



CORELLATON OF RESPIRATORY RATE, BODY TEMPERATURE AND GAP SCORE WITH RESULTS OF MAJOR TRAUMA PATIENTS AT EMERGENCY ROOM OF REGIONAL GENERAL HOSPITAL JOMBANG EAST JAVA INDONESIA

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ABSTRACT

Background: The purpose of this study was to analyze the factors of internal factors patient (respiratory rate, and body temperature), GAP Trauma score, Age, Pressure) in major trauma patients at baseline Emergency Room Regional General Hospital Jombang, associated with outcomes (out-of-hospital conditions) of deceased or alive. So we get the related factors and the highest relation of outcome.

Methods: The type of research used is observational analytics with retrospective design approach. Research sample of 182 major trauma patients with ISS scale > 15, cause of traffic accident and fall. Referral patients and not admitted through the Emergency room were excluded from the study. The total population of trauma patients in Jombang Hospital one years of 2017 is 1823. **Result:** In Bivariate analysis by using spearman rho test, it is found that variable data related to outcome is respiratory rate p value = 0.001, body temperature p values = 0.010 and GAP scale with p values = 0.000. The confidence interval is 95% ($\alpha = 0.005$). Multivariate analysis with logistic regression tests got the final model variable GAP scale with coefficient valued 0,496 value $\exp B = 1,643$. This shows the GAP variable as the highest factor associated with outcome of major trauma patients. The prediction ability of outcome models on GAP scale got the value of AUC = 0,962 which means that model able to predict outcome based on discrimination equal to 96,2%. **Conclusion:** Internal factors patient (respiratory rate, and body temperature), GAP Trauma score, Age, Pressure) are correlate with outcome in major trauma patients. variable GAP scale is the highest variable related outcome in major trauma patient of regional general hospital Jombang. GAP scales can be used to predict outcomes of major trauma patients.

KEYWORDS: Respiratory rate, Body temperature, GAP scale and outcome.

BACKGROUND

Trauma is an injury that has the potential to cause disability or death. Trauma is defined as sudden, unpredictable, dramatic, strong, or violent, blunt, penetrating, explosive and thermal events that cause damage to the structure or function of the body. Trauma can occur of one organ system or several organ systems in the body. Severe trauma is a major global public health problem.^[14]

Incidence of trauma in Indonesia has increased prevalence from RISKESDAS from 7.5% in 2007 to 8.2% in 2013. Distance of the scene is a factor that affects the high mortality rate due to trauma. Severe

trauma will be more likely to die at the scene.^[13] trauma victims are mostly young and male, the mechanism of trauma occurring most of the prehospital cases is motorcycle accidents.^[15]

Major trauma is defined as a single or multiple trauma of organs with severity that can immediately strangle life. Major trauma often includes multiple trauma. Most patients arriving at the hospital can be saved after trauma is detected and treated promptly.^[16]

The ability to estimate the outcome of a trauma becomes a fundamental function of the trauma patient care process. This arises from the patient's curiosity and the patient's family against prognosis. Scientists have an

opinion that judging the degree of injury or trauma can provide objective information. Outcome is a clinical condition of the patient's trauma after medical treatment for the hospital. Outcome was measured by results that could be evaluation of organ function, identification of dependency level, patient memory function, and disability, and death.^[17]

This study analyzed the factors of respiratory frequency, body temperature, and GAP scale associated with outcome in major trauma patients. Researchers analyzed the relationship of respiratory frequency, body temperature and the researchers will conduct a GAP assessment (GCS, Age, Pressure). The researchers also analyzed the dominance of these factors and will present predictors of outcome of trauma patients. Based on preliminary study on December 7, 2017 in the medical record room of Regional General Hospital Jombang, the number of trauma incidents in January-December 2017 was 1823 cases of trauma.

Most cases of trauma deseaded less than 48 hours in the hospital this increases the GDR (Gross death rate) in Regional General Hospital Jombang. GDR in Regional General Hospital Jombang amounted to 53/1000 patients treated for total patient awareness. While 27/1000 people died after being treated for more than 48 hours of the

hospital. Based on the above exposure the researcher wanted to examine about "Relation of Respiratory Rate, Body Temperature and GAP Score with Outcome of Major Trauma patient at Emergency Room of Regional General Hospital Jombang."

METHODS

The type of research used is observational analytic with retrospective design to approach, that is research which try to look backward by determining dependent variable and connect it with one or more independent variables that has happened as potential cause. Population of this research is all medical record data on to patient with major trauma of january until December 2017 in Regional General Hospital Jombang. The trauma patient came to the Regional General Hospital Jombang which amounted to 1823 patients

The sample in this research is determined based on the consecutive sampling technique that is the determination of the sample by selecting each medical record that meets the criteria of the research can be included in the research period of time so that the required number of samples can be fulfilled. The sample is based on the inclusion criteria and exclusion criteria.

