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Severity indexes of blunt trauma victims in intensive therapy: prediction capacity for mortality*

Índices de gravidade em vítimas de trauma contuso na terapia intensiva: capacidade preditiva de mortalidade

Índices de gravedad en las víctimas de traumas contusos en los cuidados intensivos: capacidad predictiva de la mortalidad

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Kézia Porto Lima[1,2]
Lilia de Souza Nogueira[1]
Genesis Barbosa[1,3]
Ane Karoline Silva Bonfim[1]
Regina Marcia Cardoso de Sousa[1]

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[1] Universidade de São Paulo, Escola de Enfermagem, Programa de Pós-Graduação em Enfermagem na Saúde do Adulto, São Paulo, SP, Brazil.

[2] Faculdade dos Carajás, Marabá, PA, Brazil.

[3] Universidade Federal do Rio de Janeiro, Campus Professor Aloísio Teixeira, Macaé, RJ, Brazil.

ABSTRACT

Objective: To identify the predictive capacity for mortality of the indexes *Revised Trauma Score, Rapid Emergency Medicine Score, modified Rapid Emergency Medicine Score*, and Simplified Acute Physiology Score III in blunt trauma victims hospitalized in an intensive care unit and compare their performance. **Method:** Retrospective cohort of patients with blunt trauma in an intensive care unit from medical records. *Receiver Operating Characteristic* and a 95% confidence interval of the area under the curve were analyzed to compare results. **Results:** Out of 165 analyzed patients, 66.7% have received surgical treatment. The mortality in the intensive care unit and in the hospital was 17.6% and 20.6%, respectively. For the mortality in the intensive care unit, the area under the curve varied from 0.672 to 0.738; however, better results have been observed in surgical patients (0.747 to 0.811). Similar results have been observed for in-hospital mortality. In all analyses, the areas under the curve of the indexes presented no significant difference. **Conclusion:** The accuracy of the severity indexes was moderate, with an improved performance when applied to surgical patients. The four indexes presented a similar prediction for the analyzed outcomes.

DESCRIPTORS

Wounds and Injuries; Severity of Illness Index; Trauma Severity Indexes; Mortality; Prognosis; ROC Curve.

Corresponding author:
Genesis Barbosa
Av. Aloísio da Silva Gomes, 50,
Granja dos Cavaleiros
CEP 27930-560 – Macaé, RJ, Brazil
genesis@ufrj.br

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INTRODUCTION

Trauma is an important public health problem in Brazil and worldwide due to its high death rate or severe consequences which lead to temporary or permanent disabilities of its victims. According to information of the Informatics Department of Brazil's Unified Health System (*Departamento de Informática do Sistema Único de Saúde do Brasil* – DATASUS), in 2008, there were 135,936 deaths by external causes in Brazil; in 2017, the mortality due to this occurrence was 158,657 cases[1], leading to a 17.0% increase in only one decade, whereas the population growth in that period was 9.5%[2].

The data of DATASUS of the last 20 years still point external causes as having the main responsibility for the deaths in the age group from 1 to 49 years; in 2017, 72.1% of deaths of individuals aged 15 to 29 were due to trauma[1].

Guaranteeing a better care for trauma victims depends on the efficiency of all professionals involved in their care, from care in the trauma setting to the complete treatment in an intra-hospital environment, which will be concluded with the rehabilitation and reinsertion of this individual in society[3]. The professional involved in all these steps must understand the severity of the clinical condition of the trauma victims to adopt immediate conducts of intervention and screening, planning care and qualifying services involved in this care[4-5].

To meet this purpose, mortality and prognosis scores, commonly named severity indexes, were developed[6-7]. There are many severity indicators which may be used for trauma victims: those which are specific for traumatic occurrence, those elaborated for individuals which receive care in emergency services and, in severe cases and referred to the Intensive Care Unit (ICU), there are indexes which are particular to patients of these units.

Trauma victims are frequent in ICU and their risk of death characterizes them as a group whose clinic severity is of great interest. However, choosing an appropriate instrument to this end constitutes a challenge. In the literature, the Revised Trauma Score (RTS)[8], Rapid Emergency Medicine Score (REMS)[9], modified Rapid Emergency Medicine Score (mREMS)[10], and the Simplified Acute Physiology Score III (SAPS III)[11] stand out as physiological indexes to estimate the severity of patients admitted in the emergency services and ICU.

