



CENTRAL LINE ASSOCIATED BLOODSTREAM INFECTIONS IN SURGICAL INTENSIVE CARE UNIT IN A TERTIARY CARE CENTRE

Clinical Microbiology

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ABSTRACT

Introduction: Central venous catheters though indispensable in current medical and intensive care treatment, also puts patients at risk of Central Line Associated Blood Stream Infections (CLABSI) contributing significantly to morbidity, mortality and costs in intensive care units (ICU). **Methods:** All Adult patients admitted in Surgical ICUs of Gandhi Hospital during the study period July 2017 to June 2018 were investigated for CLABSI. They were followed up from the time of catheterization till discharge. Their clinical and treatment details were recorded and blood cultures were collected both from central and peripheral veins after 48hrs of central venous catheterization. **Results:** Out of 110 patients with 490 Central line days, 10 patients developed CLABSI with a CLABSI rate of 20.4 per 1000 catheter days. The overall incidence of CLABSI was 9.09 %. *Klebsiella* species was the most common pathogen isolated. **Conclusion:** Since central venous catheters are increasingly being used in the critical care, regular surveillance for infection associated them are essential. With the escalating prevalence of antimicrobial resistance, healthcare sector has to go back to the very basics of hospital infection control.

KEYWORDS

INTRODUCTION

Health care associated infections (HAIs) are the most common complication among hospitalized patients¹. More than 75% of all HAIs are due to four types of infections: urinary tract infections, surgical site infections, bloodstream infections and pneumonia². Central venous catheters (CVCs), also known as Central Lines play an integral role in modern health care, allowing for the administration of intravenous fluids, blood products, medications, and parenteral nutrition; their use, however, is associated with a risk of bloodstream infection.

A Central Line Associated Blood Stream Infection (CLABSI) is a laboratory-confirmed bloodstream infection in a patient where the central line was in place for > 2 calendar days (48 hours) on the date of the event, with day of device placement being Day 1 and the central line was in place on the date of event or the day before. (CDC 2018 guidelines)³

The Institute of Medicine (IOM) of American Quality health care reported that, even by modest estimates, preventable patient events in hospitals (including HAIs) exceeded the number of deaths due to AIDS, breast cancer, and motor vehicle accidents each year^{4, 5}. A study conducted in Indian tertiary care teaching hospital during last decade identified the CLABSI incidence in India varies from 0.2% to 27 %⁶. Based on the number of catheter days, for 1000 catheter days the rate of incidence varies from 0.5 - 47 in Hemodialysis catheters⁷. In developing countries, CLABSI mortality rates may be as high as 50%⁸.

Despite all this emphasis on HAIs, limited progress has actually been made in preventing them. In many developing countries, it is still difficult to document both the burden of CLABSI infections and the actual improvement in patient outcomes due to difficulties in obtaining reliable data.⁹

CLABSI will continue to pose a serious threat unless prevention strategies, diagnostic techniques and treatment modalities are implemented. For this, it is essential to initiate systematic surveillance, based on standard definitions and to assess strategies for standardizing health care practices consistent with evidence-based recommendations.

Hence keeping this view in mind, the present study is designed to study Central Line Associated Blood Stream Infections (CLABSI) caused by various micro-organisms in the Surgical ICU's, their susceptibility patterns to various antimicrobial agents and to identify the risk factors influencing it, which would help to institute better prophylactic measures.

AIIMS & OBJECTIVES

Aim:

To Study the Central Line Associated Bloodstream Infections (CLABSI) among patients admitted in Surgical Intensive Care Units (ICUs) of our Hospital.

Objectives:

The present Study was undertaken –

- To estimate the Rate of Central Line Associated Blood Stream Infections (CLABSI) among patients admitted in Surgical ICUs.
- To identify the Etiological agents of Central Line Associated Blood Stream Infections (CLABSI).
- To determine Antibiotic Susceptibility pattern of organisms isolated.

MATERIALS AND METHODS

MATERIALS:-

The present study was conducted in Gandhi Hospital, Hyderabad, Telangana from July 2017 to June 2018. Informed consent was taken from each patient after briefing them about the study.

Source Of Data:

Patients admitted to the Surgical Intensive Care Units (ICU's) during 1 year study period from July-2017 to June 2018.

Inclusion Criteria:

All patients who underwent Central line insertion admitted in Surgical ICUs.

