

Research Article



INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

EFFECTS OF CLABSI (CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTION) ON THE DURATION OF HOSPITAL STAY

Dr. Vamshi Krishna K.

Assistant Professor, Department of General Medicine, Dhanalakshmisrinivasan Medical College & Hospital, Siruvachur, Perambalur, Tamilnadu

Email id: Vamshikotturu@gmail.com

How to cite: Krishna VK. Effects of CLABSI (central line-associated bloodstream infection) on the duration of hospital stay. International Research Journal of Pharmacy, 2023,14:11:16-20.

Doi: 10.56802/2230-8407.1303913

=====

ABSTRACT

Background: Infections linked to healthcare cause a substantial amount of healthcare burden, expense, mortality, and morbidity in India. The primary source of avoidable healthcare infections is CLABSI (central line-associated bloodstream infections), which has increased due to the use of central lines in normal medical treatment. However, there is a dearth of literature data in India.

Aim: The purpose of this study was to evaluate the parameters linked to an extended length of stay in the hospital as well as the impact of CLABSI (central line-associated bloodstream infection) on the length of hospital stay.

Methods: The study used a retrospective design and involved adult individuals who visited the Institute with CLABSI. It was conducted at a healthcare facility in India. During the specified research period, the individuals experienced CLABSI following the insertion of the central line. A statistical analysis was performed on the collected data.

Results: There were 566 research participants, and the length of stay associated with CLABSI was 13.11±9.51 days. For all outcomes associated to CLABSI, the length of stay rose considerably ($p<0.03$). Subjects who had their central lines removed later had a considerably longer length of stay ($p<0.001$). The extended stay in the intensive care unit, however, was not seen before to or following the infection. Moreover, a significant ($p<0.01$) correlation was seen between the length of stay and the inotropes required following infection.

Conclusion: After infection, the current investigation finds that sick individuals need hemodynamic support. Significantly longer stays might result from CLABSI, and a lengthy stay is also linked to the slow and delayed removal of the central line.

Keywords: CLABSI, central line-associated bloodstream infection, length of stay, LOS

INTRODUCTION

When caring for critically ill patients, central venous catheters, or CVCs, are typically essential because they enable the safe administration of intravenous (IV) drugs that cannot be administered peripherally. Nonetheless, central venous catheters may serve as entry points for both localized and systemic bloodstream infections.¹

Increases in healthcare expenses, mortality, and morbidity rates are significantly influenced by infections linked to healthcare. CLABSI (central line-associated bloodstream infection) is a leading source of avoidable healthcare infections as a result of the increased use of central lines in standard clinical practice. According to data from earlier research, central line delay

patients had a significant risk of CLABSI. Additionally, evidence from other sources indicated that central line delay patients had a higher prevalence of CLABSI.²

CLABSI is defined by the Centers for Disease Control and Prevention (CDC) surveillance guidelines as bloodstream infections in patients with CVCs who do not have a clear secondary cause of bacteremia. When the person has a central line implanted for more than two days or on the day or one day before to the onset of the first symptom or indication of CLABSI that meets the criteria, the bloodstream infections that are verified by laboratory testing are referred to as CLABSI. The definition also says that an illness shouldn't be connected to any other infections the person may have.³

Both the mortality and morbidity of the afflicted individuals as well as the healthcare system are significantly impacted by CLABSI, which creates an ergonomic load that lengthens hospital stays (LOS).

Long stays in particular result in significant economies of beds, facilities, personnel, and equipment. It is difficult to completely eradicate these expenses, although eliminating CLABSI in hospitals does not typically result in cost savings since hospital resources may be directed toward other fruitful tasks. It is necessary to evaluate the duration of stay that is excessive based on the resources available and the number of days spent in bed that might have been avoided with the preventative.⁴

Numerous strategies that consider factors related to both catheterization and implantation are used to avoid CLABSI. One factor is the use of a totally sterile technique during insertion; other factors related to catheters include suture-less securement devices, catheters impregnated with antibiotics, and efficient infection control procedures. However, there isn't much information about CLABSI in the literature currently available in India. 5. Accordingly, the current study sought to evaluate the parameters linked to an extended length of stay as well as the impact of CLABSI (central line-associated bloodstream infection) on hospital stay duration.

