EVALUATION OF QUICK SOFA IN DIAGNOSIS AND PROGNOSIS OF SEPSIS PATIENTS TREATED AT HUE CENTRAL HOSPITAL (4/2018 - 3/2020)

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Summary

Background: Sepsis is a life - threatening organ dysfunction. Previous consensuses defined sepsis as infection with systemic inflammation response syndrome (SIRS). The new 2016 consensus selected SOFA and Quick SOFA instead of SIRS in diagnosing sepsis. *Objectives:* 1. Describe clinical and subclinical characteristics of patients with sepsis. 2. Compare qSOFA and SIRS in the diagnosis and prognosis of the outcome of patients with sepsis. *Subjects and method:* Patients were diagnosed with sepsis based on the definition Sepsis - 2 (2001) or Sepsis - 3 (2016), treated at the Intensive Care Unit and the Department of Tropical Diseases, Hue Central Hospital. A prospective study. *Results:* There were 59 selected patients. The mean age was 60.22 ± 18.19 (28 - 90). Coagulation and cardiovascular dysfunction in patients with sepsis were the most common (61%), followed by kidneys (54%) and CNS (51%). Results of treatment: 44.1 % of patients had a septic shock; 28.8% died. In all patients, qSOFA ≥ 2 achieved rate was lower than SIRS ≥ 2 (72.9% compared to 98.3%). $qSOFA_0$ had a high value in predicting ICU admission and had statistically significantly higher when compared to $SIRS_0$. $qSOFA_0$ had mean value in predicting in septic shock and had significantly higher when compared to $SIRS_0$. qSOFA had a high value in predicting hospital mortality and had significantly higher when compared to SIR_0. *Conclusion:* SIRS is more noted than qSOFA in patients with sepsis. $qSOFA_0$ has higher value than $SIRS_0$ in predicting ICU admission and hospital mortality in patients with sepsis.

Key word: Sepsis, SIRS, qSOFA.

BACKGROUND

Sepsis is defined as life - threatening organ dysfunction caused by a dysregulated host response to infection. Procession from sepsis to septic shock, organ failure is fast so patients are at high risk for death unless diagnosed early and treated promptly[4]. Previous consensuses defined sepsis as infection with systemic inflammation response syndrome (SIRS)[3]. In The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis - 3), sepsis was redefined[10]. The new consensus excluded SIRS because SIRS could present in the most infectious patients and some non - infectious patients (burns, trauma, acute pancreatitis…) then selected SOFA and Quick SOFA to diagnose sepsis. The new consensus stated that qSOFA had a higher predictive of mortality than SIRS and recommended using qSOFA to determine infectious patients at risk for death (Sepsis). However, many experts disagree with this opinion. Additionally, many experts mean the use of qSOFA will make diagnosis delay until organ failure is apparent. To evaluate the value of SIRS and qSOFA in the diagnosis and prognosis of septic patients, we conduct this study with the aim of:

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1. Describe clinical and subclinical characteristics of patients with sepsis.

2. Compare qSOFA and SIRS in the diagnosis and prognosis in patients with sepsis.

PATIENTS AND METHOD

Patients: Patients were diagnosed with sepsis, treated in The Intensive Care Unit and Department of Tropical Disease, Hue Central Hospital, from April 2018 to March 2019.

Selection Criteria: Adult patients, 16 years and older, were diagnosed with sepsis. Sepsis was defined by the criteria of Sepsis - 2 (confirmed or suspected infection with SIRS ≥ 2) or Sepsis - 3 (confirmed or suspected infection with SOFA ≥ 2 or qSOFA ≥ 2).

Selected patients were examined and recorded symptoms, subclinical results. Then we calculated qSOFA and SIRS, SOFA in the first 24 hours ($qSOFA_0$ and $SIRS_0$), during the time of hospitalization, monitored changes of subclinical results until diagnostic criteria were met, the progress of the disease, treatment results.

