Evaluation of SOFA score in Predicting the need for critical care interventions among Obstetric ICU Patients at a Tertiary Care Centre in Loni, India

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Abstract-

Background: The Sequential Organ Failure Assessment (SOFA) score is widely used in critical care settings to assess organ dysfunction and predict mortality. However, its utility in obstetric intensive care units (ICUs) remains unclear. Pregnant and postpartum women admitted to ICUs often present with unique physiological challenges, making early risk stratification crucial for regular interventions.

Objectives: This study aims to evaluate the effectiveness of the SOFA score in predicting need for critical care interventions among obstetric patients admitted to the ICU at a tertiary care institution in India.

Methodology: This hospital record-based study was conducted on obstetric patients admitted to the ICU due to severe maternal complications. The SOFA score was calculated at admission and monitored throughout the ICU stay. Patient outcomes, including need for critical care interventions, were recorded. Statistical analysis was performed using SPSS version 20. Categorical variables were expressed as numbers and percentages, while continuous variables were presented as mean ± standard deviation.

Conclusion: In the present study, a total of 120 obstetric patients were included, with an average age of 34.32 ± 7.28 years. Among these participants, most obstetric ICU patients had a SOFA score between 6 and 10 (70.83%), with severity increasing in higher score groups. Obstetric indications (58.33%) were the primary reason for admission, mainly hypertensive disorders (30.83%) and obstetric hemorrhage (25.00%), while 41.67% had non-obstetric causes. The need for assisted ventilation (35%), inotropes (26.67%), and blood transfusion (61.67%) increased with higher SOFA scores, with all patients in the 21 to 25 score group requiring ventilation and inotropic support.

Keywords: ***SOFA score, obstetric ICU, maternal mortality, critical care, organ dysfunction, India.***

I. INTRODUCTION

Maternal critical illness is a major global health challenge, with obstetric patients requiring intensive care. Maternal morbidity and mortality rates are extremely high in low- and middle-income countries (LMICs), exacerbated by limited access to specialized critical care. In 2020, nearly 800 women died daily from preventable pregnancy-related complications. The World Health Organization (2024) reports an annual maternal mortality of 295,000, with many deaths resulting from severe complications necessitating ICU admission.

Leading causes include hypertensive disorders, obstetric haemorrhage, sepsis, and multi-organ dysfunction, necessitating urgent critical care interventions. The Sequential Organ Failure Assessment (SOFA) score is a commonly used predictor of morbidity and mortality in critically ill patients. Originally developed for sepsis-related organ dysfunction, the SOFA score has been validated across various ICU settings. However, its applicability in obstetric ICU patients is debatable, given pregnancy-induced physiological alterations in organ function parameters. Some previous research work primarily focuses on general ICU populations, with limited studies assessing maternal critical illness using the SOFA score. Obstetric patients present with unique cardiovascular & haematological, adaptations that may influence SOFA score performance.

II. MATERIALS AND METHODS

The present hospital-based record study was conducted in the Department of Obstetrics and Gynaecology, at Dr. BVP Rural Medical College, PIMS (DU), Loni. The SICU, a 14 bedded unit within the associated Hospital was managed by a multidisciplinary team consisting of intensivists, obstetricians, resident doctors, medical officers, and nursing staff. The unit was equipped with all necessary

facilities for assisted ventilation and critical care management. In this study, a total of 120 patients were selected based on the following criteria:

Inclusion Criteria:
1.Obstetric patients admitted to the SICU during the study period (July 2022 – February 2025).
2.Patients whose admissions were based on the Operational Guidelines for Obstetric ICU/HDU established by the Government of India.
3.Patients for whom complete medical records, including baseline variables, obstetric history, SOFA score, and ICU outcomes, were available.
Exclusion Criteria:
1.Patients admitted outside the specified study period.
2.Patients with incomplete or missing medical records, making SOFA score calculation or outcome assessment impossible.
3.Non-obstetric ICU admissions (e.g., surgical or general ICU patients).
4.Patients discharged against medical advice before sufficient data collection.

