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Effectiveness care bundle on prevention of catheter associated blood stream infection (CLABSI)

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Abstract

This study is to highlight practical recommendations in a concise format designed to assist acute-care hospitals in implementing and prioritizing their central line-associated bloodstream infection (CLABSI) prevention efforts.

Objectives: To assess the Catheter Associated Blood Stream Infection (CLABSI) among patients with central line catheter in experimental and control group To evaluate the effectiveness of Care bundle on prevention of catheter associated blood stream infection among patients with central line catheter in experimental and control group. To associate the level of blood stream infection among patients with central line catheter and their demographic variables in experimental and control group.

Methodology: Quantitative research approach. A non probability purposive sampling technique is used.The research design adopted for this study was quasi experimental non randomized control group post test only design.. Sample of the study include patients with central line catheter admitted in ICU and those who fulfill the inclusion criteria and present during the time of the data collection at Dhanvantri Critical Care Center, Erode.

Results: Assessment of Catheter Associated Blood Stream Infection (CABSI) among patients with central line catheter in experimental group and control group. The study found that there was no significant association of CLABSI with age of patients, gender and site of insertion. This Study shows, CLISA score reduce the risk for central line associated blood stream infection.

Keywords: Care bundle, prevention of catheter associated blood stream infection, central line insertion site assessment

Introduction

Central venous catheters (CVC) are commonly used in critically ill patients and offer several advantages to peripheral intravenous access. However, indwelling CVCs have the potential to lead to blood stream infections, with the risk increasing with an array of characteristics such as catheter choice, catheter location, insertion technique and catheter maintenance. Evidence-based guidelines have led to a significant reduction in the incidence of blood stream infections associated with CVCs. The combination of guideline implementation combined with newer technologies has the potential to further reduce morbidity and mortality from infections related to CVCs.

Guidelines provide comprehensive recommendations for detecting and preventing healthcare-associated infections (HAIs). The intent of this study is to highlight practical recommendations in a concise format designed to assist acute-care hospitals in implementing and prioritizing their central line-associated bloodstream infection (CLABSI) prevention efforts. Many studies updates the *Strategies to Prevent Central Line-Associated Bloodstream Infections in Acute-Care Hospitals.* This expert guidance document is sponsored by the Society for Healthcare Epidemiology of America (SHEA). It is the product of a collaborative effort led by SHEA, the Infectious Diseases Society of America (IDSA), the Association for Professionals in Infection Control and Epidemiology (APIC), the American Hospital Association (AHA), and The Joint Commission, with major contributions from representatives of a number of organizations and societies with content expertise.

The subclavian vein is considered the preferable site for central venous catheter (CVC) insertion in the intensive care setting to reduce infectious complications. Previously, the primary recommendation was to avoid the femoral vein for access. Although this remains valid, it has been replaced by a positively formulated recommendation regarding the subclavian site. The recommendation to use ultrasound guidance for catheter insertion is backed by better evidence than was available previously; however, the procedure itself may jeopardize the strict observation of sterile technique.

The use of chlorhexidine-containing dressings is now considered an “essential practice”; in the past, it was listed under special approaches that should only be employed if CLABSI rates remain high despite the implementation of basic practices. Routine replacement of administration sets not used for blood, blood products, or lipid formulations can be performed at intervals of up to 7 days. Previously, this interval was no longer than 4 days. Antimicrobial ointment for the catheter site, which is geared toward the population of hemodialysis patients, has been moved to “additional practices” given the focus on a specific population. Despite currently being supported by high-level evidence, antiseptic-containing caps remain an “additional practice” because they are not considered superior to the manual disinfection, an essential practice. The importance of infusion teams has been highlighted by listing it under “additional practices”, and Suture less securement of catheters also added in this approach.

Need for the Study

Central line-associated bloodstream infections (CLABSIs) result in thousands of deaths each year and billions of dollars in added costs to the U.S. healthcare system, yet these infections are preventable. CDC is providing guidelines and tools to the healthcare community to help end CLABSIs. CDC, in collaboration with other organizations, has developed guidelines for the prevention of CLABSI and other types of healthcare-associated infections. Facilities can monitor the rates of CLABSI and assess the effectiveness of prevention efforts through CDC's National Healthcare Safety Network (NHSN).

