DESCRIPTIVE STUDY TO THE ASSESS LEVEL OF SKILL REGARDING PREVENTION OF CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTION AMONG STAFF NURSES IN SELECTED HOSPITAL KASHMIR.

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*Abstract:-*The aim of this study was to assess the level of skill regarding prevention of central line associated blood stream infection among staff nurses in selected hospital Kashmir. Central venous catheters are among the most frequently used medical devices in critically ill patients. Unfortunately, complications are not uncommon despite the many improvements in caregiver behavior observed over recent decades. Central line-associated bloodstream infection is probably the most feared complication. It is defined as a primary laboratory-confirmed bloodstream infection in a patient with a central line at the time of, or within 24-h prior to, the onset of symptoms, in cases where the cultured organism is not related to an infection from another site. The central line should be in place for > 2 calendar days on the date of the event, with the day of device placement being day 1. Tens of thousands of patients continue to experience CLABSIs each year in the US, resulting in thousands of deaths each year and billions of dollars in added costs to the US healthcare system. Healthcare providers must follow a strict protocol when inserting the line to make sure the line remains sterile and a CLABSI does not occur. In addition to inserting the central line properly, health care providers must use stringent infection control practices and each time they should check the line or change the dressing. So medical personals can play vital role in safe guarding the patients from developing the infection while doing any procedure or treatment. There are different types of hospital acquired infections but central line associated blood stream infection is most common. Globally 250000 blood stream infections occur annually and most are related to the presence of intravascular devices. In united sates the central line associated blood stream infection rate in intensive care unit is estimated 0.8 per 1000 central line days. On this basis a pre-experimental study was conducted to assess the level of skill regarding prevention of central line associated blood stream infection among staff nurses in selected hospital Kashmir. Thirty study subjects were selected by non-probability purposive sampling technique. Self-structured questionnaire was used to assess the level of skill. Data was analyzed by using descriptive and inferential statistics. The findings revealed that mean pretest 12.56 among staff nurses was poor with SD 2.41 and t-test 3.98.The study recommended that planned teaching program, awareness programmes, demonstrations and trainings should be imparted to increase the level of skill among health professionals.

Keywords: Assess, level, skill, Blood Stream Infections, Prevention, and Staff Nurses.

1. INTRODUCTION

The use of vascular catheters is common in both inpatient and outpatient care. In the United States, it is estimated that almost 300 million catheters are used each year, nearly 3 million of which are Central Venous Catheters (CVCs), also known as central lines. However, their use is associated with a risk of bloodstream infection caused by microorganisms that colonize the external surface of the device or the fluid pathway when the device is inserted, as well as an infection that occurs over the course of use. CVCs are the most frequent cause of Healthcare-Associated bloodstream Infections (HAIs).The Central Line-Associated Bloodstream Infection (CLA-BSI) is a primary bloodstream infection (*i.e.,* there is no apparent infection at another site) that develops in a patient with a central line in place within the 48-hour period before the onset of the bloodstream infection that is not related to infection at another site.[1-4]

Central line associated bloodstream infections (CLABSIs) are defined as bacteremia, fungemia in a patient with an intravascular catheter with at least one positive blood culture obtained from a peripheral vein, clinical manifestations of infection (i.e., fever, chills, and/or hypotension), and no apparent source for the bloodstream infection except the catheter. Bloodstream infections are considered to be associated with a central line if the line was in use during the 48-hour period before the development of the bloodstream infection. If the time interval between the onset of infection and device use is greater than 48 hours, there should be compelling evidence that the infection is related to the central line.[5]

CLABSI is caused by various ways such as contamination of intravenous (IV) fluids by tubing , Insertion of drug additives to IV fluid, Addition of connecting tube or stopcocks to IV system, Improper care of needle insertion site, Contaminated needles or catheters, Failure of change IV access site when inflammation first appears, Improper technique during administration of multiple blood products, Improper care of peritoneal or hemodialysis shunts , Improper accessing an IV port .[6]

During central venous pressure the nurse monitors the patient for complications, which include local obstruction with distal ischemia, external hemorrhage, massive ecchymosis, dissection, air embolism, blood loss, pain, arterial spasm, and infection.[7]

