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Assessment of the Level of Knowledge and Practice of Peripheral Intravenous Catheters among Internee Nurses Working at Liaquat University Hospital, Jamshoro

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ABSTRACT

Hospital treatment has to involve a variety of procedures, including peripheral intravenous catheters (PIVCs), where fluid needs must be met quickly, and loading rates are high. Nursing competency is a major concern since improper treatment of PIVCs can result in problems like infections, phlebitis, etc. **Objectives:** To assess the level of knowledge and practice regarding Peripheral Intravenous Catheters among intern nurses working at Liaquat University Hospital, Jamshoro. **Methods:** A descriptive cross-sectional study was conducted from December 2025 to February 2026 among 152 intern nurses working at a tertiary care hospital in Jamshoro, and these participants were selected through a convenience sampling method. Data were collected using a structured, self-administered questionnaire, and data were analysed using SPSS version 27.0. Descriptive statistics were calculated for demographic variables, while correlation analysis was performed to determine the relationship between knowledge and practice scores of PIVCs. **Results:** Over 69.7% of the participants were males, and the mean age was 26 years. Most of the trainee nurses (63.2%) had moderate knowledge of PIVCs (mean 10.31 ± SD 2.31), and regarding practice, 60.5% of participants had moderate practice (Mean 27.79 ± SD 4.93). And this study found a moderate positive correlation (r=0.52, p<0.001) between knowledge and practice of PIVCs. **Conclusions:** The study finds that most of the intern nurses have moderate knowledge and practice levels on PIVCs, and a moderate positive correlation indicates that higher knowledge leads to better practice.

INTRODUCTION

One of the most common invasive procedures in contemporary healthcare settings is the insertion of a peripheral intravenous catheter (PIVC), which is regarded as a basic nursing skill, in order to administer fluids, drugs, blood products, and for diagnostic purposes, including blood samples. A tiny, flexible catheter is inserted into a peripheral vein [1, 2]. It is estimated that one billion PIVCs are inserted in hospital patients annually, and millions of patients globally require intravenous therapy [3]. Owing to its extensive use, PIVC management is essential for guaranteeing patient safety, enhancing treatment results, and lowering problems related to healthcare. In clinical practice, PIVC insertion and maintenance are performed mainly by the nurses; therefore, the role of nurses is vital for delivering quality care to patients [4]. In addition to inserting the catheter, nurses are in charge of monitoring the site, avoiding problems, upholding aseptic technique, and making sure the device is removed on time [5]. Furthermore, the clinical judgment and technical expertise of nurses have been demonstrated to significantly affect the effectiveness, durability, comfort, and safety of PIVCs and the patient [6]. Even though PIVC is linked to several issues that can have a detrimental impact on patients' health, it is often used, such as phlebitis, infiltration,

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extravasation, catheter occlusion, dislodgement, and infection, which are typical side effects [7]. Studies have shown that as many as 50% of PIVCs may be unsuccessful, leading to more insertions, increased patient pain, and cost. In addition, systematic reviews [8] identified that up to 70-90% of people with PIVCs might have an issue while undergoing treatment. So, in addition to increasing hospital stays, these problems can result in life-threatening infections like bloodstream infections and increased morbidity. Inadequate understanding, subpar clinical practice, and healthcare workers' disregard for conventional criteria are frequently associated with the incidence of these problems [9]. According to research, nurses' capacity to carry out PIVC treatments successfully might be severely impacted by inadequate training, outdated clinical knowledge, and a tremendous workload [10]. Higher complication rates are also a result of variances in clinical practice, such as poor catheter maintenance practices, inadequate hand cleanliness, and incorrect site selection [11]. These results highlight the significance of competency-based training programs and ongoing education for nurses. Thus, the quality of nursing care is influenced by the knowledge and practice of PIVCs) Used in clinical settings. Proper technique application, grounded in solid knowledge, helps nurses maintain evidence-based standards [12]. Research has shown that nurses who are more knowledgeable about PIVC are more likely to practice better clinically, which is associated with improved patient outcomes [13]. Following evidence-based recommendations is crucial to lowering PIVC-related problems. Strict aseptic procedures, appropriate site selection, routine catheter site evaluation, and prompt removal of superfluous catheters are all advised by international guidelines [14]. However, research indicates that healthcare providers frequently fail to follow these recommendations, which compromises patient safety and causes avoidable problems [15]. Such as phlebitis, infiltration, occlusion, catheter dislodgement, local infection, and bloodstream infections. These complications can disrupt therapy, increase discomfort for patients, extend hospital stays, and elevate healthcare costs [16]. Research indicates that almost one-third of PIVCs fail before the therapy is completed due to preventable issues linked to improper insertion and maintenance practices [17].

