ARAŞTIRMA / RESEARCH

Comparison of the efficacy of trauma scores in predicting prognosis and hospitalization

Travma skorlarının prognozu ve hastaneye yatışı öngörmede etkinliğinin karşılaştırılması

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Abstract

Purpose: The aim of this study was to compare the efficacy of ISS (injury Severity Score), RTS (Revised Trauma Score) and ViEWS (VitalPAC Early Warning Score) scoring systems in predicting prognosis and mortality.

Materials and Methods: Patients over the age of 18 who presented with multitrauma were prospectively examined between May 1, 2019 and November 1, 2019. Trauma scores, clinical outcomes within the first 24 hours, surgery requirement and 30-day mortality data were recorded.

Results: The study included 435 patients, of whom 333 (76.6%) were male. The median age was 34 (IQR: 18-90) years. It was observed that ISS, RTS and ViEWS had a significant relationship with 30-day mortality. In the ROC analysis of 30-day mortality, no statistically significant difference was observed between the ISS, RTS, and ViEWS AUC values. There was also no statistically significant difference in terms of the ISS, RTS and ViEWS according to the length of hospital stay and surgery requirement.

Conclusion: In addition to their relationship with mortality, it should be kept in mind that the investigated scoring systems may also be related to the length of hospital stay and surgery requirement.

Keywords:. ISS, RTS, ViEWS, trauma scores, trauma, mortality

Öz

Amaç: Bu çalışmada travma skorlama sistemlerinden ISS (Injury Severity Score), RTS (Revised Trauma Score) ve VİEWS (VitalPAC Early Warning Score)'in prognoza ve mortaliteye etkilerinin karşılaştırılması amaçlanmıştır.

Gereç ve Yöntem: Multitravma ile gelen 18 yaş üstü onam alınan hastalar 01.05.2019-01.11.2019 tarihleri arasında prospektif olarak incelendi. Travma skorları, ilk 24 saatlik klinik sonlanım, cerrahi gerekliliği ve 30 günlük mortalite verileri kaydedildi.

Bulgular: Çalışmaya 435 hasta dahil edildi. Hastaların 333'ü (%76,6) erkek idi. Yaş median değeri 34(IQR:18-90) idi. 30 günlük mortalite oranı, ilk 24 saatte hospitalizasyon oranı, ICU yatış oranı ve cerrahi gereklilik oranı sırasıyla; %1,1, %19,1, %1,8 ve %8,5 idi. ISS, RTS ve VİEWS'in 30 günlük mortalite ile anlamlı ilişkisi olduğu gözlendi. 30 günlük mortalite ile ilgili olarak yapılan ROC analizinde ISS, RTS, and VIEWS AUC değerleri arasında istatistiksel olarak anlamlı fark bulunmamıştır. Hastanede yatış süresi ve operasyon gerekliliği açısından da ISS, RTS ve VİEWS arasında istatistiksel olarak anlamlı fark bulunmamıştır.

Sonuç: Travma skorlama sistemlerinin mortalite ile ilişkisinin karşılaştırılmasının yanısıra, hastanede kalış süresi ve operasyon ihtiyacı olup olmaması ile bu skorlama sistemlerinin ilişkili olabileceği unutulmamalıdır.

Anahtar kelimeler: ISS, RTS, VİEWS, travma skorları, travma, mortalite

INTRODUCTION

Trauma is one of the leading causes of death in young people. Among the exogenous factors that lead to trauma-related mortality are damage incurred within the first hour and causes secondary to resuscitation and surgery (hypoxia, metabolic acidosis, hypothermia, intracranial hypertension, thoracic injuries, acute respiratory distress syndrome, fat embolism, and tissue ischemia due to organ perfusion failure)[1-3]. In wars, the most common cause of death after trauma is hemorrhagic shock[4]. As a result of the experience gained, the concept of the 'golden hour' emerged. Subsequently, the concept of 'triage' was proposed to provide standardization for the golden hour based on physiological and hemodynamic parameters, and scoring systems were established through the analysis of serious injury and death risk[5,6].

