



## Trauma Analysis Related Injury Severity Score (Triss) in Predicting the Prognosis of Politrauma Patients in Adam Malik General Hospital

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**Abstract : Objective :** The purpose of this study was to analyze the ability of TRISS in predicting the prognosis of polytrauma patients in the Haji Adam Malik General Hospital Medan, January 2016 to December 2018.

**Material and Method :** This type of research is an analytic study with cross sectional design, which is a study by measuring independent variables and dependent variables at the same time, which aims to analyze the ability of TRISS in predicting the prognosis of patients in Haji Adam Malik General Hospital Medan January 2016 to December 2018.

**Results :** From January 2016 - December 2018, a total 175 polytrauma patients which mostly was adult patient (>18 y.o) observed. Based on sex, referral status and diagnosis, patients with polytrauma dominated in patients with male sex (143 patients), referred patient (68 patients) and diagnosed with head injury (29 patients).

**Conclusion :** There is an influence between TRISS Score on the prognosis of polytrauma patients.

**Keywords :** TRISS, polytrauma, trauma, trauma prognosis.

### Introduction:

Trauma is one of the main health problems and is a major cause of death in adolescents and young adults. In Indonesia, injury is the number four cause of death, whereas in the age group 15-25 years trauma is the main cause of death. Traffic accidents (KLL) are the most common cause of injury worldwide. Injury due to KLL is a major cause of death and disability in general, especially in developing countries. Based on WHO data in 2000, there were 5.8 million fatal injuries and ranked 7th as the cause of death worldwide. During 2002 the KLL was ranked 11th as a cause of death worldwide and is expected to continue to increase, even in 2020 it is predicted to rank third as the cause of death worldwide as the automotive industry worldwide increases (Levin et al. 2007).

Given the high incidence of trauma, a scoring or scoring system is needed that can change the quality of trauma in the form of scores or numbers (Levin et al, 2007). This scoring system feels necessary because it can predict mortality, compare therapeutic methods, is a pre and inter hospital triage tool, assesses quality improvement and prevention programs, and is a tool for trauma research (Chawda et al, 2004).

According to Becher et al (2013) the scoring system in determining the severity of trauma varies from the beginning of its manufacture. Some scoring systems available include Revised Trauma Score (RTS), Injury Severity Score (ISS), and Trauma Related Injury Severity Score (TRISS). This scoring system was chosen because it is often used in trauma research articles.

RTS assesses the human physiological system as a whole, is the result of perfecting the GCS instrument (Glasgow Coma Scale) to assess the initial condition of head trauma patients. The RTS assessment is carried out immediately after the patient is injured, generally just before entering the hospital or while in the emergency department (Kondo et al, 2011).

ISS is an extensive injury assessment system used to assess injuries based on anatomic injury assessment, which can provide overall scores for patients with multiple injuries. The higher the score, the greater the severity of the patient and its consequences, and the mortality will be higher (Eid and Abuzidan, 2014).

TRISS is a more comprehensive method by combining anatomic and physiological measurements of the severity of the wound (ISS and RTS), and also the patient's age in order to estimate the prognosis of a trauma (Byod et al, 1987). By recognizing the difference between blunt and sharp wounds, the researchers developed different methods for each mechanism of trauma. TRISS can be used for adult patients and children over the age of 12 years (Brilez et al, 2010).

Previous research on the TRISS Score was investigated by BambangGunawan, et al (2017) in polytrauma patients in the Emergency Department of the National Center General Hospital Dr. CiptoMangunkusumo (RSUPNCM). In his research, it was examined and processed statistically four variables namely TRISS Score, Response Time, Gender, Reference Status, and it was found that the TRISS Score was very good in predicting the prognosis of polytrauma patients with a value of 89.9%.

It is very important to analyze the scoring system that affects the prediction of patient prognosis in cases, especially in H. Adam Malik General Hospital, as the only class A trauma referral hospital in North Sumatra Province. In H. Adam Malik General Hospital there is no research on TRISS Score analysis to be able to predict the patient's prognosis so it is necessary to conduct this study.

## **Method:**

This type of research is an analytic study with cross sectional design which aims to analyze the ability of TRISS (Trauma Related Injury Severity Score) in predicting the prognosis of patients in Haji Adam Malik General Hospital Medan January 2016 to December 2018. The samples was collected from medical records (gender, referrral status, diagnosis and response time). The gathered data then analyzed with univariate, bivariate and multivariate analysis for correlation for prognosis.

In this study no intervention was made in the study sample because the data used in this study came from medical records. Before conducting research, the protocol will be asked for Ethical Clearance from the Haji Adam Malik Hospital Ethics Committee.

## **Result:**

Characteristics of subjects in this study in patients with polytrauma based on age, sex, response time, referral status, TRISS Score and patient prognosis and can be seen in Table 1.

