

A Retrospective Study of Sepsis Management Outcomes, Including Mortality Rates and Length of Stay

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Abstract

Background: The global burden of sepsis is high, especially in low- and middle-income countries (LMICs), where delayed presentation and resource limitations lead to high morbidity and mortality. Analysis of institutional data is crucial in determining local disease burden and optimizing management.

Methods: In this retrospective observational study included 103 adult patients diagnosed with sepsis based on the new Sepsis-3 criteria and admitted to our hospital between February 2025 and July 2025. Extraction of data from the case sheets, laboratory records, and Intensive Care Unit (ICU) charts. The study variables included demographic, comorbidities, source of infection, and intubation due to the primary lung infection, antibiotic initiation, and length of stay (LOS), in-hospital mortality and asthmatic attack. Statistics were computed as mean \pm standard deviation and percentages. Chi-square and independent t-test were applied to test associations between variables with $p < 0.05$ in statistical analysis.

Results: Mean age 56.8 ± 15.4 years, male 59.2 % of patients and the figures show the in-hospital mortality rate was 28.2% across the board. Patients >70 years of age and those admitted to the ICU had higher mortality. The mean LOS was 9.6 ± 4.8 days in hospital, which was significantly longer in ICU patients than in non-ICU patients. 68.9% of cases had early antibiotics administered.

Conclusion: Sepsis represents a major mortality burden at a tertiary care centre. Poorer outcomes were associated with older age, admission to the ICU, and delayed presentation. Improvement of early identification approaches and a standard treatment plan for sepsis may impact mortality and influence the clinical course.

Keywords: Sepsis, Mortality, Length of Stay, Intensive Care Unit, Antibiotic Therapy, Retrospective Study.

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Introduction

Sepsis is a critical illness represented by organ dysfunction triggered by an unregulated reaction against infection [1]. Sepsis is identified, according to the Sepsis-3 definition, when there is suspected or confirmed infection accompanied by an acute increase of ≥ 2 points in the Sequential Organ Failure Assessment (SOFA) score, reflecting important organ dysfunction [2,3]. Septic shock is a subset of sepsis in which there are profound circulatory and

metabolic abnormalities that sustained hypotension despite adequate fluid recovery requires vasopressor support to maintain a mean arterial pressure ≥ 65 mmHg and serum lactate levels >2 mmol/L [4]. These revised definitions simplify the diagnostic criteria by focusing on organ dysfunction instead of systemic inflammatory response criteria, thus enhancing diagnostic and prognostic specificity.

Sepsis is the synergism of an infection with an immune response led by microflora or infectious disease, and a substantial international health issue [5]. Sepsis has been described by the World Health Organization (WHO) as one of the leading causes of preventable mortality in the world and also a priority for global health action [6]. Based on recent estimates worldwide, sepsis impacts almost 49 million people each year, causing nearly 11 million deaths (one in five) per year globally [7]. Sepsis imposes a disproportionate burden on LMICs, where there are limited resources for health infrastructure, early diagnostic facilities and critical care [8]. In these environments, morbidity and mortality are compounded by delayed diagnosis, poor antimicrobial stewardship, and the absence of management protocols.

The reported mortality from sepsis is still high, especially in resource-limited settings. In LMICs, studies show that the case fatality rate can be >30–40%, even in patients presenting with septic shock or multi-organ dysfunction [9]. Delays in seeking health care, shortage of intensive care unit availability, costs and monitoring ability are contributing factors [10]. The endemic nature of infectious diseases, malnutrition and the high risk of comorbid conditions contribute to the very high risk of not only severe sepsis but also poor outcomes.

Sepsis is an illness in which early detection and quick treatment are essential to improve survival rates [11]. The same early recognition and prompt management associated with improved mortalities in sepsis are required. Protocols based on evidence, such as initial broad-spectrum antibiotic therapy, timely fluid resuscitation, hemodynamic monitoring, and organ support, have been reported to substantially reduce mortality [12]. International guidelines for the treatment of patients with sepsis recommend the implementation of structured treatment bundles within the first hour of recognition. Such adherence within institutions is particularly critical in tertiary care centers that frequently treat very ill patients [13]. Consequently, assessment of identified sepsis outcomes in the context of the healthcare system becomes essential to target systemic areas to perfect care and optimize management outcomes.

While the significant burden of sepsis in India is innumerable, region-specific data for the state of Bihar and Eastern India are particularly limited. The majority of the evidence available comes from city tertiary hospitals, and there is a need for prospective institutional studies reporting the clinical features and outcome of sepsis from this region. The need for local data generation is a result of differences in patient demographics, socioeconomic features, infectious patterns, antimicrobial resistance profiles, and the accessibility of healthcare services.

