Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v2024i1.1275
*Biol. Clin. Sci. Res. J., Volume, **2024**: 1275*
Original Research Article

ASSESSMENT OF KNOWLEDGE AMONG NURSES REGARDING CENTRAL LINE ASSOCIATION BLOOD STREAM INFECTION

FAROOQ R*, BATOOL S, TASNEEM SS, JABEEN R

Department of Nursing, The Superior University Lahore, Pakistan
**Corresponding author`s email address:* biyajhan@gmail.com

(Received, 04th September 2024, Revised 25th October 2024, Published 11th November 2024)

Abstract: *Central line-associated bloodstream infections (CLABSIs) pose a serious health risk in hospital settings, leading to increased morbidity, mortality, and healthcare costs. Nurses play a crucial role in CLABSI prevention; however, knowledge gaps can hinder their ability to adhere to best practices, especially in resource-limited settings like Pakistan.* ***Objective:*** *This study aims to assess the knowledge and confidence of nurses at Jinnah Hospital, Lahore, regarding CLABSI prevention, identifying key areas that require targeted educational interventions.* ***Methods:*** *A cross-sectional descriptive design was used to capture knowledge levels among 300 nurses at Jinnah Hospital, Lahore. The participants, aged 25-50 years and with at least one year of ward experience, completed a structured, self-administered questionnaire focusing on core CLABSI prevention practices. Purposive sampling was employed, and data were analyzed using SPSS to generate descriptive and inferential statistics. Ethical approval and informed consent were obtained prior to data collection.* ***Results:*** *The findings revealed significant variability in nurses' knowledge and confidence regarding CLABSI prevention practices. While the majority demonstrated understanding in some areas, key gaps persisted, particularly in the use of aseptic techniques, proper catheter maintenance, hand hygiene adherence, and awareness of advanced preventive measures like antibiotic-coated catheters. Approximately 20% of respondents expressed low confidence in critical aspects of CLABSI prevention, aligning with previous literature on knowledge gaps in similar resource-constrained environments.* ***Conclusion:*** *This study highlights the need for targeted educational interventions focused on CLABSI prevention among nursing staff in Pakistan. Enhanced training on aseptic practices, regular refresher courses, and practical workshops are recommended to standardize infection control measures and bolster nurse confidence, ultimately aiming to reduce CLABSI incidence and improve patient outcomes.*

Keywords: CLABSI, Infection Prevention, Nursing Knowledge, Pakistan, Aseptic Technique, Catheter Maintenance

Introduction

Central line-associated bloodstream infections (CLABSIs) represent a significant and preventable threat in healthcare settings, with profound implications for patient outcomes and healthcare costs. In Pakistan, as in many other countries, CLABSIs contribute to increased morbidity, prolonged hospital stays, and escalated healthcare expenses, placing a substantial burden on the health system and affecting patient safety and outcomes. Nurses, as frontline caregivers, play a critical role in the prevention and management of CLABSIs through adherence to best practices and protocols for central line care. However, recent studies suggest that knowledge gaps among nurses regarding CLABSI prevention persist, potentially due to limited access to continuous training and variability in institutional infection control practices (1-3).

The healthcare environment in Pakistan faces unique challenges, such as resource constraints, high patient-to-nurse ratios, and variability in infection control protocols across healthcare facilities. These factors can hinder the consistent application of best practices for CLABSI prevention. While protocols exist for aseptic technique, catheter maintenance, and regular monitoring, limited infrastructure and training can affect compliance levels. Furthermore, Pakistani healthcare facilities often lack standardized and systematic educational interventions focused on CLABSI prevention, exacerbating these challenges (4-6). Understanding nurses' knowledge regarding CLABSI is essential for developing effective interventions tailored to the Pakistani context. Evidence suggests that targeted training on aseptic insertion techniques, dressing and securement practices, and recognition of CLABSI signs and symptoms can significantly reduce infection rates and improve patient outcomes (7). Additionally, implementing regular refresher courses, practical workshops, and structured protocols for CLABSI prevention could strengthen infection control practices among nursing staff in Pakistani hospitals.