The first scoring system defined in the literature for this purpose is the Abbreviated Injury Scale (AIS)[7], which has been revised according to anatomical locations and renamed the Injury Severity Score (ISS). Head, neck, face, chest, abdomen, extremity, and external injuries are scored from 1 to 6 as minor, moderate, serious, severe, critical, and unsurvivable, and the AIS is obtained. The sum of the square of each value taken from minor to unsurvivable gives the ISS (except for identical values)[7]. The Revised Trauma Score (RTS), which was later accepted as a physiological scoring system, includes the Glasgow Coma Scale (GCS), systolic blood pressure, and respiratory rate. Each variable is scored between 0 and 4[8]. In addition, peripheral oxygen saturation and oxygen demand have also been used in mortality prediction as an alternative to scoring systems[9,10]. The VitalPAC Early Warning Score (ViEWS) system includes systolic blood pressure and respiratory rate, as well as heart rate, temperature, AVPU (alert, reacting to voice, reacting to pain, unresponsive) score[11,12]. The superiority of the scoring systems over each other allows the comparison of physiological and anatomical examinations. However, considering the variability of trauma patients, it is very important for the physician to evaluate the patient's prognosis at the first examination. For this, an accepted common evaluation score must be used. We speculated that these scoring systems might be superior to each other in predicting prognosis.

The primary aim of our study is to determine whether the ISS, RTS, and ViEWS are effective in determining prognosis. The secondary aim is to investigate whether these anatomical and physiological scoring systems have superiority over each other in determining prognosis.

MATERIALS AND METHODS

Study design

The prospective cohort study was conducted in the emergency department of Istanbul Umraniye Training and Research Hospital, which is a tertiary trauma center providing care for an average of 500,000 patients per year. Our hospital emergency room consists of green, yellow, and red areas. Applications made due to trauma are evaluated in the yellow and red areas. The patients' vital signs and examination findings are recorded with 'Health Information Systems v 5.5', and patient follow-up is conducted with the examination request.

For the study, ethical approval was obtained from the local clinical research ethics committee of our hospital (Comparison of the effects of ISS, RTS, and ViEWS on mortality and hospitalization in multi-trauma patients admitted to the emergency department, date: May 22, 2019, number: B.10.1.TKH.4.34.H.GP.0.01/111). Patients who had a sufficient level of consciousness and the relatives of patients who were not adequately conscious were invited to participate in the study. An informed consent form was signed by the patients or their relatives who agreed to participate in the study.

Study population

Patients over the age of 18 who presented with multi-trauma between May 1 and November 1, 2019 were examined. Inclusion criteria in our study were patients with multiple traumas over the age of 18, high-energy traumas even if a single anatomical region was affected, and low-energy multiple traumas affecting more than one anatomical region. The exclusion criteria were all patients under 18 years of age and low-energy traumas affecting a single anatomical region. Further, patients who were initially included in the study but were later determined to have an underlying pathology causing the trauma (stroke, myocardial infarction, etc.) were excluded from the sample.

Patient monitoring

In our prospective study, trauma patients were evaluated by emergency medicine specialists. ISS,

RTS, and ViEWS calculations were made by emergency medicine specialists at the first examination. Follow-up of the patients (service admission, discharge, mortality) was done with the help of 'Health Information Systems v 5.5' and 'Hospital Mortality System'.

Data collection

Demographic data, comorbidities, trauma mechanism, trauma scores, lactate levels, first 24-hour clinical outcomes, length of hospital stay, surgery requirement, hospitalized clinics, areas of injury, and 30-day mortality data were recorded. Comorbidities were grouped as hypertension, diabetes, coronary artery disease, and chronic renal failure. Mechanisms of trauma were classified as assault, non-vehicle traffic accident, in-vehicle traffic accident, motorcycle accident, bicycle accident, falls from a height of ≤ 3 m, falls from a height of > 3 m, and gunshot wounds.

Areas of injury were evaluated as head, neck, face, thorax, abdomen, extremities, and external. The ISS, RTS, and ViEWS values were calculated. In the first 24 hours, the patients who were hospitalized and those who recovered were evaluated as having a good prognosis, while those who required intensive care or died were considered to have a poor prognosis. The hospital clinics to which the patients were admitted— namely orthopedics, general surgery, thoracic surgery, otolaryngology, ophthalmology, plastic and reconstructive surgery, cardiovascular surgery, neurosurgery, gynecology and obstetrics, and urology—were recorded. The first 24-hour clinical outcomes were grouped as discharge from hospital, hospitalization, admission to intensive care unit (ICU), patient refusal to continue treatment, referral to external hospital, and mortality. The primary outcome of the study was 30-day mortality due to all causes. Our secondary outcomes were first 24-hour clinical outcomes, length of hospital stay, and surgery requirement.

