

The Application of Revised Trauma Score Assessment System for Trauma Patient in Emergency Department of PKU Muhammadiyah Bantul Hospital

1st Azizah Khoiriyati*

Emergency Department School of Nursing Faculty of Medicine and Health Sciences

*Universitas Muhammadiyah Yogyakarta, Indonesia.
azizah.khoiriyati@umy.ac.id*

2nd Al Afik

Emergency Department School of Nursing Faculty of Medicine and Health Sciences

*Universitas Muhammadiyah Yogyakarta, Indonesia.
afik72@umy.ac.id*

Abstract— Nurses in the Emergency department of PKU Muhammadiyah Bantul Hospital do not have the instruments to conduct trauma assessments to injured patients. The Rapid Trauma Score (RTS) is an instrument for assessing quickly and precisely cases of injury or trauma. RTS is considered easy and simple for trauma scoring and can effectively assess trauma prognosis. The main purpose of the study was to evaluate the implementation of RTS for trauma patients in the Emergency department of PKU Muhammadiyah Hospital, Bantul. This study was a descriptive analytic study. Data were collected from purposive sampling patients who were admitted in the Emergency department of PKU Muhammadiyah Bantul hospital in July–August 2018 with total of 31 patients and 12 nurses. The instrument of this study consisted of an observation sheet for the assessment of the RTS and an RTS needed identification questionnaire. The data analysis used descriptive analysis. Results: 83.4% of nurses at PKU Muhammadiyah Bantul Hospital said they needed a tool to assess trauma cases in the Emergency department. In addition, the age of patients with trauma in the Emergency department at PKU Muhammadiyah Bantul Hospital was 38.7% of them aged 40–65 years, 25.8% of the patients suffered from minor head injury, the highest trauma score was 16 (67.7%), the lowest trauma score was 7 (3.2%) and 9.7% of the patients were referred to the tertiary hospital. RTS is considered as easy and simple for trauma scoring and can effectively assess trauma prognosis.

Keywords— *Emergency Department, Revised Trauma Score, Trauma Patient*

I. INTRODUCTION

Revised trauma score (RTS) is used worldwide in prehospital practice and in the Emergency department (ED). The RTS is composed of physiological patient parameters: systolic blood pressure (SBP), respiratory rate (RR), and

Glasgow Comma Scale (GCS). Those parameters are easily obtained in the early phase of trauma [1]. In addition, physiological parameters including Glasgow Coma Scale (GCS) score, systolic blood pressure and respiratory rate are useful predictors for the outcome and can be utilized in the pre-hospital triage of patients with traumatic brain injury (TBI) [2].

RTS was introduced by Champion, *et al.* (1983), and this system is the most widely used because it is easier and simpler so it only requires a short time to make an assessment. The RTS has high interrater reliability and has demonstrated accuracy in predicting death [3]. Its helps to determine the response rate from the results of RTS values that will be correlated to the mortality rate so that it will provide fast and appropriate services and management in providing actions in emergency trauma conditions.

The number of trauma events is quite high so a scoring system is needed to be able change the quality of trauma in the form of values/numbers. RTS is a scoring system that can be used as a scoring tool to predict mortality, becoming pre-hospital triage tool or between hospitals and emergency rooms. It is a scoring tool that assesses human physiological systems as a whole. RTS is the result of the improvement of the GCS (Glasgow Comma Scale) instrument used to assess the initial condition of head trauma patients. RTS assessment is done immediately after the patient has been traumatized, usually before entering the hospital, in the referral between hospitals, or when in the emergency unit [4].

