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Original Article

Central-line associated bloodstream infections at a tertiary care hospital

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ABSTRACT

Introduction: The Central line associated bloodstream infections (CLABSI) are the bloodstream infections where central line was in situ for more than 48 hours from the time of event and the line was in place on the date of event or before that and are confirmed by lab investigation. CLABSI are becoming common hospital acquired infections in indoor patients.

Materials and Methods: This was a prospective one-year study to assess the occurrence of CLABSI at a tertiary care hospital in Gujarat. The study involved all hospitalized patients having a central line access during August 2015 to July 2016. CLABSI were identified according to the 'Center for Disease Control and Prevention' definitions. Microsoft excel was used for calculation of CLABSI rates and other statistical analysis.

Results: There was 3.69 per 1000 central line days of CLABSI. More CLABSI was seen with underlying medical co morbid conditions. In this study, there were five infections caused by ESBL producing organisms and one carbapenemase producing K. pneumoniae. This study shows multi drug resistant pathogens as causative agent of CLABSI. A higher rate of CLABSI in this study might be due to underlying co-morbid conditions.

Keywords: CLABSI, Health care associated infection, Central-line, Infection.

INTRODUCTION

The central line associated bloodstream infections (CLABSI) are the bloodstream infections confirmed by laboratory where central line was in situ for more than 48 hours from the time of event and the line was in place on the date of event or before that.[1] The central line associated bloodstream infections (CLABSI) are now common hospital associated infections (HAIs) in hospitalized patients. In 2014, Centre for Disease Prevention and Control had estimated that the rate of CLABSI was three percent among patients staying in an ICU for more than two

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days.[2] There is also increase in the hospital costs due to high CLABSI infections.[3-5] Pinon M et al. showed a CLABSI incidence of 0.95.[6] This is a prospective study which was conducted for one year, to monitor hospitalized patients with central line for the occurrence of CLABSI and identify causative microorganism at a tertiary care hospital in Gujarat. The study involved all hospitalized patients having a central line access during August 2015 to July 2016.

METHODOLOGY

This prospective observational study was done among hospitalized patients with a central line access during August 2015 to July 2016 at a tertiary care hospital. All patients admitted in ICU with central line inserted were included. The patients were enrolled from August 2015 to July 2016. Total 369 hospitalized patients with central line who fulfilled the inclusion criteria were enrolled in the study during the study period.

Diagnosis of CLABSI was done by culturing blood from central line and blood from peripheral vein. The time difference of more than two hours between positive growth from central line followed by peripheral blood were considered as CLABSI.[1] Blood was inoculated in brain heart infusion broth. Positive cultures were isolated and identified manually as per standard guidelines. [7] The data was collected daily in a standardized pre-design study format. CLABSI rate was measured and compared with the study variables using Microsoft excel.

RESULTS

Total 369 patients with central line in situ that fulfilled inclusion criteria of study were included. There were 16 female and 11 male patients. The mean age of patients was 37 years. The comorbid conditions of the patients included in the study were: medical (n = 198), cancer (n =132), surgical (n = 33) and other (n = 6).

Table 1: Organisms isolated in CLABSI.

Comorbid condition	No. of patients	CLABSI
Medical	198	17
Oncological	132	6
Surgical	33	3
Other	6	1
Total	369	27

Median catheter insertion time during hospital admission was 3.5 days with total 7312 catheter observation-days. During the study period, there were total 27 CLABSI episodes. The incidence of CLABSI was 3.69/1000 central line-days. Among these, 9 catheters were inserted in jugular vein and 18 were peripherally inserted. Maximum CLABSI were observed in patients with a medical comorbid condition (i.e., cardiac diseases, metabolic, respiratory, hypertension, neurological or renal diseases). More CLABSI was noted in patients within the respiratory group compared to the other comorbid conditions. All CLABSI were observed in patients who were in intensive care unit for some time during their hospital stay.

DISCUSSION

This prospective study was done to assess the occurrence of CLABSI among hospitalized patients of tertiary care hospital in a one-year study period. In our study CLABSI was 3.69/1000 central line-days. Study published in 2006 by Peter pronovost et al.[8] had shown CLABSI of 2.7/1000 central line days in Michigan, that is less than our study results. Similar findings were also reported in a multi centric study done in 2009 from USA.[9] CLABSI rate of 4.0 was reported by Soraya Cherifi et al. in 2013 from Belgium.[10] We observed that underlying medical conditions of patients was one of the important risk factors in occurrence of CLABSI. However, there are very few studies available that correlate CLABSI with

Table 2: Organisms isolated in CLABSI.

Organism isolated	No. of patients	Percentage
K. pneumonie	11	40.7 %
S. aureus	7	26.0 %
Coagulase negative Staphylococci (CoNS)	4	14.8 %
Candida sp.	2	7.4 %
E. coli	2	7.4 %
P. aeruginosa	1	3.7 %
Total	27	100 %

Table 3: ESBL and carbapenemase producing organisms isolated in CLABSI.

Organism isolated	No. of isolates
ESBL producing K. pneumonie	4
ESBL producing E. coli	1
Carbapenemase producing P. aeruginosa	1
Total	6

comorbid clinical condition of patients. Most studies focused more on intensive care and oncological patients.[6,11-15] The common microorganism isolated with CLABSI are Staphylococci (S. aureus, CoNS), Enterobacteriaceae (K. pneumonie, E. coli) and Candida. Enterobacteriaceae is an important cause of severe CLABSI infections. These enterobacteriaceae are of concern due to high rise of carbapenem, ESBL and multi drug resistance.[16] Montagnani C et al. had shown that gram negative resistance rate to 3rd generation cephalosporins is 30 - 56%, carbapenem resistant Klebsiella 34% in invasive infections from Italy.[17] In our study, there were five infections, that are caused by ESBL producing organisms 4 - K. pneumonia and 1 - E. coli and 1 infection was by carbapenemase producing K. pneumoniae. The CLABSI caused by Candida were sensitive to fluconazole and most of other anti-fungal agent tested.

CONCLUSION

We had noted Multi-resistant pathogens as causes of CLABSI. More CLABSI were reported in patients with comorbid medical conditions.

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