Sarah L. Krein, Timothy P. Hofer, Christine P. Kowalski, Russell N. Olmsted, et.al (2007) conducted a study on Use of Central Venous Catheter-Related Bloodstream Infection Prevention Practices by US Hospitals. The overall survey response rate was 72% (n=516). A higher percentage of VA compared to non-VA hospitals reported using maximal sterile barrier precautions (84% vs 71%; P=.01), chlorhexidine gluconate for insertion site antisepsis (91% vs 69%; $P<.001$); and a composite approach (62% vs 44%; P=.003) combining concurrent use of maximal sterile barrier precautions, chlorhexidine gluconate, and avoidance of routine central line changes. Most US hospitals are using maximal sterile barrier precautions and chlorhexidine gluconate, 2 of the most strongly recommended practices to prevent CRBSIs. However, fewer than half of non-VA US hospitals reported concurrent use of maximal sterile barrier precautions, chlorhexidine gluconate, and avoidance of routine central line changes. Wider use of CR-BSI prevention practices by hospitals could be encouraged by fostering a culture of safety, participating in infection prevention collaboratives, and promoting infection control professional certification.[8]

Render ML, Brungs S, Kotagal U, Nicholson M, et.al (2006) conducted a study on Evidence-based practice to reduce central line infections. In 2003, through the Greater Cincinnati Health Council nine health care systems agreed to participate and fund 50% of a two-year project to reduce hospital-acquired infections among patients in intensive care units (ICU) and following surgery (SIP). At the project midpoint (3 quarters of 2004), adherence to evidence-based practices increased from 30% to nearly 95%.The direct role of hospital leadership and development of a local community of practice, facilitated cooperation of physicians, problem solving, and success. Use of forcing functions (removal of betadine in kits, creation of an accessory pack and a checklist for line insertion) improved reliability. The appropriate floor for central line infections in ICUs is < 1 infection /1,000 line days.[9]

Craig M. Coopersmith, Jeanne E. Zack, Myrna R. Ward, Carrie S. Sona et.al (2004) conducted a study on the Impact of Bedside Behavior on Catheter-Related Bacteremia in the Intensive Care Unit. Appropriate practice was observed before and after the behavioral intervention in catheter site placement, dressing type, absence of antibiotic ointment, and proper securing of central venous catheters. Thirty-two CRBSIs occurred in 9353 catheter-days 24 months before the behavioral intervention compared with 17 CRBSIs in 6152 catheter-days during the 15 months after the intervention (3.4/1000 to 2.8/1000 catheter-days, P = .40). Although a previous educational program decreased the CRBSI rate, this was associated with only modest compliance with best practice principles when bedside audits were performed 18 months later. A behavioral intervention improved all identified deficiencies, leading to a non-significant decrease in CRBSIs.[10]

P. Nair, E. Pabs-Garnon, C.F. Whitehead (2010) UK survey of central line related sepsis in a neurointensive care unit .The incidence of central line associated blood stream infections (CR-BSI) was audited in 2008.Data was collected daily for a period of four months. This included the number of patients with central venous catheters in the unit, The percentage of lines removed for clinically suspected CR-BSI reduced in this period from 30% to 15.04%. The average duration of stay for the lines were SC 4.4 days, IJ 5.8 days and F 4 days which was shorter than our previous audit showed. The percentage of microbiologically proven CR-BSI also dropped from 12.5% to 2.5% (4 from internal jugular lines and one from a femoral line)The survey proves that with strict adherence to guidelines and following infection control protocols diligently the risk of CR-BSI from all line types can be reduced.[11]

Criona M. Walshe, Kevin S. Boner, Jane Bourke, Rosemary Hone, et.al (2010) conducted a study on Catheter-related blood stream infection (CRBSI) in TPN patients. A multidisciplinary TPN committee was created to examine CRBSI episodes and a parallel education programme was set up and maintained. Prospectively collected data were analyzed from 1,392 patients in whom 2,565 CVCs were used over 15,397 CVC days. CRBSI incidence was expressed as CRBSI episodes per 1,000 CVC days, percentage patients or percentage CVCs infected. CRBSI incidence fell from 33 to 7 episodes per 1,000 CVC days (p<0.01). Percentage of infected CVCs fell from 17 per cent to 5 per cent(p <0.05) and proportion of patients affected fell from 27 per cent to 7 per cent(p <0.01). The corresponding slopes of the lines expressing fall in CRBSI rate were -1.3-0.63 and -1.4 respectively.[12]

Victor D. Rosenthal (2009) conducted a study on Central Line-Associated Bloodstream Infections in Limited-Resource Countries, 99 studies were initially identified as being potentially eligible for inclusion, but no systematic review was found at the Cochrane Library. After the full text of these 99 studies were reviewed, 49 were excluded for the following reasons, 38 because they showed only overall health care associated infection rates, 10 because they showed only ventilator-associated pneumonia rates, and 1 because it showed only catheter-associated urinary tract infection rates. After the remaining 50 studies showing only CLABSI rates were reviewed. In other words, to make it feasible for hospitals in limited-resource countries to achieve the levels of quality and patient safety found in developed countries, public nationwide and global health care policies are needed to provide health care facilities with the necessary resources and support.[13]

