ORIGINAL RESEARCH

Clinical profile of sepsis cases by latest scoring systems (SOFA & qSOFA) for critically ill patients

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ABSTRACT

Introduction: Patients are frequently admitted to ICU (intensive care units) because of sepsis significant morbidity and death occur in intensive care unit patients with severe sepsis or shock. Sepsis has a mortality rate of 30-40%. Despite breakthroughs in sepsis treatment during the last two decades, mortality remains stable.

Aims and objectives: To study the clinical profile of sepsis cases by monitoring the clinical parameters & latest scoring systems (SOFA &qSOFA) for critically ill patients.

Materials and methods: This was a prospective observational study conducted at Sri Aurobindo Institute of Medical Sciences and PGI, Indore on 100 patients.

Results: The distribution of patients according to comorbidities. Majority of the patients were having DM (62%) followed by HTN (45%) and IHD (9).Less number of patients were having Cyanotic heart disease (1), CLD (1), CVA (1), RA (1), and sickle cell anemia (1)

The SOFA score, developed by the European Society of Intensive Care Medicine (ESICM) Working Group on Sepsis-Related Problems, can represent both individual and multiple organ failure. The effectiveness of the SOFA score has already been examined in large cohorts of critically sick patients. Due to its ease of use and ability to incorporate easily available clinical and laboratory data, the SOFA score has a number of benefits in the emergency department.

Conclusion: Majority of the patients having age group between 51-60 years followed by 61-70 years. Least number of the patients were found in age > 70 years. Majority of the patients were having DM followed by HTN and IHD. Less number of patients were having Cyanotic heart disease, CLD, CVA, RA, and sickle cell anemia.

Keywords: SOFA, qSOFA, sepsis

INTRODUCTION

Patients are frequently admitted to ICU (intensive care units) because of sepsis significant morbidity and death occur in intensive care unit patients with severe sepsis or shock. Sepsis has a mortality rate of 30-40%. Despite breakthroughs in sepsis treatment during the last two decades, mortality remains stable.

When the body's reaction to an infection becomes out of control, it causes sepsis, a life-threatening event that can be fatal. Septic shock, a severe form of sepsis in which anomalies in the circulatory, cellular, and metabolic systems increase the patient's mortality risk

significantly. A diagnosis based on the Sepsis-3 criteria is made when there is a suspected (or verified) infection, plus the need for vasopressor medication to keep mean arterial pressure under 65 mm of mercury and s. lactate above 2.0 mmol/L despite sufficient fluid replacement[1].

Septic shock and severe sepsis (acute organ dysfunction as a result of a proven or suspected infection) are both caused by sepsis, which is a systemic, harmful host response to infection (severe sepsis and hypotension not responsive to fluid resuscitation). Sepsis has a complicated pathophysiology. Infection sets off a pro- and anti-inflammatory response, both of which aid in infection control and tissue damage, both of which contribute to organ failure as a result. Both the host (co-morbidities and immunosuppression) and pathogen features influence patient response to sepsis (virulence and organism load). Inflammation of the endothelium causes coagulation problems such as intravascular coagulation, fibrinolysis, microvascular thrombi, and reduced oxygenation of tissue. As a result of vasodilation and hypotension, tissues are deprived of blood circulation, resulting in organ failure.The most common cause of mortality and morbidity in patients with sepsis is multi-organ dysfunction syndrome (MODS), which occurs in 15% of all admissions. To describe the severity of sepsis-related disease in patients, a number of scoring models have been created over the last few years. A good example is the Sepsis-related Sequential Organ Failure Assessment (SOFA) score, which initially appeared in 1994. Patient organ dysfunction was measured serially throughout time to determine severity of sickness. It's important to note that APACHE II and the Simplified Acute Physiology Score are severity-scoring systems that use the initial 24 hours of a patient's hospital stay. The SOFA system, on the alternative hand, considers a patient's status throughout their entire stay in the hospital. This makes it possible for doctors to keep tabs on the progress of a patient's condition[2].