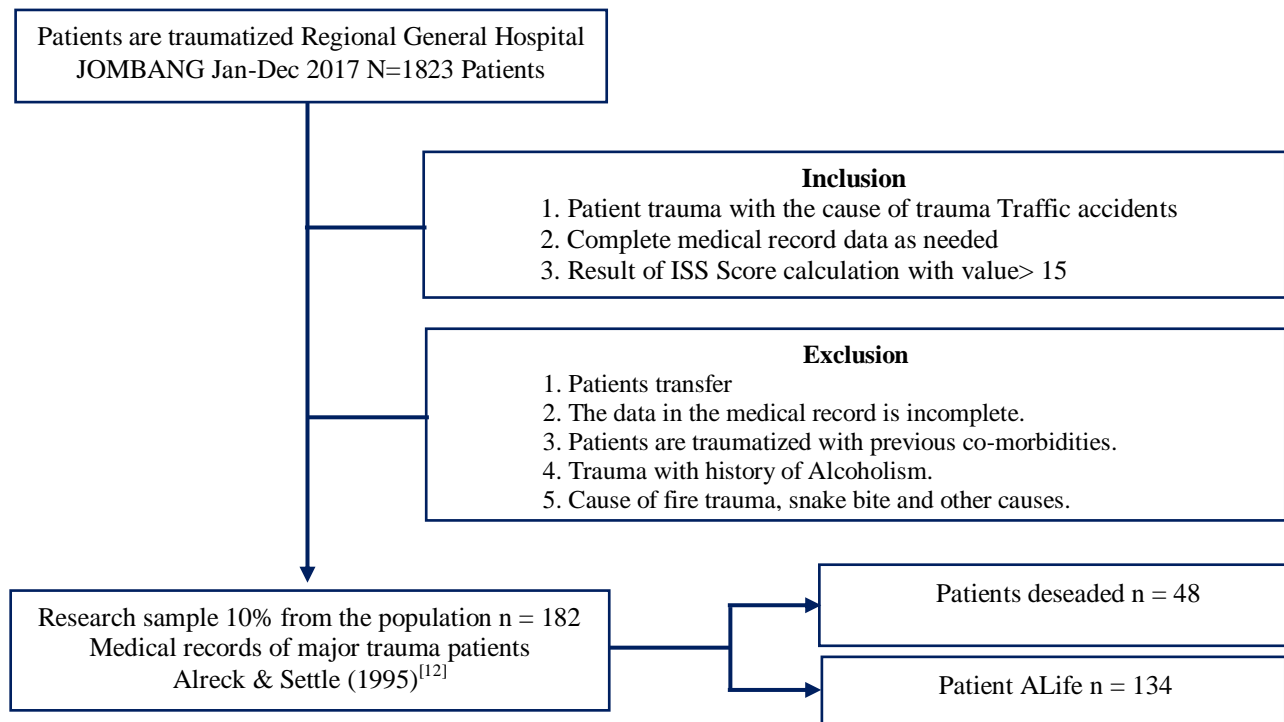


Figure 1: Selection scheme Medical records to determine the study sample.

The independent variables in this study were respiratory frequency, body temperature recorded in medical record, and GAP score (GCS, Age, Pressure) scored by researcher based on data contained in medical record. The dependent variable in this study was the major trauma outcome (deseaded or alive) when leaving the hospital after receiving treatment of Regional General

Hospital Jombang, recorded in medical record data. Presentation of univariate descriptive data, bivariate to find relation of each variable and Multivariate test to determine the dominance of variables and outcome prediction. This research was conducted at Regional General Hospital Jombang, dated 22 february until 10 maret 2018.

RESULT

Table 1: Characteristic description of research sample.

Characteristics		Measurement of statistics	Unit	Result
Gender	Man	N (%)		130 (71,4)
	Women			52 (28,6)
	Total			182 (100)
Education	Not school	N (%)		7(3,8)
	Elementary school			56 (30,8)
	Junior high school			35 (19,2)
	Senior High School			66 (36,3)
	higher education			18 (9,9)
Total	182 (100)			
type of work	Not work	N (%)		70 (38,5)
	Farm			34 (18,7)
	Private			59 (32,4)
	government employees			19 (10,4)
Total	182 (100)			
Cause of trauma	Traffic accident	N (%)		144 (79,1)
	Fall			38 (20,9)
	Total			182 (100)
Age		Median (min-max)	Years	39,5 (6-81)
Respiratory rate		Median (min-max)	bpm	23 (11-38)
Body temperature		Median (min-max)	°C	36,8 (36,0-38,5)
GCS		Median (min-max)		15 (3-15)
Systolic Blood pressure		Median (min-max)	mmHg	122,5 (59-155)
GAP (GCS, Age, Pressure)		Median (min-max)		22 (6-24)
Outcome	Deseaded	N (%)		48 (26,4)
	Alive			134 (73,6)
	Total			182 (100)
Deseaded category	≤ 48 jam	N (%)		27 (56,25)
	>48 jam			21 (43,75)
	Total			48 (100)

Source: Research data 2018

Table 2: Bivariate correlation test results.