MATERIALS AND METHODS

The purpose of this retrospective cohort clinical study was to evaluate the parameters linked to an extended length of hospital stay as well as the impact of central line-associated bloodstream infection (CALBI) on hospital stay duration.

The study subjects were from the Department of Medicine of the Institute. Prior to their involvement in the study, all individuals gave their written and verbal informed permission. Participants in the study had to be at least 18 years old, have had a central line inserted at the Institute, and have had CLABSI within the specified research period. Subjects having a positive culture from the central line, whose records were evaluated retrospectively from the microbiology laboratory records, met the study's inclusion requirements. Subjects who had an eligible central line and an eligible BSI (bloodstream infection) pathogen were further excluded from the data.

Participants who had a central line in situ for at least 48 hours before to the culture or 24 hours following the central line's removal were eligible for the research. Data were collected following instruction on the CDC's CLABSI diagnostic criteria. Clinical results, therapy, admission features, central line features, and demographic information about the participants were among the data gleaned from previous medical records. Time was defined for the research as either the amount of time required to treat CLABSI or its aftereffects from the moment of diagnosis or the amount of time required for a new central line insertion in the event that the insertion caused a delay in hospital release.

The statistical analysis of the collected data was conducted using the Statistical Package for the Social Sciences (SPSS) software version 24.0 (IBM Corp., Armonk, NY, USA) for the Mann-Whitney U test, t-test, and descriptive measure evaluation. In addition to frequency and percentages, the findings were presented as mean and standard deviation. The p-value of <0.05 was considered statistically significant.

RESULTS

The purpose of this retrospective cohort clinical study was to evaluate the parameters linked to an extended length of hospital stay as well as the impact of central line-associated bloodstream infection (CALBI) on hospital stay duration. Following the implantation of a central line, 566 participants with CLABSI of both sexes were evaluated. The research participants' average age was 32.24±0.05, and a non-significant connection (p=0.23) was observed. There was no significant association (r = 0.45), with the male and female correlations being 12.76±9.27 and 13.58±9.27, respectively. As seen in Table 1, the association with ICU admission was non-significant (p=0.25).

Upon evaluating the central line features of the research participants, bundle insertion was observed in 1.1% (n=6) of the individuals and not in 98.9% (n=560) of the subjects. Of the study participants, 31.4% (n=178) had bundle maintenance,

whereas 68.6% (n=388) did not. Of the research participants, 87.3% (n=494) had a single central line, whereas 12.7% (n=72) had several central lines. Of the research participants, 63.3% (n=358) had a permanent central line, whereas 36.7% (n=208) had a temporary one. As shown in Table 2, guidewires were utilized in 6.57% (n=26) of the research participants to replace the central line.

The study's findings demonstrated that, in terms of intubation and inotrope need in relation to length of stay, intubation was not required prior to culture, with a mean value of 11.52 ± 9.73 , 12.56 ± 8.23 , 14.15 ± 7.25 , and 11.94 ± 11.23 indicating statistically non-significant results with $p=0.923$. Compared to intubation not required after CLABSI, intubation after CLABSI was substantially less common (12.16 ± 9.44 ; $p=0.165$).

The rate of intubation prior to CLABSI was also considerably lower than the rate of intubation not required prior to CLABSI ($p=0.435$). Not required before to culture, inotrope reduced and rose as 11.61 ± 9.47 , 19.73 ± 8.82 , 12.02 ± 6.83 , and 10.42 ± 11.75 , respectively, and was statistically not significant with $p=0.393$. Compared to those who did not require it, inotrope following CLABSI was required in considerably fewer participants ($p=0.04$). The number of patients who required inotropes prior to CLABSI was non-significantly lower than that of subjects who did not require it ($p=0.435$; Table 2).

DISCUSSION

Following the implantation of a central line, 566 participants with CLABSI of both sexes were evaluated for this investigation. At $p=0.23$, the research participants' mean age of 32.24 ± 0.05 indicated a non-significant connection. The correlation was non-significant at 0.45 for both males and females, with values of 12.76 ± 9.27 and 13.58 ± 9.27 , respectively. The association with ICU admission was non-significant ($p=0.25$). These findings mirrored those of studies conducted by Smith PW et al. (2008) and Gastmeier P et al. (2009), in which the authors evaluated participants who had the same demographic and medical features as the current research.