Ranju A. Soni, Gwen Rogers, August Valenti, and Thomas E. Van der Kloot, (2008) conducted a study on Cathter related blood stream infection rates in a mixed medical-surgical icu population before and after the implementation of a central line bundle (clb). After the implementation of CLB, from January 2007 through August 2007,the CRBSI rate was 4.44 infections/1000 device days After the implementation of CLB, from January 2007 through August 2007,the CRBSI rate was 4.44 infections/1000 device days (26 total cases

and 5853 total device days). A statistically significant difference was noted between the CRBSI rate in the two time periods (P = 0.0038). No statistically significant difference was found in the Apache II score between the two groups, withmean values of 15.68 in 2006 and 13.13 in 2007 (P = 0.067).[14]

Chee L, Brown M, Sasadeusz J, MacGregor L.et.al (2008) Gram-negative organisms predominate in Hickman line-related infections in non-neutropenic patients with hematological malignancies. A detailed retrospective review was done from January 2003 to December 2005 on all patients with hematological malignancies who had double lumen non-antibiotic impregnated tunneled CVCs (Hickman catheters) inserted in our hospital to identify those fulfilling our criteria for CRBSI episodes. The majority (73%) of initial CRBSI episodes required catheter removal within 7 days of onset. Vancomycin and cefepime was the most common initial antibiotic regimen used. This study highlights the predominance of gram-negative infections in our cohort of non-neutropenic patients with underlying hematological malignancies who had Hickman catheters whose lines were not salvageable in the majority of cases. Empiric monotherapy with an antimicrobial agent with broad spectrum gram-negative cover needs to be given upfront pending results of the nature and sensitivity of organisms identified.[15]

Leonardo Lorente, Ruth Santacreu, María M Martín,Alejandro Jiménezet.al (2006) conducted a study on arterial catheter-related infection of 2,949 catheters. A total of 2,018 patients was admitted to the intensive care unit during the study period. The number of arterial catheters, the number of days of arterial catheterization, the number of CRLIs and the number of CRBSIs were as follows: total, 2,949, 17,057, 20 and 10; radial, 2,088, 12,007, 9 and 3; brachial, 112, 649, 0 and 0; dorsalispedis, 131, 754, 0 and 0; and femoral, 618, 3,647, 11 and 7. The CRLI incidence was significantly higher for femoral access (3.02/1,000 catheter-days) than for radial access (0.75/1,000 catheterdays) (odds ratio, 1.5; 95% confidence interval, 1.10–2.13; P = 0.01). The CRBSI incidence was significantly higher for femoral access (1.92/1,000 catheter-days) than forradial access (0.25/1,000 catheter-days) (odds ratio, 1.9; 95% confidence interval, 1.15– 3.41; P = 0.009). Our results suggest that a femoral site increases the risk of arterial catheter-related infection.[16-17]

Issam Raad, Hend A. Hanna, BadieAlakech, IoannisChatzinikolaou, et.al(2004)conducted a study ondifferential time to positivity. A Useful Method for Diagnosing Catheter-Related Bloodstream Infections. 191 bloodstream infections with positive simultaneous central venous catheter and peripheral vein blood cultures were included. One hundred eight patients had catheter-related bacteremias, and 83 had non– catheter-related bacteremias. Catheter-related bacteremias were more frequently caused by staphylococci and less likely to be associated with underlying hematologic malignant conditions, neutropenia, and longer duration of hospitalization. As a diagnostic tool for catheter-related bacteremia differential time to positivity of 120 minutes or more was associated with 81% sensitivity and 92% specificity for short-term catheters and 93% sensitivity and 75% specificity for long-term catheters.Differential time to positivity of 120 minutes or more is highly sensitive and specific for catheter-related bacteremia in patients who have short- and longterm catheters[18].

