



## CLABSI IN MEDICAL INTENSIVE CARE UNITS IN A TERTIARY CARE CENTRE.

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**ABSTRACT** **Introduction:** Central venous catheters (CVCs) are essential components in the care of many patients, including those who are chronically or critically ill and those requiring Hemodialysis. Central Line Associated Bloodstream Infection (CLABSI) is recognized as the most serious complication in the use of the CVC today. **Methods:** All Adult patients admitted in MEDICINE UNITS 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 180 patients with 1909 Central line days, 31 patients developed CLABSI with a CLABSI rate of 16.2 per 1000 catheter days. The overall incidence of CLABSI was 17.22%. Klebsiella species was the most common pathogen isolated. **Conclusion:** Research infrastructure should be focused on evaluating costs of HAIs, risk factors for developing HAI, hand hygiene, gather surveillance data on HAI, study on antibiotic consumption and resistance patterns and monitor impact of infection control programs.

## KEYWORDS :

## INTRODUCTION

Health care associated infections (HAIs) are the most common complication among hospitalized patients<sup>1</sup>. More than 75% of all HAIs are due to four types of infections: urinary tract infections, surgical site infections, bloodstream infections and pneumonia<sup>2</sup>.

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)<sup>3</sup>

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<sup>4,5</sup>.

A study conducted in Indian tertiary care teaching hospital during last decade identified the CLABSI incidence in India varies from 0.2% to 27%.<sup>6</sup> Based on the number of catheter days, for 1000 catheter days the rate of incidence varies from 0.5 - 47 in Hemodialysis catheters<sup>7</sup>. In developing countries, CLABSI mortality rates may be as high as 50%.<sup>8</sup>

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.<sup>9</sup>

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 Medical 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.

## AIMS &amp; OBJECTIVES

## Aim:

To Study the Central Line Associated Bloodstream Infections (CLABSI) among patients admitted in Medical 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 Medical 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

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 Medical 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 Medical ICUs.

## Exclusion Criteria:

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

## Type Of Study

Hospital based Descriptive study

## METHODS:-

All the relevant details of the patients included in the study 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.<sup>10</sup>

## Sample Processing:

- All Cultures signaled 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 signaled 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<sup>11</sup> (Clinical Laboratory Standards Institute) guidelines.

## RESULTS &amp; DISCUSSION:

A total of 180 patients with central line insertion of duration >48 hours admitted in Medical adult intensive care units were processed.

Among 180 samples collected, 124 samples were of Male (68.9%) patients and samples were of females (31.1%). Male : Female ratio was 2.2 : 1. Similarly in a study conducted by Harsha V. Patil et al in Maharashtra where 59.25% were males and 40.74% were females<sup>12</sup>. 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<sup>13</sup>.

Of the 180 patient samples, cultures satisfying the clabsi criteria were positive in 31 of samples.

#### Distribution Of Patients Having CLABSI In Intensive Care Units

ICU	No. of patients	No. of CLABSI
Nephrology	110	22
Liver	25	2
General Medicine	15	2
Respiratory Medicine	30	5
Total	180	31

The overall incidence was found to be 17.22%. 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<sup>12</sup> 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 77.4%, *Candida albicans* for 6.4% and Gram positive organisms accounted for 16.1% of all the causative agents.

Of the Gram-Negative organisms, *Klebsiella* species (22.5%) was the commonest followed by *Pseudomonas* species (12.9%).

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

#### Culture Profile Of Microorganisms Causing CLABSI

Micro Organism	No. of CLABSI (n=31)	Percentage
<i>Klebsiella</i> species	7	22.5%
<i>Pseudomonas</i> species	4	12.9%
Coagulase Negative <i>Staphylococcus</i> (CONS)	3	9.6%
<i>Candida</i>	2	6.4%
<i>Escherichia coli</i>	3	9.6%
<i>Acinetobacter</i> species	3	9.6%
<i>Stenotrophomonas maltophilia</i>	2	6.4%
<i>Staphylococcus aureus</i>	2	6.4%
<i>Enterobacter cloacae</i>	1	3.2%
<i>Proteus mirabilis</i>	1	3.2%
<i>Pantoea</i> species	1	3.2%
<i>Burkholderia cepacia</i>	1	3.2%
<i>Sphingomonas</i> species	1	3.2%
Total	31	

In a study conducted by Chen et al (2013)<sup>14</sup> 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.,<sup>15</sup> (2010) 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*.

#### CLABSI Rate Per 1000 Catheter Days:

Department	Total No. of Patients	No. of CLABSI	Catheter Days	Rate of CLABSI per 1000 days
Nephrology	110	22	1504	14.6
Liver	25	2	75	26.6

General Medicine	15	2	120	16.6
Respiratory Medicine	30	5	210	23.8
Total	180	31	1909	16.23

The CLABSI rate in our study was 16.23/1000 catheter days which was closely correlating with Mousa Al Hassan et al<sup>16</sup> (17.7/1000 catheter days) from Jordan.

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.<sup>17</sup> But a much higher incidence rates (47.31/1000 catheter days) have been reported by Patil et al<sup>12</sup> 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=31) were found to be within age -group of 40-49 yrs. (9/31, 29.03%) 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:-

CLABSI are a therapeutic challenge. To keep these devices from doing more harm than good, clinicians must assess the need for them and remove them as soon as clinically advised to halt the possibility of Central line associated infection.

