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Original Article

Knowledge & Practice of Nurses Regarding Central Line-Associated Bloodstream Infection & Prevention

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ABSTRACT

Background: Central venous catheters (CVCs) are crucial in medical care but pose a significant risk for bloodstream infections, leading to increased morbidity, mortality, and healthcare costs. Effective knowledge and practices among nurses are essential for preventing central line-associated bloodstream infections (CLABSI).

Objective: To assess the knowledge and practices of nurses regarding the prevention of CLABSI at Sughra Shafi Medical Complex Narowal and identify factors influencing these practices.

Methods: This descriptive cross-sectional study involved 200 staff nurses selected from a population of 400 using a non-probability convenient sampling technique. Data were collected via a self-administered questionnaire covering demographics, professional experience, and specific knowledge and practices related to CLABSI prevention. The study was conducted over six months, and data analysis was performed using SPSS version 25, with chi-square and Fisher exact tests applied to determine associations between variables. Ethical approval was obtained, and all participants provided informed consent.

Results: The study included 200 nurses, predominantly female (90%), with ages ranging from 18 to 37 years (mean age 25 ± 3.9 years). Professional experience varied, with 36.5% having 1-5 years, 41% having 6-10 years, and 22.5% having 11-15 years of experience (mean experience 7.31 ± 3.0 years). Knowledge assessment revealed that 68.5% knew CVCs should be routinely replaced, and 88.5% were aware of disinfecting catheter insertion sites with 10% povidone-iodine. However, only 43% regularly performed hand hygiene before inserting a central line, and 48.5% used chlorhexidine for skin preparation.

Conclusion: While nurses demonstrated satisfactory knowledge regarding CLABSI prevention, their practices were inadequate, indicating a need for enhanced training and adherence to infection prevention protocols.

Keywords: Central Line-Associated Bloodstream Infection, CLABSI Prevention, Central Venous Catheter, CVC Nurse Knowledge.

INTRODUCTION

Central line-associated bloodstream infections (CLABSI) are serious complications often arising from the use of central venous catheters (CVCs). These infections pose significant risks, contributing to increased morbidity, mortality, and healthcare costs (1). CVCs, thin and long tubes used for administering fluids, blood products, and nutrients, have become indispensable in medical care (2). However, the use of these catheters is associated with a high risk of infections, particularly CLABSI, which can lead to prolonged hospital stays and increased mortality (3). Each case of CLABSI can add approximately $33,000 to healthcare costs and extend hospitalization by up to three weeks (4). The literature highlights the critical need for effective infection prevention practices to mitigate these risks (5).

Hand hygiene and aseptic techniques are pivotal in the insertion and maintenance of CVCs (6). Proper handwashing, use of sterile gloves, and adherence to aseptic techniques during catheter insertion and maintenance significantly reduce infection rates (7). Despite these known measures, the incidence of CLABSI remains high in many hospital settings, including Pakistan, where the rate is approximately 9 per 1,000 catheter days (8). This high rate is partly attributed to gaps in medical education and training among

Journal of Health and Rehabilitation Research 2791-156X JHRR

nursing staff (9). Studies indicate that in 89% of healthcare centers, specific training for managing CVCs is mandatory, yet compliance remains inconsistent (10).

The level of knowledge and practices regarding CLABSI among nurses varies widely, especially in developing countries. Nurses, who are primarily responsible for the care and maintenance of vascular catheters, often exhibit better knowledge than physicians, but this knowledge is not always sufficient or standardized (11-13). Enhanced education and training on CLABSI prevention are crucial to improving nursing practices and reducing infection rates (14). Previous studies, such as those conducted in Egypt and other developing countries, have reported low levels of knowledge and compliance with CLABSI prevention guidelines among nurses (15-16). The present study aims to assess the knowledge and practices of nurses at Sughra Shafi Medical Complex Narowal regarding CLABSI prevention, identifying key factors that influence these practices and proposing measures to enhance infection control.

MATERIAL AND METHODS

This descriptive cross-sectional study aimed to evaluate the knowledge and practices of nurses regarding CLABSI prevention at Sughra Shafi Medical Complex Narowal. Conducted over six months, the study recruited 200 staff nurses using a non-probability convenient sampling technique from a population of 400 nurses. Inclusion criteria included nurses aged 18-37 years with 1-15 years of professional experience, excluding student nurses and those with less than one year of experience.

Data were collected using a self-administered questionnaire designed to assess demographic information, professional experience, training on CLABSI prevention, and specific knowledge and practices regarding CVC care. The questionnaire included items on hand hygiene, use of antiseptics, dressing protocols, and documentation practices. Responses were recorded as 'Yes,' 'No,' or 'Don't know.' Ethical approval for the study was obtained from the relevant institutional review board, and all participants provided informed consent in accordance with the Helsinki Declaration. Data analysis was performed using SPSS version 25. Demographic data were presented as frequencies and percentages, and chi-square and Fisher exact tests were used to determine associations between demographic/professional variables and knowledge/practices scores. A p-value of ≤0.05 was considered statistically significant.

RESULTS

The study included 200 nurses, predominantly female (90%), with ages ranging from 18 to 37 years (mean age 25 ± 3.9 years). Professional experience varied, with 36.5% having 1-5 years, 41% having 6-10 years, and 22.5% having 11-15 years of experience (mean experience 7.31 ± 3.0 years).

