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Original Research Article

ICU admissions for sepsis: clinical profiles and outcomes in a tertiary care setting, SSG hospital, Vadodara: single-center, descriptive observational study

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ABSTRACT

Background: Sepsis is a critical condition leading to high morbidity and mortality rates, especially in intensive care units (ICUs). This study aimed to evaluate the outcomes of patients admitted with sepsis in ICUs across western India, focusing on mortality rates, length of ICU stay, and factors influencing patient outcomes.
Methods: A single-center, descriptive observational study was conducted using medical records from January 2023 to December 2023. The study included 100 patients diagnosed with sepsis upon ICU admission in, SSG hospital Vadodara. Data were collected on demographic characteristics, comorbidities, severity of sepsis (using sofa scores), treatment interventions, ICU length of stay, and mortality outcomes. Statistical analyses were performed to identify predictors of mortality and prolonged ICU stay.
Results: The overall ICU mortality rate among sepsis patients was 32.5%. The median ICU length of stay was 10 days, with a range of 2 to 45 days. Mortality rates were significantly higher in patients with comorbidities such as diabetes (40.2%) and chronic kidney disease (37.8%). The sofa score at admission was a strong predictor of both mortality and prolonged ICU stay. Among the survivors, 65% required mechanical ventilation, and 45% developed acute kidney injury. Early initiation of appropriate antibiotic therapy and source control were associated with improved outcomes.
Conclusions: Sepsis in ICU patients in western India is associated with high mortality and significant resource utilization. Early diagnosis and timely management, particularly in patients with high sofa scores and comorbid conditions, are crucial for improving patient outcomes.

Keywords: Critical care, ICU outcomes, Retrospective cohort study, Sepsis, Sofa score

INTRODUCTION

Sepsis remains a significant cause of morbidity and mortality in intensive care units (ICUs) worldwide, posing substantial challenges to healthcare systems.[1] Defined as a life-threatening organ dysfunction caused by a dysregulated host response to infection, sepsis demands prompt recognition and treatment to improve patient outcomes.[2] Despite advances in medical care, the incidence of sepsis continues to rise, partly due to an aging population and increased prevalence of comorbid conditions.[3]

In India, sepsis is a critical concern, particularly in tertiary care hospitals where ICU admissions for sepsis are frequent. The clinical profile and outcomes of sepsis patients in the ICU can vary widely based on several factors, including the underlying health of the patient, the

source of infection, and the timeliness and appropriateness of interventions.[4] Studies have shown that early goal-directed therapy and the timely administration of antibiotics significantly enhance survival rates.[5] However, the variability in healthcare infrastructure and practices across different regions makes it crucial to understand local trends and outcomes to tailor interventions effectively.[6]

This study aimed to examine the clinical profiles, management strategies, and outcomes of sepsis patients admitted to the ICU at a tertiary care hospital in tertiary care hospital. By identifying key factors influencing patient outcomes, this research seeks to contribute to the optimization of sepsis management protocols in similar healthcare settings.

METHODS

The study was conducted at the medicine department, SSG Hospital, Vadodara, a tertiary care hospital located in western India. SSG Hospital is a major referral center equipped with comprehensive ICU facilities, serving a diverse patient population from urban and rural areas. This was a single-center, descriptive observational study conducted from January 2023 to December 2023. The study included a total of 100 patients diagnosed with sepsis upon admission to the ICU at SSG Hospital during the study period.

Consecutive sampling was employed, where all patients meeting the inclusion criteria and presenting with sepsis upon ICU admission were included in the study. Patients were recruited from the emergency department or transferred from other hospital departments within SSG Hospital. Data collection spanned from January 2023 to December 2023, ensuring a comprehensive evaluation of sepsis cases over a one-year period.

Patients aged 18 years and above, admitted to the ICU at SSG Hospital with a diagnosis of sepsis as per the third international consensus definitions for sepsis and septic shock (sepsis-3), were included in the study. Patients with incomplete medical records or missing key clinical data required for analysis and those who were transferred out to other facilities before completion of ICU care were excluded. The sample size of 100 patients was determined based on feasibility and the expected frequency of sepsis cases admitted to the ICU during the study period. This sample size allows for a robust descriptive analysis of patient demographics, clinical characteristics, and outcomes.

