

Curb-65 Score And Sofa Score Sensitivity And Specificity (Accuracy) As Mortality Predictors In Covid 19 Patients Admitted To Haji Adam Malik Medan Central General Hospital

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Abstract:

Background: SARS-CoV-2 or severe acute respiratory syndrome coronavirus 2 is the most recent strain of the coronavirus responsible for the late-2019 pneumonia epidemic. Initial clinical manifestation of COVID-19 disease is pneumonia. About 15 percent of patients with mild-to-moderate symptoms develop severe pneumonia, and 5 percent develop acute respiratory distress syndrome (ARDS), septic shock, and multiple organ failures. Therefore, clear and objective risk stratification criteria are required for early diagnosis of patients at high risk of clinical deterioration, so that physicians can predict outcomes and make treatment-related decisions. This study aims to compare the sensitivity and specificity (accuracy) of the CURB-65 and SOFA scores as predictors of mortality in COVID-19 patients admitted to the Haji Adam Malik Central General Hospital in Medan.

Method: The study used an observational analytic design with a consecutive sampling technique. This study was conducted between March and July 2021 at the Haji Adam Malik Central General Hospital using patient medical records.

Results: This study revealed that the optimal cutoff value for predicting mortality using SOFA scores was 3.5, with a sensitivity of 73.5% and a specificity of 87.5%. The SOFA score can predict mortality by 82%. The optimal CURB-65 score threshold for predicting mortality is 1.5, with a sensitivity of 80.9% and a specificity of 81.3%. The CURB-65 score can accurately predict mortality by 82%.

Conclusion: CURB-65 scores are more accurate and sensitive at predicting mortality than SOFA scores.

Keywords: SOFA Score, CURB 65, COVID 19.

Background

SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) is the most recent strain of the coronavirus that caused the outbreak at the end of 2019 and was first discovered in Wuhan, China.¹ The World Health Organization (WHO) declared COVID-19 a pandemic after numerous victims were infected and deaths occurred across the globe.¹

COVID-19 clinical manifestations include fever, dry cough, and fatigue. Headache, dizziness, abdominal pain, nausea, and vomiting are uncommon symptoms. A few days prior to fever, anosmia (loss of smell), dysgeusia (taste distortion or loss), nausea, and diarrhea may also be present. Although severe lung injuries can occur at any age, the virus is more likely to cause severe

interstitial pneumonia, ARDS, and subsequent multiorgan failures, which are responsible for severe acute respiratory failure and a high mortality rate, in high-risk individuals, such as the elderly or those with comorbidities^{1,2}. The majority of COVID-19 patients exhibit mild-to-moderate symptoms, but approximately 15% develop severe pneumonia and 5% develop acute respiratory distress syndrome (ARDS), septic shock, or multiple organ failure^{3,4}.

Several demographic studies on severe COVID-19 have been published previously. The study in Gabon identified 31 (3.7 percent) out of 837 patients with severe COVID-19⁵. Out of 1094 positive RT-PCR cases in Pakistan, 5.2% of patients had severe COVID-19. 61% of patients are 50 years of age or older, while only 5% of patients are in their 20s.⁶

Clear and objective criteria must be used for risk stratification and early diagnosis of patients at high risk of clinical aggravation. The scoring system used for this purpose is a useful tool that assists doctors in predicting outcomes and guiding treatment-related decisions⁷. Assessing mortality risk in COVID-19 patients is a challenge for physicians. Among the available tools are the CURB-65 and the SOFA score. In prior research, the CURB-65 and SOFA scores were utilized to determine the severity and mortality of COVID-19 patients⁸⁻¹¹.

Thus, due to the high morbidity and mortality rate of COVID-19 cases and the fact that no studies have ever been conducted at RSUP H. Adam Malik Medan, the author aims to investigate the sensitivity and specificity (accuracy) of CURB-65 and SOFA scores in predicting mortality in COVID-19 patients at RSUP H. Adam Malik Medan.

Methods

This study employed an observational analytical method with a diagnostic test design, as well as non-probability sampling consecutive sampling techniques. This study was conducted at the Adam Malik Haji Center General Hospital with the approval of the FK USU Research Ethics Commission. This study's sampling period was January 2022 to March 2022, and it used medical record data from patients treated between March 2021 and July 2021. Patients infected with SARS COV-2 were included in the study, as evidenced by RT-PCR. The study sample came from a patient who tested positive for SARS COV-2 via RT-PCR. In addition, the inclusion and exclusion criteria must be met. Inclusion criteria included being over the age of 18 and having SARS-COV2 confirmed via RT-PCR. Patients who died within 24 hours, did not complete treatment at RSUP Haji Adam Malik Medan, did not have complete medical record data, patients with comorbidities such as chronic kidney disease, hepatic cirrhosis, acidosis, malignancy, NYHA III-IV heart failure, and HIV stage III-IV are excluded from this study. Patient personal data collected includes name, gender, age, medical record number, address, religion, occupation, marital status, and laboratory examination results. The obtained results will be recorded on the data collection sheet. After collecting the data, the researcher processes and analyzes it using the SPSS data management application.