SOFA is an easy and objective score that can be used to determine the number and gravity of organ dysfunction in six different organ systems. On a scale of one to six, the lower the number, the greater the number of organs that are functioning normally. On a scale of 0 (normal) to 4, each organ receives a letter grade (the most abnormal)[3].

There is a new diagnostic technique called the Quick Sequential Organ Failure Assessment introduced by the Sepsis III criteria, which permits rapid risk assessment of sepsis patients requiring longer ICU admission and in-hospital death. Patients with high qSOFA scores should have their SOFA scores examined further. Surviving Sepsis advocates using qSOFA exclusively to predict prognosis. Whether or if this will be integrated into current sepsis recommendations is yet to be seen[4].

AIMS AND OBJECTIVES

To study the clinical profile of sepsis cases by monitoring the clinical parameters & latest scoring systems (SOFA &qSOFA) for critically ill patients.

MATERIALS AND METHODS

This was a prospective observational study conducted at Sri Aurobindo Institute of Medical Sciences and PGI, Indore on 100 patients with following inclusion and exclusion criteria:

INCLUSION CRITERIA

1. Patients above 18 years of age admitted to the ICU suspected to have sepsis.
2. Patients with SOFA score more than 2

EXCLUSION CRITERIA

1. Patients who do not give consent
2. Age less than 18 years

3. Need for immediate surgery in critically ill patient.
4. Patients who have already received treatment for more than 48 hours in other center.

STATISTICAL ANALYSIS

All the data analysis were performed using IBM SPSS ver. 20 software. Frequency distribution and cross tabulation was performed to prepare the tables. Quantitative data is expressed as mean and standard deviation whereas categorical data is expressed as percentage. Paired sample t test was used to compare the means. Chi Square test was used to compare the categorical data. ROC analysis for SOFA and qSOFA score also performed to obtain the area under the curve. P value of <0.05 is considered as significant.

RESULTS

In the present study, we evaluated the distribution of patients according to age. Majority of the patients (38%) having age group between 51-60 years followed by 61-70 years (27%). Least number (4%) of the patients were found in age > 70 years as shown in **table-1**

Table 1: Distribution of patients according to age

Age(years)	Frequency	Percentage
21-30	6	6
31-40	10	10
41-50	15	15
51-60	38	38
61-70	27	27
>70	4	4
Total	100	100

The distribution of patients according to comorbidities. Majority of the patients were having DM (62%) followed byHTN (45%) and IHD (9).Less number of patients were having Cyanotic heart disease(1),CLD(1),CVA(1),RA(1),and sickle cell anemia (1) as shown in **table-2**

Table 2: Distribution of patients according to comorbidities

Comorbidities	Frequency	Percentage
Cyanotic heart disease	1	1
DM	62	62
BA	3	3
CLD	1	1
COPD	5	5
CVA	1	1
IHD	9	9
Hypothyroidism	2	2
RA	1	1
HTN	45	45
CKD	3	3
Pulmonary TB	2	2
ILD	2	2
Sickle cell anemia	1	1

The distribution of patients according to personal history.Majority of the patients were smoking (47%) followed by alcohol (30%). Least number of patients were to baccochewer (3%) as shown in **table-3.**

Table3: Distribution of patients according to personal history

Personal history	Frequency	Percentage
Alcohol	30	30
Smoking	47	47
Tobacco chewer	3	3

We compared SOFA and qSOFA score between admission and 48 hours' time interval. SOFA score increased from 5.78 to 6.08 at 48 hours compared to admission. This difference was statistically significant (p=0.022). qSOFA score decreased from 2.03 to 1.66 at 48 hours compared to admission. This difference was statistically significant (p=0.031) as shown in **table-4, Fig-1.**

Table4: Comparing SOFA and Qsofa score between admission and 48hours

Parameters	Admission	48hours	P value
SOFA	5.78±2.82	6.08±4.57	0.022
qSOFA	2.03±0.66	1.66±0.97	0.031