Patna Medical College & Hospital (PMCH), Patna, is one of the important tertiary referral centers of Bihar and adjoining states, taking care of a large number of critically sick patients. This evaluation of institutional data on sepsis outcomes can offer valuable insights into disease patterns, mortality rates, and the effectiveness of current management practices. This analysis is crucial to improving early detection mechanisms, protocol compliance, resource allocation, and reducing sepsis-related mortality in this region.

Objectives

- To determine the mortality rate between sepsis patients
- To assess the length of hospital stay
- To evaluate the association between management strategies and outcomes

Materials and Methods

Study Design: This study was performed as a retrospective observational study to evaluate outcomes of sepsis care, especially mortality and length of hospital stay. The study was conducted retrospectively by reviewing previously documented medical records of patients diagnosed with sepsis.

An observational study and no investigators introduced any interventions, all treatments were given per standard hospital practice during the study period. This design facilitated the evaluation of clinical practices and outcomes as they are implemented in the actual tertiary care setting.

Study Setting: The study was conducted Department of Medicine and ICU, PMCH, a tertiary care teaching hospital in Bihar, India. The institution is a referral center for both the urban and rural patients of the state, as well as nearby states. Due to the high number of severely ill patients, in particular with infectious disorders and septic shock, the hospital is appropriate for assessment of outcomes associated with sepsis.

Study Duration: A retrospective study of patients admitted over a six-month period from February 2025 to July 2025. Eligible cases were defined as all cases diagnosed within this time frame. Hospital medical records were used to extract data and analyze them after the study period was completed.

Sample Size: A total of 103 patients underwent the study. This was done using census sampling, that is, all eligible patients meeting the inclusion criteria during that time period were included. The model used in this approach reduced selection bias and covered all sepsis cases admitted in specific duration.

Inclusion Criteria: A study of adult patients (aged ≥ 18 years) who were diagnosed with sepsis according to the Sepsis-3 criteria (threatened homeostasis resulting from a host response to

infection, usually indicated by a SOFA score ≥ 2 points) and admitted to the Department of Medicine or ICU during the study period. Eligibility was limited to cases with clinical and laboratory verification of diagnosis.

Exclusion Criteria: The study excluded patients with incomplete medical records or missing important clinical or laboratory data necessary for analyses. Furthermore, to prevent misclassification of the outcome and incomplete follow-up data, we excluded patients who were discharged against medical advice.

Data Collection: A structured data collection form was used to extract data from hospital case sheets, laboratory reports, and ICU charts as secondary data. The variables recorded included demographic characteristics (age and sex), presence of comorbidities (diabetes mellitus and hypertension), source of infection, and SOFA score, where available. Management-related variables, including delay in antibiotic initiation, ICU admission, mechanical ventilation, as well as their supportive measures. Outcome variables assessed were total length of stay (days) and clinical outcome (survived or dead).

Statistical Analysis: Data was analyzed by using SPSS. They summarized the data using descriptive statistics, reporting continuous values as mean \pm standard deviation and categorical values as frequencies and proportions. Data were examined using the chi-square test for associations between categorical variables and an independent t-test to compare continuous variables between groups. Statistical significance was defined as a p-value < 0.05 .

Ethical Consideration: During this study, prior approval was obtained from the Institutional Ethics Committee of the hospital. Informed consent was waived because of the retrospective nature of the study. Patients maintained ongoing confidentiality and anonymity with respect to their information through the data collection and analysis phases.

Results

Demographic Characteristics: The average age of the study population was 56.8 ± 15.4 years (age range, 19–88). Patients aged 51–70 years reported the highest proportion of the study patients. Out of 103 patients, 61 (59.2%) were male and 42 (40.8%) were female, showing male predominance in patients admitted with sepsis.

Table 1: Demographic Characteristics of Study Participants (n = 103)

Variable	Frequency (n)	Percentage (%)
Age (Mean \pm SD)	56.8 \pm 15.4 years	-
18–30 years	9	8.7
31–50 years	28	27.2
51–70 years	44	42.7
>70 years	22	21.4
Gender		
Male	61	59.2
Female	42	40.8

Clinical Characteristics: Diabetes mellitus (DM), hypertension (HTN), and chronic kidney disease (CKD) were the most frequently observed comorbidities, detected in 38 (36.9%) patients, 34 (33.0%) patients, and 15 (14.6%) patients, respectively. A total of 29 (28.2%) patients had

multiple comorbidities. In terms of infection source, respiratory tract infections (40.8%) were the main source of sepsis, followed by urinary tract infections (27.2%), intra-abdominal infections (15.5%), and bloodstream infections (10.7%). The source was unidentified in 5.8% of cases.