Results

Table 1. The characteristics of the patients

	Survival					
	Total	Alive	%	Deceased	%	p
Age						
<65 year old	151	95	52,8	56	31,1	0.66
≥65 year old	29	17	9,4	12	6,7	
Gender						
Male	89	50	27,8	39	21,7	0.098

Female	91	62	34,4	29	16,1	
Grade of COVID-19						
Mild	111	101	56,1	10	5,6	0.001
Moderate	44	8	4,4	36	20,0	
Critical	25	3	1,7	22	12,2	
GCS						
15	170	111	61,7	59	32,8	0.001
<15	10	1	0,6	9	5,0	
Others' comorbid						
Metabolic disorder						
No	131	85	47,2	46	25,6	0.228
Yes	49	27	15,0	22	12,2	
Cardiovascular disorder						
No	104	73	40,6	31	17,2	0.010
Yes	76	39	21,7	37	20,6	
Lung disorder						
No	168	106	58,9	62	34,4	0.366
Yes	12	6	3,3	6	3,3	
BUN						
≤19	91	67	37,2	24	13,3	0.001
>19	89	45	25,0	44	24,4	
Bilirubin						
<1,2	127	88	48,9	39	21,7	0.002
≥1,2	53	24	13,3	29	16,1	
Platelet						
≥ 150.000	164	103	57,2	61	33,9	0,606
< 150.000	16	9	5,0	7	3,9	
Respiratory Rate						
<30	157	107	59,4	50	27,8	0.001
≥ 30	23	5	2,8	18	10	
PaO2/FiO2						
≥ 400	69	60	33,3	9	5,0	0.001
< 400	111	52	28,9	59	32,8	
Creatinine						
< 1,2	119	82	45,6	37	20,6	0.010
≥ 1,2	61	30	16,7	31	17,2	

In this study, the number of men and women was nearly equal, with 49.4 percent of men and 50.6 percent of women participating. 39 of the 89 men who were treated died (21.7%). This figure is higher than the 29 deaths among the 91 women treated (16.1%). However, statistical tests of the study's findings revealed no significant relationship between sex and mortality ($p = 0.098$). The number of patients who died with abnormal BUN and creatinine levels was 44 (24.4%) and 31 (17.2%), respectively. The statistical test results of the relationship of these four variables are significant with p values (0.001, and 0.01). This study's 180 samples contained 49 (27.2%) metabolic disorders, 12 (6.7 percent) pulmonary disorders, and 76 (42.2%) cardiovascular disease disorders. Patients with cardiovascular disease had the highest mortality rate, with 37 (20.6 percent) dying. Statistical tests on these three comorbid variables revealed a significant relationship in cardiovascular disease ($p = 0.01$).

Table 2. Analysis of SOFA with mortality

Survival						
	Total	Alive (n=104)	%	Deceased (n=76)	%	<i>p</i>
SOFA						
0 – 2		87	48,3	10	5,6	0.001
3 – 5		16	8,9	36	20,0	
6 – 8		8	4,4	18	10,0	
> 8		1	0,6	4	2,2	
SOFA						
Resiko rendah	115	97	84,3	18	15,7	0.001
Resiko tinggi	65	15	23,1	50	76,9	

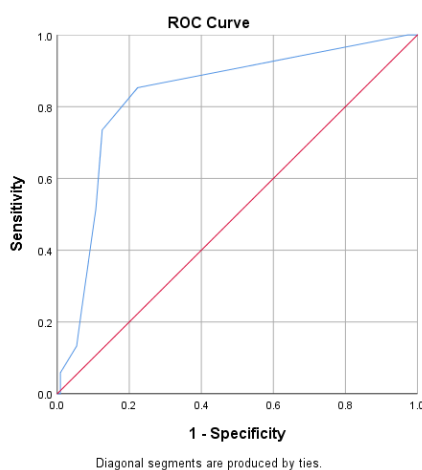


Figure 1. ROC Curve of SOFA Score with mortality

According to the findings of this study, the best cut off value for SOFA scores in predicting mortality was 3.5, with a sensitivity value of 73.5% and a specificity value of 87.5%. SOFA scores >3.5 can predict mortality by 82%.