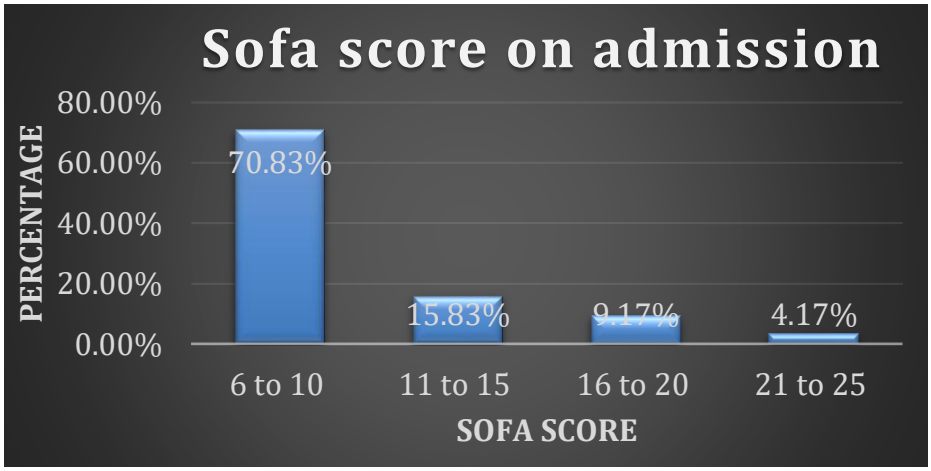
The study was conducted over a period of 2 year 7 months , from July 2022 to February 2025. Data were collected from medical records after patient discharge. Information on indications for ICU admission, SOFA score, interventions, and outcomes was also documented. The total maximum SOFA score for each patient was calculated using six parameters, with a score ranging from 0 to 4. The poorest recorded value for each parameter during the ICU stay was used for scoring. Statistical analysis was performed using SPSS version 20.

III. RESULTS

In the present study, a total of 120 obstetric patients were included, with an average age of 34.32 ± 7.28 years. The majority of Obstetric ICU patients had a SOFA score of 6 to 10 (70.83%), while fewer had higher scores: 11 to 15 (15.83%), 16 to 20 (9.17%), and 21 to 25 (4.17%), indicating increased severity and potential need for critical care interventions with higher scores.