**Table 1. Distribution of Research Subjects**

<b>Characteristic</b>	<b>n</b>	<b>%</b>
<b>Age</b>		
< 18 year	37	21,1
>18 year	138	78,9
<b>Gender</b>		
Male	143	81,7
Female	32	18,3
<b>Respon time</b>		
< 1 h	119	68,0
1 – 6 h	45	25,7
7 – 24 h	11	6,3
>24 h	0	0
<b>Referral Status</b>		
Refer	107	61,1
Not refer	68	38,9
<b>TRISS Score</b>		
Good probability of survival	152	86,9
Poor probability of survival	23	13,1
<b>Prognosis</b>		
Life	160	91,4
Death	15	8,6
<b>Total</b>	<b>175</b>	<b>100</b>

From tabel 1, it could be seen that from 175 polytrauma patients in the age group <18 years, 37 patients (21.1%) and 138 patients in the age group > 18 years (18.9%) patients, meaning that polytrauma patients mostly occurred in adult patients. Based on sex, patients with polytrauma more in patients with male sex as many as 143 patients (81.7%) while in female patients as many as 32 patients (18.3%). Based on the response time of patients at most in the category <1 hour as many as 119 patients (68%) followed by the response time category 1-6 hours that is as many as 45 patients (25.7%), while for the category 7-24 hours only 11 patients (6,3%).

Then based on referral status, most patients were referred, namely 107 patients (61.1%), while patients who were not referred were 68 patients (38.9). Then from TRISS Score the most patients in the category of good probability of survival that is as many as 152 patients (86.9%), while the probability of poor survival is only 23 patients (13.1%). For the prognosis of the most patients in the group of living patients, 160 patients (91.4%), while only 15 patients died (8.6%).

**Table 2. Distribution Based on Diagnosis**

<b>Diagnosis</b>	<b>n</b>	<b>%</b>
<i>Head Injury</i>	29	17.4
<i>Lacerated Wound</i>	23	13.8
<i>Closed Femur Fracture</i>	20	12.0
<i>Mandible Fracture</i>	19	11.4
<i>Blunt Thoracal Injury</i>	18	10.8
<i>Scald Burn Injury</i>	17	10.2
<i>Hematothorax</i>	12	7.2
<i>Blunt Abdominal Injury</i>	10	6.0
<i>Closed Clavicle Fracture</i>	10	6.0
<i>Closed Humerus Fracture</i>	9	5.4

From table 2, this study found that the majority of patients with a diagnosis of Head Injury were 29 people (17.4%). Then patients with a diagnosis of Closed Femur Fracture are as many as 20 people (12%). The patients with the least diagnosis were in the case of Closed Humerus Fracture, 9 patients (5.4%).

Bivariate analysis was performed to determine the relationship of each independent variable, namely gender, referral status, response time and TRISS Score with the dependent variable, namely the patient's prognosis presented in the form of a cross table. Data processing in bivariate analysis using Chi-Square test.

**Table 3. Bivariate analysis between independent variables and prognosis**

Independent variable	Patient Prognosis				Sum		p.
	Life		Death		n	%	
	n	%	n	%			
<b>Gender</b>							
Male	130	90,9	13	91,9	143	100	0,865
Female	30	93,8	2	6,2	32	100	
<b>Referral status</b>							
Refer	96	89,7	11	10,3	107	100	0,462
Not refer	64	94,1	4	5,9	68	100	
<b>Response Time</b>							
< 1 h	110	92,4	9	7,6	119	100	0,288
1 – 6 h	39	86,7	6	13,3	45	100	
7 – 24 h	11	100	0	0	11	100	
<b>TRISS Score</b>							
Good probability	151	99,3	1	0,7	152	100	<0,001
Poor probability	9	39,1	14	61,9	23	100	
<b>Total</b>	160	91,4	15	8,6	175	100	

In table 3 above we get the results of the analysis using chi square to identify the relationship between the sex of the patient and the prognosis of polytrauma patients showing that the results of the analysis test found that the value of  $p = 0.865 > 0.05$  which means there is no significant relationship between the sexes with prognosis of polytrauma patients.

Then the relationship between the referral status of patients with the prognosis of polytrauma patients showed that the results of the analysis test found that the value of  $p = 0.462 > 0.05$  which means there is no significant relationship between the referral status with the prognosis of polytrauma patients.

The response time variable also did not show a significant relationship with the prognosis of polytrauma patients because the value of  $p = 0.462 > 0.05$ . The results of the analysis using chi square to identify the relationship between TRISS Score of patients with the prognosis of polytrauma patients showed that the results of the analysis test showed that the value of  $p < 0.001 < 0.05$ , which means there is a significant relationship between TRISS Score with the prognosis of polytrauma patients.

Multivariate analysis is used to explain the independent variables that most influence the dependent variable. In this study, the multivariate analysis used was a logistic regression test. The stages carried out in multivariate analysis are as follows.