The incidence of trauma is the number the fourth cause of death. Trauma is the leading cause of death in the age group of 25–45 years. Traffic accidents are the most common cause of trauma throughout the world. The causes of disability and death, especially in developing countries, are trauma from traffic accidents. There was a 10.4% of mortality rate among patients. Motor-vehicle accidents were the most common mechanism of injury (66.7%) [5]. World data included in the Global Status Report on Road Safety (2013) show that around 1.24 million people die each year due to road accidents, and it is the eighth leading cause of death in the world. Falling was

the leading cause of injury among the elderly population and road traffic injuries became the leading cause among the younger groups. Head injury was frequent in trauma patients who fell from height [6]. In 2013, the number of traffic accidents in Indonesia reached 100,106 incidents, and 26.416 people died. If the program is not carried out properly, the death from accidents on the highway is estimated to be the number fifth cause of death in the world in 2030 [8].

Based on interview with one of the heads of the Emergency department of KU Muhammadiyah Hospital in Bantul, it was showed that the Emergency department of PKU Muhammadiyah Bantul Hospital had not implemented RTS yet so that it could not predict the mortality rate and correct referral determination in patients with trauma. The main purpose of the study was to evaluate the implementation of RTS in trauma patients in the Emergency department of PKU Muhammadiyah Bantul Hospital.

II. METHOD

This study was a descriptive analytic study. Data were collected from purposive sampling patients who were admitted in the Emergency department of PKU Muhammadiyah Bantul Hospital in July-August 2018 with total of 31 patients and 12 nurses. The instrument of this study consisted of an observation sheets for the assessment of the Revised Trauma Score and the RTS needs identification questionnaire. The data analysis used descriptive analysis. This study was ethically approved by institutional review board Faculty of Medicine and Health Sciences of Universitas Muhammadiyah Yogyakarta.

III. RESULT AND ANALYSIS

During the study period in July to August 2018, a total of 31 trauma patients were admitted in the Emergency department of PKU Muhammadiyah Hospital in Bantul. There were 9.7 % of the trauma patient referred to a tertiary hospital because of the trauma condition.

TABLE I. NURSES (N=31) CHARACTERISTIC

NURSES CHARACTERISTIC		
<i>Nurses Age</i>	<i>n</i>	<i>%</i>
20-30 years	3	25
31-40 years	8	66.7
41-50 years	1	8.3
<i>Working period</i>		
≤10 years	8	66.7
>10 years	4	33.3
<i>Educational status</i>		
D ₃	10	83.3
Bachelor (Ners)	2	16.7

Table. I shows nurses aged 31-40 years as many as 66.7%, nurses with working period of ≤ 10 years were as many as 66.7% and nurses with education S1 (Ners) were as much as 83.3%.

TABLE II. PATIENTS (N=12) CHARACTERISTIC

PATIENT CHARACTERISTIC		
<i>Patient Age</i>	<i>n</i>	<i>%</i>
3-6 years	2	6.5
6-12 years	3	9.7
12-20 years	4	12.9
20-40 years	7	22.6
40-65 years	12	38.7
>65 years	3	9.7
<i>Gender</i>		
Female	19	61.3
Male	12	38.7

Table II shows the age range of patients at Emergency department of PKU Muhammadiyah Hospital was mostly between 40-60 years (38.7%). Female patient who were admitted in the Emergency department more than male patient (61.3%).

TABLE III. DISTRIBUTION OF REVISED TRAUMA SCORE (RTS) THAT NEEDS IDENTIFICATION QUESTIONNAIRE (N=12)

No	RTS Need Identification		
	<i>Statement</i>	<i>yes</i>	<i>no</i>
1	Is there a tool to assess trauma cases in ED?	0	100
2	Does the tool use scoring for all cases of trauma?	0	83,3
3	Are there methods used for trauma scoring so far?	16,7	50
4	Is there a way to determine triage in trauma patients?	50	75
5	Is the tool used to assess trauma cases easy?	25	50
6	Is the tool used to assess trauma cases simple?	50	16,7
7	Do you need a tool to assess trauma cases in ED?	83,3	100

Table III shows that 83.4% of nurses at PKU Muhammadiyah Bantul Hospital needed a tool to assess trauma cases in the Emergency Department.

