Research Article

Assessment of the use of TRISS scoring system in polytraumatized patients in Suez Canal university hospital, Ismailia, Egypt

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ABSTRACT

Background: Injuries are a leading cause of the global burden of death and disability for all age groups below age 60. Trauma score systems try to translate the severity of injury into a number. The scores enable physicians to translate different severity of injuries into a common language. Quantitative characterizations of injury are essential for research, and meaningful evaluation of patient outcome, quality improvement, and prevention programs. Aim of the work was to improve the outcome of polytraumatized patients in Suez Canal University Hospital through application of a predictor of outcome scoring system.

Methods: A cross-sectional descriptive study included all Polytraumatized patients attending to the Emergency Department (ED) at the Suez Canal university Hospital during six months from 1/8/2012 to 31/1/2013.

Results: The mortality rates between the studied patients were 11.9% in comparison to 88.1% discharged alive. TRISS showed better sensitivity when compared to RTS & ISS with low false negative rate when compared to both of them. Comparable performances of the RTS, ISS, and TRISS showed RTS as the poorest index, while TRISS was the best.

Conclusions: TRISS showed high specificity and good sensitivity and the negative values are indicative of higher mortality observed in our study than predicted by TRISS and this may be lake of resources and man power or it may be due to delay of arrival of the patients. TRISS showed better sensitivity when compared to RTS and ISS with low false negative value when compared to both of them.

Keywords: Emergency department, Severely traumatized patients, TRISS

INTRODUCTION

Trauma is a major cause of mortality and morbidity. It is the disease of young and the leading cause of death in the first four decades of life.[1] Trauma score systems convert the severity of injury into a number. It make physicians able to convert different severity of injuries into an easy common language. Task of trauma investigators is to develop a trauma severity indices.[2] More than 50 score systems indices for trauma patient's classification.[3]

Trauma and injury severity score (TRISS), introduced in 1981, are a combination index based on Revised Trauma Score (RTS), Injury Severity Score (ISS), and patient's age. The physiological index in combination with anatomic index and age is a powerful predictor of outcome in trauma patients. They combined the trauma score and injury severity score with age to give a new index called TRISS (TS, ISS, Age combination index).[4]

This study was conducted to improve the outcome of polytraumatized patients in Suez Canal University

Hospital through application of a predictor of outcome scoring system.

Patients and methods

A cross-sectional descriptive study included all polytraumatized patients attending to the Emergency Department (ED) at the Suez Canal university Hospital during six months from 1/8/2012 to 31/1/2013. 2013 included 84 Polytraumatized adult patients with injury to several physical regions or organ systems, where at least one injury or the combination of several injuries are life threatening with the severity of injury being equal or above 16 on the scale of the Injury Severity Score (ISS) attended to the Emergency Department (ED) of the Suez Canal university Hospital. The study excluded: Patients transferred from other hospitals after performing any medical or surgical procedure, patient who died on arrival before initial assessment, burned patients, patients discharge on his demand, transferred to other hospitals or escaped, patients with ISS 16 or more with single body region trauma, and patients with two or more body regions trauma with ISS less than 16.

METHODS

In each patient the following data were studied

Full history (from patient or relative) including: Patient personal data: age, sex, occupation and residence, Timing of injury and timing of admission, and mechanism and type of injury according to CDC classification.

Clinical examination

Vital sign, Glasgow Coma Scale and Patients' anatomical injury coded according to the Abbreviated Injury Scale (AIS) to calculate TRISS.

Laboratory measurements

H.b and hematocrit

RESULTS

This study was conducted to assess the use of TRISS scoring system in 84 polytraumatized patients in Emergency Department in Suez Canal university hospital (Table 1). Table 2 shows that Out of 84 patient 74 (88.1%) patients were discharged alive, while 10 (11.9%) patients died. Mortality was maximum in patients of age group >59 yrs.; with statistically significant relation (p value < 0.05) and (t value of 39.9). Time interval between trauma and hospital arrival the studied patients was 30-60 minutes in 90% of patients (Figure 1). Table 3 shows significant relation between decreased systolic blood pressure and mortality of patients. Table 4 shows the assessment of the studied patients according to revised trauma score (RTS).
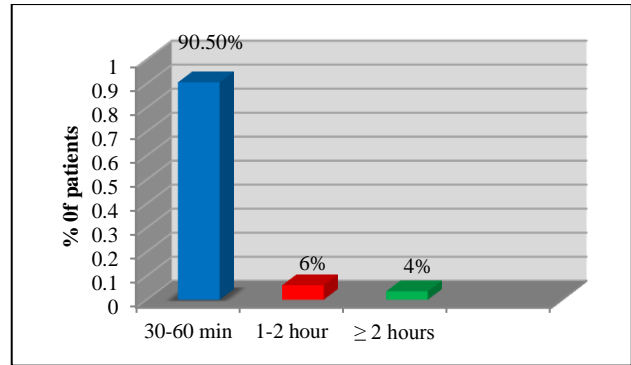