Regarding the evaluation of the central line features in the study participants, bundle insertion was observed in 1.1% (n=6) of the individuals and was not observed in 98.9% (n=560) of the subjects. Of the 178 research participants, 31.4% performed bundle maintenance, whereas 68.6% did not (n=388). 12.7% (n=72) and 87.3% (n=494) of the research participants had a single central line, respectively. Of the research individuals, 63.3% (n=358) had a permanent central line, whereas 36.7% (n=208) had a temporary one.

6.57% (n=26) of the research participants had their central lines replaced with guidewires. These findings were in line with research by Cardenas-Garcia J et al. (2015) and Atilla A et al. (2016), who both reported central line features that were comparable to the current study. With regard to central line indications, it was observed that 0.7% (n=4a) of study participants had an indication other than a peripheral line, 1.1% (n=6) had blood transfusion, 6% (n=34) had TPN (total parenteral nutrition), 12.1% (n=68) had irritant and vesicant medications, 0.7% (n=4) had plasmapheresis, 8.9% (n=50) had chemotherapy, The indication for dialysis was 41.1% (n=232), inotrope was 18.8% (n=106), and no other peripheral sites was 17.7% (n=100) of the research participants, while 9.6% (n=54) had recurrent venous cannulations and venous access line installation. Among study participants, fatalities at the conclusion of the research period were recorded in 18.8% (n=104), sequela in 5.8% (n=32), and discharge in 75.4% (n=416) of the cases.

There were considerably more discharges ($p=0.03$). These results were consistent with those of the 2017 study by Rosenthal VD et al.11 and the 2019 study by Jia H et al.10, both of which found central line indications in their participants that were similar to the current investigation.

According to the study's findings, the mean number of days after CLABSI that the central line was removed had a correlation of 0.21 with length of stay (LOS), which was statistically significant ($p=0.01$). The correlation value for mean days to death after CLABSI was 0.925, indicating a significant outcome ($p=0.000$). The correlation value for mean days to CLABSI following admission was 0.044, indicating statistical non-significantness ($p=0.444$). The correlation value for mean days to CLABSI after insertion was 0.112, which was statistically not significant ($p=0.08$). The findings of Kilgore ML et al. (12) and Mitchell BG et al. (13), whose authors reported similar central line features regarding duration of stay to the current research in their separate investigations, were in agreement with these results.

Regarding intubation and inotrope necessity in relation to duration of stay, the mean values for intubation not being required prior to culture were 11.52 ± 9.73 , 12.56 ± 8.23 , 14.15 ± 7.25 , and 11.94 ± 11.23 , respectively. These results were statistically non-significant with $p=0.923$. 12.16 ± 9.44 was the rate of intubation after CLABSI, which was substantially lower than the rate of

intubation not required after CLABSI ($p=0.165$). The rate of intubation prior to CLABSI was also considerably lower than the rate of intubation not required prior to CLABSI ($p=0.435$).

Statistically non-significant increases and decreases in inotrope were seen as follows: 11.61 ± 9.47 , 19.73 ± 8.82 , 12.02 ± 6.83 , and 10.42 ± 11.75 , which were not required prior to culture [$p=0.393$]. Compared to those who did not require it, inotrope following CLABSI was required in considerably fewer participants ($p=0.04$). The requirement for inotropes prior to CLABSI was non-significantly lower in those who required it than in those who did not ($p=0.435$).

These results were consistent with those of Bell T et al. (2017) and Barrasa-Villar JI et al. (2017), whose authors reported intubation and inotrope demands in connection to duration of stay in their investigations, which was consistent with the current study.

CONCLUSION

In light of its limitations, the current investigation comes to the conclusion that for sick participants who required hemodynamic support following infection. The duration of stay can be considerably extended by CLABSI, and the removal of the central line slowly and slowly is also linked to a large lengthening of stay. For a conclusive result, more research with a greater number of participants and longer monitoring is required.