Measures

Injury Severity Score (ISS)

Head, neck, face, chest, abdomen, extremity, and external injuries are scored from 1 to 6 as minor, moderate, serious, severe, critical, and unsurvivable, and the AIS is obtained. The sum of the square of each value taken from minor to unsurvivable gives the ISS (except for identical values) (e.g., head neck;

moderate (2), abdomen; severe (4), other system examinations are normal: AIS: 6, ISS: 20).

The Revised Trauma Score (RTS)

If the GCS is 3, systolic blood pressure 0 mmhg, respiratory rate 0/min, the RTS value is 0 for each parameter. If the GCS is 4-5, systolic blood pressure 1-49 mmhg, respiratory rate 1-5/min, the RTS value is 1 for each parameter. If the GCS is 6-8, systolic blood pressure 50-75 mmhg, respiratory rate 6-9/min, the RTS value is 2 for each parameter. If the GCS is 9-12, systolic blood pressure 76-89 mmhg, respiratory rate > 29/min, the RTS value is 3 for each parameter. If the GCS is 13-15, systolic blood pressure > 89 mmHg, respiratory rate 10-29 min, the RTS value is 4 for each parameter.

ViEWS

If the systolic blood pressure is <70mmhg, heart rate >130/min, respiratory rate >30/min and AVPU score is unresponsive, the ViEWS value is 3 for each parameter. If the systolic blood pressure is 71-80 mmhg or >200 mmhg, heart rate <40/min or 111-129/min, respiratory rate <9/min or 21-29/min, temperature <35°C or >38.5°C and the AVPU score is reacting to pain, the ViEWS value is 2 for each parameter. If the systolic blood pressure is 81-100 mmhg, heart rate 41-50/min or 101-110/min, respiratory rate 15-20/min, and the AVPU score is reacting to voice, the ViEWS value is 1 for each parameter. If the systolic blood pressure is 101-199 mmhg, heart rate 51-100/min, respiratory rate 9-14/min, temperature 35-38.4°C and the AVPU score is alert, the ViEWS value is 0 for each parameter.

Statistical analysis

All statistical analyses were performed using SPSS v. 23.0 for Windows (SPSS Inc., Chicago, IL, USA). Categorical data were expressed as numbers and percentages, and median, minimum, and maximum values were used for non-parametric numerical data without normal spatial distribution. The distribution of numerical data was evaluated using the Shapiro-Wilk test. The chi-square test was conducted to evaluate the relationship between categorical data. The Mann-Whitney U test was used to compare non-parametric numerical data between the two groups. If there were more than two groups, the Kruskal-Wallis test was used to compare non-parametric numerical data. According to the mortality status, Spearman's correlation analysis was undertaken to determine the relationship between the trauma scoring systems and

the length of hospital stay. We also formed a receiver-operating characteristic curve (ROC) for 30-day mortality and obtained the area under the curve (AUC) for individual variables. The AUC values of the three scores were calculated and tested between ISS, RTS, and ViEWS or significance using the DeLong equality test. A p value of less than 0.05 was considered statistically significant for all analyses. The G-power analysis method was used. When the Type 1 error was 0.05, the total sample size was determined to be 428 in the analysis of two independent groups . Our sample size was created by taking this criterion into accountResults

