

The Characteristics of Mortality Predictor Scoring for Sepsis Patients in Haji Adam Malik Hospital

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ABSTRACT

Introduction: Sepsis is a leading cause of death in the Intensive Care Unit (ICU) in developed countries and its incidence is increasing. Many scoring systems are used to assess the severity of disease in patients admitted to the ICU. SOFA score to assess the degree of organ dysfunction in septic patients. The Acute Physiology and Chronic Health Evaluation II (APACHE II) scoring system is most often used for patients admitted to the ICU. CCI scoring system to assess the effect of comorbid disease in critically ill patients on mortality. The study aimed to describe the characteristics of the use of scoring to predict patients' mortality admitted to Haji Adam Malik Hospital.

Methods: This is an observational study with a cross-sectional design. A total of 299 study subjects met the inclusion criteria and exclusion criteria, three types of scoring, namely SOFA score, APACHE II score, and CCI score were used to assess the prognosis of septic patients. Data analysis was performed using SPSS. P-value <0.05 was considered statistically significant.

Results: A total of 252 people (84.3%) of sepsis patients died. The mean age of the septic patients who died was 54.25 years. The SOFA score ranged from 0-24, the median SOFA score in deceased sepsis patients was 5.0. The APACHE II score ranged from 0-71, the median APACHE II score in deceased sepsis patients was 23.0. The CCI score ranged from 0-37, the median CCI score in deceased sepsis patients was 5.0.

Conclusion: Higher scores are associated with an increased probability of death in septic patients.

Keywords: Sepsis; mortality predictor; SOFA score; APACHE II score, CCI score

INTRODUCTION

Sepsis, according to the 2016 Surviving Sepsis Campaign (SSC), is a life-threatening state of organ dysfunction due to the body's response to a dysregulated infection.[1] Based on World Health Organization (WHO) data in 2017, globally the incidence of sepsis affects around 30 million patients with the death rate is estimated at 5 million per year worldwide. [2] A report conducted by Ginting F, et al., obtained data on cases of sepsis patients in 2016 as many as 535 patients, of which 150 patients were treated in the ICU, 385 people were treated in non-ICU rooms, 295 people in the community sepsis/community-acquired sepsis group, and 240 people in the hospital sepsis/hospital-acquired sepsis group. [3]

At the 2016 scientific meeting, the Society of Critical Care Medicine (SCCM)/European Society of Intensive Care Medicine (ESICM) evaluated the identification criteria for sepsis patients, by comparing the traditional criteria for Systemic Inflammatory Response Syndrome

(SIRS) with another method, namely the Sequential Organ Failure Assessment. (SOFA) scoring. Based on the analysis recommended SOFA score to assess the degree of organ dysfunction in septic patients. [4] Research conducted by Harahap A, et al at the HAM Hospital in 2018 found a significant relationship between SOFA scores and mortality rates in hospitals with the median value of patients who died being seven and the median value of discharged patients being five, with a p-value of 0.026.[5]

Many scoring systems are used to assess the severity of disease in patients admitted to the ICU. The Acute Physiology and Chronic Health Evaluation II (APACHE II) scoring system is most often used for patients admitted to the ICU.[6] APACHE II has been used since 1985 in many ICU care units worldwide because of its simplicity and ability to classify disease severity and predict disease severity. in-hospital mortality. [7] The APACHE II scoring cannot comprehensively assess septic patients with multiple comorbidities that are often accompanied by advanced age. Several studies have then used CCI to assess the effect of comorbid disease in critically ill patients on mortality.[8]

In a study conducted by Firmansyah M, et al on Community-Acquired Pneumonia (CAP) patients at Cipto Mangunkusomo Hospital, Jakarta. Of the 434 patients, 104 patients died. Of the 104 patients who died, 39 (35.1%) with a CCI score 5, and 65 people with a CCI score < 5. Comorbidity as expressed by a CCI score of 5 was one of the independent predictors of mortality in patients (OR 2.25; 95% CI 1.6-3.15; $p < 0.001$). [9] The study aimed to describe the characteristics of the use of scoring to predict patient' mortality admitted to ICU at Haji Adam Hospital.