A Srinivasan, MD, M Wise, PhD, M Bell, MD, D Cardo, MD, el.al (2011) conducted a study on Central Line Associated Blood Stream Infections United States, In 2001, an estimated 43,000 CLABSIs occurred among patients hospitalized in ICUs in the United States. In 2009, the estimated number of ICU CLABSIs had decreased to 18,000. Reductions in CLABSIs caused by *Staphylococcus aureus* were more marked than reductions in infections caused by gram-negative rods, *Candida* spp., and *Enterococcus* spp. In 2009, an estimated 23,000 CLABSIs occurred among patients in inpatient wards and, in 2008, an estimated 37,000 CLABSIs occurred among patients receiving outpatient hemodialysis. In 2009 alone, an estimated 25,000 fewer CLABSIs occurred in U.S. ICUs than in 2001, a 58% reduction. This represents up to 6,000 lives saved and $414 million in potential excess health-care costs in 2009 and approximately $1.8 billion in cumulative excess health-care costs since 2001. A substantial number of CLABSIs continue to occur, especially in outpatient hemodialysis centers and inpatient wards.[19]

Koll BS, Straub TA, Jalon HS, Block R,et.al (2008) conducted a study on CLABs collaborative, a regionwide effort to improve the quality of care in hospitals.There was a statistically significant decrease of 54% (p < .001) between the mean CLABs rate during the intervention period (2.24 infections per 1,000 central line days) compared with the mean baseline rate (4.85 infections per 1,000 central line days). By March 2008, the rate had dropped by 70% (1.44 infections per 1,000 central line days) compared with baseline. At the hospital level, decreases in CLABs rates up to 88% were observed between the baseline period and the intervention period, with 56% of hospitals achieving at least a 50% decrease in their CLABs rate. Each participating hospital sustained implementation of the central line bundle throughout the 33-month intervention, which, along with standardized line maintenance procedures, resulted in reduction in, and sometimes elimination of, CLABs.[20]

Eggimann P, Pittet D (2002) conducted a study on overview of catheter-related infections with special emphasis on prevention based on educational programs Intravascular access is an unavoidable tool in sophisticated modern medical practice, and catheter-related infection remains a leading cause of nosocomial infections.We briefly review the pathophysiology of these infections, highlighting the importance of the skin insertion site and the intravenous line hub as principal sources of colonization and infection. A large proportion of these infections are preventable and this has been the objective of creating precise guidelines. It was recently suggested that the situation may evolve with the introduction of antibiotic antiseptic-coated devices, whose impact on the epidemiology of antibiotic resistance remains to be determined. Recently, educational programs and or a global preventive strategy based on the strict application of specific preventive measures and careful control of all factors associated with infection proved to be even more effective than coated devices in reducing rates of infection. Practical aspects regarding educational approaches will help clinicians to adapt and incorporate educational programs into clinical practice.[21]

2. OBJECTIVES OF THE STUDY

1. To assess level of skill among staff nurses regarding prevention of central Line associated blood stream infection.
2. To find out the association between the pretest level of skill score with selected demographic variables.

3. METHODOLOGY

The pre-experimental research study was conducted to assess the skill among staff nurses regarding prevention of central line associated blood stream infection in selected Hospital Kashmir. Thirty Subjects were selected for the study by non-probability purposive sampling technique. Self-structured questionnaire was used to assess the skill among staff nurses. The data was analyzed by using descriptive and inferential statistics.

4. RESULT

Table 1: Frequency and percentage distribution of study subjects according to age.

Age	Study Subjects	
	Frequency	Percentage (%)
15-30	12	40
31-45	14	46.7
46-60	4	13.3

The data presented in table 1 showed that majority of study subjects 14(46.7%) were belonged to age group of 31-45 years,12(40%) were belonged to age group of 15-30 years, 4(13.3%) were belonged to age group of 46-60 years.

Table 2: Frequency and percentage distribution of study subjects according to gender.

Gender	Study Subjects	
	Frequency	Percentage (%)
Male	12	40
Female	18	60

The data presented in table 2 also revealed that majority of study subjects 18(60%) were females and 12(40%) were males.

Table 3: Frequency and percentage distribution of study subjects according to educational qualification.

Educational Qualification	Study Subjects	
	Frequency	Percentage (%)
B. Sc Nursing	15	50
Diploma in Nursing	15	50

The data presented in table 3 also portrayed that equal numbers of study subjects 15(50%) were having B.Sc Nursing and 15(50%) were having Diploma in Nursing.

Table 4: Frequency and percentage distribution of study subjects according to Experience in years.

Age	Study Subjects	
	Frequency	Percentage (%)
0 - 5 years	6	20
6 - 10 years	16	53.3
Above 10 years	8	26.7

The data presented in table 4 also showed that majority of study subjects 16(53.3%) had 6-10 years of experience, 8(26.7%) had above 10 years of experience, 6(20%) had 0-5 years of experience.

Table 5: Frequency and percentage distribution of study subjects according department of working.

Department of working	Study Subjects	
	Frequency	Percentage (%)
ICU	17	56.7
Emergency	13	43.3

The data presented in table 5 also showed that majority of study subjects 17(56.7%) had worked in ICU and 13(14.3) had worked in emergency.

