



EVALUATION OF CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS (CLABSI) IN THE EMERGENCY DEPARTMENT SETTING

Emergency Medicine

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ABSTRACT

Central line-associated bloodstream infection (CLABSI) remains an important healthcare-associated infection in critically ill patients and is associated with prolonged hospitalization, increased costs, and adverse outcomes. Although central venous catheters are frequently inserted in emergency departments, emergency department-specific Indian data are limited. This prospective observational study was conducted in the Emergency Department of Amaltas Institute of Medical Sciences, Dewas, over 18 months to determine the incidence of CLABSI and its association with selected demographic, clinical, and procedural variables. Sixty-two adult patients undergoing central venous catheter insertion were enrolled by consecutive sampling. Demographic profile, hemodynamic status, procedure type, and blood culture data before and after catheter insertion were recorded. All baseline blood cultures were negative. At 48 hours, 5 of 62 patients had positive cultures, giving a CLABSI incidence of 8.06%, while the CLABSI rate was 8.56 per 1000 catheter days. Most isolates were gram-negative organisms, and *Klebsiella pneumoniae* was the most common pathogen, accounting for 40% of positive cultures. No statistically significant association was observed between CLABSI and age group, gender, general condition, or procedure type in this cohort. The findings support strict aseptic precautions, surveillance, and standardized catheter-care practices in emergency departments.

KEYWORDS

CLABSI, Central Venous Catheter, Emergency Department, Bloodstream Infection

INTRODUCTION

Central venous catheters are commonly used in emergency departments for fluid resuscitation, vasopressor delivery, blood transfusion, and hemodynamic monitoring in seriously ill patients. However, catheter use carries the risk of central line-associated bloodstream infection, an important and largely preventable healthcare-associated infection linked to prolonged hospital stay, increased cost, and higher morbidity and mortality. In India, most published discussion on CLABSI focuses on intensive care units, while the emergency department, where many lines are initially inserted, remains less studied. The present study was undertaken to evaluate CLABSI incidence in the emergency department and assess its relation to selected demographic, clinical, and procedural factors.

MATERIALS AND METHODS

This prospective observational study was carried out in the Emergency Department of Amaltas Institute of Medical Sciences, Dewas, after institutional approval, over a period of 18 months. Adult patients aged 18 years or older who underwent central venous catheter insertion in the emergency department and consented to participation were included. Patients younger than 18 years, those with prior central line insertion, recent fever or active infection, severe coagulopathy, inability to consent, or major conditions that could distort bloodstream infection assessment were excluded.

A total of 62 patients were enrolled by consecutive sampling. Baseline demographic and clinical details were recorded, including age, gender, general condition, allergy status, and procedure type. Blood cultures were assessed before catheter insertion and again at 48 hours where indicated, and patients were observed for clinical evidence of bloodstream infection. Diagnosis of CLABSI was based on clinical findings, microbiological evidence, and standard surveillance criteria used in the source manuscript. Descriptive statistics and chi-square testing were used to examine associations between CLABSI and selected variables.

RESULTS

Among the 62 patients, 36 were male (58.1%) and 26 were female (41.9%). The largest age groups were 31-45 years and 46-60 years, with 21 patients each (33.87% each), followed by more than 60 years in 11 patients (17.74%) and 18-30 years in 9 patients (14.52%). Forty patients (64.5%) were hemodynamically unstable at presentation, while 22 (35.5%) were stable. No patient had a documented allergy history.

Central venous catheter insertion alone was performed in 58 patients (93.5%), while 4 patients (6.5%) underwent catheter insertion along with another procedure. All 62 baseline blood cultures were negative before catheter insertion. At 48 hours, 57 patients (91.9%) remained culture-negative and 5 patients (8.1%) had positive blood cultures. The overall incidence of CLABSI was therefore 8.06% (5 of 62 patients), and the CLABSI rate was 8.56 per 1000 catheter days based on 584 catheter days and 5 confirmed infections.

No statistically significant association was found between age group and CLABSI ($p = 0.649$), gender and CLABSI ($p = 0.573$), general condition and CLABSI ($p = 0.479$), or procedure type and CLABSI ($p = 1.000$). Microbiological analysis of CLABSI cases showed *Klebsiella pneumoniae* in 2 patients (40%), *Enterococcus* in 1 (20%), *Pseudomonas* in 1 (20%), and *Staphylococcus haemolyticus* in 1 (20%).

Table 1. Core Findings

Variable	Finding
Sample size	62 patients
Male sex	36 (58.1%)
Hemodynamically unstable	40 (64.5%)
Baseline cultures negative	62/62 (100%)
Positive culture at 48 hours	5/62 (8.1%)
CLABSI incidence	8.06%
CLABSI rate	8.56 per 1000 catheter days
Commonest isolate	<i>Klebsiella pneumoniae</i> (40%)

Table 2. Association Testing

Variable	p-value
Age group	0.649
Gender	0.573
General condition	0.479
Procedure type	1.000

DISCUSSION

This study demonstrates that CLABSI remains a meaningful risk among emergency department patients undergoing central venous catheter insertion, with an incidence of 8.06% and a rate of 8.56 per 1000 catheter days in the present cohort. The finding that all patients were culture-negative before catheter insertion strengthens the likelihood that later bloodstream infections were related to catheter exposure or subsequent catheter care rather than pre-existing bacteremia. The absence of statistically significant associations with age, gender, general condition, or procedure type suggests that

CLABSI development may depend on multiple interacting factors rather than on a single baseline variable in this sample.

The microbiological profile showed a predominance of gram-negative pathogens, especially *Klebsiella pneumoniae*, with additional isolates including *Enterococcus*, *Pseudomonas*, and *Staphylococcus haemolyticus*. These results support the need for strict aseptic insertion technique, continued line surveillance, and standardized catheter-care bundles in emergency settings.

CONCLUSION

The incidence of CLABSI among patients undergoing central venous catheter insertion in the emergency department was 8.06%, with a CLABSI rate of 8.56 per 1000 catheter days. Gram-negative organisms predominated, and *Klebsiella pneumoniae* was the commonest isolate. No significant association was demonstrated between CLABSI and age, gender, general condition, or procedure type in this cohort [file:58]. Strengthening infection prevention practices and routine surveillance in emergency departments may help reduce catheter-related bloodstream infection burden.

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