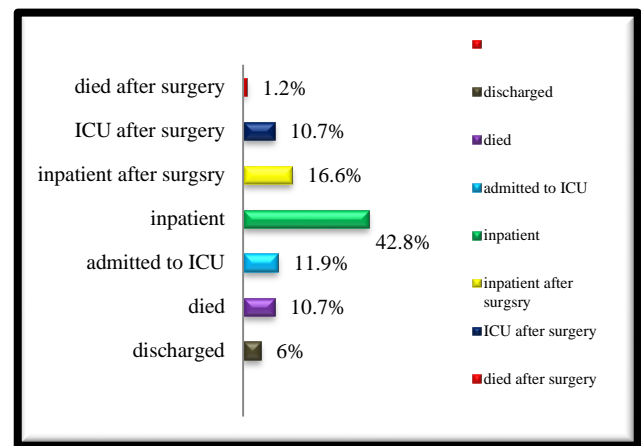**Figure 1: Time interval between trauma and hospital arrival the studied patients.**

Figure 2: Distribution of the studied patients according to their outcome.

Table 1: Personal data of polytraumatized studied patients (n=84).

Characteristic		Number	Percent
	Range Mean±SD	18-70	32.14±12.5
Age	<20 y	10	11.9%
	20-29 y	30	35.7%
	30-39 y	30	35.7%
	40-49 y	5	5.9%
	50-59 y	1	1.2%
	60-70 y	8	9.6%
Sex	Male	69	82.1%
	Female	15	17.9%

Table 5 shows the assessment of the studied patients according to the injury severity score (ISS). And also the cut off for prediction was taken at PS = 50. Table 6 illiterates the assessment of the studied patients according to trauma and injury severity score (TRISS). The cut off for prediction was taken at PS = 0.6. Table 7 shows comparison between RTS, ISS, and TRISS regarding specificity, sensitivity, false negative and false positive rate. Distribution of the studied patients according to their outcome is illustrated in Figure 2.

Table 2: Age-wise mortality between the studied patients.

Age	Number	Alive	Died	Mortality
< 20	10	9	1	10%
20-29	30	27	3	10%
30-39	30	29	1	3%
40-49	5	3	2	25%
50-59	1	1	0	0%
60-70	8	5	3	37.5%

Table 3: Relation between vital signs and mortality.

Vital signs		Mortality	P value
Heart rate	≤ 60 beat/min	20.5%	0.26 (NS)
	60-100 beat/min	5.9%	
	> 100 beat/min	0%	
Systolic BP	> 90 mmHg	6.1%	0.00*
	≤ 90 mmHg	66.6%	
Respiratory rate	≤ 20 /min	17.7%	0.23 (NS)
	> 20 /min	6.9%	

Table 4: Assessment of the studied patients according to revised trauma score (RTS).

RTS	Predicted to live	Predicted to die	Total
Alive	74	0	74
Died	8	2	10
Specificity= 74/74			100%
Sensitivity= 2/10			20%
False negative rate= 8/10			80%
False positive = 0/74			0%
Range			1.163 - 7.841
Mean±SD			7.16±1.2

Table 5: Assessment of the studied patients according to the injury severity score (ISS).

ISS	Predicted to live	Predicted to die	Total
Alive	74	0	74
Died	7	3	10
Specificity= 74/74			100%
Sensitivity= 3/10			30%
False negative rate= 7/10			70%
False positive = 0/74			0%
Range			9 - 50
Mean±SD			26±9.6

The cut off for prediction was taken at PS = 50.