Exclusion Criteria:

- All Pediatric Patients.
- All Patients without central line insertion admitted in Surgical and other ICUs of Hospital

Type Of Study

Hospital based Descriptive study

METHODS:-

All the relevant details of the patients included in the study, i.e. name, age, sex, diagnosis, past history, family history, indication of central line insertion, type & duration of central line, whether any invasive procedures or surgical intervention done etc, were taken in a structured proforma.

Two blood samples were collected after 48 hours of central line insertion (One obtained from the central venous catheter and the second from a peripheral venipuncture). If both the samples had same organism growth on culture media, it was termed a Positive case.¹⁰

Sample Processing:

- All Cultures signalled as Positive by BACT/ALERT 3D blood

culture system were inoculated on Blood agar, MacConkey's agar and Chocolate Agar and incubated aerobically at 37°C for 24hrs.

■ Even negative signalled cultures were sub cultured on above culture media before being considered sterile and finally being discarded.

■ The specific identification of bacterial pathogen was done based on microscopic morphology, staining characteristics, cultural and biochemical properties using standard laboratory techniques.

Antibiotic Susceptibility Testing:

The antibiotic sensitivity of aerobic bacterial isolates was performed on Mueller Hinton agar (MHA) plates by standardized Kirby Bauer disc diffusion technique as per the CLSI (Clinical Laboratory Standards Institute)11 guidelines.

■ The quality control for antimicrobial susceptibility testing was done with standard strains of *Escherichia coli* (ATCC 25922), *Staphylococcus aureus* (ATCC 25923).

Detection of methicillin resistance in *Staphylococcus aureus* and *Coagulase negative Staphylococci* (CoNS) isolates by cefoxitin disc diffusion test: (M100-S22, (CLSI)11

Screening Test for Extended -Spectrum β -Lactamases (ESBLs) in Enterobacteriaceae isolates: (M100-S22, (CLSI)11 by using Cefotaxime and Ceftazidime discs was by disc diffusion as per CLSI guidelines.

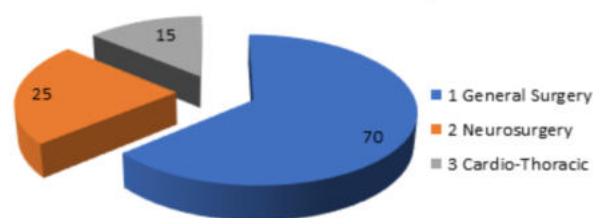
RESULTS & DISCUSSION:

A total of 110 patients with central line insertion of duration >48hrs admitted in Surgical adult intensive care units were processed.

ICU Wise Distribution Of Patients In Total

S. No	ICU	N
1	General Surgery	70
2	Neurosurgery	25
3	Cardio-Thoracic	15

ICU wise distribution of patients

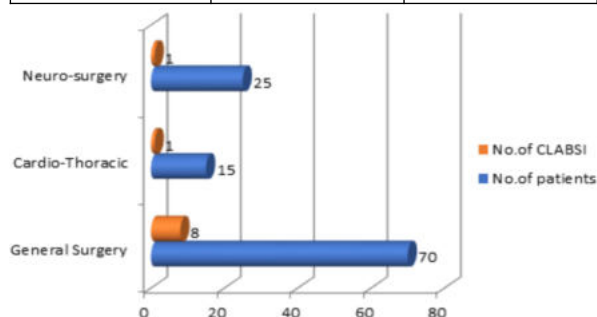


Among 110 samples collected, 77 samples were of Male (70%) patients and 33 samples were of females (30%). Male : Female ratio was 2.3 : 1. Similarly in a study conducted by Harsha V. Patil et al in Maharashtra where 59.25% were males and 40.74% were females. Similar results were also obtained from a study conducted by Parameswaran et al in Karnataka, 66.3% males and 33.7% of females were included.

Of the 110 patient samples, cultures satisfying the clabsi criteria were positive in 10 of samples.

Distribution Of Patients Having CLABSI In Intensive Care Units

ICU	No. of patients	No. of CLABSI
General Surgery	70	8
Cardio-Thoracic	15	1
Neuro-surgery	25	1
Total	110	10



The overall incidence was found to be 9.09%. Studies from various parts of India over the last decade had reported a varying incidence of CLABSI ranging from as low as 0.16% by Singh et al from Gujarat in 2010 to as high as 27.77% by Patil et al from Maharashtra in 2011. Such a wide variation is probably due to variation in risk factors, extent of antibiotic use, and variation in adherence to proper infection control practices, variation in knowledge of nursing staff regarding hospital infection control and lastly being a public sector or a private sector hospital to have proper infrastructural facilities for adequate patient care.