TABLE IV. THE FREQUENCY DISTRIBUTION OF PATIENTS BASED ON MEDICAL DIAGNOSIS AT THE EMERGENCY DEPARTMENT OF PKU MUHAMMADIYAH HOSPITAL IN BANTUL (N = 31)

Patient based Medical Diagnosis		
<i>Medical diagnosis</i>	<i>n</i>	<i>%</i>
Femur fracture	3	9.7
Phalang fracture	1	3.2
Antebrachii fracture	4	12.9
Closed 1/3 proximal sinistra fracture	1	3.2
Abdominal trauma	1	3.2
Head injury	2	6.5
Mild head injury	8	25.8
Trochanter	1	3.2
Rupture placenta	1	3.2
Vulnus Laceratum	1	3.2
Open Fr. Cruris Proximal	1	3.2

<i>Patient based Medical Diagnosis</i>		
<i>Medical diagnosis</i>	<i>n</i>	<i>%</i>
Shoulder Joint Fracture	1	3.2
Collum Humeri Fracture	1	3.2
Radius Ulna Fracture	2	6.5
Severe head injury	1	3.2
Tibia Fibula Fracture	1	3.2
Suspect. Ankle Fracture	1	3.2

Table IV shows that 25.8% of patients suffered from mild head injury at Emergency department of PKU Muhammadiyah Hospital in Bantul.

TABLE V. DISTRIBUTION OF FILL IN THE RTS FORM BY A NURSE AT THE PKU MUHAMMADIYAH HOSPITAL IN BANTUL

No	Fill in RTS Form		
	<i>Item</i>	<i>Filled (%)</i>	<i>Not Filled (%)</i>
1	Name/Initial	71	29
2	Age	100	0
3	Gender	100	0
4	Medical diagnosis	100	0
5	Respiration rate	100	0
6	Breathing effort	100	0
7	Capillary Refill Time (CRT)	100	0
8	Glascow Comma Scale (GCS)	100	0
9	Trauma Score	100	0

Table V shows that 29% of nurses did not fill the patient's name on the RTS form and other items were filled 100%.

TABLE VI. TRAUMA FREQUENCY DISTRIBUTION OF PATIENT SCORES AT THE EMERGENCY DEPARTMENT OF PKU MUHAMMADIYAH HOSPITAL IN BANTUL (N=31)

Trauma Score		
<i>Trauma score</i>	<i>n</i>	<i>%</i>
7	1	3.2
13	2	6.5
14	4	12.9
15	3	9.7
16	21	67.7

Table VI shows a trauma score of 16 at the Emergency department of PKU Muhammadiyah Hospital in Bantul was identified as 67.7%.

IV. DISCUSSION

The results of the RTS application study for trauma scoring of PKU Muhammadiyah Bantul Hospital patients find that minimum score of 7 of the patients with trauma as much as 3.2%, and maximum trauma scores of 16 as much as 67.7%. Patients with trauma score of 7 experience severe head injury. Meanwhile 2 patients who have trauma score of 13 have moderate head injury. Patients with trauma score of 14 experience moderate, mild head injury and femoral fracture.

Patients with trauma score of 15-16 experience fracture trauma in the *estrassia*, abdominal trauma and placental rupture. There is a correlation between the trauma value of the RTS score and the condition experienced by the patient. The revised trauma score has been validated as a method of assessment to distinguish patients who have good or bad prognosis, and the assessment of RTS can identify more than 97% of people who will die if they do not receive treatment. Clearly, the results of the analysis show that the smaller the trauma value of the RTS score, the worse the trauma condition. The existence of different conditions in each range of scores on the trauma of the RTS score is sufficient to indicate that RTS can be used to identify the prognosis of trauma in patients at the Emergency department of PKU Muhammadiyah Hospital in Bantul.