MATERIALS & METHODS

This is an observational study with a cross-sectional design. The study was conducted at the Haji Adam Malik Central General Hospital (RSUP) Medan after

obtaining approval from the Health Research Ethics Commission of USU Medical Faculty / H. Adam Malik Hospital Medan. The time of the study was from December 2020 to July 2021. A total of 299 study subjects met the inclusion criteria and exclusion criteria. The study inclusion criteria were as follows: Adult sepsis patients based on 2016 SSC criteria at Haji Adam Malik Hospital Medan from January - December 2019 with SOFA score > 2, CKD patients with SOFA score > 2, without assessing kidney function, Stroke patients with SOFA score > 2, without assessing the patient's consciousness, Patients with blood disorders with SOFA score > 2, without assessing blood coagulation, Patients with liver disorders with SOFA score > 2, without assessing liver function. From the medical record data in the form of identity, history taking, physical examination, laboratory examination, and chest x-ray examination, data on the diagnosis of sepsis and the results of each laboratory, chest x-ray examination, and patient mortality data were obtained. Then the research sample was assessed for SOFA Score, APACHE II Score, and CCI Score taken from medical record data.

Statistical Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) 24.0 software. Numerical variables were presented as mean and standard deviation if normally distributed, moreover presented as median (minimum-maximum value) when not normally distributed. Categorical variables were presented as percentages. Data were tested for normal distribution; differences between parametric quantitative independent groups were assessed by T-independent test or Mann-Whitney for not normal distribution data. $P\text{-value} < 0.05$ was considered statistically significant.

RESULT

This study included 299 research subjects of sepsis patients at the H. Adam

Malik Central General Hospital Medan in 2019 who had met the inclusion and exclusion criteria. A total of 252 people (84.3%) of sepsis patients died and 47 people lived with sepsis (15.7%). The mean age of the septic patients who died was 54.25±14.27 years, while the mean age of the living sepsis patients was 51.74±15.03 years.

From the characteristic data, it was found that 141 patients (86%). The most

septic patient wards were in the ICU as many as 180 people (60.2%), 19 people (10.6%) from the group of living patients, and 161 people (89.4%) from the group of patients who died. The incidence of Hospital Sepsis was more than half of the total study subjects, namely 159 people (53.2%), 23 people (14.5%) from the group of living patients, and 136 people (85.5%) from the group of patients who died (**Table 1**).

Table 1. Baseline Characteristics

Characteristics	Alive (n= 47)	Died (n= 252)	Total
Gender			
Male	23 (14 %)	141 (86 %)	164 (55%)
Female	24 (17,8 %)	111 (82,2 %)	135 (45%)
Age	51,74±15,03	54,25±14,27	53,86±14,40
Room Care			
ICU	19 (10,6 %)	161 (89,4 %)	180 (60%)
Non-ICU	28 (23,5 %)	91 (76,5 %)	119 (40%)
Septic Type			
Community Sepsis	24 (17,1 %)	116 (82,9 %)	140 (47%)
Hospital Sepsis	23 (14,5 %)	136 (85,5 %)	159 (53%)
Infection resources			
Pneumonia	31 (18,9 %)	133 (81,1 %)	164 (54,8%)
UTI (Urinary Tract Infection)	4 (12,5 %)	28 (87,5 %)	32 (10,7%)
IAI (Intra Abdominal Infection)	2 (11,8 %)	15 (88,2 %)	17 (5,6%)
SSTI (Skin Soft Tissue Infection)	7 (12,3 %)	50 (87,7 %)	57 (19%)
etc	3 (10,3 %)	26 (89,7 %)	29 (9,6%)

The most sources of infection from the group of patients who died compared to the living group that caused sepsis were Pneumonia 133 people (81.1%), SSTI 50 people (87.7%), UTI 28 (87.5%), other sources of infection 26 people (89.7%), and Intra Abdominal Infection (IAI) 15 people (88.2%). While in the group of living patients, the most common source of infection was pneumonia 31 people (18.9%), SSTI 7 people (12.3%), UTI 4 people (12.5%), other sources of infection 3 people (10,3%), and IAI 2 people (11,8%).

The mortality scoring systems in septic patients showed that scores in septic patients who died were higher than scores in septic patients who were still alive. The characteristics of the septic patient mortality scoring system are presented in (**Table 2**). The SOFA score ranged from 0-24, the median SOFA score in living sepsis patients was 2.0, while the median SOFA score in deceased sepsis patients was 5.0. The APACHE II score ranged from 0-71, the

median APACHE II score in living sepsis patients was 17.0 while the median APACHE II score in deceased sepsis patients was 23.0. The CCI score ranged from 0-37, the median CCI score in living sepsis patients was 3.61 while the median CCI score in deceased sepsis patients was 5.0. All of scoring system differences has been statistically significant with p-value<0,05 between two groups.

