



SERIAL EVALUATION OF SOFA SCORE FOR PREDICTING OUTCOME IN CRITICALLY ILL PATIENTS ADMITTED IN MEDICAL ICU

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**ABSTRACT**

Sepsis is a life threatening organ dysfunction caused by dysregulated host response to infection. The incidence of sepsis related mortality is 85% in Indian ICU. The Sequential Organ Failure Assessment (SOFA) score is a simple and objective score in patients of sepsis admitted in ICU. The aim of this study was to determine the usefulness of Serial SOFA Score and DELTA SOFA Score for prediction of the outcome in patients with severe sepsis admitted in Medical ICU. SOFA Score on admission to ICU, at 48 hours, at 96 hours and DELTA SOFA Score were calculated. Study showed that increase in Serial SOFA Score of 12 and above at 48 hour is associated with high mortality (92.85% mortality). The Serial SOFA Score of 12 and above at 96 hours is associated with a 95.23% mortality. SOFA score at 48 hours and 96 hours as well as DELTA SOFA score are useful predictors of outcome as compared to SOFA score at admission. In this study, SOFA 48 hours, 96 hours, DELTA SOFA showed mortality with P value <0.001 which is statistically significant. Hence use of Serial SOFA score and DELTA SOFA score are good predictors of outcome in patients of sepsis.

**KEYWORDS :**

**INTRODUCTION**

Sepsis is a life threatening organ dysfunction caused by dysregulated host response to infection (1). Sepsis causes high morbidity and mortality and is the second leading cause of death worldwide (2). The incidence of sepsis related mortality is 85% in Indian ICU (3). There are several outcome prediction score that are currently available for use in clinical practice. Some widely used among them are Chronic health evaluation IV score (4), the Simplified acute physiology score III (5), the logistic organ dysfunction score (6) but they require extensive data and are time consuming. The Sequential Organ Failure Assessment (SOFA) score is a simple and objective score for patients of sepsis admitted in ICU, that allows for calculation of both the number and severity of six organ system i.e respiratory, coagulation, liver, cardiovascular, renal and neurology. It is graded 0 to 4 according to severity and the score can measure individual or aggregate organ dysfunction. The SOFA scoring system has advantage over other scoring systems like APACHE IV scoring system where 142 variables are used. It can be calculated bedside. The delta SOFA score is calculated as the change in total SOFA score (or that of an individual sub-score) between a defined time point and the baseline value.

**AIMS AND OBJECTIVE**

To determine the usefulness of Serial SOFA score and DELTA SOFA Score for prediction of the outcome in patients with severe sepsis admitted in ICU.

**Study Design**

Prospective observational study conducted over 2 years from 1<sup>st</sup> September 2018 to 30<sup>th</sup> September 2020. Ethical clearance was obtained from the ethical committee of the institution. 100 patients admitted in medical ICU of civil hospital Ahmedabad who follows the following criteria were taken into study.

1. Patients more than 12 years of age.
2. Satisfying 2 or more criteria of SIRS-
  - Body temperature over 38 or under 36 degrees Celsius.
  - Heart rate greater than 90 beats/minute
  - Respiratory rate greater than 20 breaths/minute or partial pressure of CO2 less than 32 mmHg
  - Leukocyte count greater than 12000 or less than 4000 /microliters or over 10% immature forms or bands.

The score was calculated on daily basis till discharge from ICU or till mortality.

Delta SOFA score was calculated and its correlations with mortality were obtained. The six parameters use for calculating the SOFA score are showed in the figure below.

**SOFA Scoring System**

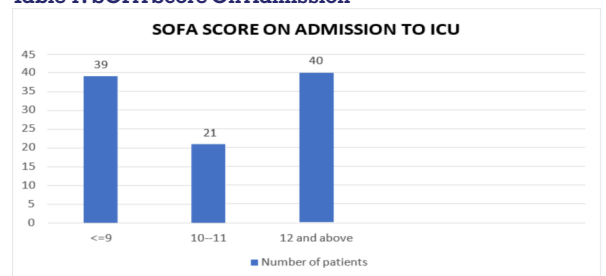
	0	1	2	3	4
PaO <sub>2</sub> / FiO <sub>2</sub>	>400	<400	<300	<200 with respiratory support	≤ 100 with respiratory support
Platelets (x1000/μL)	> 150	<150	<100	<50	≤20
Bilirubin (mg/dL)	<1.2	1.2-1.9	2.0-5.9	6.0-11.9	>12.0
Hypotension (mmHg)	MAP ≥ 70 mmHg	MAP <70 mmHg	Dopamin 5 or dobutamin (any dose)	Dopamin >5 or epi ≤ 0.1 or norepi ≤ 0.1	Dopamin >15 or epi >0.1 or norepi >0.1*
GCS	15	13-14	10-12	6-9	<6
Cr (mg/dL) or UO (ml/day)	<1.	1.2-1.9	2.0-3.4	3.5-4.9 or <500 mL/d	>5.0 or <200 mL/d

\*Catecholamines doses are given as μg/ kg/ min.

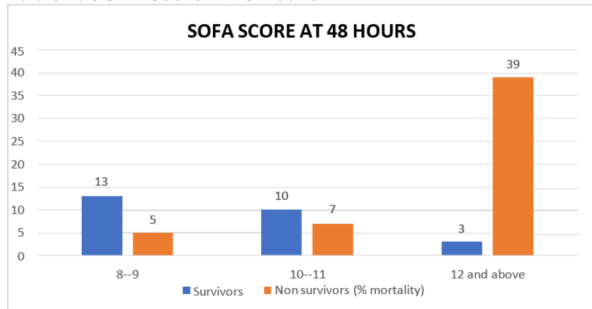
SOFA Scoring system is composed of scores from six organ system i.e Respiratory(PaO<sub>2</sub>/FiO<sub>2</sub>), Coagulation(Platelets), Hepatic(Bilirubin), Circulatory(Hypotension), Neurology(GCS), Renal(Creatine and urine output) are graded 0 to 4 according to severity.