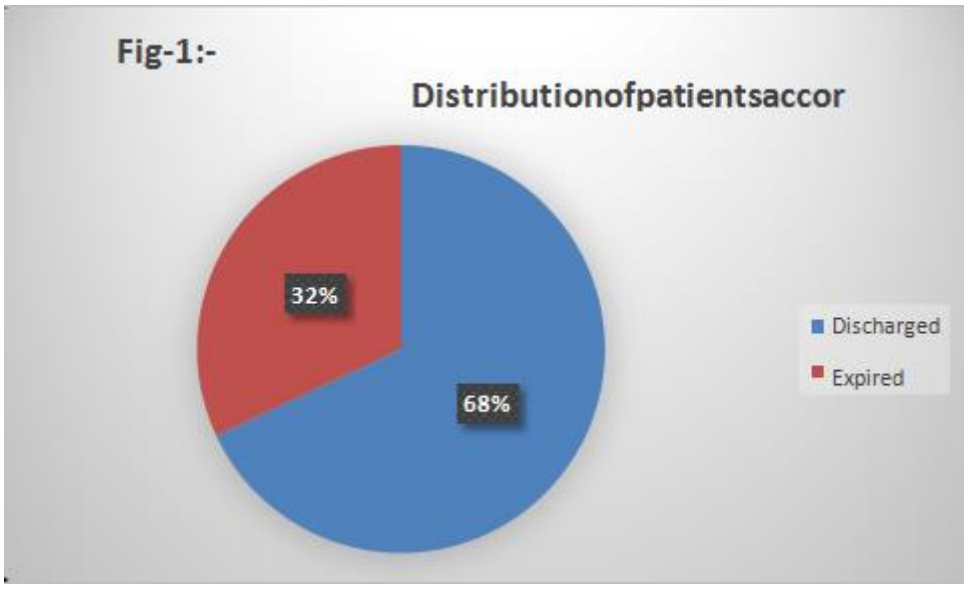

Fig-1:-Distribution of patients according to outcome

DISCUSSION

Despite its prevalence, sepsis is a one of the common cause of illness and mortality all across the world. However, how to detect sepsis has long been a conundrum for medical professionals and scholars alike. The sole real cause of sepsis, notwithstanding everything we've said, is infection. Although 20% to 40% of patients having sepsis do not have positive culture findings, this means that a significant portion of these individuals have an infection that cannot be detected with present technology, or does not have an infection at all. In the past three decades, numerous expert committees and task forces have met to develop a consensus definition of sepsis[5]. Sepsis-3, the latest definition of sepsis, was developed recently by a task team using the Sequential Organ Failure Assessment (qSOFA). As indicated in their chapter on "Screening for Individuals Likely to Have Sepsis," the panel noted that qSOFA should be used to identify patients suspected to have infection and to "prompt consideration of probable illness in patients who had not been diagnosed as sick prior." These symptoms are being presented against a backdrop of deteriorating sepsis.The SOFA score, developed by the European Society of Intensive Care Medicine (ESICM) Working Group on Sepsis-Related Problems, can represent both individual and multiple

organ failure. The effectiveness of the SOFA score has already been examined in large cohorts of critically sick patients. Due to its ease of use and ability to incorporate easily available clinical and laboratory data, the SOFA score has a number of benefits in the emergency department[6-8].

We looked at the patients' age distribution in the current study, 38% of patients were in the ages of 51 and 60, with the remaining 16% being between the ages of 61 and 70. (27 percent). Only 4% of the patients were more than age of 70 years. A study by Baig et al. found that patients having severe sepsis were on average 59.6 years old, whereas those in septic shock were on average 60 years old. Most septic shock patients had urinary tract infections, whereas severely septic patients had stomach infections. More than 60% of patients who had septic shock required Intensive care unit admission, whereas 88% of those with severe sepsis required admission to an Intermediate care unit. The mean lactate level was 2.9 + 2.79 mmol/L in patients who had severe sepsis, and 4.2 + 3.7 mmol/L in those with septic shock. In patients with severe sepsis, 33.3% died, and in those with septic shock, the death rate was significantly greater at 61.2 percent[9-12].

