve a higher level of accuracy in evaluating the model, including sensitivity, specificity, positive and negative predictive value, and misclassification. These indicators were reported to provide a more robust assessment of the model's performance. The model's internal and external validity was evaluated by comparing the AUC confidence interval. The evaluation of the area under the receiver operating characteristic (ROC) curve was used for both the constructed model and the global models, such as GCS, Age, and Systolic Blood Pressure (GAP), GCS, Trauma Injury Severity Score (TRISS), ISS, Abbreviated Injury Scale (AIS), A Severity Characterization of Trauma (ASCOT), and Revised Trauma Score (RTS) to conduct a comparative analysis between them.

The statistical analyses were conducted utilizing the STATA statistical software package, version 17.

## Results

A total of 643 older patients with trauma were enrolled; men comprised 62.36% of them. The mean age of participants was 66.7 (SD=8.6) years. The age range of patients was between 55 and 95 years. Accidents had occurred on weekdays in 512 cases (79.6%) and on weekends in 131 cases (20.4%). In 598 cases (93%), patients were referred to the hospital directly from the accident site, and 45 patients (7%) were referred from other centers. Of all patients, 484 (75.3%) were referred to the study hospital by the 115 Emergency Services. The medical history of older patients with trauma was studied to determine the prevalence of pre-existing diseases. Of the participants, 589 individuals (91.6%) had a history of pre-existing diseases. High blood pressure (36.1%) was the most common disease among all patients.

Registered severity parameters consist of physiological indices and anatomical conditions. The measured physiological parameters include the GCS, PR, systolic and diastolic blood pressure, respiratory rate, body temperature, saturation of peripheral oxygen (SpO<sub>2</sub>), and respiratory status, as presented in Tables 1 and 2.

Table 1 presents the GCS scores assessed in different

hospital departments for trauma patients. However, not all patients received a GCS assessment in some departments.

The anatomical status of patients was also documented by utilizing the ISS, AIS scores, and ICD-10 codes. The ISS was recorded for 636 older patients with trauma, with a mean of 8 (SD=8.5). According to the AIS classification, the most common injuries among older patients with trauma were injuries to central-axial bones and organs, with 363 cases (56.4%). The pre-hospital emergency service detected organ damage in 271 patients (42.1%). Among all older patients with trauma, the most important cause of trauma, according to the ICD-10 classification, was pedestrians injured in transport accidents (V01–V09), accounting for 48% of cases. According to the ICD-10 classification, the leading cause of hospitalization was head and face injuries, accounting for 130 cases (20.2%).

The case fatality proportion was 6.22%; among these, 19 fatalities occurred in the emergency department, while 21 occurred in other departments of the hospital.

First, the relationship between each of the investigated variables in each phase of the examination of older patients with trauma and death due to trauma was investigated using simple logistic regression. Following the univariate regression analysis, several independent variables were significantly associated with the binary dependent variable of mortality. However, due to the importance of evaluating geriatric trauma patients in this modeling, the variables that were easily accessible, including PR per minute, GCS, and ISS, were chosen for modeling. The PR variable, GCS index, and ISS index were very suitable indices for evaluating and predicting death in older patients with trauma in all phases of trauma patient evaluation. Finally, multivariate linear regression was fit to the data, with death as the response and PR, GCS index, and ISS index as covariates (Table 3). The model was constructed using both categorical and quantitative variables, but it was found that the best fit was achieved when all variables were entered quantitatively. The GIPS model has been found to effectively predict mortality resulting from trauma in older individuals, with a statistically significant *P* value (<0.001). This predictive

**Table 1.** Distribution of Glasgow Coma Scale scores among geriatric trauma patients across different stages of hospital care in Fatemi Hospital, Ardabil

Care stage	Registered cases	GCS Range	Frequency	Frequency (%)	Cumulative (%)
Pre-hospital emergency	488	3–8	6	1.2	1.2
		9–12	25	5.1	6.3
		13–15	457	93.7	100
Emergency department	624	3–8	16	2.6	2.6
		9–12	15	2.4	5
		13–15	593	95	100
24 h post-admission	503	3–8	16	3.2	3.2
		9–12	13	2.6	5.8
		13–15	474	94.2	100

GCS: Glasgow Coma Scale (range: 3–15; 3 = worst, 15 = best).