One of the most used trauma severity indexes is the prognosis index RTS, developed in 1989, whose coefficients derive from a logistic regression analysis applied to the broad database Major Trauma Outcome Study[8].

The REMS is a physiological severity index used in emergency derived from Acute Physiologic and Chronic Health Evaluation II (APACHE II), which requires rapid evaluation for the obtention of physiological parameters and provides for immediate calculation, with no use of laboratory or complementary exams[9].

Although studies have considered the use of REMS as appropriate for trauma victims, researchers have identified that this score should be adjusted to provide a better prediction of these patients' mortality. Thus, mREMS was developed and published in 2017[10].

When validating this new version of the index, researchers have identified that mREMS has provided precise predictions for in-hospital mortality, surpassing Injury Severity Score (ISS) and Shock Index (SI), paralleling RTS and Mechanism, Glasgow Coma Score, Age, and Arterial Pressure (MGAP). Consequently, mREMS is considered a simple, objective, and valuable tool for trauma victims in the emergency setting[10].

To evaluate the severity of ICU patients, the index SAPS III[11] is currently applied; this is a uniform system which is internationally accepted for this objective, a result of an improvement of APACHE and versions of SAPS.

The use of the severity indexes, in addition to trauma records, holds diverse possibilities of clinical and scientific application to provide a better description and classification of trauma victims. In this sense, the improvement of indexes used to measure the severity of trauma victims is under ongoing development[4,7]. There are many severity indexes which may be employed in care of trauma victims in different moments of their care; however, it is important to identify those which offer appropriate precision.

Given the presented aspects, this study has the objectives of identifying the capacity of mortality prediction, both in ICU and in-hospital, of RTS, REMS, mREMS, and SAPS III in blunt trauma victims admitted to the ICU and comparing their performance.

METHOD

Design of study

This is a retrospective cohort study which computed information from medical records of trauma patients from their admission in emergency to hospital discharge.

Scenario

This study was conducted in a reference ICU which has 24 beds and specialized in Surgical Emergencies and Trauma, providing care to cases of high-complexity trauma in the state of São Paulo, Brazil.

Selection criteria

The sample comprised all patients meeting the following eligibility criteria: victims of blunt trauma, aged 18 or older, and admitted to the ICU from August 1, 2014 to July 31, 2016. Blunt and penetrating trauma have different etiologies, clinical manifestations, treatments, and mortality, circumstances which indicate distinct analyses for these types of trauma. During data collection, 90% of people receiving care in this study's local presented blunt trauma. Consequently, an analysis of the indexes in victims of this type of lesion was opted for.

Those excluded from the sample comprised individuals who made it to the emergency service 24 hours after trauma, victims of hanging, choking, drowning, or nearly drowning, poisoning, burn, and electrocution. The exclusion of those who arrived at the emergency service 24 hours from the trauma was established taking into account that the initial clinical conditions of the victims of trauma are used to calculate the indexes and pointed out as important indicators of mortality or survival. The victims of the external causes previous cited were excluded, considering the important specificities of the physiopathology of these traumas in face of the others.

Data collection

From a consultation to the records of patient admission at the study's ICU, a list of patients which met the study's eligibility criteria was produced. Based on this list, the institution's Medical and Statistical Archive Service was asked for the location of the medical records for consultation and compilation of data of interest to this study.

The analysis of the medical records has enabled verification of whether patients met the eligibility criteria, as well as filling two forms used for data collection. The data included in the first instrument provided for the calculation of RTS, REMS, and mREMS from admission registers of victims in the emergency department, the identification of surgical and non-surgical patients, deaths and survivals during hospitalization, in addition to sample characterization (sex, age, external cause, type of prehospital support and length of hospital stay). The index SAPS III, which refers to severity and is regularly applied in the ICU by the medical team, had its score transcribed to the second data collection instrument, which also included information on admission until discharge from the ICU.

Considering that the analyzed severity indexes were elaborated for predicting ICU[11] or in-hospital[8-10] mortality, analyses which considered mortality in the ICU and during hospitalization as a dependent variable were performed.

