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Assessment of Sofa Score of Elderly Patients Admitted in ICU and Correlate with Prognosis

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Abstract: The use of scoring systems to predict the risk mortality and evaluating outcome in critically ill patients is important in modern medicine. Scoring systems for use in intensive care units have been developed from past 30 years. SOFA is the most widely used organ failure model. Most of the variables included in these systems are easily available and obtained from the critical care settings. World elderly population is significantly increased over few decades as human life expectancy is improved. And this population is neglected in developing and under developed countries due to limited resource. Hence this study is conducted only on elderly population; the study was prospectively carried out over 12 months at the 24 bedded multidisciplinary Medical ICU at Gandhi Medical College and allied Hamidia Hospital, Bhopal. Enrolled patients were divided into two group survivor and non-survivor. The SOFA score was calculated at the time of admission and 48 hours after admission which were then used as mortality predictors. The study concluded that SOFA score during the first 48 hours of ICU admission was a good indicator of prognosis. Independent of the initial score, an increase in SOFA score during the first 48 hours in the ICU predicted a mortality of at least 90%. The SOFA score demonstrated a fair to good accuracy for predicting in-hospital mortality when applied to elderly population.
Keywords: SOFA Sequential organ function assessment.

INTRODUCTION

The use of scoring systems to predict the risk mortality and evaluating outcome in critically ill patients is important in modern medicine. Scoring systems for use in intensive care units have been developed from past 30 years [1].

They are widely used in the field of critical care medicine. A severity of illness scoring systems allow the investigator to risk stratify patients and compare patients risk from different intensive care units. They allow quantification for severity of illness and a probability of in hospital mortality. Severity scoring systems are useful in guiding hospital administrative policies and they optimize ICU bed usage by reducing unnecessary low risk monitored only patients and futile care of terminally ill patients [2].SOFA is the most widely used organ failure model. Most of the variables included in these systems are easily available and obtained from the critical care settings. The sepsis related organ failure score was developed to evaluate organ dysfunction patients with sepsis [3]. Later it was renamed "The Sequential Organ Failure Assessment Score" because it's utility was not merely restricted to patients with sepsis. The SOFA system was created in a consensus meeting of the European Society Intensive Care Medicine in 1994[3] and further revised in 1996. SOFA comprises separate daily scores for respiratory, renal, cardiovascular, CNS, coagulation and hepatic failure. The SOFA score uses routinely collected data for the calculation of a score of 0–4 for each organ, providing a daily score of 0 to 24 points. Higher number means more severe failure. The scores can be used in several ways, as individual scores (each organ), as the sum of scores on one single ICU day or the sum of the worst scores during the ICU stay. There is a slight breach of the intent to keep the score independent of therapy, because evaluation of cardiovascular function is partially based on the choice of vasoactive drugs. Both the mean and highest SOFA scores are particularly useful predictors of outcome. Independent of the initial score and increase in SOFA score during the first 48 hrs. in ICU predicts a mortality rate of 50%.

There has been a notable increase in incidence of elderly patients being admitted to ICU globally. Studies on the diagnosis and management of ICU patients often exclude subjects with multiple co morbidities or elderly patients. However as the world's population becomes increasingly old and ill, this subset will require ICU admission more frequently and their management will pose a serious challenge to the treating critically ill patient. Little is known about the outcome of elderly patients admitted to ICU. Most developed countries have accepted the chronological age of 65 years as a definition of elderly or older person. Being 60-65 years old is usually a requirement for becoming eligible for senior social programs. However, various countries and societies consider the onset of old age as anywhere from the mid-40s to the 70s. the definitions of old age continue to change especially as life expectancy in developed countries has risen to beyond 80 years. The United Nations has agreed that 60 and more than 60 years as old age. Our study mainly aims at assessing the SOFA score of elderly patients admitted in Medical ICU and usefulness of SOFA score to correlate with their outcome.

METHODS AND MATERIALS

The study was prospectively carried out over 12 months period from April 2016 to March 2017 at the 24 bedded ICU at Gandhi Medical College and allied Hamidia Hospital, Bhopal, India. This study was conducted on 201 patients admitted in ICU for any illness with age 60 years and above, and who survived for at least 24 hours after admission. Patients who were taken away from ICU against medical advice and patients who were referred from other hospital were excluded from the study. In this study, demographic profile (age and sex), presenting complaint for ICU admission of the enrolled patients was taken, Hematological (bilirubin, creatinine, platelet count and PaO2/FiO2 ratio) and clinical (glasgow coa scale and mean arterial blood pressure) parameters with respect to 6 variables constituting SOFA score were taken at the time of admission and 48 hours after admission. Total SOFA score of a patient was calculated at the time of admission and 48 hours after admission which were then used as mortality predictors. Enrolled patients were analyzed under two group viz. Survivors who were successfully discharged after recovery and non-survivor group which included the patients who died in the hospital. Statistical differences if any in the profile of the two groups were analyzed.

STATISTICAL ANALYSIS

Data were presented as mean ± standard deviation and percentage. All mean values were compared by't' test. Differences between the two groups were tested using the independent two-sample t-test or the Mann-Whitney U-test for continuous variables. A $P<0.05$ was considered significant.