Table 2. Characteristics of Mortality Predictor Scoring for Septic Patients

Scoring System	Prognostic of Sepsis Patients		Nilai p
	Alive	Dead	
SOFA score (0-24)	2,0 (2,0 – 7,0)	5,0 (2,0-14,0)	<0,001
APACHE II score (0-71)	17,0 (2,0-31,0)	23,0 (8,0-44,0)	<0,001
CCI score (0-37)	3,61 (0,0 – 8,0)	5,0 (1,0 – 10,0)	<0,001

Data was presented in median (minimum-maximum)

DISCUSSION

In this study, from 299 septic patients, 252 (84.3%) sepsis patients died and 47 sepsis patients (15.7%) were alive. This is following the results of research

conducted by Harahap A et al, at the Haji Adam Malik General Hospital Medan in 2018 found that 134 people died of sepsis (88%) out of 152 total sepsis patients. [5] In the Systematic Review conducted by Failla, KR et al found that 5 studies showed a lower comorbid index in women than men. The source of infection was obtained from 6 studies reported, statistically concluded that in men the incidence of pneumonia is higher, and in women, it is a more high incidence of UTI. [10]

For the treatment of sepsis patients in this study, the results showed that the most sepsis patients were treated in the ICU as many as 180 people (60.2%), consisting of 161 people (89.4%) from the group of patients who died and 19 people (10.6%) of the living patient group. This is supported by research conducted by the FORECAST Study by Abe, T et al in Japan in 2017 which showed that 725 patients with sepsis were treated in the ICU (61%).⁷⁵ While another study conducted by Heldens, M et al at the Royal North Shore Hospital Sydney, Australia in clinically established sepsis patients treated in the ICU as many as 146 people, and 32 people who died (22%). [11] Based on WHO data in 2010, sepsis is the leading cause of death in the ICU or intensive care due to organ dysfunction. that happened. This is also the case in developed countries, where the incidence continues to increase. [12]

This is supported by the research of Baharoon, S et al in Saudi Arabia in 2011 which was obtained from 96 septic patients, 60% were Hospital Sepsis and 40% were Community Sepsis. [13] In another study conducted by Rabee, HA et al at An-Najah National University Hospital (ANUH) Palestine. The results were obtained from 174 sepsis patients who were Hospital Sepsis as many as 138 people (78%), and Community Sepsis as many as 38 people (22%). [14]

The high incidence of death in sepsis can not be separated from the patient's factors, namely the severity and extent of organ dysfunction that occurs and comorbid

diseases experienced by these patients. Because there is no definitive tissue examination or definitive serological test to diagnose sepsis, the gold standard for the diagnosis of sepsis in the clinical identification of organ dysfunction caused by infection and can be assessed and calculated using a scoring system. [11]

A higher SOFA score is associated with an increased probability of death in septic patients. [4] In another study, conducted by Harada et al in Japan showed that a SOFA score >8 was associated with a significantly higher hospital mortality rate.⁹ Research by Harahap A, et al at RSUP HAM in 2018 found a significant relationship between SOFA scores and mortality rates in hospitals with the median value of patients who died being 7 and the median value of discharged patients being 5, with a p-value of 0.026. [5] In another study conducted by Innocenti F et al, From June 2006-April 2016 in Italy from 742 sepsis patients, the median SOFA score on mortality was 6.5 (4-9) with $p < 0.0001$ statistically significant. [15]

A report by Xie, J et al in China showed the mean of the APACHE II score on mortality in sepsis patients was 22.15 with a p-value < 0.0001 .⁷⁰ In another study conducted by Innocenti F et al, from June 2006-April 2016 in Italy from 742 patients. sepsis, the median value of the APACHE II score on mortality was 21.5 (16-27) with $p < 0.0001$ statistically significant. [15]

Septic patients tend to have aggravating factors, namely comorbid diseases, in this study the correlation between CCI scores and mortality in sepsis patients was found. In a study conducted by Firmansyah M, et al on CAP patients at Cipto Mangunkusomo Hospital, Jakarta. Of the 434 patients, 104 patients died. Of the 104 patients who died, 39 (35.1%) with a CCI score 5, and 65 people with a CCI score < 5 . Comorbidity as expressed by a CCI score of 5 was one of the independent predictors of mortality in patients (OR 2.25; 95% CI 1.6-3.15; $p < 0.001$). Types of comorbidities that were proven as predictors

from the results of multivariate analysis in this study were a cerebrovascular disease, all types of malignancy, diabetes mellitus, and hypertension. 535 people got the most CCI scores with a score of 4-7 250 patients (46%). Innocenti F et al conducted a study from June 2006-April 2016 in Italy on 742 septic patients. The median CCI score on mortality was 3 (2-6) with $p < 0.0001$ statistically significant. [15]