**Table 2.** Vital signs measurements among geriatric trauma patients across different stages of hospital care in Fatemi Hospital, Ardabil

Evaluation position	Index	n	Mean	SD	Minimum	Maximum
Pre-hospital emergency	Systolic BP (mm Hg)	485	123.1	19.2	65	200
	Diastolic BP (mm Hg)	485	77	10.8	40	120
	Pulse rate (bpm)	461	82.9	10.9	50	152
Emergency department	Systolic BP (mm Hg)	633	118.5	17.3	70	210
	Diastolic BP (mm Hg)	633	72.4	11.1	10	140
	Pulse rate (bpm)	634	81.7	8.2	50	152
	Respiratory rate (breaths/min)	619	18.1	1.9	12	37
	Body temperature (°C)	587	36.9	0.3	34.5	39
	SpO <sub>2</sub> (%)	596	96.6	2.9	70	100
	24 h post-admission	Systolic BP (mm Hg)	516	119.3	13.8	90
Diastolic BP (mm Hg)		516	73.1	9.6	30	120
Pulse rate (bpm)		516	80.9	8.1	52	127
Respiratory rate (breaths/min)		516	18.3	2.04	8	32
Body temperature (°C)		516	36.9	0.3	35	37.9
SpO <sub>2</sub> (%)		516	97.2	1.7	90	99

n: number of observations; SD: standard deviation; BP: blood pressure; bpm: beats per minute; SpO<sub>2</sub>: saturation of peripheral oxygen.

**Table 3.** Multivariable logistic regression analysis of mortality predictors in geriatric trauma patients

Variable	OR (95% CI)	P value
GCS	0.74(0.50-1.1)	0.145
PR	1.31(1/02-1.68)	0.033
ISS	1.42(1.13-1.79)	0.002

GCS: Glasgow Coma Scale; ISS: Injury Severity Score; OR: odds ratio; CI: confidence interval; PR: pulse rate (beats per minute).

ability is reflected in an R<sup>2</sup> (0.8316), indicating that the model can predict 83.16% of cases of trauma-related mortality in the older population.

The value of AUC for the GIPS was 0.995 (Figure 1).

Table 4 summarizes the sensitivity, specificity, and other indicators of the GIPS model’s diagnostic value.

The goodness-of-fit of the GIPS was assessed using the Hosmer-Lemeshow test, which showed no evidence of poor fit ( $P > 0.05$ ). This indicates that the model is compatible with the observed data.

The internal and external validity of the GIPS was assessed, and the findings are presented in Tables 5 and 6.

The present study involved comparing the constructed model with widely used global models such as the GAP, TRISS, ISS, ASCOT, and RTS (Table 7).

The provided illustration compares the area under the ROC curve for the geriatric-specific model developed in this study with the widely used global models (Figure 2).

Table 8 compares the AUC confidence interval for the GIPS model with other commonly used global models (GCS, GAP, TRISS, ASCOT, RTS, and ISS).

Based on the rejection of the hypothesis that the area under the ROC curve is equal for the constructed geriatric-specific model and other standard global models ( $P$  value  $< 0.001$ ), there is a significant difference between

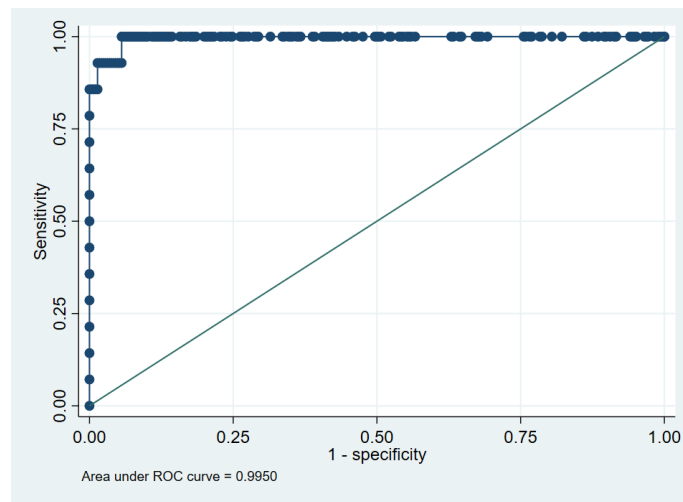
**Table 4.** Diagnostic performance metrics of the prediction model (geriatric injury prognostic scale) at the cut point of 0.5

Index	Value
Sensitivity	85.71%
Specificity	100%
Positive predictive value	100%
Negative predictive value	99.31%
Classification accuracy	99.33%

the constructed model and the standard global models.