Bundles incorporate evidence-based science into practices, and bundle use is recommended in central line–associated bloodstream infection (CLABSI) guidelines.1,2,3 More than a decade ago, the bundles were shown to reduce rates of central venous catheter (CVC)–related infections.4 Recent studies have demonstrated that consistent application of evidence-based practices can lead to significant, sustained reductions in CLABSI rates.5–16 The Institute for Healthcare Improvement (IHI) describes bundles as "groupings of best practices with respect to a disease process that individually improve care, but when applied together result in substantially greater improvement. The science supporting the bundle components is sufficiently established t

Statement of the Problem

" Effectiveness of Care Bundle on Prevention of Catheter Associated Blood Stream Infection (CLABSI) among Patients with Central Line Catheter in Intensive Care Unit at Dhanvantri Critical Care Center, Erode".

Objectives

1. To assess the Catheter Associated Blood Stream Infection (CLABSI) among patients with central line catheter in experimental and control group.
2. To evaluate the effectiveness of Care bundle on prevention of catheter associated blood stream infection among patients with central line catheter in experimental and control group.
3. To associate the level of blood stream infection among patients with central line catheter and their demographic variables in experimental and control group.

Hypotheses

Level of Significance p < 0.05

H_1: There is a significant difference in post test score on Catheter Associated Blood Stream Infection among patients with central line catheter in experimental & control group

H_2: There is a significant association between the post test score on Catheter Associated Blood Stream Infection among patients with central line catheter in experimental & control group with their selected demographic variables.

Review of Literature

The literature organized under the following Headings

1. Studies related to incidence and prevalence of catheter associated blood stream infection.
2. Studies related to Care Bundle on prevention of catheter associated blood stream infection.

Methodology

Research approach

Quantitative research approach was adopted for this study

Research Design

The research design adopted for this study was quasi experimental non randomized control group post test only design.

Population

The population of this study include patients who are admitted in ICU with central line catheter

Setting

Dhanvantri Critical Care Center, Erode.

Sample

Sample of the study include patients with central line catheter admitted in ICU and those who fulfill the inclusion criteria and present during the time of the data collection at Dhanvantri Critical Care Center, Erode.

Sample size

Sample size of the study include 40 patients with central line catheter. Among 40 patients, 20 patients were experimental group & 20 patients were control group.

Sampling Technique

Non probability purposive sampling technique

Criteria for Sample Selection

Inclusion criteria

The patients who were both male and female, had central line catheter on 2nd day, willing to participate in this study, staying in the ICU minimum 5 days and till the CVC is removed.

Exclusion criteria

The patients who were diagnosed to have infection, Immuno-compromised, cancer, neurological problems.

Independent variable

Care Bundle

Dependent variable

Catheter Associated blood Stream Infection.

Description of the tool

The tool was prepared by the investigator after an extensive study of the related literature and with the guidance of experts. The tool consists of four sections.

Section - A: Demographic Variables

This section consists of demographic variables like age, gender, religion, marital status, education, occupation, family monthly income. The baseline data were collected by using structured interview schedule.

Section-- – B : Clinical Variables

This section consist of clinical variables like co-morbid illness, indication of central line catheterization, use of antibiotics, site of central line insertion and types of central venous catheter.

Section – C: Central Line Insertion Site Assessment (CLISA) score

This section was used to assess the Central Line Insertion Site. The checklist consist of 4 assessment parameters related to catheter associated blood stream infection, if Normal Appearance score as 0, Minimal Erythema score as 1, Advancing Erythema score as 2, Severe Erythema score as 3.

Section – D Observational Checklist to Assess the Catheter Associated Blood Stream Infection

Observational checklists were used to assess the Catheter Associated Blood Stream Infection. The check list consist of 4 assessment parameters related to Catheter Associated Blood Stream Infection, if Yes give one mark and if No give zero mark.

Validity

Validity of the tool was established by the consultation with guides and experts. The tool was validated by Experts Critical Care Physician, Nursing Personnel and Statistician. The tool was found adequate and suggestions given by the experts were incorporated.