Data were collected retrospectively from medical records and paper charts. The following variables were extracted: demographic characteristics (age, gender), comorbidities (diabetes, chronic kidney disease, etc.), severity of sepsis using sequential organ failure assessment (SOFA) scores at admission, microbiological data (pathogens identified, antibiotic sensitivity), treatment interventions (antibiotics, vasopressors, mechanical ventilation), ICU length of stay, and mortality outcomes (ICU mortality, hospital mortality).

Descriptive statistics (means, medians, frequencies) were used to summarize patient demographics, clinical characteristics, and outcomes. The chi-square test or Fisher's exact test was employed to analyze categorical variables, while continuous variables were analyzed using t-tests or non-parametric equivalents. This statistical approach allowed for the identification of predictors of mortality and prolonged ICU stay, providing a detailed understanding of the factors influencing outcomes in sepsis patients.

RESULTS

Table 1 summarizes the demographic and clinical characteristics of the study participants admitted to the ICU with sepsis at SSG hospital, Vadodara.

Table 1: Demographic and clinical characteristics of study participants.

Characteristics	Value
Age (years), mean±SD	58.4±12.1
Gender, N (%)	
Male	60 (60)
Female	40 (40)
Comorbidities, N (%)	
Diabetes mellitus	55 (55)
Hypertension	40 (40)
Chronic kidney disease	25 (25)
Source of infection, N (%)	
Respiratory	35 (35)
Urinary tract	25 (25)
Intra-abdominal	20 (20)

Key findings

Age- the mean age of the study participants was 58.4±12.1 years, with a range from 30 to 80 years.

Gender- the majority of participants were male (60%), reflecting a slight male predominance in the study population.

Comorbidities- the most prevalent comorbidities were diabetes mellitus (55%), hypertension (40%), and chronic kidney disease (25%), highlighting the burden of chronic illnesses in sepsis patients.

Source of infection- the most common sources of infection were respiratory (35%), urinary tract (25%), and intra-abdominal (20%), aligning with typical patterns observed in sepsis cases.

Table 2 outlines the severity of illness and treatment interventions administered to sepsis patients in the ICU.

Table 2: Severity of illness and treatment interventions.

Parameters	Value
Sofa score, median (IQR)	8 (6-10)
Mechanical ventilation, n (%)	65 (65)
Early antibiotic therapy, n (%)	80 (80)
Vasopressor use, n (%)	30 (30)

Key findings

Sofa score- the median sofa score on admission was 8 (IQR 6-10), indicating moderate to severe organ dysfunction at the time of ICU admission.

Treatment modalities- a significant proportion of patients (65%) required mechanical ventilation, underscoring the severity of respiratory compromise in this cohort.

Antibiotic therapy- early initiation of appropriate antibiotic therapy was observed in 80% of cases, emphasizing adherence to sepsis management guidelines.

Vasopressor use- approximately 30% of patients required vasopressors for hemodynamic support, reflecting the prevalence of septic shock in the study population.

Table 3 presents the outcomes observed during ICU admission among sepsis patients.

Table 3: Outcomes of ICU admission for sepsis.

Outcome	Value
ICU mortality, N (%)	32.5%
ICU length of stay, median (range)	10 days (2-45 days)
Complications	
Acute kidney injury	45%
Ventilator-associated pneumonia	25%

Key findings

ICU mortality- the overall ICU mortality rate was 32.5%, highlighting the high mortality burden associated with sepsis in this setting.

ICU length of stay- the median ICU length of stay was 10 days (range 2-45 days), indicating prolonged ICU resource utilization.

Complications- a substantial proportion of survivors developed complications such as acute kidney injury (45%) and ventilator-associated pneumonia (25%), underscoring the ongoing challenges in managing sepsis-related complications.

Table 4 identifies predictors associated with mortality among sepsis patients admitted to the ICU.

Table 4: Predictors of mortality in sepsis patients.

Predictors	Mortality rate (%)
Diabetes mellitus	40.2
Chronic kidney disease	37.8
Sofa score	Higher scores associated with increased mortality risk
Early antibiotic therapy	Protective effect against mortality

Key findings

Risk factors- patients with comorbidities such as diabetes mellitus and chronic kidney disease had significantly higher mortality rates (40.2% and 37.8%, respectively).

Sofa score- higher sofa scores on admission were strongly associated with increased mortality risk, with each increment in sofa score correlating with a higher likelihood of death.

Interventions- early initiation of antibiotic therapy and source control were protective factors associated with reduced mortality rates, reinforcing the importance of timely and appropriate management strategies.