Selection of variable candidates to be multivariate tested by entering independent variables include gender, reference status, response time and TRISS Score on the dependent variable, namely the Prognosis of Polytrauma Patients. Variables that have a p value  $< 0.25$  will be included in the multivariate analysis. From the results of the candidate test, it was found that the independent variables, among others, Gender and TRISS Score had a value of  $p < 0.25$ . The selection results of these variables can be seen in the following table:

**Table 4.Independent Variable Candidate Test Results**

Variable	Sig value ( <i>p</i> )
Gender	0,606
Referral status	0,317
Respon Time	0,908
Triss Score	<0,001

In the final multivariate modeling with logistic regression test shows that the Triss Score variable has a *p* value of less than 0.05 (*p* value <0.05), so that the variable is the final multivariate modeling after a logistic regression test of two modeling stages. Multivariate analysis results can be concluded that the TRISS Score variable has a strong influence on the prognosis of polytrauma patients. it means TRISS Score is the most dominant variable influencing the prognosis of Politrauma patients. The results of the analysis can be seen in the following table.

**Table 5.Results of Multivariate Logistic Regression Analysis**

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	TrissScore	5.756	1.126	26.114	1	.000	316.107
	Gender	-1.610	1.001	2.586	1	.108	.200
	Constant	-9.015	2.211	16.622	1	.000	.000
Step 2 <sup>a</sup>	TrissScore	5.459	1.090	25.061	1	.000	234.889
	Constant	-10.476	2.052	26.076	1	.000	.000

The *p* value of the effect of the TRISS Score on the prognosis of polytrauma patients is *p* <0.0001. This shows that there is a significant influence between TRISS Score and the prognosis of polytrauma patients.

**Table 6.AUC Value (Area Under the Curve)**

Area	Std. Error <sup>a</sup>	Asymptotic Sig. <sup>b</sup>	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.939	.039	.000	.863	1.000

In table 4.6.above it was found that the Triss score has a perfect AUC score of 0.939 or 93.9% which means the TRISS Score is very strong in predicting the prognosis of polytrauma patients.

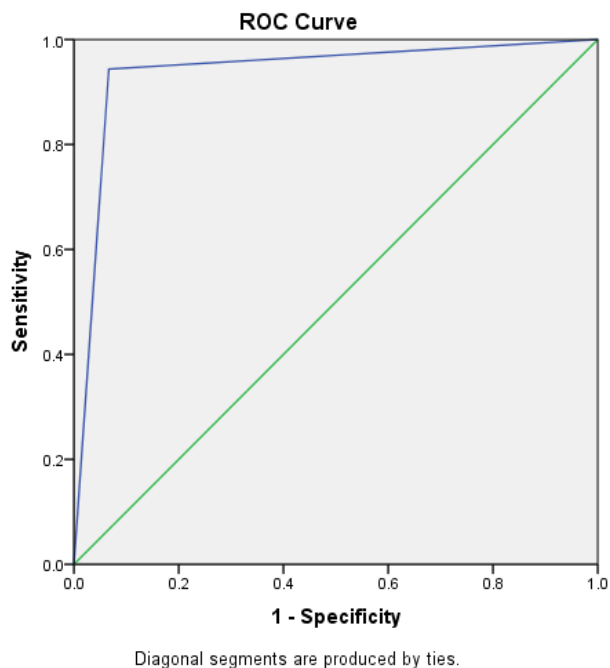
## Discussion:

The results of this study are consistent with the theory that the TRISS Score is an assessment of trauma scores with the highest sensitivity and specificity compared to ISS, SKG, and RTS. (Al Eassa, 2013; Salim, 2015). This study is also in line with research conducted by Bambang Gunawan, et al (2017) in polytrauma patients in the Emergency Department (IGD) of the National Center General Hospital Dr. CiptoMangunkusumo (RSUPNCM). In his research between the TRISS Score variable with the prognosis of polytrauma patients have a significant correlation with the *p* value of the TRISS Score variable is <0.001.

Then this study is also in line with research conducted by Nangarwal et al, (2017). From the results of statistical analysis using the chi square test on the TRISS Score variable on the patient's prognosis shows a *p* value <0.001 which means there is a significant relationship to the prognosis of trauma patients.

This study is also in line with research conducted by Bambang Gunawan, et al (2017) in polytrauma patients in the Emergency Department (IGD) of the National Center General Hospital Dr. Cipto Mangunkusumo (RSUPNCM). In his research it was found that TRISS Score has a high AUC value of 89.9%.

A high TRISS score represents a higher life expectancy, with a sensitivity of 94% and specificity reaching 100%. This is consistent with the Osaka study comparing the RTS, ISS, and TRISS Scoring systems showing that the TRISS Score has the highest sensitivity, specificity, and accuracy (95, 96, 95%). (Al Eassa, 2013). The results of the curve can be seen in the following figure.



**Figure 1. TRISS Score Receiver Operating Characteristic Curve**

### Conclusion:

From this study it can be concluded that there is an influence between TRISS Score on the prognosis of polytrauma patients, no effect between response time on the prognosis of polytrauma patients, no influence between sex on the prognosis of polytrauma patients., no effect of referral status on the prognosis of polytrauma patients. A high TRISS score represents a higher life expectancy, with a sensitivity of 94% and specificity reaching 100%.

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