The independent variables for this investigation were RTS, REMS, mREMS, and SAPS III. The calculation of the index RTS is based on the Glasgow Coma Scale (GCS), value for systolic blood pressure (SBP) and respiratory rate (RR). To estimate the probability of survival of the trauma victim, values from zero to 4 are attributed to each physiological parameter measured in hospital admission, which are subsequently multiplied by their weights (0.9368 for GCS, 0.7326 for SBP, and 0.2908 for RR) and summed[8]. The index RTS may range from zero to 7.8408 and the higher the final value, the best is the victim's prognosis. The probability of survival for trauma victims presents correspondence with the RTS score, as proposed by the authors of this index[8].

The index REMS comprises GCS, heart rate (HR), mean arterial pressure (MAP), RR, oxygen saturation (SaO2), and age. According to the values observed in the admission to the emergency service, these variables received a score from zero to four, except for age, which ranges from zero to six; the total REMS score is the sum of the score obtained in these variables[9]. The calculation of mREMS includes age, SBP, HR, RR, SaO2, and GCS. Scores from 0 to 4 are attributed to the values observed in these parameters, except for GCS, whose score ranges from 0 to 6; the mREMS value is the sum of these scores[10]. The scores of REMS and mREMS vary from zero to 26 and higher scores indicate higher risk of death[9-10].

In the application of SAPS III, the values of three groups of variables are used: age and information on previous health status (comorbidities, length of hospital stay and intra-hospital location before ICU admission, and use of vasoactive drugs); circumstances of ICU admission (reasons for ICU hospitalization, anatomic site of surgery, if applicable, type of ICU admission – planned or unplanned, surgical status, and presence of nosocomial and/or respiratory infection), and physiological variables (body temperature, SBP, HR, oxygenation, arterial pH, creatinine, bilirubin, hematocrit, leukocytes, platelets, and GCS). To score in this index, the worst values attributed to the physiological variables are considered in the first hour of patient hospitalization in the ICU[11]. Each SAPS III item has a specific score and the final score is the sum of these values. The lowest score which can be attributed to the index is 16 and the highest is 217; the higher the score, the more severe is the patient health status. When this score is converted by logistic regression equation, the index shows the probability for hospital mortality[4,11].

Data analysis and treatment

This study's computerized database was built with the Statistical Package for the Social Sciences (SPSS) software version 22, which was used in statistical tests, abiding by an orientation from a specialist in this area. Except for SAPS III, which was transcribed from the medical records, the other indexes were calculated in an electronic spreadsheet.

Inferential analyses were performed to evaluate the performance of the severity indexes (RTS, REMS, mREMS, and SAPS III) and compare their capacity for predicting death of victims during hospitalization in the ICU and in the hospital, considering separately the total cases and the patients submitted or not to surgical treatment. The diagnostic proof Receiver Operating Characteristic (ROC curve) was used to analyze the performance of these indexes. The cut point was identified through the Youden index and the values for sensitivity, specificity, predictive positive value (PPV), and predictive negative value (PNV) were calculated. The difference in index performance was identified through analysis of area under curve (AUC) and 95% confidence interval (95%CI).

Ethical aspects

The study was approved by the Research Ethics Committee of the institution (protocol n. 2.490.677). All patient data were saved and protected in a computer, with access restricted to this study's researchers, ensuring the safety and anonymity of the collected information.

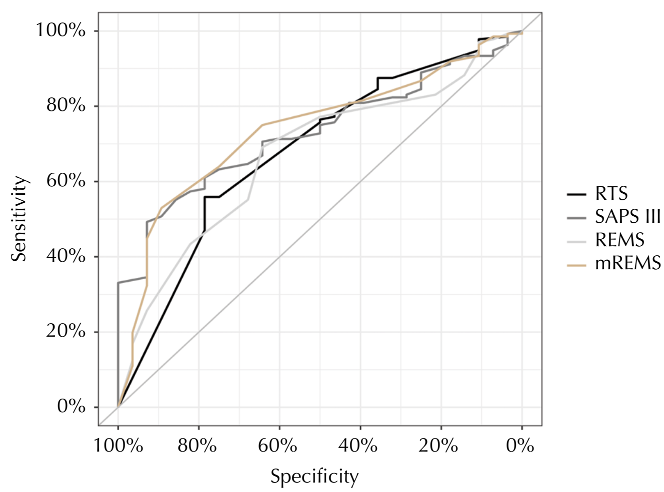
RESULTS

The study population comprised 165 blunt trauma victims admitted to the ICU with a mean age of 38.5 and a standard deviation (SD) of 15.4 years. Concerning sex, men were prevalent, representing 81.2% of the total sample. The external cause with the most occurrences was motorcycle accident (33.3%), followed by being run over (27.3%), and falling (20.6%). In 43.0% of cases, the victims got to the emergency unit through basic life support; however, more than half the victims (53.4%) received care through air (35.8%) or ground (17.6%) advanced life support.