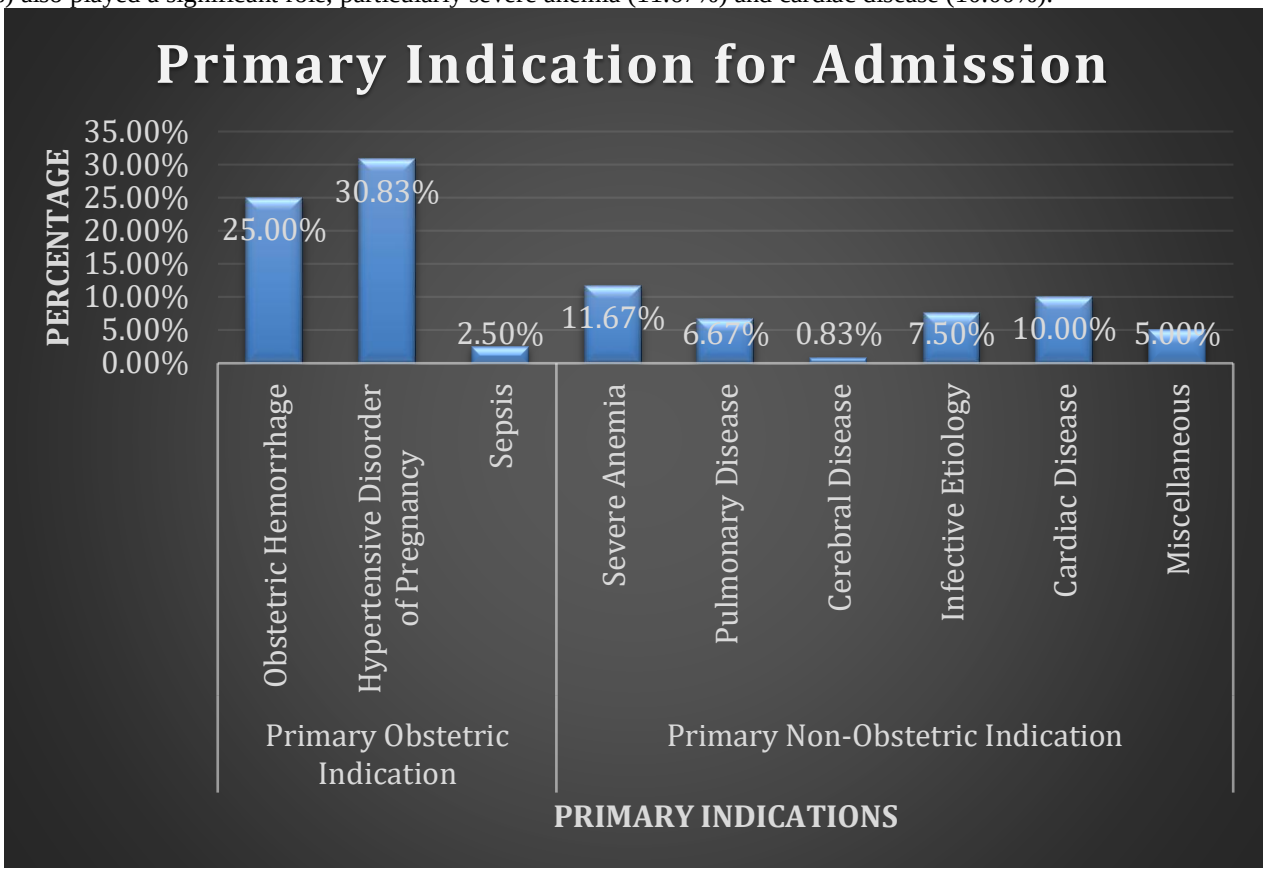
Table 1: SOFA score on admission

Sofa score on admission	No of cases	Percentage
6 to 10 (n = 85)	85	70.83%
11 to 15 (n = 19)	19	15.83%
16 to 20 (n = 11)	11	9.17%
21 to 25 (n = 5)	5	4.17%



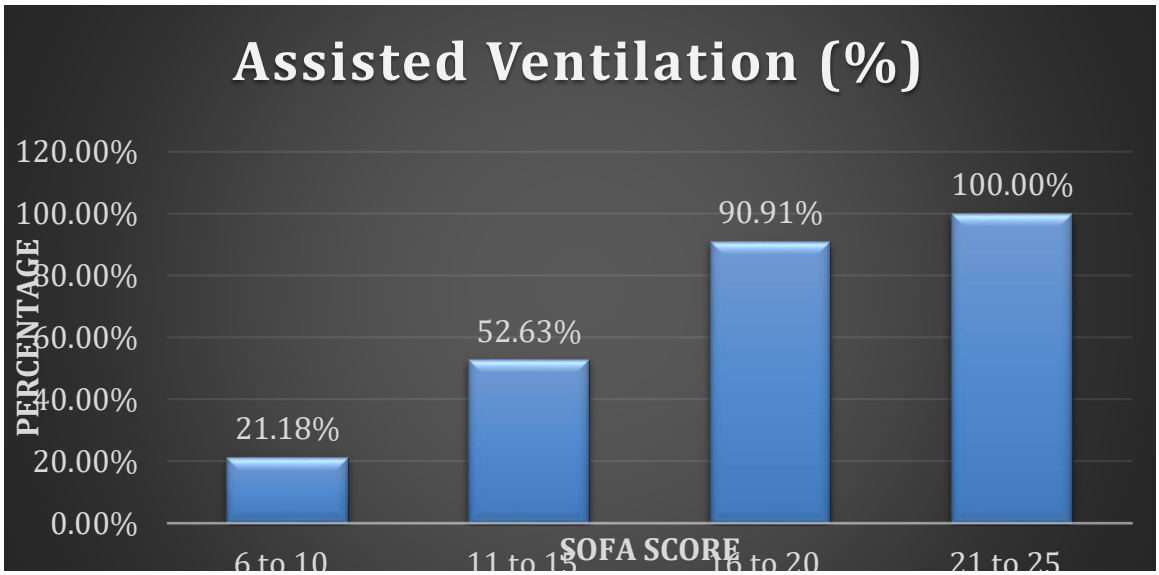
Graph 1: SOFA score on admission

Our study findings showed that, primary obstetric indications (58.33%) were the leading cause of admission, with hypertensive disorders of pregnancy (30.83%) and obstetric hemorrhage (25.00%) being the most common contributors. Non-obstetric causes (41.67%) also played a significant role, particularly severe anemia (11.67%) and cardiac disease (10.00%).