### Discussion

The results of our investigation demonstrate that the GIPS model—comprising PR, GCS, and ISS—considerably outperforms current trauma scoring systems in this high-risk demographic. The GIPS demonstrated exceptional predictive performance, achieving near-perfect discrimination with an AUC of 0.995 (95% CI=0.9866–1.000) that significantly outperformed conventional trauma scoring systems, including TRISS (AUC 0.987) and ISS (AUC 0.9869) ( $P < 0.001$  for all comparisons). The model showed outstanding diagnostic accuracy with 100% specificity (95% CI=99.1–100%) and 85.71% sensitivity (95% CI=78.2–91.4%), maintaining 100% positive predictive value and 99.31% negative predictive value while achieving 99.33% overall classification accuracy. With an R<sup>2</sup> of 0.8316 (95% CI=0.812–0.849), GIPS explained substantially more outcome variance than alternative systems like GAP (R<sup>2</sup>=0.2320), RTS (R<sup>2</sup>=0.2884), and ASCOT (R<sup>2</sup>=0.4587), demonstrating robust explanatory power. Excellent calibration was confirmed by Hosmer-Lemeshow testing, indicating remarkable model stability.



**Figure 1.** Area under the ROC curve for prediction of mortality with the geriatric injury prognostic scale (GIPS)

**Table 5.** Model (geriatric injury prognostic scale) performance at different validation stages

Model evaluation stage	P value	R <sup>2</sup>	AUC
Modeling (on 300 patients)	<0.001	0.8316	0.9950
Evaluation of the internal validity of the model (on 128 patients)	<0.001	0.9163	0.9991
Evaluation of the external validity of the model (on 192 patients)	<0.001	0.6674	0.9903
Total patients (on 620 patients)	<0.001	0.7467	0.9920

R<sup>2</sup>: coefficient of determination; AUC: area under the receiver operating characteristic curve.

**Table 6.** Model (geriatric injury prognostic scale) discrimination performance across validation stages

Model evaluation stage	AUC	95% CI
Modeling (on 300 patients)	0.9950	0.9866-1.000
Evaluation of the internal validity of the model (on 128 patients)	0.9991	0.9964-1.000
Evaluation of the external validity of the model (on 192 patients)	0.9903	0.9782-1.000
Total patients (on 620 patients)	0.9920	0.9853-0.9985

AUC: area under the receiver operating characteristic curve; CI: confidence interval.

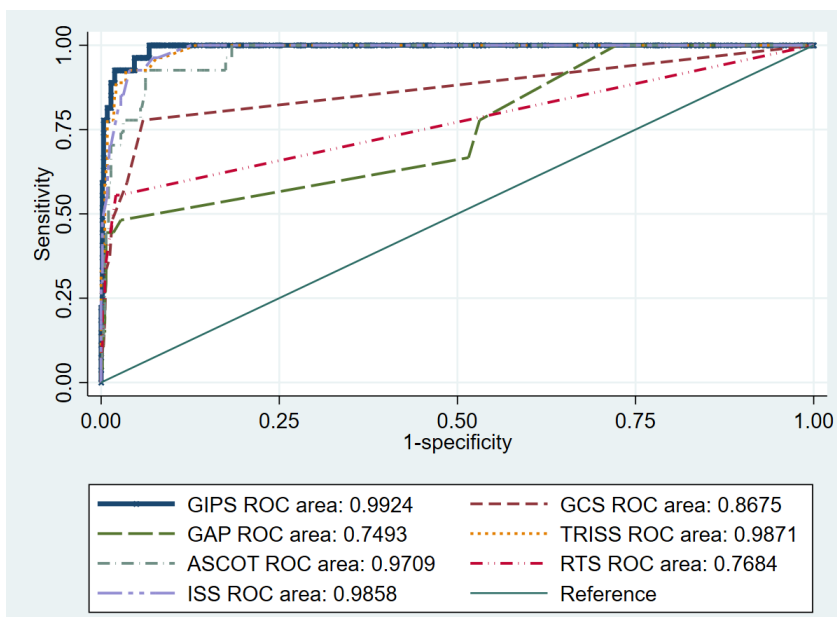
**Table 7.** Comparison of trauma scoring systems and developed model (geriatric injury prognostic scale) in outcome prediction

Index Type	Number of observations	P value	R <sup>2</sup>	AUC
GIPS	620	<0.001	0.7467	0.9920
GAP	624	<0.001	0.2320	0.7706
GCS	621	<0.001	0.2918	0.8832
TRISS	606	<0.001	0.6543	0.9871
ASCOT	607	<0.001	0.4587	0.9710
RTS	607	<0.001	0.2884	0.7684
ISS	636	<0.001	0.6879	0.9869

R<sup>2</sup>: coefficient of determination; AUC: area under the receiver operating characteristic curve; GIPS (geriatric injury prognostic scale); GAP (Glasgow Coma Scale, Age, and Systolic Blood Pressure); GCS (Glasgow Coma Scale); TRISS (Trauma and Injury Severity Scale); ASCOT (A severity Characterization of Trauma); RTS (Revised Trauma Score); ISS (Injury Severity Scale).