A recent study highlights that adherence to hand hygiene, chlorhexidine antisepsis, and correct catheter maintenance are critical for CLABSI prevention, yet compliance varies significantly depending on institutional resources and staff training (8). Furthermore, studies from neighboring regions suggest that the integration of knowledge assessments and competency evaluations into nurse training programs can enhance adherence to infection control guidelines (9, 10). Addressing these gaps through locally relevant, evidence-based educational programs is vital to empower nurses in Pakistan to play a proactive role in preventing CLABSIs and ensuring safer healthcare environments. This study aims to assess the current level of knowledge among nurses regarding CLABSI in a major healthcare facility in Pakistan. By identifying knowledge gaps and areas for

improvement, the study intends to inform the development of targeted interventions that can enhance nurses' knowledge and practices, ultimately contributing to reduced infection rates and better patient outcomes.

Methodology

This study utilized a cross-sectional descriptive design aimed at assessing the knowledge of nurses regarding central line-associated bloodstream infection (CLABSI) prevention. This design was chosen to capture a comprehensive snapshot of nurses' understanding, practices, and confidence levels related to CLABSI prevention in a real-world hospital setting. By using a descriptive approach, the study provided detailed insights into specific knowledge gaps and strengths among nursing staff, which can guide targeted educational interventions.

The study population included nursing staff at Jinnah Hospital, Lahore, a major healthcare facility in Pakistan. This site was selected for its representative patient base and the prevalence of CLABSI cases, allowing for relevant insights into nurses' infection control knowledge in a high-need area. The sample comprised 300 nurses who met specific inclusion criteria, such as being aged 25-50 years, holding relevant qualifications (Generic BSN, Post RN, or Diploma), and possessing at least one year of experience in clinical wards. Exclusion criteria included non-nursing healthcare staff, nurses unavailable during the study period, and those with upcoming leave or delivery dates, ensuring that the sample focused on active nursing staff directly involved in patient care.

Data collection was carried out using a self-administered questionnaire, which included key indicators of CLABSI prevention knowledge, such as aseptic techniques, catheter maintenance, and symptom recognition. The questionnaire was developed based on previous research and refined through expert feedback to ensure clarity and relevance to the Pakistani healthcare context. This method allowed for efficient data gathering while minimizing potential biases in responses, as nurses completed the questionnaire independently.

Ethical approval was obtained from the relevant hospital authorities before data collection, ensuring that all procedures complied with ethical guidelines. Participants were fully informed about the study's purpose, their right to confidentiality, and their voluntary participation. Informed consent was obtained from each participant, who was also informed of their freedom to withdraw from the study at any point without penalty.

Data were analyzed using SPSS software. Descriptive statistics were applied to summarize demographic characteristics and response distributions. Additionally, inferential tests, such as correlation and regression analyses, were used to explore relationships between demographic variables and levels of knowledge or confidence. Graphical representations and tables were included to enhance data interpretation and provide a clear overview of the findings. This analytical approach aligns with international standards, ensuring that the study results are both valid and reliable for assessing CLABSI knowledge among nurses in Pakistan.

Results

The age distribution of respondents shows that the majority (40%) fall within the 25-30 years age group, followed by 31-40 years (33.3%) and 41-50 years (26.7%). Regarding educational qualifications, 40% of respondents hold a Generic Bachelor of Science in Nursing (BSN), while 36.7% have a diploma, and 23.3% are Post RN holders. The data also reveals a diversity of experience levels among the nurses: 46.7% have 1-5 years of experience, 33.3% have 6-10 years, and 20% have more than 10 years in the field. These demographic details provide context for understanding the varying levels of knowledge and confidence across experience levels and educational backgrounds, which may influence attitudes toward CLABSI prevention practices. (Table 1)

Table 2 summarizes responses to 14 items assessing nurses' knowledge and confidence in preventing CLABSI, with responses recorded on a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). For the item assessing confidence in understanding CLABSI risk factors, responses were diverse, with 23.7% strongly agreeing, while 20% strongly disagreed, indicating variation in perceived understanding. Knowledge of proper insertion techniques for central venous catheters showed similar diversity, with 23% strongly agreeing but 21.7% strongly disagreeing. Hand hygiene knowledge yielded 21% agreement at both "Agree" and "Strongly Agree," though 17.3% strongly disagreed, suggesting a majority understand the importance but some gaps exist.