Out of the analyzed sample, 110 patients (66.7%) were submitted to surgical treatment. The mean of length of stay for ICU patients was 16.8 days (SD = 33.4) and, in the hospital, 24.6 days (SD = 40.6). A total of 29 patients (17.6%) died in intensive care and the in-hospital mortality rate was 20.6%; five patients died in the hospital after ICU discharge.

The survival rate estimated by RTS in the cases ranged from 98.8% to 2.7% and survival lower than 50% was estimated to be 18.7%. The mean REMS was 4.8 (SD = 3.42); scores ≥ 6 and ≤ 13 have been observed in 35.7% of the cases and > 13 in 1.2%. The mean mREMS was 5.1 (SD = 3.7) and 41.2% of the victims had scores ≥ 6 and ≤ 13, whereas 1.8% had a score > 13. The mean SAPS III was 48.6 (SD = 17.1) and most victims had a score between 32 and 67.

The AUC/ROC for ICU mortality of blunt trauma victims were close to 0.70 for all the analyzed indexes (variation from 0.672 to 0.738), as observed in Figure 1.



ROC - Receiver Operating Characteristic; RTS - Revised Trauma Score; SAPS III - Simplified Acute Physiology Score III; REMS - Rapid Emergency Medicine Score; mREMS - modified Rapid Emergency Medicine Score; ICU - Intensive Care Unit (n = 165).

Figure 1 – ROC Curves for the indexes RTS, SAPS III, REMS, and mREMS to distinguish, in trauma victims, the deaths and survivals upon ICU discharge – São Paulo, SP, Brazil, 2014-2016.

The results provided in Table 1 show that AUC/ROC for ICU mortality were similar to in-hospital mortality in all indexes, according to the observed 95%CI. Also, the 95%CI indicated, in the comparison of index performance, no statistical difference for the results of AUC/ROC at a 0.05 level, as they present overlapping values, according to results in Table 1.

The SAPS III has presented a higher AUC than the other indexes when in-hospital mortality was analyzed, and it was similar to mREMS for ICU mortality. However, SAPS III presented a lower sensitivity and PNV than the other indexes for the two analyzed outcomes.

Table 1 – Predictive capacity of RTS, REMS, mREMS, and SAPS III for ICU and in-hospital mortality – São Paulo, SP, Brazil, 2014-2016.

ROC Metrics	ICU Mortality			
	RTS	REMS	mREMS	SAPS III
AUC/ROC	0.682	0.672	0.738	0.731
95%CI	0.574–0.789	0.569–0.775	0.646–0.831	0.646–0.815
Cut point	6.2	5.5	4.5	44.5
Sensitivity	78.6%	69.1%	52.9%	49.3%
Specificity	55.9%	64.3%	89.3%	92.9%

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ROC Metrics	ICU Mortality			
	RTS	REMS	mREMS	SAPS III
PPV	26.8%	90.4%	96.0%	97.1%
PNV	92.7%	30.0%	28.1%	27.4%
ROC Metrics	In-hospital mortality			
	RTS	REMS	mREMS	SAPS III
AUC/ROC	0.646	0.637	0.688	0.734
CI95%	0.541–0.752	0.535–0.738	0.589–0.787	0.652–0.816
Cut point	6.2	5.5	6.5	44.5
Sensitivity	72.7%	68.7%	74.8%	50.4%
Specificity	55.7%	57.6%	57.6%	90.9%
PPV	29.3%	86.5%	87.5%	95.6%
PNV	89.0%	31.7%	36.5%	31.6%

AUC/ROC - Area Under Curve/Receiver Operating Characteristic; RTS - Revised Trauma Score; REMS - Rapid Emergency Medicine Score; mREMS - modified Rapid Emergency Medicine Score; SAPS III - Simplified Acute Physiology Score III; ICU - Intensive Care Unit; CI - Confidence Interval; PPV – Predictive Positive Value; PNV – Predictive Negative Value (n = 165).