Table 1. Demographic data, trauma scores, prognostic factors, and mortality

	Total	Survivor	Mortality	p value
Age	34 (18-90)	34 (18-90)	53 (24-80)	0.173
Gender (n,%)				0.595
Female	102 (23.4%)	102 (23.7%)	0(0%)	
Male	333 (76.6%)	328 (76.3%)	5 (100%)	
Comorbidities (n (+/-),%)				
Hypertension	3 (0.7%)	3/427 (0.7%)	0/5	
Diabetes mellitus	5 (1.1%)	5/425 (1.2%)	0/5	
Coronary artery disease	2 (0.5%)	1/429 (0.2%)	1/4	
Chronic renal failure	1 (0.2%)	1/429 (0.2%)	0/5	0.023
Mechanism of trauma				0.544
Assault	148 (34%)	148 (34.4%)	0(0%)	
Non-vehicle traffic accident	52 (12%)	51 (11.9%)	1 (20%)	
In-vehicle traffic accident	97 (22.3%)	96 (22.3%)	1 (20%)	
Motorcycle accident	74 (17%)	72 (16.7%)	2 (40%)	
Bicycle accident	3 (0.7%)	3 (0.7)	0 (0%)	
Fall from a height of <3 m	34 (7.8%)	34 (7.9%)	0 (0%)	
Fall from a height of >3 m	24 (5.5%)	23 (5.3%)	1 (20%)	
Gunshot wound	3 (0.7%)	3 (0.7%)	0 (0%)	
Trauma Scoring				
ISS	6 (1-66)	6 (1-66)	6 (3-66)	0.007
RTS	7.84 (4.6-7.84)	7.84 (6.08-7.84)	4.65 (1.6-7.84)	<0.001
ViEWS	1 (1-20)	1 (1-10)	13 (7-20)	<0.001
Lactate level (mmol/L)	1.5 (0.4-19)	1.4 (0.4-8.7)	8.4 (2.3-19)	0.001
Clinical outcome within the first 24 hours				<0.001
Discharge from hospital	331 (76.1%)	331 (77%)	0 (0%)	
Admission to inpatient clinics	83 (19.1%)	82 (19.1%)	1 (20%)	
Admission to the intensive care unit	8 (1.8%)	7 (1.6%)	1 (20%)	
Patient refusal to continue treatment	9 (2.1%)	9 (2.1%)	0 (0%)	
Referral to an external hospital	1 (0.2)	1 (0.2%)	0 (0%)	
Death	3 (0.7%)		3 (60%)	
Length of hospital stay (days)	1 (0-30)	1 (1-30)	0 (0-14)	0.202
Operation status				
Operated	37 (8.5%)	37 (8.6%)	0 (0%)	
Non-operated	398 (91.5%)	393 (91.4%)	5 (100%)	
Inpatient clinics of admitted patients				
Orthopedics	44 (10.1%)	44 (10.2%)	(0%)	
General surgery	23 (5.3%)	22 (5.1%)	1 (20%)	
Thoracic surgery	4 (0.9%)	3 (0.7%)	1 (20%)	
Otolaryngology	1 (0.2%)	1 (0.2%)	(0%)	
Ophthalmology	1 (0.2%)	1 (0.2%)	(0%)	
Plastic and reconstructive surgery	2 (0.5%)	2 (0.5%)	(0%)	
Cardiovascular surgery	1 (0.2%)	1 (0.2%)	(0%)	
Neurosurgery	11 (2.5%)	11 (2.6%)	(0%)	
Gynecology and obstetrics	1 (0.2%)	1 (0.2%)	(0%)	
Urology	2 (0.5%)	2 (0.5%)	(0%)	
Mortality	5 (1.1%)			

During the study period, 630 cases over the age of 18 presented to the emergency department due to trauma. Of these cases, 152 were excluded due to only having minor trauma and 43 refused to participate in the study. As a result, 435 patients were included in the final analysis. The flowchart of the study is presented in Figure 2.

Of the 435 patients, 333 (76.6%) were male. The median age was 34 (IQR: 18-90) years. Five (1.14%) patients who were included in the study died within 30 days after trauma. Furthermore, within the first 24 hours, three patients (60%) died—one patient (20%) after hospitalization and one patient (20%) after admission to the ICU. The rates of 30-day mortality, first 24-hour hospitalization, ICU admission, and surgery requirement were 1.1%, 19.1%, 1.8%, and 8.5%, respectively. The demographic characteristics of the patients, clinical outcomes, clinics to which they were admitted, ISS, RTS, and ViEW scores, and their relationship with mortality are shown in Table 1.