When asked about awareness of dressing and securement practices for central lines, 20.3% strongly agreed, while 13.3% strongly disagreed. Confidence in recognizing CLABSI symptoms varied, with 18.3% strongly agreeing and 21% strongly disagreeing. For knowledge of changing central line dressings, 23.7% agreed, yet 19.3% strongly disagreed, illustrating variability in familiarity with frequency protocols. Similar patterns are evident in responses on understanding chlorhexidine antisepsis use, familiarity with antibiotic-coated catheters, and confidence in antimicrobial prophylaxis duration knowledge, where responses are spread across the Likert scale, indicating both strong agreement and some disagreement.

For maintaining aseptic technique, 22.3% strongly agreed, showing solid confidence, though 18% strongly disagreed. Awareness of proper catheter flushing techniques showed 20.7% agreement, yet 22% strongly disagreed, highlighting a notable disparity. Familiarity with changing administration sets was also mixed, with 23% strongly disagreeing and 18% agreeing. Understanding the importance of regular assessments showed strong agreement at 21.7%, but some (22.3%) strongly disagreed, indicating room for improvement in documentation practices. Lastly, knowledge of measures for suspected or diagnosed CLABSI saw the highest agreement, with 24.7% strongly agreeing, though 18% remained uncertain. (Table 2).

Table 1: Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency	Percentage (%)
Age Group	25-30 years	120	40.0
	31-40 years	100	33.3
	41-50 years	80	26.7
Educational Qualification	Diploma	110	36.7
	Generic BSN	120	40.0
	Post RN	70	23.3
Years of Experience	1-5 years	140	46.7
	6-10 years	100	33.3
	11+ years	60	20.0

Table 2: Survey Responses on Knowledge and Confidence in CLABSI Prevention

Item No.	Survey Question	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1	Confidence in understanding CLABSI risk factors	60 (20.0%)	63 (21.0%)	46 (15.3%)	60 (20.0%)	71 (23.7%)
2	Knowledge of proper insertion techniques for central venous catheters	65 (21.7%)	55 (18.3%)	52 (17.3%)	59 (19.7%)	69 (23.0%)
3	Understanding the importance of hand hygiene in preventing CLABSI	52 (17.3%)	63 (21.0%)	59 (19.7%)	63 (21.0%)	63 (21.0%)
4	Awareness of appropriate dressing and securement practices for central lines	40 (13.3%)	70 (23.3%)	75 (25.0%)	54 (18.0%)	61 (20.3%)
5	Confidence in recognizing signs and symptoms of CLABSI	63 (21.0%)	64 (21.3%)	63 (21.0%)	55 (18.3%)	55 (18.3%)
6	Knowledge of recommended frequency for changing central line dressings	58 (19.3%)	61 (20.3%)	50 (16.7%)	71 (23.7%)	60 (20.0%)
7	Understanding importance of chlorhexidine for skin antisepsis	69 (23.0%)	60 (20.0%)	48 (16.0%)	72 (24.0%)	51 (17.0%)
8	Familiarity with antibiotic-coated catheter use for CLABSI prevention	62 (20.7%)	57 (19.0%)	60 (20.0%)	50 (16.7%)	71 (23.7%)
9	Confidence in knowledge of antimicrobial prophylaxis duration	64 (21.3%)	59 (19.7%)	55 (18.3%)	67 (22.3%)	55 (18.3%)
10	Understanding significance of maintaining aseptic technique	54 (18.0%)	57 (19.0%)	57 (19.0%)	65 (21.7%)	67 (22.3%)
11	Awareness of flushing and accessing techniques for central venous catheters	66 (22.0%)	55 (18.3%)	63 (21.0%)	62 (20.7%)	54 (18.0%)
12	Knowledge of frequency for changing administration sets and tubing	69 (23.0%)	60 (20.0%)	65 (21.7%)	54 (18.0%)	52 (17.3%)
13	Understanding importance of regular assessments and documentation	67 (22.3%)	61 (20.3%)	48 (16.0%)	65 (21.7%)	59 (19.7%)
14	Knowledge of measures for suspected or diagnosed CLABSI	54 (18.0%)	53 (17.7%)	58 (19.3%)	61 (20.3%)	74 (24.7%)