Exclusion criteria: End - stage cancer, End - stage kidney disease, cirrhosis Child - Pugh class C, hypovolemic shock, cardiogenic shock, patients died, or transferred to another hospital within the first 24 hours.

Places: Department of Tropical Diseases and Intensive Care Unit, Hue Central Hospital

Method: Prospective Study.

Data analysis: By EXEL and SPSS 22.0, the difference is statistically significant when $p < 0.05$.

RESULT

Clinical and subclinical characteristics of patients with sepsis

There were 59 selected patients. The mean age was 60.22 ± 18.19 (28 - 90). Males accounted for 64.5% and females accounted for 35.6% of total patients.

Risk factors

Table 1. Risk factors for sepsis

Risk factors	n	Proportion %
Diabetes	10	16.9
Gallstones	3	5.1
Cirrhosis/ Hepatitis	4	3.8
Recent history of trauma, surgery, give birth	2	3,4
Urinary tract stones	4	6.8
Immunodeficiency disorder (drug, splenectomy, HIV/AIDS, tuberculosis)	3	5.1
Diabetes + Cirrhosis/ Hepatitis	2	3.4
Diabetes + Urinary tract stones	1	1.7
No risk factor	30	50.8
N	59	100.0

Comment: About 50% of septic patients had risk factors. The highest percentage was diabetes (more than 22%), followed by cirrhosis and urinary tract stones.

Organ dysfunction

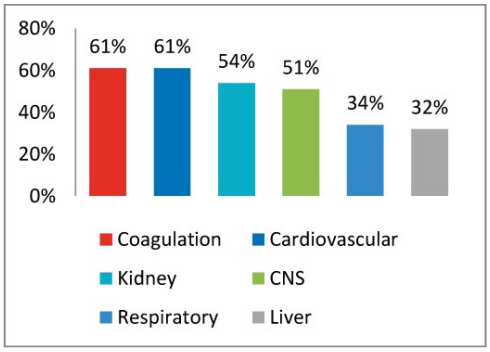


Figure 1. Organs dysfunction

Comment: In organs dysfunction of septic patients, coagulation and cardiovascular were the most common (61%); followed by the kidney (54%) and the central nervous system - CNS (51%). The rate of other organs dysfunctions fluctuated within 30%.

Treatment Result

Table 2. Treatment result of septic patients

	Result	Patients (N = 59)	Proportion (100%)
Septic shock	Yes	26	44.1
	No	33	55.9
Multi - Organ Dysfunction	Yes	47	79.7
	No	12	20.3
Outcome	Cured	42	71.2
	In - hospital mortality	17	28.8
ICU length of stay (days)	No	13	22.0
	< 3	7	11.9
	≥ 3	39	66.1
	Mean (Min - Max): 6,4 (0 - 20)		
Hospital length of stay (days)	**Mean (Min - Max):** 16,4 (2 - 33)		

Comment: 44.1 % of patients suffered from septic shock. Hospital mortality patients accounted for 28.8% while 88% of patients were treated in ICU and most of them had a length of stay ICU more than 3 days. The mean ICU length of stay was 6.4 days. The mean hospital length of stay was 16.4 days.

Compare qSOFA and SIRS for diagnosing and predicting events (ICU admission, septic shock), the outcome of sepsis patients.

Compare SIRS and qSOFA for diagnosing sepsis.

Table 3. Distribution of SIRS and qSOFA in the study population

		qSOFA classification		N
		< 2	≥ 2	59
SIRS classification	**< 2**	0	1	1 (1.7%)
	≥ 2	16	42	58 (98.3%)
N	**59**	16 (27.1%)	43 (72.9%)	100.0

Comment: In the study population, the proportion of patients with qSOFA ≥ 2 was lower than SIRS ≥ 2 (72.9% vs 98.3%). However, though meeting SIRS criteria, 16 patients (27.1%) did not meet qSOFA criteria. In contrast, 1 patient (2.3%) met the qSOFA criteria but did not meet the criteria for SIRS.