The high incidence of trauma requires a scoring system that can change the quality of trauma in the form of numbers/values. Revised Trauma Score (RTS) is a scoring system that can be used as a mortality scoring tool, a pre-hospital triage tool or between hospitals and emergency rooms. The RTS system is filled and given with values by nurses, so the effectiveness of nurses' work needs to be considered.

This RTS combines GCS values with respiration rate and systolic blood pressure, helping to decide the response rate from the results of RTS values that will be correlated with mortality rates so that it will provide prompt and appropriate service and management in providing emergency care measures. The presence of RTS in the ED will facilitate the performance of nurses. The results showed that 83.3% of nurses needed a tool to assess trauma in the emergency department.

The need for trauma identification tools is possible due to the absence of tools and methods used to determine trauma scoring. The results showed that there were no tools to assess trauma, and as many as 12 nurses (100%) stated this. The results of the interviews with the staff of PKU Muhammadiyah Hospital in Bantul showed that all this time the emergency department of PKU Muhammadiyah Bantul Hospital have not implemented RTS yet so that it could not predict the mortality rate and determine the right reference for patients with trauma. The availability of tools to assess trauma in the Emergency Department makes trauma assessment easier and simpler so that it only requires a short time to conduct an assessment, and the realization of tools to determine trauma is something that needs to be done by the hospital emergency department. In addition to the unavailability of tools for assessing trauma, 83.3% of nurses also stated that no method was used for trauma scoring.

Trauma or injury often causes physiological disturbances in the body, and if the trauma is not known quickly and is not handled appropriately, it will have a fatal effect of having an unfavorable prognosis in trauma patients because treatment of trauma patients who should receive treatment is not immediately identified properly. Therefore, the unavailability of methods for assessing trauma decreases the quality of early trauma management. The need for nurses at ED of PKU Muhammadiyah Bantul will be a tool for assessing trauma because no existing triage system has been used to assess trauma, as stated by 50% of the nurses, and 75% of them stated there was no tool used to assess easy trauma

cases, as well as 50% others. The nurse stated there was no tool to assess cases of trauma patient.

The trauma assessment with RTS was carried out by the emergency nurse before the patient received treatment, and each patient who came with trauma was assessed as having a condition with RTS. The results of the analysis found that 6.4% of patients (n= 2) were referred to a higher trauma center, namely trauma patients with a score of 7 who suffered from severe head injury and trauma score of 13 with moderate head injury. RTS has the ability to make it easier for nurses to determine trauma classifications quickly and simply, and thus it helps the collaboration of nurses and doctors to determine the right prognosis and treatment according to the patient's situation. Minardi and Crocco (2009) state that RTS is easy to do and can estimate the prognosis more accurately if used for trauma patients, and RTS' ability to determine life-threatening conditions is 76.9%. However, the RTS have decreasing predictive accuracy at older ages [5].

RTS is considered easy and simple when used to assess trauma. Nurses will easily understand RTS because the RTS components which include patient demographic data, breathing frequency, breathing effort, CRT, GCS, and trauma scores can be easily assessed and reported. This statement is supported by the results of this study which shows data that 100% of nurses fill the assessment component of RTS including breath frequency, breathing effort, CRT, GCS and trauma score. The data also showed that nurses at PKU Muhammadiyah Hospital were able to carry out trauma assessment scores with RTS. The results of this scoring prediction can be used as a tool in the application of the triage system and the process of transferring patients with trauma cases, and the guideline is proposed below:

TABLE VII. RTS AND TRIAGE PREDICTOR CATEGORIES AS WELL AS THE TRANSFER PROCESS OF TRAUMA PATIENT

No	RTS total score	Triose Predictor	Activity & Transfer
1	< 6	Serious	Resuscitation/Isolation/Intensive Do Not Resuscitation (DNR) High Mortality (Death)
2	6-7	Severe	Observation in every 15 minutes Transfer to an intensive room Referral to Trauma Center
3	8-10	Moderate	Observation in every 30 minutes Transfer to an ordinary care room Outpatient with motivation
4	>11	Mild	Symptom Therapy and outpatient