Table 2 shows that, for surgical patients, RTS, REMS, and mREMS presented the highest AUC/ROC when ICU mortality is analyzed; however, SAPS III presented a similar value for ICU and in-hospital mortality. In the 95%CI analysis, the other indexes, RTS, REMS, and mREMS, also presented results that did not significantly differ between the conditions leaving the ICU and the hospital.

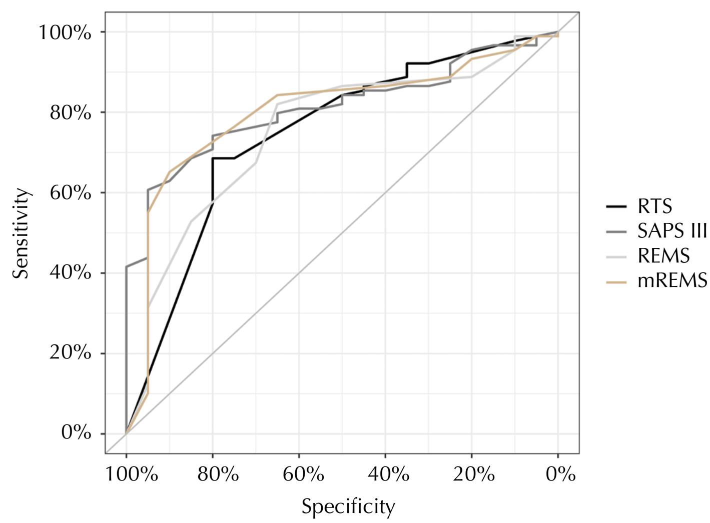
The data in Table 2, with the ROC curves of the indexes presented in Figure 2, show an AUC between 0.747 and 0.811 in the prediction of ICU mortality of trauma victims submitted to surgical treatment. The SAPS III and the mREMS presented the highest AUC, with values above 0.80; however, the lowest sensitivity values and PNV were found for these indexes. In this analysis, the 95%CI have also indicated similarities in the performance of the four indexes. For in-hospital mortality in this group, SAPS III presented the highest AUC (0.818) value, with no significant difference from the other ones, since the 95%CI overlap (Table 2).

Table 2 – Predictive capacity of RTS, REMS, mREMS, and SAPS III for mortality in ICU and in-hospital of blunt trauma victims undergoing surgical treatment – São Paulo, SP, Brazil, 2014-2016.

ROC Metrics	ICU Mortality			
	RTS	REMS	mREMS	SAPS III
AUC/ROC	0.747	0.753	0.802	0.811
CI95%	0.627–0.868	0.636–0.870	0.697–0.907	0.726–0.896
Cut point	6.2	5.5	4.5	44.5
Sensitivity	80.0%	82.0%	65.2%	60.7%
Specificity	68.5%	65.0%	90.0%	95.0%
PPV	36.4%	91.2%	96.7%	98.2%
PNV	93.8%	44.8%	36.7%	35.2%
ROC Metrics	In-hospital mortality			
	RTS	REMS	mREMS	SAPS III
AUC/ROC	0.703	0.706	0.737	0.818
CI95%	0.584–0.822	0.589–0.824	0.622–0.852	0.736–0.900
Cut point	6.2	5.5	6.5	44.5
Sensitivity	72.0%	82.1%	84.5%	63.1%
Specificity	69.0%	56.0%	56.0%	92.0%
PPV	40.9%	86.2%	86.6%	96.4%
PNV	89.2%	48.3%	51.8%	42.6%

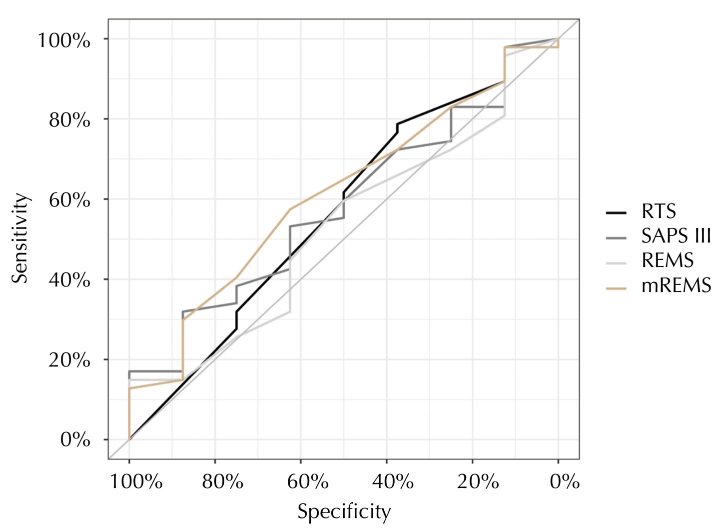
AUC/ROC - Area Under Curve/Receiver Operating Characteristic; RTS - Revised Trauma Score; REMS - Rapid Emergency Medicine Score; mREMS - modified Rapid Emergency Medicine Score; SAPS III - Simplified Acute Physiology Score III; ICU - Intensive Care Unit; CI - Confidence Interval; PPV – Predictive Positive Value; PNV – Predictive Negative Value (n = 110).