Compare SIRS and qSOFA for predicting events (ICU admission, septic shock), hospital mortality within the first 24 hours.

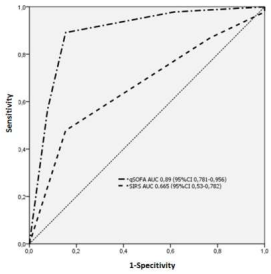
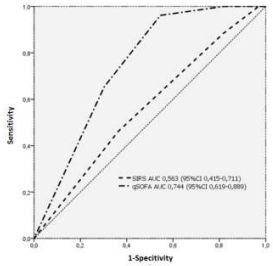


Figure 2. Comparison of ROC curves of $qSOFA_0$ and $SIRS_0$ criteria to predict ICU admission

Comment: $qSOFA_0$ (AUC 0.89) had good value and $SIRS_0$ (AUC 0.65) had a poor value in predicting ICU admission. The discrimination of ICU admission using $qSOFA_0$ score was significantly greater than that of $SIRS_0$ (p = 0.0173).

Figure 3. Comparison of ROC curves of $qSOFA_0$ and $SIRS_0$ criteria to predict septic shock



Comment: $qSOFA_0$ (AUC 0.744) had a fair value and $SIRS_0$ (AUC 0.563) was useless in predicting septic shock. The discrimination of septic shock using $qSOFA_0$ score was significantly greater than that of SIRS (p = 0.045).

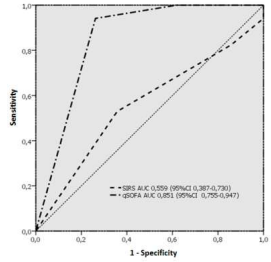


Figure 4. Comparison of ROC curves of $qSOFA_0$ and $SIRS_0$ criteria to predict hospital mortality

Comment: $qSOFA_0$ (AUC 0.851) had good value and $SIRS_0$ (AUC 0.559) was useless in predicting hospital mor-

tality. The discrimination of hospital mortality using $qSOFA_0$ score was significantly greater than that of $SIRS_0$ (p = 0.007).

DISCUSSION

Clinical, subclinical characteristics of patients with sepsis

Risk factors: The percentage of patients with underlying diseases in our study was quite high (45.8%). The highest percentage was diabetes (more than 22%), followed by cirrhosis and urinary tract stone. Early identification of risk factors will help doctors to make a more accurate diagnosis and prognosis.

Organs dysfunction: In organ dysfunctions of septic patients, coagulation and cardiovascular were the most common (61%); followed by the kidney (54%) and central nervous system (51%). The proportion of other organ dysfunctions fluctuated within 30%. Respiratory dysfunction accounted for 34 %, and liver dysfunction 32%. These results were different from Ngoc Thao T. Pham's study (Choray hospital, 2009), in the order of common ones are: respiratory (69.2%), cardiovascular (62.8%), kidney (43.6%)[2]. According to Astrid L Wester, recorded organ dysfunctions were a respiratory failure (28.2%), and heart failure (11.8%). The progression of organ dysfunction depends on factors such as the pathogen, host response, diagnosis and treatment time.

Treatment Results: According to the result from the table. 2, septic shock accounted for 44.1% of patients, however, more than 79% of patients suffered from organ dysfunction.The hospital mortality rate was 28.8%. The septic shock rate in Ngoc Thao T. Pham's study was 75.2%[4]; in other studies, multi - organ dysfunctions fluctuated between 18% and 46%. Quang Dai Huynh recorded 46.5% hospital mortality in severe sepsis patients[1]. MOSAICS study conducted in 150 ICUs of 16 countries showed the mortality rate of 44.9%[6]. The mean ICU length of stay was 6.4 days. The percentage of prolonged ICU stays was 66.1%. The mean hospital length of stay was 16.4 days.