#### REFERENCES:

- Burke JP et al. Infection control: A problem for patient safety. *N Engl J Med*. 2003; 348(7):651-656.
- US Department of Health and Human Services. HHS Action Plan to Prevent Healthcare-Associated Infections: Introduction. Jun 2009. Accessed Mar 16, 2012. <http://www.hhs.gov/ash/initiatives/haai/introduction.html>.
- CDC 2018 4 BSI EVENT [www.cdc.gov/nhsn/PDFs/pscManual/4PSC\\_CLABS\\_current.pdf](http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABS_current.pdf).
- Kohn LT, Corrigan JM, Donaldson MS, editors; Institute of Medicine, Committee on Quality of Health Care in America. *To Err Is Human: Building a Safer Health System*. Washington, DC: National Academy Press; 2000. Accessed Mar 16, 2012. [http://www.nap.edu/catalog.php?record\\_id=9728](http://www.nap.edu/catalog.php?record_id=9728).
- Institute of Medicine, Committee on Quality of Health Care in America. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington DC: National Academy Press; 2001. Accessed Mar 16, 2012. [http://www.nap.edu/catalog.php?record\\_id=10027](http://www.nap.edu/catalog.php?record_id=10027).
- Avinash Rode, Prasad Y, Bansod, Ajit Gujela, Alok Singh et al. Study of central line-associated bloodstream infections in intensive care unit: a prospective observational study. *Indian J Chest Dis Allied Sci*. 2014 Apr-Jun; 56(2):85-91
- Pavel Napalkov, Diana M Felici, Laura K Chu, Joan R Jacobs, and Susan M Begelman et al. Incidence of catheter-related complications in patients with central venous or hemodialysis catheters: a health care claims database analysis *BMC Cardiovasc Disord*. 2013; 13: 86
- Gupta A, Kapil A, Lodha R, Kabra SK, Sood S, Dhawan B, Das BK, Sreenivas V. Burden of healthcare-associated infections in a pediatric intensive care unit of a developing country: A single centre experience using active surveillance. *J Hosp Infect*. 2011.
- Allegretti B, Bagheri Nejad S, Combescore C, Graafmans W, Attar H, Donaldson L, Pittet D. Burden of endemic health-care associated infection in developing countries: Systematic review and meta-analysis. *Lancet*. 2011 Jan 15; 377(9761):228-241. Epub 2010 Dec 9.
- Rode A, Y, Bansod P, Gujela A, Singh A. Study of central line-associated bloodstream infections in intensive care unit: a prospective observational study. *Int J Med Res Rev [Internet]*. 2017 Apr; 30 [cited 2022 Oct 3]; 5(4):429-37.
- CLSI - Clinical and Laboratory Standards Institute 2012. Performance standards for antimicrobial susceptibility testing. Twenty-second informational supplement. Wayne, PA, USA: CLSI: 2012; M100-S22.
- Patil HV, Patil VC, Ramteerthkar MN, Kulkarni RD. Central venous catheter-related bloodstream infections in the intensive care unit. *Indian J Crit Care Med*. 2011 Oct; 15(4):213-23. doi: 10.4103/0972-5229.92074.
- Parameswaran R, Sherchan J B., Varma M, Mukhopadhyay C, Vidyasagar S. Intravascular catheter-related infections in an Indian tertiary care hospital. *J Infect Dev Ctries* 2011; 5(6):452-458.
- Hsing-Chen Tsai, Li-Min Huang, Luan-Yin Chang, Ping-Ing Lee, Jong-Ming Chen, Pei-Lan Shao, Po-Ren Hsueh, Wang-Huei Sheng, Yu-Ching Chang, Chun-Yi Lu, Central venous catheter-associated bloodstream infections in pediatric hematology-oncology patients and effectiveness of antimicrobial lock therapy. *Journal of Microbiology, Immunology and Infection*, Volume 48, Issue 6, 2015.
- Datta P, Rani H, Chauhan R, Gombal S, Chander J. Health-care-associated infections: Risk factors and epidemiology from an intensive care unit. *J. Curr. Microbiol. App. Sci* (2018) 7(5): 697-707 706 unit in Northern India. *Indian J Anaesth*. 2014 Jan-Feb; 58(1): 30-35.
- Al-Mousa HH, Omar AA, Rosenthal VD, Salama MF, Aly NY, El-Dossoky Noweir M, Rebello FM, Narciso DM, Sayed AF, Kurian A, George SM, Mohamed AM, Ramaparth RJ, Varghese ST. Device-associated infection rates, bacterial resistance, length of stay, and mortality in Kuwait: International Nosocomial Infection Consortium findings. *Am J Infect Control*. 2016 Apr 1; 44(4):444-9. doi: 10.1016/j.ajic.2015.10.031. Epub 2016 Jan 5. PMID: 26775929.
- Mehta A, Rosenthal VD, Mehta Y, et al. Device associated nosocomial infection rates in intensive care units of seven Indian cities. Findings of the International Nosocomial Infection Control Consortium (INICC). *J Hosp Infect* 2007; 67(2): 168-174.