Independent variables	Correlation coefficient (r)	P value
Respiratory rate	0,247	0,001
Hearth rate	0,055	0,464
Body temperature	-0,191	0,010
GAP Scale	0,709	0,000

Source: Research data 2018

The respiratory frequency variable of $p = 0,001$ ($p < 0,05$) and spearman correlation coefficient value ($r = 0,247$) this shows that there is a respiratory frequency relationship with outcome in major trauma patient with weak relation strength. Variable of body temperature got data values $p = 0,010$ ($p < 0,05$) and spearman correlation coefficient values = $- 0,191$. These values indicate that there is a relationship between body temperature with outcome of major trauma patients. GAP of variable (GCS, Age, Pressure) got values $p = 0,000$ ($p < 0,05$) and spearman correlation coefficient value = $0,709$. The correlation test results show that there is a significant relationship between the GAP scale of the outcome of the major trauma patient and has a strong relationship strength.

Table 3: Results of Multivariate Analysis of Logistic Regression Factors Associated With Outcome in Major Trauma Patients In ED Regional General Hospital Jombang.

CI (95%)			
Variabel	koefisien	p	RR
GAP	0,496	0,000	1,643
Konstanta	42,605	0,000	0,000

Source: Research data 2018

The result of multivariate logistic regression analysis was found that the most dominant variable on outcome of major trauma patients was GAP score indicated by $p = 0,000$ with relative risk relation strength of 1,643.

Table 4: AUC tests results discriminate logistic regression equations factors related to outcome in major trauma patients at ED Regional General Hospital Jombang.

Area Under the Curve			
Area	Asymptotic Sig. ^b	Confidence of Interval 95%	
		Lower Bound	Upper Bound
0,962	0,000	0,931	0,994

Source: Research data 2018

Noting the value of Area Under Curve (AUC) got the value of 0.962 which means 96.2%. It is known from the interpretation of logistic regression equation that is produced able to distinguish outcome of major trauma patient based on GAP score equal to 96,2%.

DISCUSSION

1. Respiratory Rate

There was a significant correlation between respiratory rate of outcome major trauma patients at emergency room at Jombang General Hospital. The value of positive correlation coefficient of 0.247 means there is a weak relationship between respiratory frequency with outcome in major trauma patients at Regional General Hospital Jombang.

Median respiratory frequency is 23 with respiratory frequency at least 11 times per minute and maximally 38 times per minute. Major trauma patients have varied respiratory rates. Respiratory frequency is also one component of vital signs that can be examined by the nurse to determine the initial condition of the patient entering the hospital, especially critical patients. Respiratory Rate less than 10 times per minute or more than 29 times per minute will worsen outcome.^[1]

This study is in line with research conducted by Thomson^[2] obtained the result that there is influence of the frequency of respiration with outcome trauma patients. Respiratory frequency is also used as one of the predictors for determining outcome in trauma patients.^[2] The results of this study are not in accordance with that proposed by Ahun^[3] which shows that the frequency of respiration does not affect the outcome in psien major trauma. Several clinical and experimental studies have confirmed that patients with trauma will experience changes in the mechanics of the respiratory system, particularly the improvement of respiratory system and respiratory tract, resistance, and hypoxemia.

Management of traumatized patient ventilation should aim to optimize neurologically, and circulation at the same time prevent further damage to respiratory dysfunction. Patients with head trauma and thoracic trauma who interfere with lung function will cause respiratory distress.^[4] Calculating respiratory frequency and other abnormal vital signs may provide an overview of the subsequent implementation.^[5]

2. Body temperature

There was a significant relationship of body temperature with outcome major trauma patients at Regional General Hospital Jombang. Correlation strength is weak and negative correlation direction means the higher body temperature value will be worse outcome. Body temperature is a balance between the production and expenditure of heat of the body as measured in a unit of heat called degrees.^[6]

The temperature measurements on this study are based on the patient's medical record data documented on the patient medical triage sheet of Regional General Hospital Jombang. Based on table 5.5 obtained data that the median body temperature 36.8 °C with a minimum value of 35 °C and a maximum of 38.5 °C. The trauma patient's body temperature is one of the predictors for determining the outcome of major trauma patients <35 °C and> 40 °C indicating poor outcome.^[7]

This study is different from the research conducted by Ahun,^[3] which suggests that the value of body temperature has no effect on outcomes. Traumatic patients with body temperature > 40 °C upon arrival at the hospital had the highest percentage of death, 72% with an odds ratio of 2.97, indicating that trauma patients with hyperthermic temperatures (> 40 °C) had a 3-fold mortality risk than normal.^[8]

3. GAP score

Significant relationship was obtained for GAP score with outcome of major trauma patients at Regional General Hospital Jombang. Strong correlation strength and positive correlation direction which means the greater the value of GAP score will be the better outcome of major trauma patients.