The results of this study indicate that RTS can be used as a tool to predict patients trauma. RTS can be used in the ED of PKU Muhammadiyah Bantul Hospital and provides predictive convenience in the emergency unit of hospitals in trauma patients. One important application of this scale is the prediction of mortality rates in trauma patients and the selection of patients more critical for treatment in specialized trauma centers. Faster RTS Measurement can lead to better results. In addition, RTS will be better used in triage trauma patients and predicts their mortality as well as be useful if used in conjunction with the others. RTS score and serum albumin

level improve the prediction of mortality in trauma patients because of hypoalbuminemia. Hypoalbuminemia is caused by a condition of protein energy malnutrition (PEM). PEM contributes to impaired wound healing, increased susceptibility to infection, multiorgan dysfunction, prolonged hospitalization, and in-hospital mortality [7].

RTS is very helpful in the classification of trauma patients when in emergency department. RTS can act as a triage predictor to predict mortality and to prioritize the care of trauma patients with different intensities especially when faced with a lack of resources. The application of other tools can increase the predictive value of mortality in trauma patients and minimizes the possibility of errors in prioritizing and in treating patients

V. CONCLUSION AND RECOMMENDATION

RTS is considered as easy and simple for trauma scoring and can assess trauma prognosis effectively. The emergency nurse can fill out RTS completely and precisely, consisting of respiratory frequency, breathing effort, CRT, GCS and total trauma score. RTS is very helpful in the classification of trauma patients when in an emergency unit. RTS can act as a triage predictor to predict mortality and to prioritize the care of trauma patients with different intensities especially when faced with a lack of resources.

REFERENCES

- [1] Rivera-rodriguez E 2017 Role of the Nurse During Disaster Preparedness : A Systematic Literature Review and Application to Public Health Nurses.]
- [2] Chowdhury T, Kowalski S, Arabi Y, and Dash H 2014 Pre-hospital and initial management of head injury patients: An update. *Saudi J Anaesth* 8 1 :114.]
- [3] Galvagno SM, Massey M, Bouzat P, Vesselinov R, Levy MJ, Millin MG, Stein DM, Scalea TM, and Hirshon JM 2019 Correlation Between the Revised Trauma Score and Injury Severity Score: Implications for Prehospital Trauma Triage. *Prehospital Emerg Care* 23 2 :263–270.]
- [4] Llompert-Pou JA, Chico-Fernández M, Sánchez-Casado M, Salaberria-Udabe R, Carbayo-Górriz C, Guerrero-López F, González-Robledo J, Ballesteros-Sanz M, Herrán-Monge R, Servià-Goixart L, León-López R, and Val-Jordán E 2017 Scoring severity in trauma: comparison of prehospital scoring systems in trauma ICU patients. *Eur J Trauma Emerg Surg* 43 3 :351–357.]
- [5] Yadollahi M 2019 A study of mortality risk factors among trauma referrals to trauma center, Shiraz, Iran, 2017. *Chinese J Traumatol - English Ed* 22 4 :212–218.]
- [6] Wui L, Shaun G, Ramalingam G, and Wai KS 2014 Epidemiology of trauma in an acute care hospital in Singapore. *J Emerg Trauma Shock* 7 3 :174.]
- [7] Kim SC, Kim DH, Kim TY, Kang C, Lee SH, Jeong JH, Park YJ, Lee SB, and Lim D 2017 The Revised Trauma Score plus serum albumin level improves the prediction of mortality in trauma patients. *Am J Emerg Med* 35 12 :1882–1886.]
- [8] Kemenkes, RI. (2014). Kementerian Kesehatan RI Direktorat Jenderal Pencegahan dan Pengendalian Penyakit. (<http://pppl.depkes.go.id/focus?id=15086>). Diakses pada 27 Desember 2017).