

A Study to Assess the Effectiveness of Information Booklet on Knowledge regarding Prevention of Central Line Associated Bloodstream Infection (CLABSI) among Staff Nurses Working in selected Hospital Kota, (Raj.)

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Abstract: *Background:* Central line-associated bloodstream infections not only negatively impact patient safety, but they are also a tremendous financial burden for healthcare organizations. Central line-associated bloodstream infections per case costs are estimated at \$49,201. This financial impact is even more significant to organizations because central line associated blood stream infection are included in the Center for Medicare and Medicaid Services' value-based purchasing and hospital-acquired conditions pay-for-performance reimbursement programs. In addition, individual hospital central line associated bloodstream infection rates are compared with other organizations and are visible to the public through the Medicare.gov Hospital Compare web site with the potential to significantly impact the consumer perception of an organization. The financial and reputational impact of poor performance in this area has increased the nation's healthcare industries' attention on improvement efforts. *Methods:* The research approach was quantitative in nature. *Results:* The result showed that in pre-test the mean percentage of overall knowledge obtained by the respondents is 49.36% with SD is 3.95 and in post-test the mean percentage of overall knowledge obtained by the respondents is 79.70% with SD is 2.56. The result showed that in the pre-test 6.66% respondents had adequate knowledge on prevention on central line associated bloodstream infection, 23.33% respondents had moderate knowledge and 70% respondents had Inadequate knowledge on prevention on central line associated bloodstream infection. After giving Information Booklet in post-test most of the respondents gain adequate knowledge on prevention of central line associated bloodstream infection that was 70% whereas 30% respondents had moderate knowledge and 0% respondents had in adequate knowledge on prevention of central line associated bloodstream infection.

Keywords: Central line-associated bloodstream infections, staff nurses, effectiveness, information booklet

1. Background

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 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.¹

Central line-associated bloodstream infections not only negatively impact patient safety, but they are also a tremendous financial burden for healthcare organizations. Central line-associated bloodstream infections per case costs are estimated at \$49,201. This financial impact is even more significant to organizations because central line associated blood stream infection are included in the Center for Medicare and Medicaid Services' value-based purchasing and hospital-acquired conditions pay-for-performance reimbursement programs. In addition, individual hospital central line associated bloodstream infection rates are compared with other organizations and are visible to the public through the Medicare.gov Hospital Compare web site

with the potential to significantly impact the consumer perception of an organization. The financial and reputational impact of poor performance in this area has increased the nation's healthcare industries' attention on improvement efforts.⁴

To improve patient safety and positively impact the financial burden associated with central line associated bloodstream infection, organizations should strive to achieve a culture of high reliability. The culture of high reliability is not an individual performance improvement project, but rather a continuous commitment toward ongoing patient safety and high-quality care. High-reliability organizations (HROs) consistently maintain a high level of organizational safety. A key aspect of High-reliability organizations is their ability to eliminate safety deficiencies through robust process improvement that creates constant awareness and a collective mindfulness for high-quality care. Creating a High-reliability organization culture may be an effective method for preventing central line associated blood stream infection. The purpose of this article is to describe the process of using high-reliability methodology to maintain zero tolerance for central line associated bloodstream infection in an acute care patient setting.⁵ Prevention of catheter related infection is key to the successful use of parenteral nutrition. Most infections that do occur result from contamination of the exit site or catheter hub. Nurse must follow strict guidelines or protocols for the care of the vascular access device before, during, and after its insertion. ⁶ An estimated 250,000 to 500,000 central line

associated bloodstream infection occur in US hospitals each year central line associated bloodstream infection are an important cause of morbidity and excess cost of care for hospitalized patients. Studies of central line associated bloodstream infection that control for the underlying severity of illness suggest that the attributable mortality rate is 4% to 20%.⁷

The high incidence of central line associated bloodstream infection, the associated morbidity and mortality, our increasing understanding of pathogenesis and prevention strategies, and a growing unwillingness of payers, patient advocates, and patients to accept healthcare-associated infections (HAIs) as a risk of hospitalization, have led to a culture of "zero-tolerance" setting the goal for healthcare-associated infections rates at 0, treating every infection as if it should never happen, and holding everyone accountable for healthcare-associated infections, particularly central line associated bloodstream infection, which are increasingly viewed as preventable or "never" events.⁸

2. Need of the Study

The findings will be reported at the ATS 2010 International Conference in New Orleans. To examine whether or not publicly-reported infection rates actually identify the best hospitals, Kate Courtright, M.D., resident physician at the University of Pennsylvania and colleagues looked at patients in Pennsylvania hospitals especially at risk for two types of infections: pneumonia and blood stream infections. They calculated hospital death rates accounting for differences in illness severity across 158 hospitals, which included nearly 19,000 admissions involving mechanical ventilation and over 16,000 ICU admissions involving central venous catheterization, and compared them to ICU-acquired infection rates obtained from a public state website. They then used rank correlation and linear regression to determine the relationship between infections and death. —We found that ICU-acquired infection rates as reported on a state website did not correlate with death rates for at-risk patients. said Dr. Courtright, lead author of the abstract. —In fact, hospitals with lower rates of ICU- acquired infection did not also have lower death rates for at-risk patients. For example, the 43 hospitals that reported no cases of ICU-acquired pneumonia had an average death rate of 35.7 percent for patients receiving mechanical ventilation; hospitals with high infection rates (ranging from 1 to 8 cases per 1000 ventilator days) had an average death rate of 34.6 percent. These numbers were not statistically different.¹³