Reliability

Reliability of the Observational Checklist tool was established by using inter rater method and reliability was 0.86, which showed that the tool was reliable and considered for proceeding.

Pilot Study

Formal permission was obtained from the Managing Director of Hospital, Erode. The data collections were analyzed by using descriptive and inferential statistics. The pilot study reveals that the tool was feasible and practicable for conducting the research.

Data collection procedure

The data was collected from Patients who based on the inclusion criteria were selected from the hospital by non probability purposive sampling technique. Out of 40 patients on central line catheter, 20 patients were selected for control group and in 20 patients were selected for experimental group. Their demographic variables were collected by using semi- structured interview schedule. Care bundle were provided to the patients with central line catheter on 2nd day for once in a day. It was continued for 5 days to the experimental group. Control group received routine central line catheter care. Post test assessment was done on 6th day for both experimental and control group by using Central line Insertion Site Assessment score & observational check list to assess the Catheter Associated Blood Stream Infection. Dropout patients are replaced by new patients in both experimental and control group.

Plan for data analysis

Data were analyzed by using descriptive and inferential statistics. Descriptive statistics like frequency, percentage, mean, standard deviation and mean difference was used to assess the level of catheter associated blood stream infection and inferential statistics like Independent 't' test was used to evaluate the effectiveness of Care Bundle on prevention of catheter associated blood stream infection. Chi square test was done to find out the association between the level of catheter associated blood stream infection. and their selected demographic variables

Data Analysis

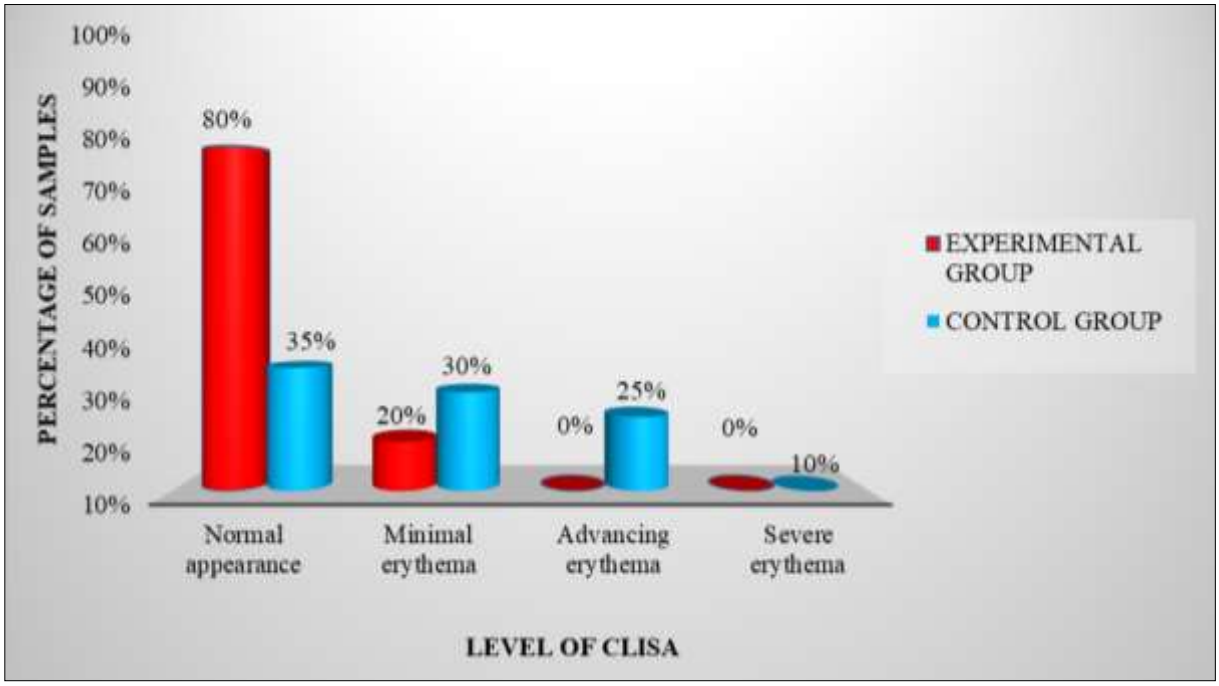

Fig 1: Comparison of post test score on CLISA among patients with central line catheter in experimental group and control group