Table 6: Frequency and percentage of study subjects according to Training programme on CLABSI.

Training programme on CLABSI	Study Subjects	
	Frequency	Percentage (%)
Undergone	5	16.7
Not undergone	25	83.3

The data presented in table 6 also revealed that majority of study subjects 25(83.3%) had not undergone training of CLABSI while as 5(16.7%) had undergone CLABSI training.

Table 7: Frequency and percentage distribution of pretest level of skill.

n=30

Pre-test level of skill	Level of skill					
	Inadequate (50% and less)		Average (51-74%)		Adequate (75% and above)	
	Frequency	%	Frequency	%	Frequency	%
	9	30	14	46.7	7	23.3

The data presented in table 7 revealed that in pretest majority of study subjects 14(46.7%) had average level of skill, 7(23.3%) had adequate level of skill and 9(30%) had inadequate level of skill.

Table 8:   Assessment of Mean, SD and t-test of pretest level of skill on assessment.

n=30

Domain	Mean	SD	t- test
Pre-test level of skill	12.56	2.41	3.98

The data presented in table 8 revealed that in pretest mean score was 12.56 SD 2.41 with t-test 3.98.

Table 9: Association of pre-test level of skill among staff nurses with selected demographic variables.

Demographic Variables	Pretest Level of skill						Chi square	Df	Remark
	Inadequate		Average		Adequate				
	Frequency	%	Frequency	%	Frequency	%			
Age in years 15-30 31-45 46-60	3 1 0	10 3.3 0	5 3 0	16.6 10 0	4 10 4	13.3 33.3 13.3	7.12	4	Not Significant
Gender Male Female	3 1	10 3.3	0 8	0 26.6	9 9	30 30	8.12	2	Not Significant
Educational Status B.Sc Nursing Diploma in Nursing	3 1	10 3.3	6 2	20 6.6	6 12	20 40	5.0	2	Not Significant
Experience in years 0 - 5 years 6 - 10 years Above 10 years	3 1 0	10 3.3 0	1 7 0	3.3 23.3 0	2 8 8	6.6 26.6 26.6	14.93	4	Significant
Department of working ICU Emergency	4 0	13.3 0	3 5	10 16.6	10 8	33.3 26.6	4.26	2	Not Significant
Training programme on CLABSI Undergone Not Undergone	0 4	0 13.3	1 7	3.3 23.3	4 14	13.3 46.6	1.3	2	Not Significant

The data presented in table 9 revealed that significant association was found between pre-test with one demographic variable (experience in years) and no association was found between pre-test level of skill score at 0.05 level of significance with these demographic variables (Age in years, Gender, Educational Qualification, Department of working and Training on CLABSI). Hence partially research hypothesis was rejected and partially null hypothesis was accepted.

5. RECOMMENDATIONS

- A similar study need to be undertaken with a large number of samples for better generalization.

- A similar study can be conducted by seeking other variables.

- A true Experimental research approach can be used.

- The study can be conducted among nursing student's to assess their skill regarding central line associated blood stream infections.

- Setting can be changed by involving more hospitals and nursing homes.

- A comparative study can be conducted to assess the skill and attitude regarding central line associated blood stream infections among nurses in hospitals.

- A comparative study can be conducted between nurses and student's related importance of central line associated blood stream infections.

6. CONCLUSIONS

The following conclusions were drawn on the basis of the findings of the study.

- Pretest findings showed the skill among staff nurses working in selected hospitals were found poor regarding central line associated blood stream infections in descriptive study.
- The planned teaching programme can be used to show effectiveness in improving the skill regarding central line associated blood stream infection as it was evident from pretest level of skill score.
- The findings also revealed that data in pretest majority of study subjects 14(46.7%) had average level of skill, 7(23.3%) had adequate level of skill and 9(30%) had inadequate level of skill.
- There was statistically significant association between pre-test level of skill score with this demographic variables (experience in years) at (p >0.05) and no association was found between pre-test level of skill score at 0.05 level of significance with these demographic variables (Age in years, Gender, Educational Qualification, Department of working and Training on CLABSI). Hence partially research hypothesis was rejected and partially null hypothesis was accepted for these variables at 0.05 level of significance.
- This indicated that planned teaching programme, demonstrations, training programmes and awareness programmes can remain effective if provided regular basis to medical, nursing, paramedical professionals and staff nurses in order to increase the level of skill regarding central line associated blood stream infections because they are dealt with patients in private and government hospitals and there by reduce the rate of recurrent infections among patients.

7. AKNOWLEDGEMENT

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