CONCLUSION

Higher scores are associated with an increased probability of death in septic patients

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REFERENCES

1. Rhodes A, Evans LE, Alhazzani W, Levy MM, Antonelli M, Ferrer R, et al. Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016. Vol. 43, Intensive Care Medicine. 2017. 304–377 p.
2. Martischang R, Pires D, Masson-Roy S, Saito H, Pittet D. Promoting and sustaining a historical and global effort to prevent sepsis: The 2018 World Health Organization SAVE LIVES: Clean Your Hands campaign. Crit Care. 2018;22(1):7–9.
3. Ginting F, Sugianli AK, Barimbing M, Mardianto M, Kusumawati RL, Parwati I, et al. Appropriateness of diagnosis and antibiotic use in sepsis patients admitted to a tertiary hospital in Indonesia. Postgrad Med [Internet]. 2020;00(00):1–6. Available from: <https://doi.org/10.1080/00325481.2020.1816755>
4. Singer M, Deutschman CS, Seymour CW, Hari MS, Anname D, Bauer M. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). Am Med Assoc. 2016;315(8):801–10.
5. Harahap AH, Ginting F. Association Between SOFA Score and Mortality in Sepsis Patients at the RSUPH. Adam Malik Medan in the Period of July-December 2018. Holistic Approach In Infectious Diseases NATIONAL CONGRESS XXIV PETRI MALANG 2019. 2019. 317 p.
6. Chiavone PA, Alves Y, Sens S. Evaluation of APACHE II system among intensive care. Med J Sao Paulo. 2003;121(2):53–7.
7. Lee H, Lim CW, Hong HP, Ju JW, Jeon YT, Hwang JW, et al. Efficacy of the APACHE II score at ICU discharge in predicting post-ICU mortality and ICU readmission in critically ill surgical patients. Anaesth Intensive Care. 2015;43:2:175–86.
8. Mnatzaganian G, Bish M, Fletcher J, Knott C. Application of Accelerated Time Models to Compare Performance of Two Comorbidity-adjusting Methods with APACHE II in Predicting Short-term Mortality Among the Critically Ill *. METHODS Inf Med. 2018;57 (1):81–8.
9. Firmansyah MA, Amin Z, Loho T, Shatri H. Faktor-Faktor Prediktor Mortalitas Community-Acquired Pneumonia dalam Perawatan Inap di Rumah Sakit Cipto Mangunkusumo Jakarta. Indones J CHEST Crit Emerg Med. 2015;2(2):45–53.
10. Failla KR, Connelly CD. Systematic Review of Gender Differences in Sepsis Management and Outcomes. J Nurs Scholarsh. 2017;49(3):1–13.
11. Heldens M, Schout M, Hammond NE, Bass F, Delaney A, Finfer SR. Sepsis incidence and mortality are care unit administrative data. MUA. 2018;209(6): 255–60.
12. Bataar O, Lundeg G, Tsenddorj G, Jochberger S, Grandner W, Baelani I, et al. Nationwide survey on resource availability for implementing current sepsis guidelines in Mongolia. Bull World Health Organ. 2010;88(11):839–46.
13. Baharoon S, Telmesani A, Tamim H, Alsafi E, Aljohani S, Mahmoud E, et al.

- Community- versus nosocomial-acquired severe sepsis and septic shock in patients admitted to tertiary intensive care in Saudi Arabia, etiology and outcome. *J Infect Public Health* [Internet]. 2015;8(5):418–24. Available from: <http://dx.doi.org/10.1016/j.jiph.2014.12.003>
14. Rabee H, Tanbour R, Nazzal Z, Hamshari Y, Habash Y, Anaya A. Epidemiology of Sepsis Syndrome among Intensive Care Unit Patients at a Tertiary University Hospital in Palestine in 2019. *Indian J Crit Care Med.* 2020;24(7):551–6.
15. Innocenti F, Tozzi C, Donnini C, Villa E De. SOFA score in septic patients : incremental prognostic value over age, comorbidities, and parameters of sepsis severity. *Intern Emerg Med.* 2017;

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