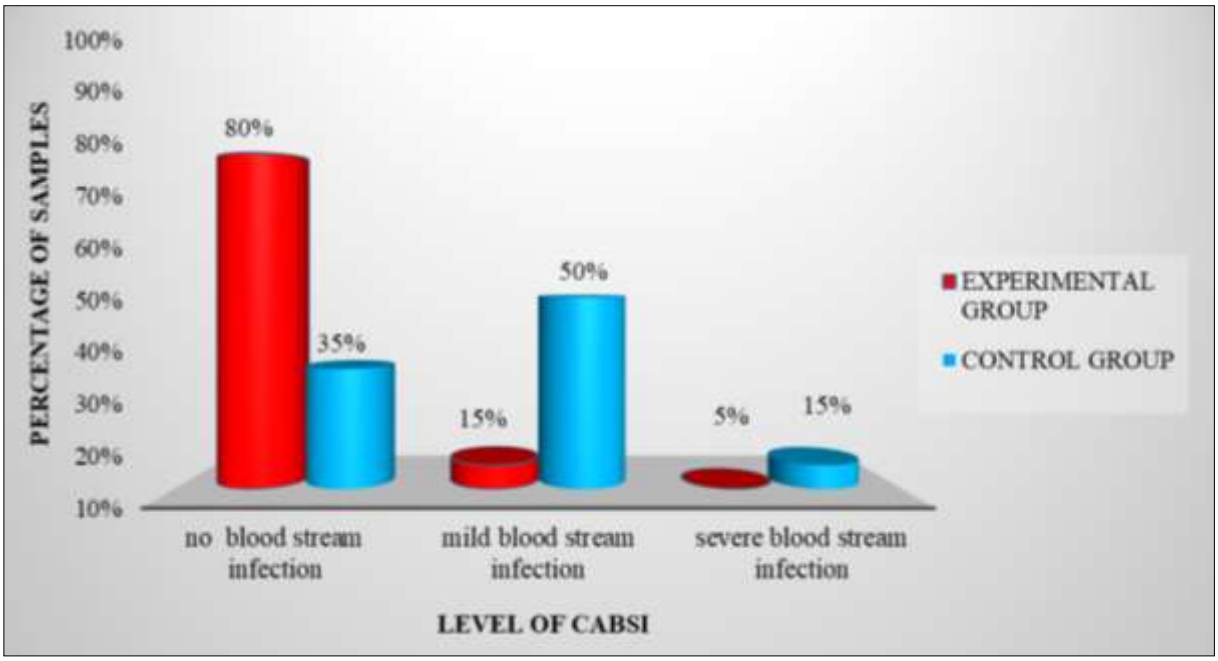

Fig 2: Comparison of post test score on CABSI among patients with central line catheter in experimental group and control group

Comparison of Mean, Standard deviation, Mean percentage and Mean difference on post test score on CLISA among patients with central line catheter in experimental group and control group

Table 1: Comparison of Mean, Standard deviation, Mean percentage and mean difference on post test score on catheter associated blood stream infection (CABSI) among patients with central line catheter in experimental group and control group.

Groups	Post test				Difference in mean %
	Max. Score	Mean	SD	Mean %	
Experimental group	3	0.4	0.88	10	24
Control group		1.35	1.23	34	

Table 2: Mean, standard deviation and 't' value on post test score on CLISA among patients with central line catheter in experimental group and control group.

Group	Mean	SD	df	Unpaired 't' value	Table value
Experimental group	0.2	0.68	38	3.37*	2.02
Control group	1.1	1.02			

Level of Significant $p \leq 0.05$

Table 3: Mean, standard deviation and 't' value on post test score on CABSI among patients with central line catheter in experimental group and control group.

