

NURSE'S KNOWLEDGE AND PRACTICE REGARDING CARE AND MAINTENANCES OF PERIPHERAL INTRAVENOUS CATHETER IN TERTIARY HOSPITAL

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Abstract: *Peripheral intravenous catheters (PICs) are widely used in clinical practice, but improper care can lead to severe complications. Nurses play a vital role in ensuring safe PIC management through adherence to evidence-based guidelines. Objective: To assess the knowledge and practices of nurses regarding the care and maintenance of PICs in a tertiary care hospital in Lahore, Pakistan. Methods: A descriptive cross-sectional study was conducted among 129 nurses using a structured questionnaire. Data were analyzed using SPSS version 26, with results presented as frequencies and percentages. Results: The study revealed that 96.9% of participants correctly identified the appropriate cannula gauge for different age groups, and 90.7% acknowledged the importance of hand hygiene in preventing infections. While 96.1% reported replacing cannulas every 72 hours and 94.6% adhered to proper documentation practices, only 89.9% consistently maintained aseptic techniques. Younger nurses and those with less experience exhibited slightly lower adherence rates, highlighting the need for targeted interventions. Conclusion: Despite moderate knowledge and practice levels, significant gaps remain in critical areas of PIC care. Targeted training programs, regular monitoring, and institutional support are essential to enhance nurses' competency and ensure optimal patient care..*

Keywords: Peripheral Intravenous Catheter, Nursing Knowledge, Nursing Practices, Infection Prevention

Introduction

Peripheral intravenous catheters (PICs) are one of the most commonly used devices in clinical settings for administering medications, fluids, and nutrients. However, improper care and maintenance of PICs can lead to complications such as phlebitis, infection, catheter occlusion, and even systemic complications like sepsis. Nurses play a crucial role in ensuring the safe and effective use of PICs through adherence to evidence-based guidelines. Their knowledge and practice directly influence patient outcomes and the quality of care provided (1, 2).

In Pakistan, where healthcare systems face challenges such as resource constraints, high patient loads, and limited training opportunities, ensuring proper care of PICs is a critical concern. Studies conducted in Pakistani healthcare settings have reported a high prevalence of catheter-related infections, often linked to suboptimal nursing practices and knowledge gaps (3, 4). This highlights the urgent need to evaluate and address deficiencies in knowledge and practice among nurses to improve patient safety.

Global evidence emphasizes the importance of regular training and adherence to standardized protocols for PIC care. According to the Centers for Disease Control and Prevention (CDC) guidelines, aseptic techniques, regular site monitoring, timely catheter replacement, and proper documentation are essential for minimizing complications(5). However, a study conducted in tertiary hospitals in Karachi revealed that only 60% of nurses adhered to basic infection control measures during PIC insertion and maintenance (6). Similarly, research from India and Bangladesh reported gaps in nurses' knowledge, particularly in recognizing signs of phlebitis and ensuring proper documentation (7, 8).

The World Health Organization (WHO) underscores the role of continuous education and competency-based training in enhancing nurses' skills in intravenous therapy (9). While such initiatives are implemented in high-income countries, there is limited focus on structured training programs in low- and middle-income countries like Pakistan. A study by Ahmed et al. demonstrated that regular workshops and audits significantly improved adherence to PIC care protocols in a tertiary hospital in Lahore (10).

Despite the critical importance of PIC care, there is limited research in Pakistan focusing on nurses' knowledge and practice in this area. This study aims to bridge this gap by assessing the knowledge and practices of nurses regarding PIC care and maintenance in a tertiary hospital in Lahore. The findings will provide valuable insights to guide targeted interventions, including training programs and policy development, to improve the quality of care and patient outcomes in Pakistani healthcare settings.

Methodology

The study employed a descriptive cross-sectional design to assess the knowledge and practices of nurses regarding the care and maintenance of peripheral intravenous catheters (PICs) in a tertiary care hospital in Lahore, Pakistan. This design was chosen to provide a comprehensive understanding of the current knowledge and practices among nurses at a specific point in time.