Although the Centers for Disease Control and Prevention cites an overall 46% decrease in central line associated bloodstream infection nation wide, there continues to be increasing national attention on the sustainability of central line associated bloodstream infection reduction. At the organization of study for this article, the central line associated bloodstream infection rates appeared to increase between 2012 and 2016 in contrast to the national trend. Sensing an opportunity, nursing leadership at the organization analyzed these data and found that overall hospital acquired infection rates and specifically, central line associated bloodstream infection rates were on the rise. In 2015, the ICU central line associated bloodstream infection rate was 3.15

infections per 1,000 device days, with a 2.10 National Healthcare Safety Network (NHSN) Standardized Infection Ratio (SIR). During the first 2 quarters of 2016, the rate continued to increase to 5.88 infections per 1,000 device days and a preliminary SIR of 3.9. Both rates were considerably higher than the national benchmark and posed a cause for concern. On further analysis, each central line associated bloodstream infection occurred approximately 10–12 days after the insertion date of the device demonstrating that the infection was not caused during the insertion process but rather during the daily maintenance.¹⁴

Nursing leadership analysis found an increase in nurse turnover ranging from 8.57% to 55.17% between 2012 and 2016, which coincided with the increase in central line associated bloodstream infection rates. This rise in nursing turnover created instability in the ICU contributing to a decrease in Registered Nurse (RN) experience and an increased knowledge deficit surrounding the key aspects of the central venous line maintenance care bundle. Further analysis indicated the higher turnover rate created a deficient on boarding program for newly hired nurses, and a failure to ensure initial or continued central venous line competence and maintenance education.¹⁵

3. Methods

- Study setting and period:** The research approach was quantitative in nature. The present study is conducted at **selected hospitals at Kota (Raj.)**. Data was collected from 28 August 2020 to 28 September 2020 in **selected hospitals, Kota (Raj.)**.
- Study Design and Population:** The research design is used for this study is quasi-experimental, One group pre-test post-test Design, for assessing the effectiveness of information booklet regarding prevention of central line associated bloodstream infection among staff nurses at selected hospital in Kota.
- Sample Size:** In the wake of acquiring the consent examiner met the subjects and builds up the affinity. 60 staff nurses were selected by convenient sampling technique.
- Sampling Techniques and Approach:** **Non-probability purposive sampling technique** was used to select the sample for this study. The researcher selected the subjects purposively for study group.

Description of the Tool

Data collection tool are instruments used by the researcher to observe or measure the key variables in the research problem. The instrument used in this study considered of two sections-

Section A: Semi structured questionnaire consists of demographic variables of staff nurses. It consists of 6 items as Age, Gender, Previous education on central line associated bloodstream infection., Year of experience, Working area and Professional qualification.

Section B: This section contains total 30 Multiple Choice Questions related to prevention on central line associated bloodstream infection. There is total 30 multiple choice items having one correct answer and total maximum scores was 30. These 30 items were divided in 4 sub area of the content-

- 1) General introduction and definition of central line associated bloodstream infection.
- 2) Causes, risk factor, pathophysiology, and symptoms of central line associated bloodstream infection.
- 3) Diagnostic test, treatment and complication of central line associated bloodstream infection.
- 4) Prevention and management of central line associated bloodstream infection.

The scoring for these questionnaires was as follows 0 (zero) score was given to the wrong answer and score 1 (one) was given to the correct answer, hence the highest possible score was 30 (thirty) and least was 0 (zero).

Pilot Study

The pilot study was conducted at Permission obtained from the Medical superintendent of New medical college and hospital Kota (Raj.) The conduction of pilot study the explained and informed consent are obtained. The pilot study is done 10 staff nurses were selected as per sampling criteria. The pre- test was conducted for the staff nurses and the following day by administering the Information booklet of central line associated bloodstream infection and after the post test was conducted for the same 10 staff nurses were selected as per sampling criteria on the day 7th day using the same structured knowledge questionnaire. The time taken for the administration of structured knowledge questionnaire was 20-30 minutes and deliver information booklet.

The data collected was analyzed using descriptive and inferential statistics. The significance of difference in the pre-test and post-test was found using paired t -test. The tools and study design were found to be feasible as no problem were found during the pilot study. **The reliability of the tool was 0.80.**

4. Main Study

Permission was obtained from the concerned authority. **The investigator conducted the main study from 28 August 2020 to 28 September 2020**, with 60 staff nurses selected by Convenience (type of non-probability) sampling technique. As the first step in the data collection procedure, the investigator met the head of the hospital in order to establish support and cooperation to conduct study successfully. The formal permission was taken from the hospital authority of the data collection according to the convenience of the hospital policies and procedure.