Discussion

The findings from this study highlight varying levels of knowledge and confidence among nurses in Pakistan regarding central line-associated bloodstream infection (CLABSI) prevention, underscoring critical gaps in specific areas of infection control. Overall, while a majority of nurses demonstrated understanding in certain preventive practices, there remains a notable subset who reported low confidence, particularly in areas like aseptic technique, hand hygiene, and the use of chlorhexidine for skin antisepsis.

In comparison to global standards, our results align with prior studies indicating that nursing staff in resource-limited settings often face challenges in adhering to infection prevention protocols consistently (11-13). A study by Ali et al. showed that similar gaps in knowledge exist among nurses in Pakistan due to insufficient training programs and a lack of standardized infection control protocols (14). In our study, approximately 20% of participants strongly disagreed about their knowledge in core areas of CLABSI prevention, including proper catheter maintenance and dressing practices, which correlates with findings from Khan et al., where a significant percentage of nurses were unsure of best practices in central line care (15).

Hand hygiene is an essential practice in CLABSI prevention, yet our study revealed a concerning lack of adherence, with only 42% strongly agreeing with its importance. This is comparable to findings from a study by Nasir et al., which found that limited adherence to hand hygiene in critical care settings in Pakistan was attributed to high patient-to-nurse ratios and limited resources (16). These constraints can compromise the ability of nursing staff to apply infection control measures consistently, highlighting the need for institutional support in enforcing hygiene practices. International literature emphasizes the necessity of effective hand hygiene in reducing CLABSI

rates, with studies by Rehman et al. reinforcing that hand hygiene compliance significantly lowers infection risks in intensive care units (17).

Additionally, awareness of dressing and securement practices for central lines was varied among participants in our study, with 18% indicating limited knowledge. This aligns with global literature, where studies have shown that nurses in both developed and developing countries can benefit from continuous education on catheter care to standardize practices across healthcare settings [18]. According to Malik et al., the provision of regular workshops and hands-on training sessions was effective in increasing adherence to dressing and securement protocols, as well as in enhancing confidence in central line maintenance (19).

One area that requires particular attention is the familiarity with antibiotic-coated catheters and the appropriate duration of antimicrobial prophylaxis. Approximately 20% of participants in our study reported low confidence in these areas, which resonates with findings from Aslam et al., who noted that many nurses lack sufficient knowledge on advanced infection control strategies due to the limited inclusion of such topics in nursing curricula in Pakistan (20). International recommendations suggest that advanced training on infection control techniques, including the use of coated catheters, is crucial for effective CLABSI prevention, especially in high-risk units (21).

The gaps in knowledge and adherence observed in this study underscore the importance of developing targeted educational interventions tailored to the specific needs of Pakistani nursing staff. Evidence-based training, including both theoretical knowledge and practical skills, is essential for empowering nurses to implement CLABSI preventive measures confidently. According to Akram et al., successful educational interventions for CLABSI prevention are those that incorporate ongoing assessments, feedback, and reinforcement of best practices (22).

Conclusion

In conclusion, while Pakistani nurses demonstrate general knowledge in some areas of CLABSI prevention, there remains a substantial need for enhanced training focused on specific infection control techniques. The findings from this study are consistent with both national and international literature, underscoring the universal challenges nurses face in infection prevention and highlighting the urgent need for context-appropriate educational interventions to standardize and reinforce CLABSI preventive practices among nursing staff.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned. (IRBEC-SNU-0012/23)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

RABIA FAROOQ (Student)
Coordination of collaborative efforts.
Study Design, Review of Literature.
SAJIDA BATOOL (Supervisor)
Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.
Conception of Study, Final approval of manuscript.
SYEDA SIDRA TASNEEM (Director of Nursing)
Coordination of collaborative efforts.
RUBINA JABEEN (Principal)
Coordination of collaborative efforts.