Table 1. Demographic Data of Participants

Variables	Frequency (f)	Percentage (%)
Age		
18-22 years	73	36.5
23-27 years	75	37.5
28-32 years	32	16.0
33-37 years	20	10.0
Sex		
Male	20	10.0
Female	180	90.0
Religion		
Muslim	195	97.5
Non-Muslim	5	2.5
Marital Status		
Married	65	32.5
Unmarried	135	67.5
Professional Experience		
1-5 years	73	36.5
6-10 years	82	41.0
11-15 years	45	22.5

The assessment of knowledge regarding CLABSI prevention revealed that 68.5% of nurses knew that CVCs should be routinely replaced, and 55% understood that transparent dressings should be changed when clean, dry, and intact. Additionally, 88.5% were

Journal of Health and Rehabilitation Research 2791-156X JHRR

aware of the need to disinfect catheter insertion sites with 10% povidone-iodine, and 83.5% knew to use anticoagulant solutions in CVC lumens.

Table 2. Knowledge of Nurses Regarding CLABSI Prevention

Sr. No.	Question	Yes (%)	No (%)	Don't Know (%)
1	It is recommended to replace CVCs routinely.	68.5	22.5	9.0
2	Use a CVC coated or impregnated with an antiseptic agent in high CLABSI rate settings.	81.0	9.0	10.0
3	Change the clean, dry, and intact transparent dressing on the catheter insertion site.	55.0	26.5	18.5
4	Change the clean, dry, and intact gauze dressing on the catheter insertion site.	76.5	15.0	8.5
5	Disinfect the catheter insertion site with 10% povidone-iodine.	88.5	6.5	5.0
6	Cover the catheter insertion site with a gauze dressing.	61.5	21.5	17.0
7	Apply an antibiotic ointment at the insertion site of a CVC.	74.0	16.0	10.0
8	Replace administration sets used in intermittent infusion.	88.5	7.5	4.0
9	Replace IV administration sets every 72 hours.	85.0	8.5	6.5
10	Routine use of anticoagulant solutions in the CVC lumens.	83.5	11.5	5.0
11	Use sterile gauze or a sterile transparent semi-permeable dressing to cover the catheter site.	76.5	17.0	6.5

The practice assessment indicated that only 43% of nurses regularly performed hand hygiene before inserting a central line, and 48.5% used chlorhexidine for skin preparation. Additionally, 47.5% waited for the skin antiseptic to dry before puncturing, and 51.5% regularly used the subclavian site for central lines in adults.

Table 3. Practices of Nurses Regarding CLABSI Prevention

Sr. No.	Question	Usually (%)	Sometimes (%)	Rarely (%)	Never (%)
1	Perform hand hygiene before inserting a central line?	43.0	16.0	27.5	13.5
2	Use maximal sterile barrier precautions before inserting a central line?	26.5	22.5	38.5	12.5
3	Use chlorhexidine to prepare the skin before inserting a central line?	48.5	25.0	11.5	15.0
4	Follow the recommended policy when changing the administration set?	36.5	31.0	11.5	21.0
5	Wait until the skin antiseptic is dry before puncturing the skin?	47.5	22.5	20.0	10.0
6	Use the subclavian site for the central line for adult patients?	51.5	18.5	21.5	8.5
7	Document the procedure details (date, location, catheter lot number, name, and signature of the operator)?	23.5	36.5	23.0	17.0
8	Perform a daily assessment of the central line necessity and document that in the patient record?	41.0	20.0	14.0	25.0
9	Remove unnecessary central lines?	32.5	35.0	15.0	17.5
10	Document the dressing-changing details in the patient record?	23.5	30.0	28.5	17.5

DISCUSSION

The study revealed satisfactory knowledge among nurses regarding CLABSI prevention but highlighted gaps in their practices. For instance, while 85% of participants knew about replacing IV administration sets every 72 hours, a similar percentage was not observed in practice adherence, indicating a disconnect between knowledge and application (17). This finding aligns with Deason and Gray's study, which recommended replacing connectors or shut-off valves every 72 hours to minimize infection risk (17). Moreover, the high awareness of disinfecting catheter insertion sites with 10% povidone-iodine (88.5%) and using chlorhexidine for skin preparation (48.5%) is supported by similar recommendations in previous studies (18-19).

Despite the satisfactory knowledge levels, the study reported inadequate practices among nurses, potentially increasing the risk of CLABSI and associated healthcare costs. Only 43% of nurses regularly performed hand hygiene before inserting a central line, echoing

findings from previous research emphasizing the importance of hand hygiene in reducing infection rates (19). This inconsistency between knowledge and practice suggests the need for more rigorous training and adherence to infection prevention protocols (20). The study's strengths include a robust sample size and the use of a standardized questionnaire to assess both knowledge and practices. However, it is limited by its cross-sectional design, which cannot establish causality. Additionally, the study was conducted in a single hospital, limiting the generalizability of the findings. Future research should consider longitudinal designs and multi-center studies to validate these results and explore strategies to enhance practice adherence (20-22).

CONCLUSION

The study revealed that while nurses at Sughra Shafi Medical Complex Narowal possess satisfactory knowledge regarding the prevention of central line-associated bloodstream infections (CLABSI), their actual practices fall short, potentially increasing infection risks and healthcare costs. This gap between knowledge and practice underscores the need for targeted interventions, including enhanced training and strict adherence to infection prevention protocols. Improving these practices is crucial for reducing CLABSI incidence, thereby enhancing patient safety and overall healthcare outcomes. Implementing continuous education programs and rigorous compliance monitoring can significantly mitigate CLABSI risks, benefiting both patients and the healthcare system.

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Journal of Health and Rehabilitation Research 2791-156X JHRR

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