Table 2 presents the ROC analysis results of the relationship of ISS, RTS, and ViEWS with 30-day mortality after admission to the emergency department together with the cut-off, sensitivity, specificity, positive predictive, negative predictive, accuracy, and AUC values. There was no statistically significant difference between the AUC values of ISS, RTS, and ViEWS according to the DeLong equality test (ISS vs RTS, $p = 0.547$; ISS vs ViEWS, $p = 0.228$; and RTS vs ViEWS, $p = 0.104$). The receiver operating characteristics curve of ISS, RTS, and ViEWS in predicting 30-day mortality is shown in Figure 3.
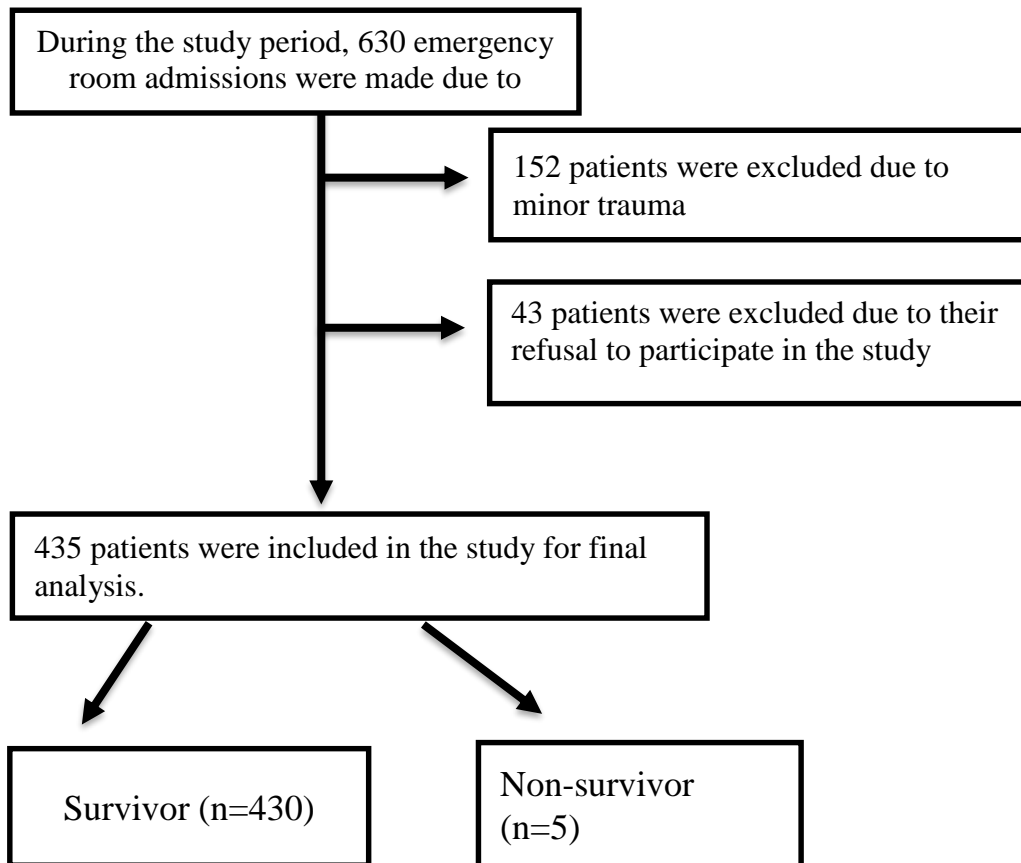

Figure 2. Flow chart of the inclusion and exclusion criteria for the enrolment of patients in the study.

Table 2. Receiver operating characteristic analysis of ISS, RTS and ViEWS in predicting 30-day mortality

	Cut-off	Sensitivity	Specificity	PPV	NPV	Accuracy	AUC
ISS	>18	80.00	86.98	6.7	99.7	66.98	84.7
RTS	≤4.653	60.00	100.00	100.0	99.5	60.00	79.5
VIEWS	>6	100.00	98.37	41.7	100.0	98.37	99.6

ISS, Injury Severity Score; RTS, Revised Trauma Score; ViEWS, VitalPAC Early Warning Score; PPV, positive predictive value; NPV, negative predictive value, AUC, area under the curve