Pathogens Associated With CLABSI:

In the present study, Gram negative organisms accounted for 70%, *Candida albicans* for 10% and Gram positive organisms accounted for 20% of all the causative agents.

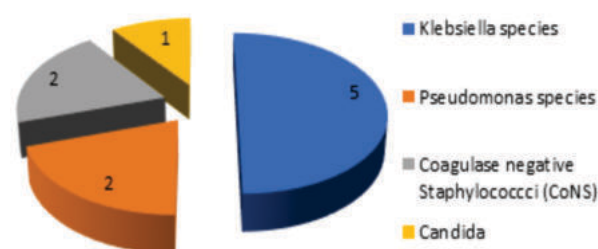
Of the Gram-Negative organisms, *Klebsiella* species (50%) was the commonest followed by *Pseudomonas* species (20%).

Of the Gram-Positive organisms, Coagulase negative staphylococcus (CoNS) were isolated.

Culture Profile Of Microorganisms Causing CLABSI

Micro Organism	No. of CLABSI (n=10)	Percentage
<i>Klebsiella</i> species	5	50%
<i>Pseudomonas</i> species	2	20%
Coagulase negative <i>Staphylococci</i> (CoNS)	2	20%
<i>Candida</i>	1	10%

No. of CLABSI (n=10)



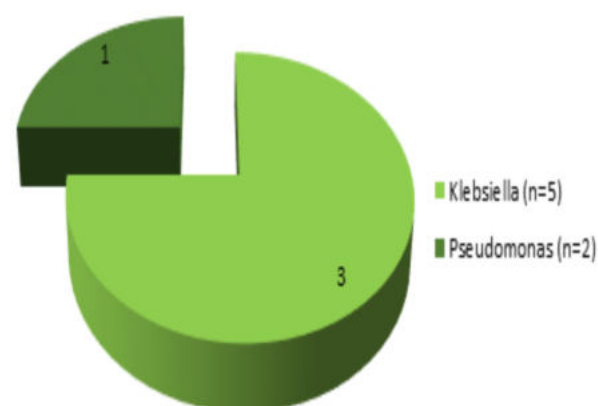
In a study conducted by Chen et al (2015) 14 from China, of the 167 catheter related infection, 46.94% had gram negative bacilli, 40.14% had gram positive cocci and 12.92% had *Candida* strains.

Datta et al., (2010)15 had reported that Non-fermentors as the most common organism found in Clabsi. *P. aeruginosa* (32%), *Acinetobacter* sp. (31%), *K. pneumoniae* (20%), *E. coli* (11%), *Enterococcus* spp (18%), *Staphylococcus aureus* (8.5%) and 4% *Candida*.

ESBL Producers Among Gram Negative Organism

Organism	No. of ESBL producers	Percentage
<i>Klebsiella</i> (n=5)	3	60
<i>Pseudomonas</i> (n=2)	1	50

No. of ESBL producers



CLABSI Rate Per 1000 Catheter Days:

Department	Total No. of patients	No. of CLABSI	Catheter days	Rate of CLABSI per 1000 days
General Surgery	70	8	320	25
Cardio-Thoracic	15	1	90	11.1
Neurosurgery	25	1	80	12.5
	110	10	490	20.4

The CLABSI rate in our study was 20.4/1000 catheter days which was closely correlating with Mousa Al hassan et al 16 (17.7/1000 catheter days) from Jordon.

The ClabSI rate is higher, when compared to the study conducted by national nosocomial infection surveillance system in seven Indian hospitals with reported incidence of 0.0 to 11.86 per 1000 catheter days.17 But a much higher incidence rates (47.31/1000 catheter days) have been reported by Patil et al 12 from Maharashtra in 2011 confirming the scenario of high infection rates in various Indian hospitals and poor infection control practices.

Most of the organisms associated with CLABSI (n=10) were found to be within age -group of 40-49 yrs. (3/10,30%) but there was no statistically relevance.

The most common site for CVC insertion was Internal Jugular vein (70%).

The overall mortality in this study was 31.8%(35/110). CLABSI associated mortality was 30%(3/10). Sepsis was seen in 66.7% of mortality CLABSI cases.

CONCLUSION:-

CLABSIs are a therapeutic challenge. A Team Approach involving Continuous active interactions and whole-hearted support by administration, clinicians, health-care workers and junior doctors is essential for effective implementation of CLABSI BUNDLE. • CLABSI Bundle Implementation is a Uphill task & Victory can be achieved by working patiently, persistently and never giving

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