**RESULTS**

**Table 1: SOFA Score On Admission**

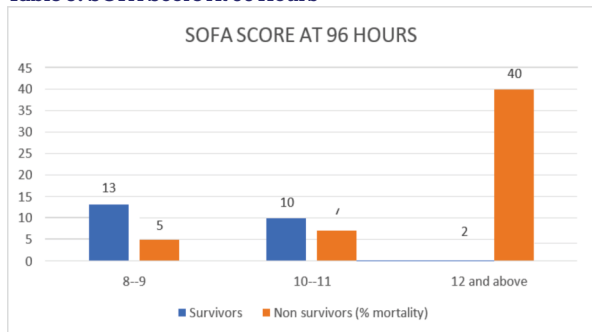


**Table 2: SOFA Score At 48 Hours**



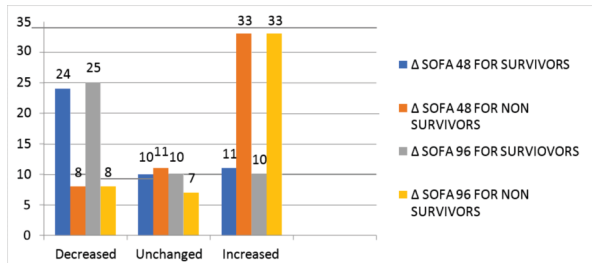
The above graph shows that Increase in Serial SOFA score of 12 or above at 48 hour is associated with high mortality (92.85% mortality).

**Table 3: SOFA Score At 96 Hours**



Above graph shows that Serial SOFA score of 12 and above is associated with a 95.23% mortality.

**Table: 4 Comparisons Between Survivor And Non-survivor With Δ SOFA At 48 Hours And 96 Hours**



Δ SOFA	Δ SOFA 48 FOR SURVIVORS	Δ SOFA 48 FOR NON SURVIVORS	TOTAL	Δ SOFA 96 FOR SURVIVORS	Δ SOFA 96 FOR NON SURVIVORS	TOTAL
Decreased	24	8	32	25	8	33
Unchanged	10	11	21	10	7	17
Increase	11	33	44	10	33	43

The delta SOFA is calculated as the change in total SOFA score (or that of an individual sub- score) between a defined time point and the baseline value.

When analysing the trend of SOFA score in first 48 hours, the mortality clearly increases when the SOFA score increases in the first 48 hours. In the present study 75 % of the patient did not survive when the SOFA score increases from the baseline in the first 48 hours. However when the SOFA score remain unchanged the mortality rate was around 50%.

The below data suggests that increase in Serial SOFA score at admission, 48 hours, 96 hours, Δ SOFA at 48 hours and 96 hours and max SOFA is associated with high mortality (With P Value <0.001, which statistically significant)

**Table: 5 Δ SOFA Score In Relation To Outcome In First 48**

**Hours And 96 Hours.**

SOFA Score change in first 48 hour	Died	Survivor	X2	p value	SOFA Score change in first 96 hour	Died	Survivor	X2	p value
Increased (n=47)	36 (76.6%)	11 (23.4%)	20.55	<0.001	Increased (n=20)	16 (80.8%)	4 (20.0%)	22.34	<0.001
No change (n=21)	11 (52.4%)	10 (47.6%)			No change (n=63)	38 (60.3%)	25 (39.7%)		
Decreased (n=32)	8 (25.0%)	24 (75.0%)			Decreased (n=17)	1 (5.9%)	16 (94.1%)		
Total	55 (55.0%)	45 (45.0%)			Total	55 (55.0%)	45 (45.0%)		

**DISCUSSION**

The SOFA score was developed to predict the severity and outcome in patient with severe sepsis in ICU. The SOFA score is widely used in the ICU among patients with infection and sepsis.

In this study, initially, SOFA score at admission to ICU was calculated and the result were comparable to the study results published F L Ferreira (7) which shows mortality more than 80% when SOFA score on admission is 12 or above.

**Table: 6 Comparison Between Present Study And F L Ferreira Et Al Study (6)**

SOFA SCORE	PRESENT STUDY	F L FERREIRA
= <5	0%	11%
6-7	14.28 %	21.5%
8-9	29.62%	33.3%
10-11	61.90%	50.0%
= >12	82.50%	95.2%

Delta SOFA is the difference in values of SOFA score over a period of time is also statistically significant in our study. There is strong evidence that, patients whose delta SOFA values when increased from the previous value showed higher mortality. The similar findings were also seen in the study Vincentj] (9) study.

Similarly in the study by F L Ferreira et al (8) the results showed that regardless of the initial score, the mortality rate was at least 50% when the sofa score was increased in first 48hours. In present study 75% of patients did not survive whose SOFA score where increased from baseline in first 48 hours. Thus, results of this study corroborate with the results of the above mentioned studies.

**CONCLUSION:**

Sequential assessment of organ dysfunction during the first few days of ICU admission is a good indicator of prognosis. SOFA Score at admission, 48 hour, 96 hour and Δ SOFA Score are useful predictors of outcome in patients with severe sepsis. In this study, high SOFA Score at admission, 48 hour, 96 hour and Δ SOFA Score showed high mortality with P Value <0.001 which is statistically significant. SOFA score is a good, convenient, bedside and easily followed predictor of outcome in patients of sepsis in ICU.

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