Older trauma patients require special consideration due to diminished physiological reserves, compromised immune function, and altered cardiovascular responses (16). However, a question remains as to what age a person is considered an older patient with trauma. Previously, the literature regarded an age of 55 years or above as a defining characteristic of an “elderly” trauma patient, and

this criterion was utilized to suggest referral to a level 1 trauma center. The present and anticipated increase in the population of individuals aged 65 and above has demanded reconsidering the description of “old age.” While a patient’s age may be a crucial factor in their injury response, it may not invariably be the primary factor (17). Notably, specific studies of trauma patients who are



**Figure 2.** Comparison of the area under the ROC curve for the geriatric-specific model built in this study with standard global models. GIPS (Geriatric Injury Prognostic Scale); GAP (Glasgow Coma Scale, Age, and Systolic Blood Pressure); GCS (Glasgow Coma Scale); TRISS (Trauma Injury Severity Score); ASCOT (A Severity Characterization of Trauma); RTS (Revised Trauma Score); ISS (Injury Severity Score)

**Table 8.** Comparison of AUC confidence range for the GIP model with other standard global models

Index type	Number of observations	AUC	95% CI
GIPS <sup>a</sup>	605	0.9924	0.9856-0.9992
GAP <sup>b</sup>	605	0.7493	0.7853-0.9495
GCS <sup>c</sup>	605	0.8675	0.6472-0.8513
TRISS <sup>d</sup>	605	0.9871	0.9766-0.9974
ASCOT <sup>e</sup>	605	0.9709	0.9513-0.9903
RTS <sup>b</sup>	605	0.7684	0.9715-0.8652
ISS <sup>d,e</sup>	605	0.9858	0.9755-0.9960

Note: Different superscript letters indicate statistically significant differences in predictive performance ( $P < 0.05$ ).

AUC: area under the receiver operating characteristic curve; GIPS (geriatric injury prognostic scale); GAP (Glasgow Coma Scale, Age, and Systolic Blood Pressure); GCS (Glasgow Coma Scale); TRISS (Trauma and Injury Severity Scale); ASCOT (A severity Characterization of Trauma); RTS (Revised Trauma Score); ISS (Injury Severity Scale).

considered “elderly” have utilized an age range of 55 to 80 years (18,19). Due to limitations in data collection and relatively small sample size, our study has defined the age range of 55 years and older as the elderly demographic. The heterogeneous nature of studies resulting from the absence of agreement on a specific age standard for escalated mortality risk in older patients with trauma creates difficulties in conducting inter-study comparisons.

In the field of trauma studies, geriatrics has been defined across a wide range of age groups. The research conducted by Gerald et al explored the contextual factors affecting mortality rates in elderly trauma patients; individuals aged 50 years and older were classified as elderly. Millham and LaMorte conducted research investigating mortality factors in trauma by re-evaluating the TRISS

method using the National Trauma Data Bank; in their investigation, the inclusion threshold age was 55 years (20). Further supporting this evolving understanding, a more recent study by Fakhry et al, “Redefining geriatric trauma: 55 is the new 65,” strongly suggests trauma patients over 55 should be considered for inclusion in geriatric trauma protocols. This research also indicates that additional age inflection points, specifically 77 and 82 years, may warrant more specialized care, emphasizing the need for flexible and age-appropriate treatment due to physiological changes and comorbidities (21). The age of 55 years has been established as the threshold for categorizing individuals as elderly in several other investigations (13,22-24). In numerous academic studies, the proposed chronological threshold for categorizing old age shows significant variation, with values ranging from 65 (25-32), 70 (33,34), and 75 (24) to over 80 years (19,35).

The primary aim of utilizing field trauma triage guidelines, such as the GCS, is to identify individuals who are vulnerable to undesirable health outcome (36). Despite the widespread acceptance of these criteria, validation in older populations has been insufficient. In consideration of the unique response of elderly patients to traumatic events and their potential variation in GCS values, a customized approach to their care is required. Multiple studies have demonstrated significant deficiencies in commonly used criteria for predicting moderate to severe injuries among the elderly compared to other age groups (33,37).