Score trauma is a trauma assessment system used to estimate survival probability in trauma patients.^[9] The GAP (GCS, Age, Pressure) scale is a trauma-scaling scale that uses Glasgow coma scale (GCS) scale indicators, Age indicators, and systolic (pressure) blood pressure indicators.

Glasgow coma scale, age, and arterial pressure (GAP) had $p = 0.001$ in the study Ahun.^[3] A simple trauma assessment system that is a GAP score, predicts death in hospital. That will lead to increased survival of traumatized patients. Available information for doctors and nurses with GAP scoring schemes to facilitate further decision making. The GAP score is simpler, more

generalizable and a good predictor for predicting hospital mortality.^[10]

GAP scores are easier to calculate and few parameters are profitable to deliver quick results, allowing quick decision-making. In major trauma patients. The GAP score is a system that is easy to calculate both in the field and at the time of entry into the Emergency Room.^[3] GAP scores are as strong in predicting patient survival as other trauma scores.^[1]

4. Multivariate analysis

The results showed that the independent variables associated with outcome in major trauma patients at Regional General Hospital Jombang were respiratory rate, body temperature, and GAP scale. After logistic regression test, the most dominant variable is GAP score. The resultant outcome of logical regression is to know the probability of Outcome in major trauma patients at Regional General Hospital Jombang.

These components can cause the GAP score to be the factor most closely related to outcomes in major trauma patients. The results of this study show that the oxygen saturation median value is 98% with a minimum value of 88% to 100%. When the patient is hypoxic then tissue perfusion will be impaired.^[5] Oxygen transport is determined by the blood circulation of hemoglobin levels that bind oxygen since it is in the lungs. Circulatory disorders, decreased blood volume due to bleeding and respiratory disorders can cause a decrease in oxygen saturation (SpO₂) and cause Hypoxia.^[11]

A study conducted by Ahun^[3] to predict patient mortality for more than 4 weeks found a AUC value of 0.904 or able to distinguish mortality of patients major trauma within 4 weeks by 90.4%. The cut off value on GAP score used was 21. While for predicting mortality in 24 hours, cut off value of GAP score was 19 and got AUC = 0.910 or 91%. The results of this study are also in line with Yutaka Kondo^[10] this research that the GAP scale is able to predict better outcomes than previously developed scales. The GAP score for predicting long-term mortality found the value of AUC = 0.933 or 93.3% and for predicting short-term value obtained AUC = 0.965 or 96.5%.^[10]

To find out whether the model has a good and sensitive prediction to predict Outcome then tested under the curve (AUC) area. The results obtained that the AUC table obtained value on the column area of 0.962, which means that the model model is able to distinguish major trauma outcome based on GAP scale is 96.2%.

Based on the results of multivariate and previous research, it was found that GAP Score was able to predict outcome in the form of death or live with prediction ability of more than 90%. For long-term and short-term GAP score prediction capability is still more than 90% this means the prediction of GAP score is Very

Strong. The model generated from the GAP Scale works well in predicting outcomes.

NURSING IMPLICATIONS

Major trauma patients received initial treatment when admitted to the hospital and in the ER were the sites for early treatment. Initial examination is a very important data to know the condition of the patient at the time and provide quick and precise action. When preliminary examination has been done then the matter tesaki nurse for decision making in the form of further handling for patient major trauma. It is also useful for providing psychological support for patients and families.

LIMITATION OF RESEARCH STUDY

The general impression of a well-produced model and able to predict outcomes in major trauma patients. However, there are many factors that are not done in the research that is the deterioration of condition that happened at prehospital, handling in room, length of time of handling, and no continuous analysis every step and model practicability analysis is not done.

CONCLUSION

Respiratory Frequency, Body Temperature, and GAP Score are significant variables associated with outcome in major trauma patients at Regional General Hospital Jombang. The GAP score is the most dominant factor associated with the outcome of major trauma patients at Regional General Hospital Jombang.

SUGGESTION

Researchers can then analyze factors that occur in the prehospital area such as pre-hospital handling, the officers involved and worsening conditions that occur in the hospital. Major trauma patients when in the ER need to investigate the length of treatment in the emergency room and identify immediate need for Resuscitation or immediate surgery for the patient. Family decision-making factors and duration of handling and readiness of hospital trauma resources and facilities can also be examined as factors affecting outcomes.

APPROVAL OF RESEARCH ETHICS

This research has received Ethical approval from Medical Research Ethics Committee from Medical Faculty Universitas Brawijaya.

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