As in previous research by Seymour ,Raith , and Khwannimit , Mohammed et al. had more number of males than females. This could be explained by the fact that male are more likely than female to develop sepsis. There was a substantial distinction in patient age between the studies conducted by Mohammed A S et al. and Raithetal.andKhwannimit et al. This reflects the underlying demographic disparities between the USA and Thailand, both of which have older populations than Kenya. Study cohorts in New Zealand and Australia, such as Raith, et al. had similar proportions of patients with SOFA scores of two or more in terms of illness severity (82.44 percent vs. 90.1 percent). A qSOFA score of two or above is the same (42.22 percent vs. 54.4 percent)[13-14].

We looked at how patients' comorbidities were distributed in this study. The most common comorbidity among the patients was diabetes mellitus (62%), followed by hypertension (45%), and idiopathic heart disease (IHD) (9). Cyanotic heart disease, CLD, CVA, RA, and sickle cell anaemia were all found in fewer patients.

We also looked at how patients were distributed based on their medical history. Most of the patients (47 percent) smoked and drank cigarettes and alcohol (30 percent). Only a small percentage of patients smoked cigarettes (3 percent). We looked at how patients were distributed based on how they fared in the research. Most of the patients were discharged from the hospital, with 68% of them being deemed to be in good health. Thirty-two percent of the patients passed away during the research.With regard to admission, we looked at the SOFA and qSOFA scores and the time gap between them (48 hours). At 48 hours after admission, the SOFA score climbed from 5.78 to 6.08. Statistically, this difference was significant (p=0.022). At 48 hours after admission, the qSOFA score dropped from 2.03 to 1.66. Statistically, this difference was significant (p=0.031)[15].

We also looked at the SOFA score's relationship to outcome between time of admission and 48 hours afterwards. Patients who were expired (6.91) had a greater SOFA score when they were admitted than those who had been released (5.25). At 48 hours, the same pattern was observed, with expired patients having a higher SOFA score (10.91) than released patients (3.81).there was a statistically significant difference (p 0.001). Compared to admission, the SOFA score for patients who were released was lower at 48 hours (3.81). (5.25). Patients who had expired 48 hours earlier had a higher SOFA score (10.91) than those who had been admitted (6.91). Statistically, there was a significant difference (p=0.001). We also looked at the change in qSOFA score from admission to 48 hours later to see if it had any bearing on the result. It was discovered upon admission that patients who died (2.28) had a higher SOFA score than those who had been released (1.91). qSOFAscores were greater in expired patients (2.47) than in discharged patients at 48 hours (1.28). P-values below 0.001 indicate a

statistically significant difference. At 48 hours, the qSOFA score was lower in patients who had been discharged (1.28 vs. 1.30) than in individuals who had been admitted (1.91). Patients who had expired 48 hours earlier had a higher 48- hour qSOFA score (2.47), compared to admission (2.28). Statistically, there was significant difference (p0.001). Overall mortality was higher in this cohort than in the Raith, et al., with a mortality rate of 20.44 percent. People in this study cohort with less severe illness or younger age had a higher mortality rate, which was ascribed to disparities in co-morbidities such as a greater number of malignant diseases. At Moi Teaching and Referral Hospital, Eldoret, Kenya, death among this sepsis-suspected cohort is lower than critical care mortality overall, with a 53% overall critical mortality rate and an 80% mortality among sepsis patients. Patients in AKUH, N intensive care units have better access to modern diagnostics and critical care therapies because of the higher mortality rates at those facilities[16-17].

CONCLUSION

Majority of the patients having age group between 51-60 years followed by 61-70 years. Least number of the patients were found in age > 70 years. Majority of the patients were having DM followed by HTN and IHD. Less number of patients were having Cyanotic heart disease, CLD, CVA, RA, and sickle cell anemia.

Majority of the patients were smokers followed by alcohol. Least number of patients were tobacco chewer. Majority of the patients were discharged from the hospital. 32% of patients expired during the study.

SOFA score increased at 48 hours compared to admission. This difference was statistically significant. qSOFA score decreased at 48 hours compared to admission. This difference was statistically significant.