Figure 3 shows results that indicate an unsatisfactory performance of the indexes used to estimate the ICU mortality of blunt trauma victims with no surgical treatment. All indexes present AUC quite close to 0.50: 0.568 (95%CI: 0.333–0.803) for RTS; 0.528 (95%CI: 0.307–0.749) for REMS; 0.612 (95%CI: 0.402–0.821) for mREMS and 0.582 (95%CI: 0.373–0.792) for SAPS III.



ROC - Receiver Operating Characteristic; RTS - Revised Trauma Score; SAPS III - Simplified Acute Physiology Score III; REMS - Rapid Emergency Medicine Score; mREMS - modified Rapid Emergency Medicine Score; ICU - Intensive Care Unit (n = 110).

Figure 2 – ROC Curves for the indexes RTS, SAPS III, REMS, and mREMS for ICU mortality of trauma victims submitted to surgery– São Paulo, SP, Brazil, 2014-2016.



ROC - Receiver Operating Characteristic; RTS - Revised Trauma Score; SAPS III - Simplified Acute Physiology Score III; REMS - Rapid Emergency Medicine Score; mREMS - modified Rapid Emergency Medicine Score; ICU - Intensive Care Unit (n = 55).

Figure 3 – ROC Curves of the indexes RTS, SAPS III, REMS, and mREMS for ICU mortality of trauma victims with no surgical treatment – São Paulo, SP, Brazil, 2014-2016.

Identical values have been observed for in-hospital mortality. No blunt trauma victim with no surgical treatment died after ICU discharge; therefore, the unsatisfactory performance of the indexes was equivalent for estimating the ICU and in-hospital mortality of these patients.

DISCUSSION

To analyze the performance of these indexes regarding their capacity to differentiate deaths and survivals in the ICU and in the hospital, the ROC curve was applied, prioritizing AUC/ROC, considering its ability in indicating the overall prognosis capacity of the instruments. The analysis of the result of this statistic in the total cases of the investigation has shown a reasonable performance for the instruments of clinical practice, with a more satisfactory prognostic capacity for mREMS and SAPS III in the ICU and SAPS III in the prediction of in-hospital mortality (AUC/ROC higher than 0.70)[12], although this difference has not reached the statistical significance level established in this study.

With the cut point established by the Youden index, SAPS III presented the worst sensitivity and PNV in relation to the other instruments, identifying approximately half of the deaths in the cases: 49.3% of ICU deaths and 50.4% of in-hospital deaths (values of the sensitivity); also, when SAPS III indicated survival, it has correctly prognosed only 27.4% of the ICU cases and 31.6% in the hospital (PNV).

On the other hand, SAPS III has presented a high specificity and PPV; it was thus a positive index to identify survival in the cases (it has indicated 92.9% and 90.9% of ICU and in-hospital survivals, respectively) and when indicating death, it has correctly prognosed most cases (97.1% in the ICU and 95.6% in the hospital).

Differently from other indexes, RTS presented higher values of sensitivity and PNV than specificity and PPV; however, when interpreting these results, it is crucial to consider that the highest scores of this index point a higher probability of survival, whereas for the other instruments higher scores indicate death.

Taking this aspect into account, RTS and SAPS III had a higher capacity of identifying survivals than deaths in the cases, whereas REMS has identified these outcomes in a similar way and mREMS has better identified the individuals who died in the hospital than in the ICU (74.8% and 52.9% sensitivity, respectively).

Severity indexes are instruments elaborated for clinical practice aiming at evaluating the quality of care provided to patients and the planning of emergency care[13-14]. In this sense, its capacity of correctly identifying individuals with a high probability of dying or living is of particular interest. Consequently, the AUC/ROC which quantified the general capacity of the indexes to perform this identification and correctly identify death and survival has provided a synthesis of the results of interest for this investigation.