There were 195 (44.82%) patients with head and neck injuries, 143 (32.87%) with facial trauma, 118 (27.12%) with thoracic trauma, 69 (15.86%) with abdominal trauma, 324 (74.48%) with extremity trauma, and 163 (37.47%) with external injuries. Head and neck trauma was present in 37 (44.57%) of the 83 patients admitted to inpatient clinics and six (75%) of the eight patients admitted to the ICU; thoracic trauma in 27 (32.53%) and three (37.5%) patients; abdominal trauma in 19 (22.89%) patients and one (12.5%) patient; and extremity trauma in 68 (81.92%) and four (50%) patients, respectively.
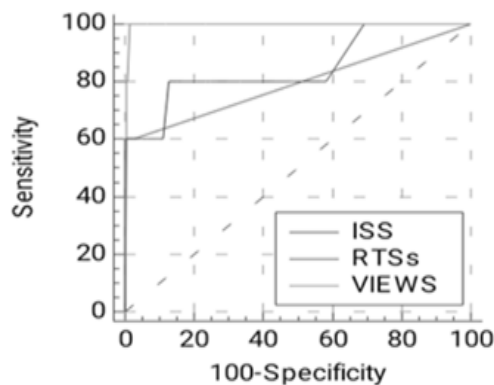
Figure3.Receiver operating characteristics curve of ISS, RTS and ViEWS in predicting 30-day mortality

In patients with a poor prognosis, the median ISS was 41 (1-66), the median RTS was 6.392 (1.605-7.841), and the median ViEWS was 9 (3-20). A statistically significant difference was found in all three scoring systems in terms of discharge and patient prognosis ($p < 0.001$) [Table 3].

When ISS, RTS, and ViEWS were compared according to the length of hospital stay (being >3 and 3≤ longer or shorter days), no statistically significant difference was found ($p=0.104$, $p=0.117$, and $p=0.136$, respectively) [Table 4]. However, ISS, RTS, and ViEWS significantly differed according to the presence of surgery requirements ($p<0.001$, $p=0.007$, and $p=0.009$, respectively) [Table 5].

The Spearman correlation analysis conducted to determine whether there was a relationship between the trauma scoring systems and hospital stay according to the mortality status revealed a moderate positive correlation between ISS and length of hospital stay in the survivor group, while no such correlation was observed in the mortality group ($r=0.545$, $p<0.001$ and $r=-0.125$, $p=0.841$, respectively). There was a weak negative correlation between RTS and length of hospital stay in the survivor group but no correlation in the mortality group ($r=-0.274$, $p<0.001$, $r=0.412$, $p=0.490$, respectively). Lastly, a weakly positive correlation was detected between ViEWS and length of hospital stay in the survivor group, and a very high level of negative correlation was found in the mortality group ($r=0.304$, $p<0.001$ and $r=-0.894$, $p=0.041$, respectively) [Figure 4].

Table 3. Clinical outcomes with the first 24 hours

Trauma Scoring	Discharge from hospital	Good prognosis	Poor prognosis	p value
ISS	3 (1-30)	17 (2-54)	41 (1-66)	<0.001
RTS	7.841 (7.108-7.841)	7.84 (6.904-7.841)	6.392 (1.605-7.841)	<0.001
ViEWS	1 (1-6)	1 (1-7)	9 (3-20)	<0.001

ISS, Injury Severity Score; RTS, Revised Trauma Score; ViEWS, VitalPAC Early Warning Score

Table 4. Relationship between trauma scores and LHS

	LHS≤ 3	LHS> 3	p value
Length of hospital stay (days)	2 (2-3)	9 (4-30)	
ISS	16.5 (3-50)	18 (1-66)	0.104
RTS	7.841 (6.90-7.841)	7.841 (4.653-7.841)	0.117
ViEWS	1 (1-6)	2 (1-10)	0.136

LHS, length of hospital stay; ISS, Injury Severity Score; RTS, Revised Trauma Score; ViEWS, VitalPAC Early Warning Score

Table 5. Relationship between trauma scores and surgery requirement

	Surgery required (n=392)	Surgery not required (n=36)	p value
ISS	5 (1-66)	17.5 (3-54)	<0.001
RTS	7.841 (1.605-7.841)	7.841 (6.085-7.841)	0.007
ViEWS	1 (1-20)	1 (1-8)	0.009