At admission, it was found that patients who expired were having higher SOFA score compared to discharged. At 48 hours, same trend was seen in which higher SOFA score was noted in expired patients compared to discharged patients. This difference was statistically significant.

REFERENCES

1. Angus DC, Linde-Zwirble WT, Lidiker, et al. J Epidemiology of severe sepsis in the United States: Analysis of incidence, outcome and associated cost of care. Crit Care Med 2001; 29: 1309-10.
2. Simon F, Rinaldo B, Jeffrey L, et al. Adult-population incidence of severe sepsis in Australian and New Zealand intensive care units. Intensive Care Med 2004; 30: 589-96.
3. Brun-Buisson C, Meshaka P, Pinton P, Vallet B. EPISEPSIS: a reappraisal of the epidemiology and outcome of severe sepsis in French intensive care units. Intensive Care Med 2004; 30: 580-8.
4. Anant M, Prajowl S, Randeep G, Ravindra M, Naveet W. Development of a mortality prediction formula due to sepsis/ severe sepsis in a medical intensive care unit. Lung India 2015; 32: 313-9.
5. Todi S, Chattarjee S, Bhattacharyya M. Epidemiology of severe sepsis in India. Crit Care 2007; 11(Supp 2): 65.
6. Marshall JC, Cook DJ, Christou NV, Bernard GR, Sprung CL, SibbaldWJ.Multiple Organ Dysfunction Score:A reliable descriptor of a complex clinical outcome;Crit Care Med 1995, 23:1638-1652
7. Seymour C.W., Liu V.X., Iwashyna T.J. Assessment of clinical criteria for sepsis: for the third international consensus definitions for sepsis and septic shock (Sepsis-3) J Am Med Assoc. 2016;315(8):762–774.

8. Seymour C.W., Coopersmith C.M., Deutschman C.S. Application of a framework to assess the usefulness of alternative sepsis criteria. Crit Care Med. 2016 Mar;44 (3):e122–e130.
9. Singer M., Deutschman C.S., Seymour C.W. The third international consensus definitions for sepsis and septic shock (Sepsis-3) J Am Med Assoc. 2016 Feb 23;315 (8):801–810.
10. TommiPätilä, SinikkaKukkonen, Antti Vento, MD, et al. Relation of the Sequential Organ Failure Assessment Score to Morbidity and Mortality After Cardiac Surgery. Ann Thorac Surgery 2006;82:2072-2078
11. Bernard GR, Doig BG, Hudson G, et al. (1995) Quantification of organ failure for clinical trials and clinical practice. Am J RespirCrit Care Med 151: A323
12. Acharya SP, Pradhan B, MarhattaMNet al. Application of "the Sequential Organ Failure Assessment (SOFA) score" in predicting outcome in ICU patients with SIRS. Kathmandu University Med J (KUMJ) 2007 Oct- Dec;5(4):475-83.
13. Bone RC, Balk RA, Cerra FB, et al. American College of Chest Physicians/Society of Critical Care Medicine Consensus Conference: definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. Crit Care Med. 1992;20(6):864-874.
14. Levy MM, Fink MP, Marshall JC, et al; International Sepsis Definitions Conference. 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. Intensive Care Med. 2003; 29(4):530-538.
15. Churpek MM, Zadravecz FJ, Winslow C, Howell MD, Edelson DP. Incidence and prognostic value of the systemic inflammatory response syndrome and organ dysfunctions in ward patients. Am J RespirCrit Care Med. 2015;192(8):958-964.
16. Kaukonen K-M, Bailey M, Pilcher D, Cooper DJ, Bellomo R. Systemic inflammatory response syndrome criteria in defining severe sepsis. N Engl J Med. 2015;372(17):1629-1638
17. Vincent JL, Moreno R, Takala J, et al; Working Group on Sepsis-Related Problems of the European Society of Intensive Care Medicine. The SOFA (Sepsis-related Organ Failure Assessment) score to describe organ dysfunction/failure. Intensive Care Med. 1996;22(7):707-710.