REFERENCES

1. Gaid E, Assiri A, McNabb S, Banjar W: Device-associated nosocomial infection in general hospitals, Kingdom of Saudi Arabia, 2013-2016. *J Epidemiol Glob Health*. 2018;7:S35-S40.
2. Balkhy HH, El-Saed A, Al-Abri SS, et al.: Rates of central line-associated bloodstream infection in tertiary care hospitals in 3 Arabian Gulf countries: 6-year surveillance study. *Am J Infect Control*. 1 2017;45:e49-e51.
3. DeVries M: CLABSI definition and diagnosis. *Vessel Health and Preservation: The Right Approach for Vascular Access*. Moureau NL (ed): Springer International Publishing, Berlin, Germany. 2019;1:163-8.
4. O'Grady NP, Alexander M, Burns LA, et al.: Guidelines for the prevention of intravascular catheter-related infections. *Clin Infect Dis*. 2011;52:162-93.
5. Umscheid CA, Mitchell MD, Doshi JA, Agarwal R, Williams K, Brennan PJ: Estimating the proportion of healthcare-associated infections that are reasonably preventable and the related mortality and costs. *Infect Control Hosp Epidemiol*. 2011;32:101-14.
6. Smith PW, Bennett G, Bradley S, et al.: SHEA/APIC guideline: infection prevention and control in the long-term care facility, July 2008. *Infect Control Hosp Epidemiol*. 2008;29:785-814.
7. Gastmeier P, Schwab F, Sohr D, Behnke M, Geffers C: Reproducibility of the surveillance effect to decrease nosocomial infection rates. *Infect Control Hosp Epidemiol*. 2009;10:993-9.
8. Cardenas-Garcia J, Schaub KF, Belchikov YG, Narasimhan M, Koenig SJ, Mayo PH: Safety of peripheral intravenous administration of vasoactive medication. *J Hosp Med*. 2015;10:581-5.
9. Atilla A, Doğanay Z, Çelik HK, Tomak L, Günel O, Kılıç SS: Central line-associated bloodstream infections in the intensive care unit: importance of the care bundle. *Korean J Anesthesiol*. 2016;69:599-603.
10. Jia H, Li W, Hou T, et al.: Impact of healthcare-associated infections on length of stay: a study in 68 hospitals in China. *Biomed Res Int*. 2019;2019:2590563.
11. Rosenthal VD, Olarte N, Torres-Hernandez H, Villamil-Gomez W: Catheter-associated bloodstream infection rates, extra length of stay and mortality in 69 adult ICUs of 37 cities of 11 developing countries. Findings of the INICC. *Am J Infect Control*. 2007;35:E68-E9.
12. Kilgore ML, Ghosh K, Beavers CM, Wong DY, Hymel PA Jr, Brossette SE: The costs of nosocomial infections. *Med Care*. 2008;46:101-4.
13. Mitchell BG, Gardner A, Barnett AG, Hiller JE, Graves N: The prolongation of length of stay because of *Clostridium difficile* infection. *Am J Infect*. 2014;42:164-7.
14. Bell T, O'Grady NP: Prevention of central line-associated bloodstream infections. *Infect Dis Clin North Am*. 2017;31:551-9.

15. Barrasa-Villar JI, Aibar-Remón C, Prieto-Andrés P, Mareca-Doñate R, Moliner-Lahoz J: Impact on morbidity, mortality, and length of stay of hospital-acquired infections by resistant microorganisms. Clin Infect Dis. 2017;65:644-52.

S. No	variables	Mean ± S. D	p-value
1.	Age (years)	32.24±0.05	0.23
2.	Gender		
a)	Males	12.76±9.27	0.45
b)	Females	13.58±9.27	
3.	ICU admission	16.23±32.02	0.25

Table 1: Demographic data of study participants at baseline

S. No	Parameters	Mean ± S. D	p-value
1.	Intubation need		
a)	Not needed before the culture	11.52±9.73	0.923
b)	Same	12.56±8.23	
c)	Decreased	14.15±7.25	
d)	Increased	11.94±11.23	
2.	Intubation after CLABSI		
a)	Yes	12.16±9.44	0.165
b)	No	13.83±9.57	
3.	Intubation before CLABSI		
a)	Yes	12.53±9.27	0.435
b)	No	13.43±9.65	
4.	Inotrope need		
a)	Not needed before the culture	11.61±9.47	0.393
b)	Same	19.73±8.82	
c)	Decreased	12.02±6.83	
d)	Increased	10.42±11.75	
5.	Inotrope after CLABSI		
a)	Yes	11.62±10.12	0.04
b)	No	13.95±9.13	
6.	Inotrope before CLABSI		
a)	Yes	11.86±11.21	0.435
b)	No	13.33±9.21	

Table 2: Intubation and inotrope need compared to the length of stay