After obtaining the permission investigator met the subjects and established rapport with them after ensuring the physical comforts. A written informed consent was taken. Appropriate orientation was given to the subjects about the aim of the study, Nature of the questionnaire and adequate care was taken for protecting the subjects from the potential risks including maintaining confidentiality, security and identity.

Data regarding socio demographic profile and pre-test was conducted by administering knowledge questionnaires The Information booklet was given soon after pre-test the subjects were eager to know and took active participation in asking questions seeking clarification. Post-test was conducted on the seventh day by using the same semi-Structured

questionnaire to find out the effectiveness of Information booklet.

Data processing and analysis

Data were coded and entered into SPSS Version 26 software for analyses. Descriptive analysis including frequency distribution, proportion and mean was performed to sum up the attributes of the review subjects. The data obtained was analyzed using frequency, percentage, mean, median, mean percentage, standard deviation in terms of descriptive and inferential statistics. The association of was tested using the Chi-square test with Yate's correction.

5. Results

Section-II Findings Related to Knowledge Score of Respondents Regarding Prevention of Central Line Associated Bloodstream Infection

The result showed that in pre-test the mean percentage obtained by the respondents was 51.11% with SD of 1.73 in the aspect of Introduction and definition regarding central line associated bloodstream infection, 53.70 with SD 0.7 in aspect of causes, risk factor, pathophysiology, and symptoms of central line associated bloodstream infection, 53.20% with SD of 0.82 in the aspect of Diagnostic test, treatment and complication of central line associated bloodstream infection, 49.36% with SD 1.82 in aspect of prevention and management of central line associated bloodstream infection. The mean percentage of overall knowledge obtained by the respondents is 49.36% with SD is 3.95.

The result showed that in post-test the mean percentage obtained by the respondents was 82.22% with SD of 1.11 in the aspect of Introduction and definition regarding central line associated bloodstream infection, 62.50% with SD 0.64 in aspect of causes, risk factor, pathophysiology, and symptoms of central line associated bloodstream infection, 76% with SD of 0.71 in the aspect of Diagnostic test, treatment and complication of central line associated bloodstream infection, 83% with SD 1.32 in aspect of prevention and management of central line associated bloodstream infection. The mean percentage of overall knowledge obtained by the respondents is 79.70% with SD is 2.56.

The result showed that in the pre-test 6.66% respondents had adequate knowledge on prevention on central line associated bloodstream infection, 23.33% respondents had moderate knowledge and 70% respondents had Inadequate knowledge on prevention on central line associated bloodstream infection.

After giving Information Booklet in post-test most of the respondents gain adequate knowledge on prevention of central line associated bloodstream infection that was 70% whereas 30% respondents had moderate knowledge and 0% respondents had in adequate knowledge on prevention of central line associated bloodstream infection.

The result showed that the mean post-test knowledge score is 23.91(79.70%) is greater than the mean pre-test knowledge score 14.81 (49.36%). The data further represent that the 't' value of 19.89 is significantly higher than the tabulated 't' value 2.0010 at 0.05 level of significance. This indicates that

there was different in pre-test and post-test knowledge score of respondents and Information Booklet is effective in improving the knowledge score of staff nurses on prevention of central line associated bloodstream infection.

Section III: Finding Related to Association between Knowledge Scores with Selected Demographic Variables of Staff Nurses

The chi-square test was carried out to determine the association between the knowledge score with selected demographic variables such as age in years, gender, professional qualification, years of experience, working area, and previous knowledge of central line procedure.

There is no significant association between knowledge of staff nurses and demographic variables such as Gender ($\chi^2=0.58$) were not significant at 0.05 level of significance. Hence the research hypothesis is rejected and null hypothesis is accepted.

There is a significant association between knowledge of staff nurses such as Age in years ($\chi^2=13.70$), professional qualification ($\chi^2=17.1$), years of experience ($\chi^2=15.60$), working area ($\chi^2=14.71$), and previous knowledge on central line procedure ($\chi^2=13.84$) were significant at 0.05 level of significance. Hence the research hypothesis is accepted and null hypothesis is rejected.

6. Conclusion

The following conclusions were drawn on the basis of the findings of the study. The findings showed that majority of the subjects had inadequate knowledge in the pre-test whereas majority of the subjects had adequate knowledge in post-test. The mean post-test percentage scores and the modified gain scores in all areas were found to be high.

Knowledge about prevention of central line associated bloodstream infection was inadequate among staff nurses working in Govt. MBS Hospital, Kota. Therefore, they have gained knowledge in all area of prevention of central line associated bloodstream infection. The t test which was computed between pre-test and post-test knowledge scores, indicate a true gain in the knowledge. Hence it was concluded that Information Booklet was effective method to improve knowledge among staff nurses.

There is no significance association between knowledge score with selected demographic variables such as Age, and Gender and there is significance association between knowledge score with selected demographic variables such as professional qualification, years of experience, working area, and previous knowledge on central line procedure.

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