Compare qSOFA and SIRS for diagnosing and predicting events (ICU admission, septic shock), the outcome of sepsis patients

Compare SIRS and qSOFA for diagnosing sepsis

In our study, the proportion of patients with qSOFA ≥ 2 was lower than SIRS ≥ 2 (72.9% vs 98.3%). However, though meeting SIRS criteria, 16 patients (27.1%) did not meet qSOFA criteria. In contrast, 1 patient (2.3%) met the qSOFA criteria but did not meet the criteria for SIRS. In Eamon P.Raith's study, 86.7% of patients manifested SIRS criteria, and 54.4% of patients had qSOFA criteria[8]. Khwannimit's study conducted on 2247 patients showed qSOFA in 88.5% of patients, while 96.4% had at least two SIRS criteria[3]. In the group patients meeting SIRS criteria of this study, 10.1% of patients did not meet qSOFA criteria; on the other hand, 3% of patients with SIRS criteria without qSOFA criteria.

The above results show that qSOFA was not good enough for the diagnosis of sepsis. This is also the opinion of many authors. In the early days of progression, signs of organ dysfunction may not be apparent. Therefore qSOFA score is low, that is understandable. In Serafim's study; SIRS ≥ 2 was higher than qSOFA ≥ 2 in sensitivity but lower in specificity (97.3% vs 84.4%)[9].

Thus, the diagnosis of sepsis for non - ICU units (SOFA is not available), SIRS criteria, and qSOFA criteria should be combined with clinical and laboratory manifestations instead of being used alone, to make exact decisions.

Compare SIRS and qSOFA for predicting events (ICU admission, septic shock), hospital mortality within the first 24 hours

Figure 2 shows that $qSOFA_0$ (AUC 0.89) had good value and $SIRS_0$ (AUC 0.65) had a poor value in predicting ICU admission. The discrimination of ICU admission using $qSOFA_0$ score was significantly greater than that of SIRS0 (p = 0.0173). This is similar to the results of Huyn Kyung Park's study on 1009 patients with suspected infection. It shows that $qSOFA_0$ was more accuracy than SIRS0 in predicting ICU admission for septic patients (AUROC = 0.717 vs AUROC = 0.577, p = 0.01)[6]

Similarly, the discrimination of septic shock using $qSOFA_0$ score was significantly greater than that of $SIRS_0$ (AUC 0.744, AUC 0.563, p = 0.045). $qSOFA_0$ had a fair value while $SIRS_0$ was useless in predicting septic shock. However, this result was different from Omar A. Usman's study, which was conducted on 940 sepsis patients. $SIRS_0$ was more accuracy than $qSOFA_0$ in predicting septic shock

(AUC 0.88 vs AUC 0.84, $p < 0.05$). This difference was due to the use of Sepsis - 2 criteria for sepsis diagnose in Omar A.Usman's study. Beside, the sample size of our study was still small.

About predicting hospital mortality, the discrimination of hospital mortality using $qSOFA_0$ score was significantly greater than that of $SIRS_0$ (AUC 0.851 vs AUC 0.559, $p = 0.007$) and $qSOFA_0$ had good value and $SIRS_0$ was useless in predicting hospital mortality. This is similar to the results of Bodin Khwannimit's study, which showed that AUC of $qSOFA_0$ and $SIRS_0$ is 0.814 and 0.547, respectively ($p < 0.05$)[5]. In the study of Hyun Kyung Park, the results were similar to our research, with AUC 0.733 and 0.599, respectively, $p = 0.04$[6].

Therefore, qSOFA has low sensitivity but has high specificity in sepsis diagnosis and it provides the significant discriminative ability to predict events (ICU admission, septic shock) as well as hospital mortality among sepsis patients. qSOFA should be used with other scales to aid in patient diagnosis and prognosis.

CONCLUSION

SIRS criteria was more common than qSOFA criteria in sepsis patients. qSOFA provides the significant discriminative ability to predict events (ICU admission, septic shock) as well as hospital mortality among sepsis patients. It is necessary to conduct multicenter studies with larger sample sizes for more reliable results.

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