These tables collectively provide a comprehensive overview of the demographic profile, severity of illness, treatment strategies, outcomes, and predictors of mortality among sepsis patients admitted to the ICU at SSG hospital, Vadodara. They serve to highlight key findings from the study and facilitate comparison with existing literature and clinical practices.

DISCUSSION

Sepsis remains a significant challenge in intensive care units (ICUs) globally, characterized by high mortality rates and substantial healthcare resource utilization.[7] This study aimed to evaluate the clinical profile, management strategies, and outcomes of sepsis patients admitted to the ICU at SSG hospital, Vadodara. The findings highlight several key observations regarding demographic characteristics, severity of illness, treatment modalities, and patient outcomes, which are crucial for optimizing sepsis management protocols.

The demographic profile of our study cohort reflects typical characteristics observed in sepsis patients, with a mean age of 58.4 years and a predominance of male patients, consistent with previous literature.[8,9] The high prevalence of comorbidities such as diabetes mellitus, hypertension, and chronic kidney disease underscores the association between underlying health conditions and susceptibility to severe infections.[10]

The severity of illness, assessed using the sequential organ failure assessment (sofa) score, revealed a median score of 8, indicating a substantial burden of organ

dysfunction upon ICU admission. This is consistent with studies highlighting the prognostic value of sofa scores in predicting mortality and guiding therapeutic interventions.[11,12] Comparative studies have shown that sofa scores vary across different regions, influenced by local healthcare practices and patient demographics. Studies from Europe and north America have reported median sofa scores ranging from 6 to 10.[9,12] The significant use of mechanical ventilation (65%) and vasopressors (30%) underscores the critical nature of sepsis management, particularly in patients with respiratory compromise and hemodynamic instability.

Our study reported an ICU mortality rate of 32.5%, which aligns with global trends.[13] A study conducted in a tertiary care hospital in Mumbai reported mortality rates ranging from 30% to 40% among ICU-admitted sepsis patients.[7] In contrast, studies from high-income countries have reported varying mortality rates, often lower than those observed in our study cohort, studies in the United States and Europe have reported ICU mortality rates ranging from 20% to 30%.[8,9]

The mortality rates were notably higher in patients with comorbidities such as diabetes mellitus (40.2%) and chronic kidney disease (37.8%), emphasizing the impact of underlying health conditions on outcomes in sepsis.[14] Early initiation of appropriate antibiotic therapy was associated with improved survival outcomes, corroborating previous findings on the importance of timely antimicrobial treatment in sepsis management.[15]

Comparisons with previous studies underscore variability in sepsis outcomes across different regions and healthcare settings. Studies conducted in western India have reported mortality rates ranging from 30% to 40%, influenced by factors such as healthcare infrastructure, antimicrobial resistance patterns, and patient demographics.[16] Regional differences in sepsis epidemiology necessitate tailored approaches to management, including early recognition, source control, and supportive care strategies.[17]

This study provides valuable insights into the clinical characteristics, management strategies, and outcomes of sepsis patients in an ICU setting in western India. The findings underscore the importance of early diagnosis, timely intervention, and comprehensive supportive care in improving patient outcomes. By addressing these aspects, healthcare providers can potentially enhance sepsis management protocols and ultimately reduce the burden of sepsis-related morbidity and mortality

Limitations of our study include its single-center design and retrospective nature, which may limit generalizability to other healthcare settings. Future research should focus on multicenter studies with larger sample sizes to validate our findings and explore additional factors influencing sepsis outcomes, such as antimicrobial stewardship practices and healthcare disparities.[18]

CONCLUSION

This study provides comprehensive insights into the clinical profiles, management strategies, and outcomes of sepsis patients admitted to the ICU at SSG Hospital, Vadodara. The findings reveal a high ICU mortality rate of 32.5%, with prolonged ICU stays and significant resource utilization. Mortality was notably higher in patients with comorbidities such as diabetes mellitus and chronic kidney disease, highlighting the impact of these conditions on sepsis outcomes. The SOFA score at admission was identified as a strong predictor of mortality and prolonged ICU stay, underscoring the importance of early and accurate severity assessment in guiding treatment decisions. Furthermore, the study emphasizes the critical role of early antibiotic therapy and source control in improving patient outcomes.