As per AUC/ROC, the victims submitted to surgical treatment had a better performance in mortality prediction in ICU than those which did not receive such treatment - AUC/ROC variation between 0.747 and 0.811 for surgical cases and between 0.528 and 0.612 for the other ones. In the surgical cases, SAPS III and mREMS achieved a positive differentiating capacity with an AUC/ROC superior to 0.80. However, in non-surgical cases, the indexes had an unsatisfactory performance (AUC/ROC < 0.70); in addition, in Figure 3, the REMS has been overcome in certain segments by reference of the ROC curve. This diagonal line in the graph represents the behaviors of indexes if the scores produce no information on victim prognosis. The REMS lines suggest thus that in some scores the index has no differentiating capacity for ICU mortality of trauma victims not submitted to surgical treatment.

Concerning the in-hospital death in victims with surgical treatment, similar results to those related to ICU mortality were found and, again, there was an improvement in the AUC/ROC values when the surgical patients were analyzed.

The values for AUC/ROC presented in the original articles of the indexes selected for this investigation were: 0.852 (SD = 0.014) for the REMS[9], 0.967 (95%CI: 0.963–0.971) for the mREMS[10] and 0.83 for SAPS III[11]. The screening RTS, which includes the values of GCS, SBP, and RR of the victims in the scene of the traumatic event, has identified more than 97% of the non-survivors in the investigation presented in its first publication, in the Journal of Trauma in 1989[8].

In the current research, the AUC/ROC between the indexes was similar when ICU and in-hospital mortality in the total cases was analyzed and when patients submitted or not to surgery were separately investigated. Thus, the prognostic capacity of RTS, REMS, mREMS, and SAPS III was equivalent. In the literature review, no articles comparing SAPS III with the other indexes analyzed in this investigation was found. Concerning mREMS, the comparison between indexes was found only in the original publication, commented on in this study's introduction.

The REMS was confronted to RTS in three studies, in which other indexes were also included among the comparisons[15-17]. In these studies, REMS and RTS had a similar performance; in two of these investigations, the indexes presented an excellent prognostic capacity, AUC/ROC of 0.91 and 0.9 for REMS and 0.89 and 0.924 for RTS[15,17]. Acceptable values, of 0.72 and 0.77 of AUC/ROC, have been observed in another study[16].

The SAPS III is a severity index of disease in the ICU; consequently, its application to trauma victims was not observed in the literature, although studies have applied its previous version, SAPS II, to this population. However, values for the AUC/ROC of this index referring to diverse clinical situations have been found. These were patients hospitalized in a general ICU (AUC 0.73) and (AUC 0.901)[18-19]; organ transplants in general (AUC 0.696)[20]; hepatic transplants (AUC 0.612)[20]; kidney transplants (AUC 0.459)[20]; lung transplants (AUC 0.792)[21]; patients hospitalized in a coronary unit (AUC 0.84)[21]; after cardiopulmonary arrest (AUC 0.621) and (AUC 0.74)[22-23]; cancer patients (AUC 0.948)[24] and septic shock (AUC 0.817)[25]. The variation in the value of AUC/ROC was 0.459 to 0.948. The worst accuracy was observed in kidney transplants[20] and the best in cancer patients[24].

In the studies comparing SAPS III to other indexes, analyses with SAPS II and APACHE II were frequent. In general, SAPS II has presented a better performance than SAPS III when their AUC/ROC are compared and SAPS III has surpassed APACHE[18-20,24-26].

Given the high in-hospital mortality identified in this study (20.6%), the frequency of REMS and mREMS cases with score > 13 was small (lower than 2%); this cut point for the index is considered a warning of a high risk of death[9-10]. Therefore, the scores of these indexes did not reflect the severity of the analyzed cases.

Results more adjusted to the observed mortality were found in RTS and SAPS III. Regarding RTS, 18.7% of the cases presented an estimate of survival probability of 50% or lower; there was thus a high probability of death. The mortality observed in the ICU, 17.6%, and the mean value of SAPS III of the victims were also convergent upon observation of the mean score of the index indicating a 15.9% probability of death in the ICU when converted by regression equation.