Table 2: Clinical Characteristics and Source of Infection

Variable	Frequency (n)	Percentage (%)
Comorbidities		
Diabetes Mellitus	38	36.9
Hypertension	34	33.0
Chronic Kidney Disease	15	14.6
Multiple Comorbidities	29	28.2
Source of Infection		
Respiratory	42	40.8
Urinary	28	27.2
Intra-abdominal	16	15.5
Bloodstream	11	10.7
Unknown	6	5.8

Management Characteristics: Out of 103 patients, 67 cases (65.0%) needed ICU admission at some

point during their hospital stay. In 39 patients (37.9%), mainly in those admitted to the ICU, it was

necessary to use mechanical ventilation. 71 patients (68.9%) received early antibiotic therapy (within 1 hour after diagnosis), indicating good compliance with sepsis management guidelines in these cases.

Mortality Outcomes: An overall persistence in hospital mortality rate of 28.2% (29 out of 103).

There was increased mortality at 30% for patients over 70 years of age (45.5%) compared to younger age groups.

Finally, the mortality rates were 38.8% and 10.5% in patients admitted to the ICU and general wards, respectively.

Table 3: Mortality Outcomes by Age Group and ICU Admission (n = 103)

Variable	Total (n)	Deaths (n)	Mortality (%)
Age Group			
18–30 years	9	1	11.1
31–50 years	28	5	17.9
51–70 years	44	12	27.3
>70 years	22	10	45.5
ICU Admission			
ICU (Yes)	67	26	38.8
ICU (No)	36	3	10.5
Overall Mortality	103	29	28.2

Length of Stay: The average hospital LOS was 9.6 ± 4.8 days across all patients. The mean duration of stay in the ICU (12.3 ± 5.1 days) was significantly greater among patients admitted to the ICU relative

to those managed in general wards (6.1 ± 3.2 days). Also, non-survivors had a longer mean hospital stay than survivors (10.8 ± 5.4 days vs. 9.1 ± 4.5 days), but it was not statistically significant ($p > 0.05$).

Table 4: Length of Stay Analysis

Variable	Mean \pm SD (Days)
Overall Hospital Stay	9.6 ± 4.8
ICU Patients	12.3 ± 5.1
Non-ICU Patients	6.1 ± 3.2
Survivors	9.1 ± 4.5
Non-Survivors	10.8 ± 5.4

These findings highlight a substantial mortality burden among elderly and ICU-admitted patients and demonstrate prolonged hospital stays associated with critical illness severity.

Discussion

The current retrospective study performed at PMCH observed a mortality in sepsis of 28.2% among the patients. These numbers are related to studies from other developing countries where the mortality rate for sepsis usually falls between 25% and 35%. Internationally, rate differences are noted according to the health infrastructure and severity at presentation, with marginally decreased mortality within high-income countries due to established recognition protocols and advanced critical care facilities. The mean hospital LOS was 9.6 ± 4.8 days in the current study, and ICU patients were expected to remain longer. A prolonged hospital stay indicates the severity of organ dysfunction and the requirement of advanced supportive care such as mechanical ventilation. Extended LOS not only leads to excess healthcare expenditures, but also increases the incidence of in-hospital acquired infections and increases the risk of the emergence of antimicrobial resistant strains. That LOS is higher in non-survivors, a more severe progression of disease and earlier complications prior to death.

Comparison with Other Studies: The findings of this study are consistent with various Indian tertiary care studies reporting mortality rates of 24% to 34% among septic patients. Correspondingly, studies carried out in prominent government medical institutions in India reported higher mortality in elderly patients and patients requiring ICU admission. Similar findings have been observed across LMICs, as constrained access to early diagnosis and limited availability of critical care equipment lead to increased mortality and morbidity.

Mortality rates have been as high as 35–40% in patients presenting with septic shock from South Asian and South Sub-Saharan Africa LMIC-based studies [14,15]. The mortality rate in the current study is relatively low compared to these numbers, possibly indicating that recommendations for early adequate antibiotic treatment were only partly met in this institution.

Clinical Implications: Early identification and timely treatment of sepsis. Exceedingly effective early mortality reduction by standardized sepsis bundles of early antibiotic and fluid resuscitation implementation is available. Developing and enforcing protocols, providing continuous staff training and adopting strong qualitative antimicrobial stewardship programs are imperative

to optimise patient outcomes. Early triage systems improved, and referral pathways may further achieve treatment initiation without delay.

Limitations: This study has certain limitations. It was retrospective and relied on the availability and accuracy of medical records. The study was conducted at one tertiary care hospital; these findings may not be generalizable to other settings single-center bias. Once assisted, the size (n = 103) is relatively small. SOFA scores were sometimes documented inconsistently. Also, they did not measure long-term outcomes post-discharge.

Conclusion

A prospective retrospective study of sepsis patients showed that the overall in-hospital mortality rate was 28.2%, while elderly patients and patients treated in the ICU had higher mortality rates in the hospital. The mean length of hospital stay was 9.6 days and was significantly longer in critically ill patients.

These results underscore the continued burden of sepsis within the contemporary tertiary care environment. Outcomes improve with early recognition, rapid fulfilment of sepsis management protocols and institutional strengthening. These findings can guide regional policy, but larger multicenter prospective studies are recommended to validate them.

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