The study population included nurses working in various departments, including medical, surgical, and cardiac wards. A total of 129 participants were selected using a convenience sampling technique. The inclusion criteria required nurses to have at least one year of clinical

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experience in PIC care and maintenance and to be actively working in the hospital at the time of data collection. Nurses on extended leave or those unwilling to participate were excluded from the study.

Data were collected using a structured and validated questionnaire designed based on existing literature and expert feedback. The questionnaire consisted of three sections: demographic characteristics, knowledge assessment, and practice evaluation related to PIC care. The demographic section gathered information about the participants' age, gender, marital status, professional qualifications, years of experience, and departmental affiliation. The knowledge section assessed their understanding of PIC-related concepts, including infection prevention, appropriate cannula use, and phlebitis identification. The practice section evaluated adherence to standard protocols, such as aseptic techniques, cannula replacement intervals, and proper documentation.

Ethical approval for the study was obtained from the institutional review board of the hospital. Participants were briefed about the study objectives, and informed consent was obtained before data collection. Confidentiality and anonymity were assured, and participants were informed of their right to withdraw at any time without any consequences.

The questionnaires were distributed to the participants during their working shifts. Adequate time was provided for them to complete the survey, and a trained research assistant was available to clarify any queries to ensure accurate responses. The completed questionnaires were collected, checked for completeness, and securely stored for data analysis.

Data were analyzed using SPSS version 26. Descriptive statistics, including frequencies and percentages, were calculated to summarize the demographic data, knowledge levels, and practice adherence. Inferential statistics were applied to identify associations between demographic variables and knowledge or practice scores. The findings were presented in tables and graphs to ensure clarity and enhance understanding.

Results

This study assessed the knowledge and practice of nurses regarding the care and maintenance of peripheral intravenous catheters (PICs) in a tertiary care hospital in Lahore, Pakistan. A total of 129 nurses participated in the study. The majority (45%) were aged 20–25 years, followed by 26–30 years (41.9%). Most participants were female (84.5%), single (53.5%), and had 1–5 years of professional experience (65.9%). Regarding qualifications, 43.4% held a Diploma in Nursing, while 34.9% had a Post-RN qualification. The majority of nurses worked in medical wards (65.9%), followed by surgical wards (27.9%) (Table 1).

The study revealed that the majority of participants demonstrated moderate to good knowledge regarding PIC care. About 96.9% of participants correctly identified the appropriate cannula gauge for adults and pediatric patients, and 82.2% knew that veins at the dorsal and ventral surface of the upper extremities are used for cannulation. Additionally, 90.7% recognized that hand hygiene before PIC insertion prevents infection, while 88.4% understood the importance of transparent dressing in identifying early signs of infection (Table 2).

The findings highlighted moderate adherence to standard PIC practices. Most participants (96.1%) reported always changing IV cannulas after 72 hours, and 92.1% immediately changed the site if signs of phlebitis were observed. Proper documentation and aseptic technique maintenance were reported by 94.6% and 89.9% of participants, respectively (Table 3).

The results indicate that while nurses have a moderate level of knowledge regarding PIC care, there are gaps in practices that need addressing. Most participants demonstrated an understanding of key concepts like hand hygiene and the use of transparent dressing but showed variability in practice adherence, particularly in maintaining aseptic techniques and proper documentation. These findings emphasize the importance of continuous training and reinforcement of PIC care protocols to enhance patient safety and reduce complications.

Table 1: Demographic Characteristics of Participants

Variable	Category	Frequency (n)	Percentage (%)
Age	20–25 years	58	45.0
	26–30 years	54	41.9
	31–35 years	15	11.6
	36–40 years	2	1.6
Gender	Male	20	15.5
	Female	109	84.5
Marital Status	Single	69	53.5
	Married	60	46.5
Experience	1–5 years	85	65.9
	5–10 years	39	30.2
	11–15 years	5	3.9
Qualification	Diploma in Nursing	56	43.4
	Post RN	45	34.9
	BSN (Generic)	28	21.7
Department	Medical Wards	85	65.9
	Surgical Wards	36	27.9
	Cardiac	8	6.2

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Table 2: Knowledge Assessment of Participants