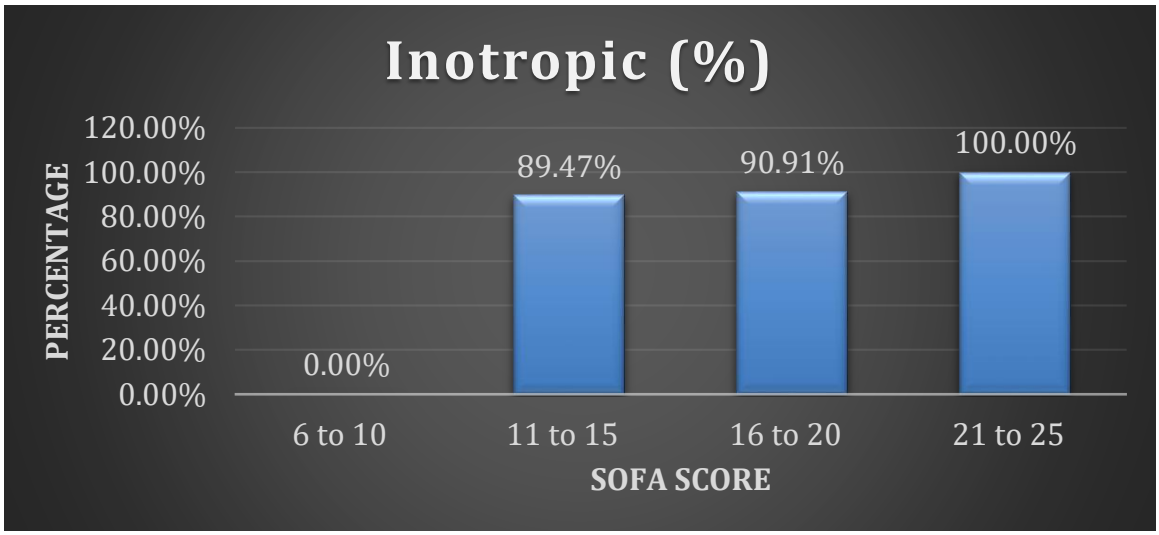
Graph 2: Primary Indication for Admission

Assisted ventilation usage increased with higher SOFA scores among Obstetric ICU patients. While 21.18% of patients with a SOFA score of 6 to 10 required ventilation, the need rose to 52.63% for scores of 11 to 15 and 90.91% for scores of 16 to 20. All patients (100%) with a SOFA score of 21 to 25 required assisted ventilation, highlighting an increased need for critical care intervention with increasing SOFA score severity.



Graph 3: Assisted Ventilation with respect to SOFA score

The need for inotropic support increased with higher SOFA scores. None of the patients with a SOFA score of 6 to 10 required inotropes, while 89.47% of those with scores between 11 to 15 and 90.91% of those in the 16 to 20 range required support. All patients (100%) with a SOFA score of 21 to 25 needed inotropic therapy, indicating a strong association between severity of score and hemodynamic instability.

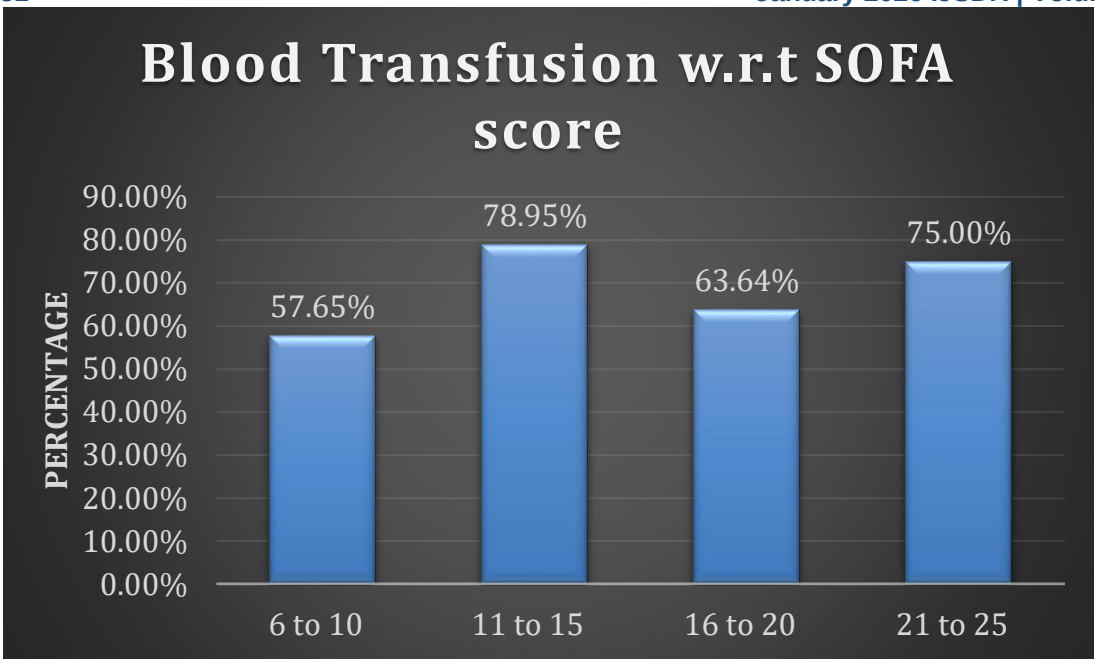


Graph 4: Inotropic with respect to SOFA score

Blood transfusion was required in 57.65% of patients with a SOFA score of 6 to 10, increasing to 78.95% for scores of 11 to 15. The need varied in higher scores, with 63.64% in the 16 to 20 range and 75.00% in the 21 to 25 group, indicating increased transfusion requirements with severity of score.