RESULTS AND DISCUSSION

In many previous studies SOFA score was calculated in wide range of age group from >16yrs age and up to 95yrs.But separate studies regarding SOFA score for elderly population are very less or none. In one of the study elderly population constitute approximately 50% of the ICU admission [4] and their prognosis is poor when compare to younger population. As this study was targeted to the elderly population the mean age of the study population was 69.63±8.24 years, majority of the study population were males (69.15%). The mean duration of hospital stay among the study population was 5.35±3.55 days, survivor was 7.21±3.313days, and among non-survivor was 2.46±1.79days. In this study we found that in hospitality mortality rate of the study population were 39.3 %(table1).

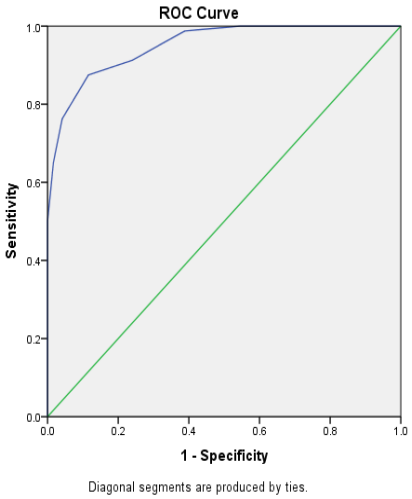
Table-1: Distribution of outcome of patients studied

Outcome	Number of Patients	Percentage
Survivor	122	60.69%
Non-survivor	79	39.30%
Total	201	100%

In our study the mean SOFA score of study population, non-survivor and survivor at the time of admission (T0) were 5.1±4.508, 9.78±4.212 and 3.015±1.92 respectively, (table2) with significant p value (<0.0001), which is similar to other various studies [5]. In this study initial SOFA score of ≥8 was associated with mortality rate of 96% and SOFA score <8 were associated with 19% mortality. But Ferreira FL et al. [6] study initial SOFA score of 11 has mortality rate of 95%. The receiver operating characteristic of SOFA score at T0 constructed to know the predictive ability, it is found that AUC SOFA score at T0 was 0.951.

Table-2: Distribution of mean sofa score at t0 hours

AT T0	TOTAL PATIENT	SURVIVOR	NON SURVIVOR
MEAN SOFA SCORE	5.1	3.015	9.78
STANDAR DEVIATION	4.508	1.92	4.212
p value		<0.00001	



Area under the Curve
Test Results Variables(s): SOFA score T0

Area
0.951

In our study we found that mean SOFA score of the study population, non-survivor and survivor at the 48 hours after admission were 4.6±5.65, 13.25±3.46 and 1.888±1.81 respectively,(table3) with significant p value (p<0.0001). While in Alan E. Jones et al[5] whole population at T72 had mean SOFA score of 7.4±4.9, non-survivor and survivor at T72 had SOFA score of 11.8 and 6.2 respectively[5].

Table-3: Distribution of mean sofa score at t48 hours

AT T48	TOTAL PATIENT	SURVIVOR	NON SURVIVOR
MEAN SOFA SCORE	4.9	1.888	13.25
STANDARD DEVIATION	5.65	1.81	3.46
p VALUE		< 0.00001	

When observing the SOFA score during first 48 hours, in our study, we found that mortality rate of the study population was 90% or more when the SOFA score was increased regardless of the initial SOFA score and mortality rate was 25% when it did not change. While in the study of Ferreira FL *et al*. [6] the mortality rate was 50% or more, when the SOFA score was increased regardless of the initial SOFA score, and mortality was 27% to 35% when there was no change in the initial SOFA score. In Aditi Jain *et al*. [7] study, on day 3 mean SOFA score of whole population, mean SOFA score of non-survivor and mean SOFA score of survivor were 5.03±3.51, 7.53±3.18 and 2.94±2.18 respectively

ΔSOFA score was calculated by subtracting T48 SOFA score from T0 SOFA score, in this study ΔSOFA score of ≥2 had mortality of 98%, and ΔSOFA score of 1 and 0 had mortality of 20% and 25% respectively. But in the previous study of Alan E. Jones *et al*. [5] ΔSOFA score of ≥2, 1 and 0 had mortality of 42%, 23% and 19% respectively, which positively correlated with the mortality. In the Ferreira FL *et al*. [6] study also ΔSOFA score had a strongest correlation with the mortality.

The main limitation of this study is that surgical patients are not included, and it is a single-center based study and study population is also less. In addition, we could not determine the influence of the time difference between the arrival of the patient to emergency department and the time course between the onsets of illness. Therefore, we suggest that a multi-center or a randomized trial be conducted in future to avoid these limitations and confirm our results.

CONCLUSION

Sequential assessment of organ dysfunction/failure during the first 48 hours of the ICU admission was a good indicator of prognosis. Both the initial and highest SOFA scores were particularly useful predictors of outcome. Independent of the initial score,

an increase in SOFA score during the first 48 hours in the ICU predicted a mortality rate of at least 90%. The SOFA score demonstrated a fair to good accuracy for predicting in-hospital mortality when applied to elderly population. The ΔSOFA score over 48 hours had a significant positive relationship to in-hospitality mortality. These data suggested that use of SOFA score is an acceptable method for risk stratification and prognosis of elderly patient admitted in ICU and that the ΔSOFA score may be useful measurement to follow in clinical and research settings.

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