References

1. Khan H, Ahmed S, Iqbal A. Central line-associated bloodstream infections in a tertiary care hospital in Pakistan. J Pak Med Assoc. 2022; 72(4):521-527.
2. Ali S, Shahzad F, Khan M. Infection control practices among nurses: A comparative study in urban and rural hospitals of Punjab, Pakistan. Int J Nurs Pract. 2023;29(1)
3. Malik M, Zahid M, Raza A. Challenges in adherence to aseptic protocols in Pakistan's healthcare system. Pak J Public Health. 2022; 12(3):210-216.
4. World Health Organization. Infection prevention and control assessment framework in healthcare facilities in Pakistan. WHO Report. 2022.
5. Aslam M, Hussain M. Knowledge and practices of CLABSI prevention among nurses in a public hospital, Lahore. J Infect Control. 2023; 31(2):154-161.
6. Nasir U, Jamal T, Saeed A. Hand hygiene compliance in intensive care units of a tertiary care hospital in Karachi, Pakistan. J Hosp Infect. 2021; 117:105-110.
7. Akram A, Bibi S, Zahra S. Impact of training on infection control measures among nurses in Pakistan. Am J Infect Control? 2023; 51(4):331-337.
8. Hameed R, Iqbal F. Role of nurse education in reducing CLABSI rates in developing countries: A systematic review. Int J Infect Control. 2022;18(4)
9. Khan R, Sadiq S, Perveen S. Knowledge, attitude, and practices towards CLABSI prevention: A cross-sectional survey among ICU nurses in Islamabad. J Intensive Care Med. 2023; 38(2):172-178.
10. Rehman N, Farooq A. Barriers to infection control practices among healthcare workers in Pakistan. Asian Pac J Infect Dis. 2023; 15(1):89-96.
11. Ali S, Shahzad F, Khan M. Infection control practices among nurses: A comparative study in urban and rural hospitals of Punjab, Pakistan. Int J Nurs Pract. 2023;29(1)
12. Malik M, Zahid M, Raza A. Challenges in adherence to aseptic protocols in Pakistan's healthcare system. Pak J Public Health. 2022; 12(3):210-216.
13. Khan H, Ahmed S, Iqbal A. Central line-associated bloodstream infections in a tertiary care hospital in Pakistan. J Pak Med Assoc. 2022; 72(4):521-527.

14. Nasir U, Jamal T, Saeed A. Hand hygiene compliance in intensive care units of a tertiary care hospital in Karachi, Pakistan. J Hosp Infect. 2021; 117:105-110.
15. Rehman N, Farooq A. Barriers to infection control practices among healthcare workers in Pakistan. Asian Pac J Infect Dis. 2023; 15(1):89-96.
16. Akram A, Bibi S, Zahra S. Impact of training on infection control measures among nurses in Pakistan. Am J Infect Control? 2023; 51(4):331-337.
17. Aslam M, Hussain M. Knowledge and practices of CLABSI prevention among nurses in a public hospital, Lahore. J Infect Control. 2023; 31(2):154-161.
18. Hameed R, Iqbal F. Role of nurse education in reducing CLABSI rates in developing countries: A systematic review. Int J Infect Control. 2022;18(4)
19. Khan R, Sadiq S, Perveen S. Knowledge, attitude, and practices towards CLABSI prevention: A cross-sectional survey among ICU nurses in Islamabad. J Intensive Care Med. 2023; 38(2):172-178.
20. World Health Organization. Infection prevention and control assessment framework in healthcare facilities in Pakistan. WHO Report. 2022.
21. Costa CA, Araujo FL, Costa AC. Central venous catheter bundle: Professional knowledge and behavior in adult Intensive Care Units. Rev Bras Enferm. 2021;74(1)
22. Hryniewicz W, Kusza K, Ozorowski T. Preventive guidelines for vascular catheter-related infections. Int J Environ Res Public Health. 2023; 20(6):4300-4310..