Table 2: Blood Transfusion with respect to SOFA score

SOFA Score Range	Blood Transfusion (n)	Blood Transfusion (%)
6 to 10 (n = 85)	49	57.65%
11 to 15 (n = 19)	15	78.95%
16 to 20 (n = 11)	7	63.64%
21 to 25 (n = 4)	3	75.00%
	74	



Graph 5: Blood Transfusion with respect to SOFA score

IV. DISCUSSION

The present study investigated the degree of maximal organ dysfunction assessed by the maximum SOFA score during ICU stay in 120 cases of Obstetric ICU admissions admitted during 2 years and 7 months study period. In this study, evaluation of performance of total maximum SOFA score showed that the score had good performance. Assessment of the SOFA scores hence had potential utility in cases of obstetrics patients admitted in ICU.

Our study findings showed that, primary obstetric indications (58.33%) were the leading cause of admission, with hypertensive disorders of pregnancy (30.83%) and obstetric hemorrhage (25.00%) being the most common contributors. Non-obstetric causes (41.67%) also played a significant role, particularly severe anemia (11.67%) and cardiac disease (10.00%).

Similar studies conducted by Beza, Z., et al., (2024); Liu, W., et al., (2025) and Asudo FD, et al., (2022) reported that, hypertensive disorders and obstetric hemorrhage as predominant obstetric causes of admission, consistent with these findings. However, the proportion of non-obstetric indications varies, depending on regional healthcare access and comorbidities. Studies from high-resource settings often report lower rates of severe anemia and infective causes, whereas resource-limited settings frequently highlight these as major contributors.

The present study demonstrates a clear association between higher SOFA scores and increased need for critical interventions was observed. Assisted ventilation was required in 21.18% of patients with a SOFA score of 6 to 10, increasing to 52.63% for scores of 11 to 15 and 100% for scores of 21 to 25, reflecting findings from prior research indicating higher respiratory support requirements in critically ill obstetric patients.

Similarly, inotropic support was necessary in 89.47% of patients with SOFA scores of 11 to 15 and 100% for scores of 21 to 25, emphasizing the link between severe illness and hemodynamic instability, as seen in previous ICU-based studies.

Blood transfusion requirements also followed a similar trend, with 57.65% of patients with SOFA scores of 6 to 10 requiring transfusion, increasing to 78.95% for scores of 11 to 15, consistent with studies demonstrating increased transfusion needs in critically ill obstetric patients due to hemorrhagic and hemodynamic complications. These findings were supported by Neel Kantilal Vaghasia, et al., (2019); Vlaar APJ, et al., (2021) and Renuka, Shridevi AS, et al., (2019) These findings reinforce the prognostic value of SOFA scores in guiding early and aggressive management of obstetric ICU patients.

V. CONCLUSION

The SOFA score is a valuable prognostic tool for predicting need for critical intervention in obstetric ICU patients. According to the present study findings, higher SOFA scores correlate with an increased need for critical intervention highlighting the importance of early risk assessment to guide clinical decisions in obstetric critical care, especially in resource-limited settings.

Acknowledgements:-

I express my sincere gratitude to all those who contributed to the completion of this research article on " Evaluation of SOFA score in Predicting the need for critical interventions among Obstetric ICU Patients at a Tertiary Care Centre in Loni, India" First and foremost, I extend our heartfelt thanks to the participants of this study, without whom this research would not have been possible. Their cooperation and willingness to be a part of this investigation are deeply appreciated. I also thank Dean of our

institution Dr. S N Mahajan for providing us with all the resources required for the study. I would like to acknowledge the Head of our Department , Dr. Vidyadhar Bangal , Department of Obstetrics and Gynaecology at Dr.Balasaheb Vikhe Patil Rural Medical College and Dr.Vitthalrao Vikhe Patil's Pravara Rural Hospital for providing the necessary facilities and support for conducting this research. Special thanks to Dr. Sarita Deshpande, my guide and mentor, for her invaluable guidance, expertise, and leadership throughout the research process. Her dedication and commitment significantly contributed to the success of this study. I am grateful to Dr. Inderjeet Singh for his constant support and motivation. I also extend our appreciation to the Institutional Ethics Committee for granting approval for this study. Furthermore, we acknowledge the support of all the healthcare professionals, laboratory technicians, and administrative staff involved in the care and management of the participants.

Declarations Funding:

No funding sources.

Conflict of interest:
None declared.

Ethical Approval:
This study was approved by Institutional Ethics Committee.

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