ISS, Injury Severity Score; RTS, Revised Trauma Score; ViEWS, VitalPAC Early Warning Score
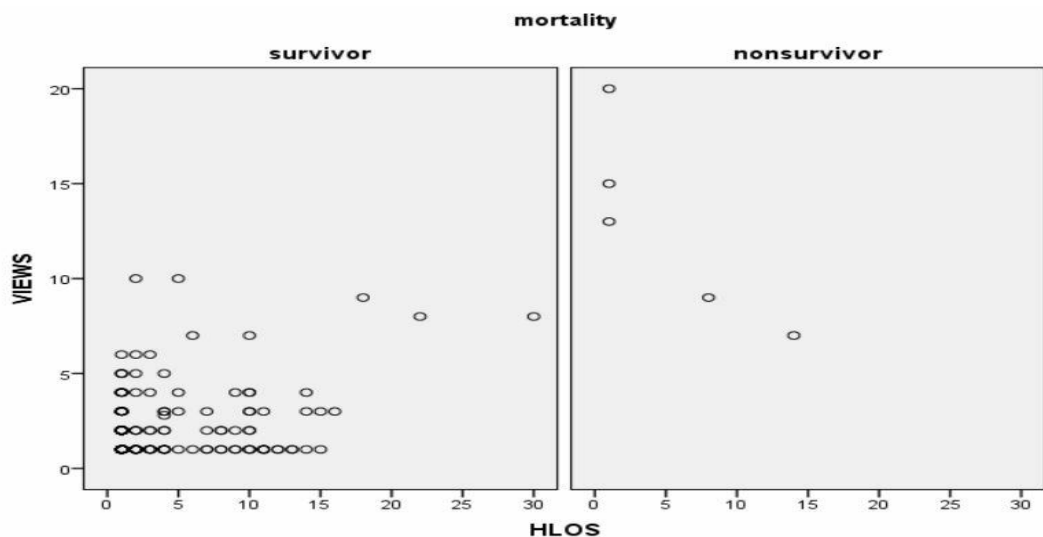
Figure 4.Correlation analysis between VİEWS and mortality

DISCUSSION

In our study, the ability of ISS, RTS, and ViEWS scoring systems to predict short-term mortality was investigated in multi-trauma patients. To the best of our knowledge, this is the first study in the literature to compare the AUC values of these scoring systems. It was concluded that ISS, RTS, and ViEWS could be used as independent predictors for short-term mortality, and none of these scoring systems had superiority over the others in this respect.

The ability of scoring systems developed for pre-hospital evaluation to predict mortality and prognosis has been previously discussed in the literature[7,8,13-17].

In their study with elderly trauma patients, Javali et al. showed a significant relationship of mortality with ISS, RTS, the New Injury Severity Score, and the Trauma Injury Severity Score (TRISS). The authors determined the cut-off values of ISS, NISS, RTS, and TRISS as 15, 17, 7.108, and 91.6, respectively, at which the sensitivity values of TRISS and RTS were higher than the other trauma systems and the specificity values of NISS were higher than the other trauma systems[18]. In a study by Ünlü et al. conducted with ICU patients, RTS and TRISS had a significant relationship with mortality in trauma patients[19]. In a retrospective study of trauma patients over 65 years of age, the relationship between ISS and RTS and

mortality was statistically significant[20]. In another study evaluating the predictability of RTS and ISS in elderly trauma patients, the cut-off values were ≤6 and ≥13.5, respectively, at which the sensitivity values of RTS were higher than ISS and the specificity values were similar[21]. Çetinkaya et al. prospectively evaluated patients presenting to the emergency department and determined the cut-off, sensitivity, and specificity values of ViEWS as 10.83, 78.95%, and 89.73%, respectively (22). In our study, the cut-off value was > 18 for ISS, ≤ 4.653 for RTS, and > 6 for ViEWS (sensitivity: 80%, 60%, and 100%; specificity: 86.98%, 100%, and 98.37%, respectively). The AUC values of ISS, RTS, and ViEWS were 84.7, 79.5, and 99.6, respectively, with no statistically significant difference among the scoring systems.