Table 3. Analysis of CURB-65 with mortality

Survival					
Total	Hidup (n=104)	%	Meninggal (n=76)	%	<i>p</i>

CURB-65

0 – 1	91	50,6	13	7,2	0.001
2	20	11,1	29	16,1	
≥ 3	1	0,6	26	14,1	

CURB-65

Resiko rendah	104	91	87,5	56	37,09	0.001
Resiko tinggi	76	21	27,6	12	41,38	

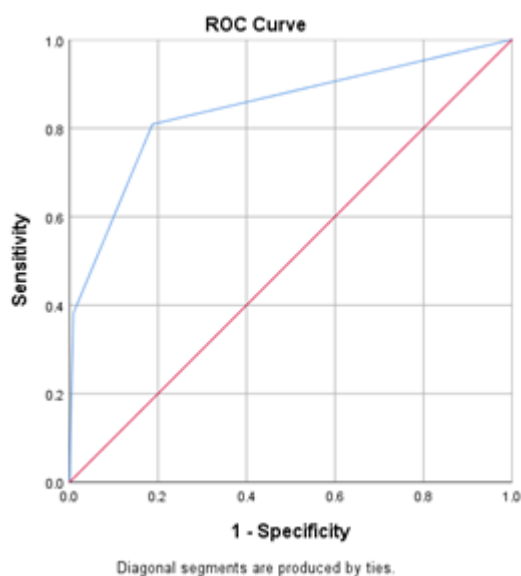


Figure 2. ROC Curve of CURB-65 with mortality

According to the findings of this study, the best cut off value for the CURB-65 score in predicting mortality was 1.5, with a sensitivity of 80.9% and a specificity of 81.3%. The CURB-65 score has an 82% accuracy in predicting mortality.

Discussion

WHO reported 3,931,221 new cases in the past week (September 6-12) for a total of 224,180,421 cases as of September 14, 2021. In the past week, more than 62,000 deaths were reported worldwide, a decrease from the previous week. As of 16 September 2021, there were 3,145 new cases and 237 fatalities in Indonesia, where the trend of cases has begun to decline. The total number of reported COVID-19 cases in Indonesia is 4,181,309, with 139,919 deaths attributable to COVID-19.¹² As of October 3, 2021, there have been 4,796,171 deaths worldwide (CFR: 2.0%) in 204 Infected Countries and 151 Community Transmission Countries, while in Indonesia alone there have been 142,171 deaths (CFR: 3.4%) attributed to COVID-19 and 4,044,235 patients have recovered from the disease.¹³

In severe cases of rapid and progressive deterioration, such as ARDS, septic shock, difficult-to-correct metabolic acidosis, and bleeding or dysfunction of the coagulation system within a few days. Some patients exhibit mild symptoms that are not even accompanied by fever. The majority of patients have favorable prognoses, with only a small proportion of those in critical condition dying. Here are the various degrees of clinical syndromes that can result from infection.¹⁴

In COVID-19 patients, CURB-65 can serve as a useful prognostic marker that can be used to rapidly triage severe patients in primary care or general practice settings. CURB-65 ≥ 2 values can be used as the prediction threshold for hospital deaths. A high CURB-65 score may aid in the early identification of COVID-19 patients with a poor prognosis.¹⁰

The CURB-65 score performed better than the ISARIC-4C and COVID-GRAM scores in predicting hospital mortality and the need for ICU care in COVID-19 patients. 7. The PSI and CURB-65 scores did not differ statistically in their ability to

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predict mortality (AUROC 0.835 vs 0.825, $p = 0.112$) and were superior to the qSOFA and MuLBSTA scores (AUROC 0.728 and 0.715, respectively, $p < 0.001$ for both compared to PSI and CURB-65). Critical degree COVID-19 patients with a SOFA score of greater than 3 had a higher likelihood of death at 28 and 60 days ($p < 0.05$)¹⁵. The optimal SOFA cutoff of 3 has a sensitivity, specificity, positive prediction value, and negative prediction value of 90%, 83.18%, 50%, and 97%, respectively.¹⁶ This study determined that the optimal cutoff value for the CURB-65 score to predict mortality was 1.5, with a sensitivity of 80.9 percent and a specificity of 81.3 percent. The CURB-65 score can accurately predict mortality by 82%.

Patients with critical degree COVID-19 and a SOFA score of > 3 were associated with increased mortality at 28 and 60 days ($p < 0.05$)¹⁵. The optimal SOFA cutoff of ≥ 3 has a sensitivity, specificity, positive prediction value, and negative prediction value of 90%, 83.18%, 50%, and 97%, respectively.¹⁷ In the study by Yang et al., the AUC score for SOFA was 0.908 (95% confidence interval: 0.857–0.960) with a diagnostic cut-off value of 2 and sensitivity and specificity values of 85.20 and 80.40 percent, respectively. These results indicate that scores ≥ 2 on the SOFA scale can predict the severity of COVID-19 in patients.¹⁸ According to the findings of this study, the best cut off value for SOFA scores in predicting mortality was 3.5, with a sensitivity value of 73.5% and a specificity value of 87.5%. SOFA scores > 3.5 can predict mortality by 82%.

Conclusion

This study concludes that CURB-65 is more accurate and better at predicting mortality. However, more research on the sensitivity and specificity (accuracy) of the CURB-65 score and sofa score as predictors of mortality in COVID-19 patients in a larger population is required.

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