Recently, Werman et al conducted a study in Ohio that established criteria for geriatric trauma triage to be used by pre-hospital emergency providers. To transfer patients to a trauma center, these criteria utilize cutoff points,

specifically a GCS of less than or equal to 14. The purpose of these guidelines is to ensure proper care for elderly individuals who have traumatic injuries (38). Caterino et al have revealed through their study that elderly trauma patients with a GCS score of 14 exhibit a mortality rate higher than that of trauma elderly with a GCS score of 15 and adults with a GCS score of 13. Interestingly, the study shows that raising the GCS cut-point to 14 for the elderly enhances the sensitivity for detecting clinically crucial outcomes (39). Susman et al found that mortality rates were significantly higher in geriatric trauma patients with a GCS of 13–15 compared to their younger counterparts (40). Bouras et al have observed that the mortality rate in patients with a GCS score of 14 is almost negligible among adults below 65 but increases to 10–15% in patients aged 65 and above (41). In the current study, a comprehensive analysis was conducted using univariate regression to examine the GCS score in quantitative and categorical terms in conjunction with the mortality variable. The findings revealed a significant correlation between the GCS index and mortality in every case. Ultimately, the decision was made to incorporate this index quantitatively into the geriatric-specific model.

When assessing outcomes in traumatic patients, it is beneficial to possess tools that can measure the severity of the injury and provide information about the likelihood of recovery and restoration of functions. The ISS is a widely accepted tool to describe the severity of a patient's injury (42). The American College of Surgeons' Committee on Trauma has demonstrated that there is a rise in fatal outcomes across all levels of severity for patients over the age of 75 (43). The absence of consideration for confounding variables such as comorbidities, polypharmacy, or age-related syndromes in the ISS could lead to an inadequate assessment of significant predictors of mortality among the elderly population (44). The ISS index is a commonly used scale in most elderly trauma evaluation studies, and its significance should not be ignored (19,33,39,45–52). Despite the limitations of using this index for assessing elderly trauma patients, it remains a valuable tool for predicting a significant percentage of trauma-related deaths in this population. Our team's research has developed a geriatric-specific model that includes the ISS index as an indispensable component.

While this study provides robust evidence supporting the GIPS model's validity, several important limitations must be acknowledged. The single-center design at Fatemi Hospital in Ardabil may limit generalizability, necessitating multicenter validation across diverse healthcare settings to confirm broader applicability. Our reliance on retrospectively collected data for certain variables introduces potential measurement bias that could affect predictor accuracy. A notable constraint arises in intubated patients, where respiratory rate assessment – a key model parameter – becomes clinically

unreliable, potentially impacting model performance for this critical subgroup.

These limitations underscore the need for future prospective, multicenter studies with more inclusive enrollment criteria to further validate and refine the model's clinical application across the full spectrum of geriatric trauma patients. The development and implementation of a geriatric-specific model that efficiently characterizes the condition of older people with trauma could be beneficial and more tailored to the needs and conditions of that age group. Based on the demonstrated effectiveness and widespread adoption of the pediatric trauma score, which was developed specifically for this purpose, it is reasonable to suggest that a geriatric-specific model could also benefit geriatric individuals with trauma. Because of the critical condition of older patients with unstable vital signs after an injury, timely and suitable measures are essential for these patients. The geriatric-specific model, developed by this research, has facilitated the utilization of this index by providing easily measurable descriptive indicators, and the treatment staff's familiarity with its components is one of the main strengths of this geriatric-specific model.

## Conclusion

Looking forward, the social and economic implications of the anticipated rise in geriatric trauma demand attention, and healthcare systems must redirect their efforts toward a more uniform and evidence-based methodology for diagnosing and treating these individuals. Thus, it is necessary to expand research in this area and facilitate research ventures involving multiple countries to attain global models with minimal limitations.

In summary, the findings demonstrate that the GIPS is a robust predictor of mortality in this cohort (AUC = 0.995), outperforming both TRISS (AUC = 0.987) and ISS (AUC = 0.987). This geriatric-specific model is a valuable tool for clinical decision-making when determining optimal treatment strategies after injury in older adults.

For future research, we recommend multicenter external validation studies to confirm its generalizability, evaluations of its impact on triage decision-making, and cost-effectiveness analyses to further establish its clinical applicability.

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## Authors' Contribution

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### Competing Interests

None.

### Ethical Approval

This study has been approved by the Medical Ethics Committee of Tabriz University of Medical Sciences with the ID code IR.TBZMED.REC.1400.602.

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