Question	Correct Response (%)	Incorrect Response (%)	Uncertain (%)
Cannula gauge for adults and pediatric patients	96.9	0.8	2.3
Veins used for IV cannulation	82.2	8.5	9.3
Phlebitis as an identifiable infection	79.8	17.1	3.1
Hand hygiene prevents infection	90.7	7.0	2.3
Transparent dressing for infection signs	88.4	5.4	5.4

Table 3: Practice Assessment of Participants

Question	Yes (%)	No (%)	Uncertain (%)
Change IV cannula after 72 hours	96.1	0.8	3.1
Change site upon signs of phlebitis	92.1	7.9	-
Proper documentation	94.6	0.8	4.7
Maintain aseptic technique	89.9	1.9	8.5

Discussion

This study assessed the knowledge and practices of nurses regarding the care and maintenance of peripheral intravenous catheters (PICs) in a tertiary care hospital in Lahore, Pakistan. The findings indicate moderate knowledge levels and variability in adherence to best practices, consistent with previous studies conducted in similar settings.

The study revealed that 96.9% of participants were aware of the appropriate cannula gauge for adults and pediatric patients, while 82.2% correctly identified the veins suitable for intravenous cannulation. These findings are comparable to the study by Ahmed et al., which reported that 89% of nurses in tertiary care hospitals in Karachi demonstrated adequate knowledge of cannula selection and vein identification (11). However, gaps were observed in recognizing signs of phlebitis, with only 79.8% demonstrating accurate knowledge. Similar results were found in research conducted by Dasgupta et al. in India, where only 75% of nurses could correctly identify phlebitis as a potential complication (12).

In terms of practice, 96.1% of participants adhered to the protocol of replacing IV cannulas after 72 hours, and 92.1% changed the site upon observing signs of phlebitis. These rates are slightly higher than those reported by Rahman et al. in Bangladesh, where adherence to cannula replacement protocols was 88%, and site changes due to phlebitis were practiced by 85% of nurses (13). This could be attributed to the availability of resources and periodic monitoring in tertiary care hospitals in Lahore.

Despite good adherence to some practices, gaps remain in maintaining aseptic techniques, with 89.9% of participants reporting consistent practice. Saeed et al. found a similar issue in public hospitals in Karachi, where aseptic techniques were adhered to by only 82% of nurses, highlighting systemic challenges such as high patient loads and insufficient training (14). Proper documentation was practiced by 94.6% of participants in this study, aligning with findings by Ullman et al., who emphasized the critical role of documentation in minimizing catheter-related infections in clinical settings (15).

The findings also highlight the need for ongoing training and education. Ahmed et al. demonstrated that structured training programs significantly improve nurses' knowledge and adherence to PIC care protocols, reducing infection

rates by 30% in a tertiary hospital in Lahore (16). This underscores the importance of regular competency assessments and refresher courses to address knowledge-practice gaps.

Furthermore, this study identified demographic factors influencing knowledge and practices, with younger nurses and those with less experience showing slightly lower adherence rates. Similar observations were made by Zafar et al., who found that nurses with more than five years of experience were more likely to follow evidence-based guidelines for PIC care (17).

The findings of this study are consistent with global and regional trends, emphasizing the need for targeted interventions to enhance nurses' knowledge and practices regarding PIC care. Continuous professional development, policy reinforcement, and resource allocation are essential to ensure optimal patient safety and quality care.

Conclusion

This study highlights the moderate knowledge and practices of nurses regarding the care and maintenance of peripheral intravenous catheters (PICs) in a tertiary care hospital in Lahore, Pakistan. While adherence to some protocols, such as timely replacement of cannulas and site changes upon signs of phlebitis, was commendable, gaps remain in maintaining aseptic techniques and recognizing potential complications. These findings emphasize the need for targeted training programs, regular competency assessments, and institutional support to enhance PIC care practices. Addressing these gaps is critical for improving patient outcomes and reducing catheter-related complications in clinical settings.

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-9110/23)

Consent for publication

Approved

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Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

Author Contribution

MUHAMMAD HAROON (BSN Student)

Coordination of collaborative efforts. Data acquisition, analysis. Manuscript drafting, Data collection Study Design, Review of Literature.

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Conception of Study, Final approval of manuscript.

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