DISCUSSION

As regard to age and sex: Singh J et al 2011, 50% of the patients were between the age group 20-40 years. WHO 1975 reveals that male preponderance is a marked in most communities between victims of trauma.[5] In our study, males comprised 83.7% of the patients. It was comparable with our results in which there were 69 males and 15 females thereby indicating male preponderance. The male to female ratio was 4.6:1.

Table 6: Assessment of the studied patients according to trauma and injury severity score (TRISS).

TRISS	Predicted to live	Predicted to die	Total
Alive	74	0	74
Died	4	6	10
Specificity= 74/74			100%
Sensitivity= 6/10			60%
False negative rate= 4/10			40%
False positive = 0/74			0%
Mean±SD Range	Blunt trauma		86.5±22.5
	Penetrating trauma		95.04±7.35

The cut off for prediction was taken at PS = 0.6.

Table 7: Comparison between RTS, ISS, and TRISS regarding specificity, sensitivity, false negative and false positive rate.

Comparative performance of three indices	RTS	ISS	TRISS
Specificity	100%	100%	100%
Sensitivity	20%	30%	60%
False negative rate	80%	70%	40%
False positive rate	0%	0%	0%

In one study Out of 1000 patient 959 patients were discharged alive, while 41 patients died. Mortality was maximum in patients of age group > 50 years.[6] In agreement with our results, as mortality was maximum in patients of age group > 59 yrs. Out of 84 patients 74 (88.1%) patients were discharged alive, while 10 (11.9%) patients died, which indicate that age was statistically significant related with mortality. Singh J et al, found that there was a graded increase in mortality with increase in delay in arrival.[5] In agreement with our results which found that delay in arrival is strongly related with percent of mortality. As regard to revised trauma score Rabbani A and Moini M, RTS on ED admission was 7.54±1.16.[7] This agrees to our study as it was found that RTS score between the studied patients ranged from 1.163-7.841 with mean of 7.16±1.2. Bilgin NG et al. Sensitivity value of ISS is 85.7% and specificity value is 99.2% when cut off value of ISS was accepted 19. In addition, PPV of ISS is 93.8% and NPV of ISS is 98.1% for this condition.[8] In our results specificity was 100%, sensitivity was 30% and the negative values was (70%) which is indicative of higher mortality observed in our study than predicted by ISS.

Bilgin NG et al, Specificity value of TRISS for blunt trauma is 72.2% and sensitivity value is 95.6% when cut off value of TRISS for blunt trauma was accepted 89.75%. In addition, PPV of TRISS for blunt trauma is 97.8% and NPV of TRISS for blunt trauma is 56.5% for

this condition. Lastly, specificity value of TRISS for penetrating trauma is 70.6% and sensitivity value is 68.8% when cut off value of TRISS for penetrating trauma was accepted 92.2%. In addition, PPV of TRISS for penetrating trauma is 81.5% and NPV of TRISS for penetrating trauma is 54.5% for this condition.[8] Singh J et al, stated that TRISS has a better combination, high specificity, and better sensitivity. With regards to comparison by PER method, RTS and TRISS performed better than ISS.[9] In our results RTS had a good combination of high specificity, low sensitivity, and high false negative rate. Comparable performances of the RTS, ISS, and TRISS showed RTS as the poorest index, while the result of TRISS was the best.

Most of the patients reached between 30-60 min after sustaining injury and it was found that delay in arrival is statistically significant with percent of mortality. There was a graded increase in mortality with decreasing RTS score.

It was found that RTS had a combination of high specificity, low sensitivity and high false negative rate. With increasing ISS, a graded increase in mortality was found and it was found that the ability of ISS to detect survival between patients (specificity) was higher than its ability to detect death (sensitivity). ISS limitations are its one-dimensional representation of the trauma patient's wide variety of multiple injuries as multiple injuries in the same body regions are not taken into consideration, because ISS uses only the highest rather than the overall. TRISS showed high specificity and good sensitivity and the negative values are indicative of higher mortality observed in our study than predicted by TRISS and this may be lake of resources and man power or it may be due to delay of arrival of the patients.

CONCLUSION

TRISS showed better sensitivity when compared to RTS and ISS with low false negative value when compared to both of them. Regarding to the false negative rate RTS showed higher value than TRISS and ISS. Comparable

performances of the RTS, ISS, and TRISS showed RTS as the poorest index, while TRISS was the best.

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