This research presents as limitations the search for data in medical records and the conduction of this study with information from one ICU only, which specialized in providing care to trauma victims, located in a hospital which provided service only to patients referred by its emergency department. The absence of a database of systematized registers, containing relevant data of trauma victims, as observed in developed countries, made the conduction of this study harder and less safe.

The characteristics of the study site have certainly added specificities to the analyzed cases: 53.4% of the participants got to the emergency department in air or ground advanced life support. This high percentage of pre-hospital care indicates the identification of severe clinical conditions in most victims in the setting of occurrence. Also, the presence of nurses and physicians in these units provided for the early conduction of invasive and complex procedures which influence the time of survival of the victims, such as advanced respiratory procedures and use of medication related to cardiopulmonary resuscitation[27]. These procedures, when started in pre-hospital care, may stabilize the circulatory and ventilatory conditions of the victims and attenuate the severity indicated by RTS, REMS, and mREMS, which use in its calculation the vital signs measured in the emergency department.

CONCLUSION

The prognostic capacity of RTS, REMS, mREMS, and SAPS III was moderate and similar, with no preferential indication of one of these scores for use in the clinical practice. Also, the best performance achieved by the indexes upon their application to surgical patients suggests that this group of victims will receive more benefits than the non-surgical patients with the use of these indexes.

RESUMO

Objetivo: Identificar a capacidade preditiva de mortalidade dos índices *Revised Trauma Score*, *Rapid Emergency Medicine Score*, *modified Rapid Emergency Medicine Score* e *Simplified Acute Physiology Score III* em vítimas de trauma contuso internadas em unidade de terapia intensiva e comparar seu desempenho. **Método:** Coorte retrospectiva de pacientes com trauma contuso de uma unidade de terapia intensiva a partir do registro em prontuários. *Receiver Operating Characteristic* e intervalo de confiança de 95% da área sob a curva foram analisados para comparar os resultados. **Resultados:** Dos 165 pacientes analisados, 66,7% tiveram tratamento cirúrgico. A mortalidade na unidade de terapia intensiva e no hospital foi de 17,6% e 20,6%, respectivamente. Para mortalidade na terapia intensiva, houve variação das áreas sob a curva entre 0,672 e 0,738; porém, melhores resultados foram observados em pacientes cirúrgicos (0,747 a 0,811). Resultados similares foram observados para mortalidade hospitalar. Em todas as análises, as áreas sob a curva dos índices não diferiram significativamente. **Conclusão:** Houve acurácia moderada dos índices de gravidade, com melhora na performance quando aplicados em pacientes cirúrgicos. Os quatro índices apresentaram predição similar para os desfechos analisados.

DESCRITORES

Ferimentos e Lesões; Índice de Gravidade da Doença; Índices de Gravidade do Trauma; Mortalidade; Prognóstico; Curva ROC.

RESUMEN

Objetivo: Identificar la capacidad predictiva de la mortalidad de los índices *Revised Trauma Score*, *Rapid Emergency Medicine Score*, *modified Rapid Emergency Medicine Score* y *Simplified Acute Physiology Score III* en víctimas de traumas contusos hospitalizadas en una unidad de cuidados intensivos y comparar su rendimiento. **Método:** Cohorte retrospectiva de pacientes con trauma contuso en una unidad de cuidados intensivos a partir de los registros médicos. Se analizaron el *Receiver Operating Characteristic* y el intervalo de confianza del 95% del área bajo la curva para comparar los resultados. **Resultados:** De los 165 pacientes analizados, el 66,7% recibió tratamiento quirúrgico. La mortalidad en la unidad de cuidados intensivos y en el hospital fue del 17,6% y del 20,6%, respectivamente. Para la mortalidad en la unidad de cuidados intensivos, las áreas bajo la curva oscilaron entre 0,672 y 0,738; sin embargo, se observaron mejores resultados en los pacientes quirúrgicos (0,747 a 0,811). Se observaron resultados similares para la mortalidad hospitalaria. En todos los análisis, las áreas bajo la curva de los índices no difieren significativamente. **Conclusión:** La precisión de los índices de gravedad fue moderada, con un mejor rendimiento cuando se aplicaron a pacientes quirúrgicos. Los cuatro índices mostraron una predicción similar para los resultados analizados.

DESCRIPTORES

Heridas y Traumatismos; Índice de la Severidad de la Enfermedad; Índices de Gravidad del Trauma; Mortalidad; Pronóstico; Curva ROC.

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