Group	Mean	SD	df	unpaired 't' value	Table value
Experimental group	0.4	0.88	38	2.86*	2.02
Control group	1.35	1.23			

Level of Significant $p \leq 0.05$

Table 4: Chi square test on post score on CLISA among patients with central line catheter with their demographic variables in experimental group and control group.

Demographic Variables	Experimental group n = 20			Control group n = 20		
	Df	x^2	table value	df	x^2	table value
Age in years	9	1.25	16.92	9	8.87	16.92
Sex	3	0.5	7.82	3	7.96	7.82
Religion	9	0.102	16.92	9	4.08	16.92
Marital status	9	0.102	16.92	9	6.51	16.92
Educational status	9	4.26	16.92	9	4.96	16.92
Occupation	9	2.74	16.92	9	13.21	16.92
Family monthly income	9	1.34	16.92	9	4.25	16.92
Co- morbid illness	9	4.50	16.92	9	6.23	16.92
Indication	9	3.02	16.92	9	13.32	16.92
Site of central line insertion	9	0.312	16.92	9	3.86	16.92
Use of antibiotics	3	0	7.82	3	0	7.82
Types of CVC	3	0	7.82	3	0	7.82

Table 5: Chi square test on post score on CABSI among patients with central line catheter with their demographic variables in experimental group and control group.

Demographic Variables	Experimental group n = 20			Control group n = 20		
	Df	x^2	table value	df	x^2	table value
Age in years	6	2.29	12.59	6	2.88	12.59
Sex	2	1.58	5.99	2	1.66	5.99
Religion	6	5.93	12.59	6	2.08	12.59
Marital status	6	5.93	12.59	6	2.22	12.59
Educational status	6	3.78	12.59	6	7.182	12.59
Occupation	6	5.6	12.59	6	2.86	12.59
Family monthly income	6	10.5	12.59	6	1.27	12.59
Co- morbid illness	6	4.91	12.59	6	7.61	12.59
Indication of central line catheterization	6	0.8	12.59	6	4.25	12.59
Site of central line insertion	2	1.03	4.30	2	0.96	4.30
Use of antibiotics	2	0	5.99	2	0	5.99
Types of CVC	2	0	5.99	2	0	5.99

Discussion

Frequency and percentage distribution of patients in experimental group and control group according to their demographic variables. The present study was supported by Mythri H, Kashinath KR, (2014) who had conducted a study to assess the nosocomial infection in patients admitted in Intensive Care Unit of a Tertiary Health Center, Karnataka. The result of this study revealed that total 130 patients admitted with the symptoms of nosocomial infection in MICU. Incidence of nosocomial infections in MICU patient was 17.7 % (23/130), 34.8% (8/130) was UTI, pneumonia 21.7% (5/130), surgical site infection 17.4% (4/130), blood stream infection 13.0% (3/130). The nosocomial infection was seen more in the 40 – 60 years of aged people. The male were prone to get nosocomial infection than the female.

Assessment of Catheter Associated Blood Stream Infection (CABSI) among patients with central line catheter in experimental group and control group.

The study shows, CLISA score reduce the risk for central line associated blood stream infection.

Effectiveness of Care Bundle on prevention of Catheter Associated Blood Stream Infection among patients with Central Line Catheter in experimental group and control group.

The average CLABSI rate from 2.2/1000 central line days during pre intervention period to 0.5/ 1000 central line days during the post intervention period. The study was concluded that care bundle can effectively reduce the CLABSI rate.

Association of catheter associated blood stream infection among patients with central line catheter with their selected demographic variables in experimental group and control group.

The study found that there was no significant association of CLABSI with age of patients, gender and site of insertion.

Conclusion

The present study was done to evaluate the effectiveness of bundle on prevention of catheter associated blood stream infection among patients with central line catheter in Intensive Care Unit at selected hospital, Erode. The findings of the study revealed that that Care bundle was effective in preventing the catheter associated blood stream infection among patients with central line catheter in Intensive Care Unit at selected hospital, Erode. Hence the research hypotheses H1 was retained at $p \leq 0.05$ levels. There was no significant association between the CABSI with their selected demographic variables in experimental and control group. Hence the research hypothesis H2 was rejected at $p \leq 0.05$ level.

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