In their 2020 study evaluating geriatric trauma cases, Jiang et al. revealed a relationship between length of hospital stay and mortality. In addition, in this study, ISS, NISS, and TRISS outperformed APACHE II (Acute Physiology and Chronic Health Evaluation II) in terms of in-hospital mortality[23]. Similarly, Adıyaman et al. showed the presence of a relationship between mortality and length of hospital stay. In this study, it was also stated that low RTS increased mortality[24]. In the current study, consistent with the literature, a significant relationship was found between length of hospital stay and mortality. However, we observed no significant relationship between the length of hospital stay and any of the scoring systems evaluated. In the mortality group, length of hospital stay had no correlation with ISS and RTS, but it had a very high level of negative correlation with ViEWS.

In a study in which 200 trauma patients over the age of 60 were examined, 83% of the patients were discharged after hospital treatment and 17% died[18]. In ICU studies, the rate of cases that died due to trauma-related causes can reach 20% or higher[19,24,25]. Since we conducted our study in the emergency department, we expected the mortality rates to be lower and investigated the results of the first 24-hour outcomes and 30-day mortality data.

Priterch et al. emphasized that the first 24 hours was the riskiest period in the mortality evaluation of trauma patients, and they found a significant relationship between the first 24-hour mortality and ViEWS (12). In a study including 106 trauma patients, 5.7% were referred to the ICU of an external center and 18.9% died after treatment[24]. In a retrospective study conducted with 502 patients, Jo et al. reported

that 36.8% of the patients were admitted to the ICU while the remaining 63.2% were admitted to hospital clinics, and a statistically significant relationship was found between ICU and inpatient clinic admission and mortality[25]. In a study examining trauma patients followed up in the ICU, 68.5% of the patients were admitted to inpatient clinics and 19.4% died. A statistically significant relationship was found between hospitalization and mortality[26]. In our study, within the first 24 hours of presentation, 19.1% of the patients were admitted to inpatient clinics, 1.8% were admitted to the ICU, and three patients (0.68%) died. In the examination of 30-day mortality, we determined that one patient (12.5%) who had been admitted to the ICU and one (1.2%) who had been admitted to a clinic died. No mortality was observed in any of the patients who were discharged from hospital or referred to an external center, and these results were statistically significant. In our evaluation of prognosis and discharge from hospital within the first 24 hours, we found that ISS, RTS, and ViEWS had a statistically significant relationship with prognosis.

In a study conducted with 502 trauma patients, 31.8% required surgery, but no statistically significant relationship was found between surgery requirement and mortality[25]. Similarly, in another study including 108 trauma patients, 6.5% of them were admitted to the ICU after an operation, and no statistically significant relationship was found between surgery requirement and mortality[26]. In their retrospective study examining 30-day mortality, Yazar et al. also did not find a significant relationship between surgery requirement and mortality[27]. In the current study, all cases that resulted in mortality were in the non-operated group, and as a contribution to the literature, we also investigated the relationship of ISS, RTS, and ViEWS with surgery requirement and found that all three scoring systems were statistically significantly correlated with surgery requirement. Our study aimed to compare anatomical and physiological scoring systems. Although it has been determined that each of these systems is effective in determining prognosis, it has also been observed that they do not have superiority over each other. This may also indicate the need for new and improved scoring systems. Early intervention for the patient and the predictability of the prognosis cannot be achieved with only anatomical examination, and physiological parameters alone may be insufficient to determine the prognosis. On the other hand, scoring systems that are easy to apply by physicians should be

preferred in order to make the most effective triage at the earliest time in emergency departments where patient admission for 24 hours is over 1,000. Our study showed that ISS, RTS, and ViEWS alone are effective in determining prognosis in trauma patients. This is important in terms of expanding the field of preference of the physician in first care.

In our prospective study, the scores were calculated according to the patients' presentation complaints and lesions. During the follow-up, control examinations could not be performed, and possible changes in scores could not be observed due to their early admission to inpatient clinics or the ICU.

In this study, in addition to their relationship with mortality, it should be kept in mind that the investigated scoring systems may also be related to the length of hospital stay and surgery requirement. It was observed that ISS, RTS, and ViEWS had a significant relationship with 30-day mortality. There was also no statistically significant difference in terms of the ISS, RTS, and ViEWS according to the length of hospital stay and surgery requirement. Scoring systems are widely used in emergency departments and ICUs not only for triage purposes but also as prognostic indicators. Comprehensive studies are required to gain knowledge on using existing scoring systems more effectively and developing new scoring systems.

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