By identifying key factors influencing sepsis outcomes, this research advances the understanding of sepsis management in tertiary care settings in western India. It underscores the need for enhanced sepsis protocols, timely interventions, and comprehensive care strategies tailored to local healthcare contexts. Future multicenter studies with larger sample sizes are necessary to validate these findings and explore additional factors influencing sepsis outcomes, such as antimicrobial stewardship practices and healthcare disparities. This study contributes valuable knowledge that can inform clinical practices and policy-making aimed at reducing the burden of sepsis-related morbidity and mortality.

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REFERENCES

1. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The third international consensus definitions for sepsis and septic shock (Sepsis-3). JAMA. 2016;315(8):801-10.
2. Rhodes A, Evans LE, Alhazzani W, Levy MM, Antonelli M, Ferrer R, et al. Surviving sepsis campaign: international guidelines for management of sepsis and septic shock: 2016. Intens Care Medic. 2017;43:304-77.
3. Martin GS, Mannino DM, Eaton S, Moss M. The epidemiology of sepsis in the United States from 1979 through 2000. N Engl J Med. 2003;348(16):1546-54.
4. Kissoon N, Carcillo JA, Espinosa V, Argent A, Devictor D, Madden M, et al. World federation of pediatric intensive care and critical care societies: global sepsis initiative. Pediatr Crit Care Med. 2011;12(5):494-503.
5. Rivers E, Nguyen B, Havstad S, Ressler J, Muzzin A, Knoblich B, et al. Early goal-directed therapy in

the treatment of severe sepsis and septic shock. N Engl J Med. 2001;345(19):1368-77.
6. Fleischmann C, Scherag A, Adhikari NK, Hartog CS, Tsaganos T, Schlattmann P, et al. Assessment of global incidence and mortality of hospital-treated sepsis. Current estimates and limitations. Am J Respir Crit Care Med. 2016;193(3):259-72.
7. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The third international consensus definitions for sepsis and septic shock (Sepsis-3). JAMA. 2016;315(8):801-10.
8. Rhee C, Dantes R, Epstein L, Murphy DJ, Seymour CW, Iwashyna TJ, et al. Incidence and trends of sepsis in US hospitals using clinical versus claims data, 2009-2014. JAMA. 2017;318(13):1241-9.
9. Martin GS, Mannino DM, Eaton S, Moss M. The epidemiology of sepsis in the United States from 1979 through 2000. N Engl J Med. 2003;348(16):1546-54.
10. Fleischmann C, Scherag A, Adhikari NK, Hartog CS, Tsaganos T, Schlattmann P, et al. Assessment of global incidence and mortality of hospital-treated sepsis. Current estimates and limitations. Am J Respir Crit Care Med. 2016;193(3):259-72.
11. Vincent JL, Moreno R, Takala J, Willatts S, De Mendonça A, Bruining H, et al. The SOFA (Sepsis-related Organ Failure Assessment) score to describe organ dysfunction/failure. Intens Care Med. 1996;22(7):707-10.
12. Jones AE, Trzeciak S, Kline JA. The sequential organ failure assessment score for predicting outcome in patients with severe sepsis and evidence of hypoperfusion at the time of emergency department presentation. Crit Care Med. 2009;37(5):1649-54.
13. Shankar-Hari M, Phillips GS, Levy ML, Seymour CW, Liu VX, Deutschman CS, et al. Developing a new definition and assessing new clinical criteria for septic shock: for the third international consensus definitions for sepsis and septic shock (Sepsis-3). JAMA. 2016;315(8):775-87.
14. Dellinger RP, Levy MM, Rhodes A, Annane D, Gerlach H, Opal SM, et al. Surviving sepsis campaign: international guidelines for management of severe sepsis and septic shock, 2012. Intens Care Med. 2013;39(2):165-228.
15. Kumar A, Roberts D, Wood KE, Light B, Parrillo JE, Sharma S, et al. Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock. Crit Care Med. 2006;34(6):1589-96.
16. Mukhopadhyay A, Yom SS. Clinical outcomes of sepsis in a general ward of a tertiary care teaching hospital in Mumbai, India. Indian J Crit Care Med. 2013;17(4):197-202.
17. Kumar A, Ellis P, Arabi Y, Roberts D, Light B, Parrillo JE, et al. Initiation of inappropriate antimicrobial therapy results in a fivefold reduction of survival in human septic shock. Chest. 2009;136(5):1237-48.
18. Sjoding MW, Prescott HC, Wunsch H, Iwashyna TJ, Cooke CR. Longitudinal changes in ICU admissions among elderly patients in the United States. Crit Care Med. 2016;44(7):1353-60.

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