There are a few similar studies conducted internationally which assess nurse knowledge and practice around PIVC care, but evidence on the knowledge and practice of intern nurses or nurses in Pakistan, especially during mandatory clinical internship in a tertiary care hospital, is limited. This is crucial for determining their knowledge, self-reported practice, and educational/clinical training needs before independent practice. The objective of the study was to evaluate the knowledge and self-reported practices of intern nurses with regard to the care of the peripheral intravenous catheter (PIVC) at Liaquat University Hospital, Jamshoro. It aimed to assess their level of knowledge and self-reported level of practice about PIVC management, and to understand if there is any association between knowledge and self-reported practice among intern nurses working in this tertiary care hospital.

METHODS

It was a descriptive cross-sectional study and the level of knowledge and practice of PIVCs among internee nurses at Liaquat University Hospital, Jamshoro, Pakistan was evaluated. This study took place in December 2025-February 2026. The study involved intern nurses graduated from any private or public nursing institution and were doing their mandatory clinical internship in Liaquat University Hospital, Jamshoro. Inclusion criteria: Registered internee nurses of public or private nursing institutions, who were doing clinical internship at Liaquat University Hospital during the study period and gave written informed consent. Exclusion criteria: Nurses who did not participate because they were absent during data collection, those who refused, and those who were part of the pilot study. A minimum sample size of 152 internee nurses was calculated using the Raosoft Sample Size Calculator with the following assumptions: Population = 250, Confidence Level = 95%, Margin of Error = 5%, Response Distribution = 50%. A convenience sampling technique was employed to select an intern nurse. The data was collected through a questionnaire, which was modified from the one developed by Tegegne et al. [10] validated peripheral intravenous catheter device users' knowledge, clinical practice, and influencing factors of peripheral intravenous catheters in Dessie City public hospitals. The questionnaire included three sections: Sociodemographic data (age, gender, profession, education, and experience). The second part presented 15 questions regarding the practice of PIVC, and the third part presented 17 questions regarding knowledge of PIVC insertion, maintenance, and complications. Participants rated each of the 15 items of the scale on a frequency basis: (Always 3, Often 2, and Sometimes 1), with a total possible score of 15-45 for evaluating practice. The average practice score was 27.79 (SD=4.93) for a maximum score. Knowledge was assessed by a 17-item questionnaire on a binary scale: Yes=1, No/Don't Know=0, and total scores ranged from 0-17. A total knowledge score (range: 0-17) was obtained, and a total practice score (range: 15-45) for each participant. Total scores were reported descriptively, and all statistical analyses were performed on the total scores. A pre-test was undertaken to check the reliability and clarity of the questionnaire to be used in the data collection. Those who

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participated in the pilot study were not included in the final analysis. Regarding the scoring system we developed, we had three categories for knowledge: poor (0-8), moderate (9-13), and good (14-17), and three categories for practice: poor (15-25), moderate (26-35), and good (36-45). A structured questionnaire was given to intern nurses, and data were collected. The required institute protocol has been obtained and approved by the Head of the institute, before the administration process of data collection, to ensure that the process is in line with the institute protocol. Aims and methodology of the study were explained, and participants were told that participation was voluntary, and they could withdraw from the study at any time. Responses were kept confidential and only used for research purposes. Questionnaires were completed and recovered to ensure accuracy and completeness of the data. Data were coded and analyzed using SPSS version 27.0. The participants' sociodemographic profiles were described using frequencies, percentages, means, and standard deviations, and their knowledge and practice regarding the management of peripheral intravenous catheters were summarized. The Shapiro–Wilk test was used to determine the normality of knowledge and practice scores. The normality assumption was satisfied, so Pearson correlation analysis was used with a p-value<0.050 being statistically significant.

RESULTS

The participants, 69.7% of whom were male, and 69.1% were aged between 24 and 27 years; the majority (73.0%) were single. According to CGPA, 59.2%. were 3.0 to 3.4. In terms of placements, 30.9% of participants were assigned to the ER ward, followed by the pediatric ward at 25%. Also, the participants had moderate knowledge in 63.2%, poor knowledge in 18.4%, and good knowledge in 18.4%. In addition, the findings from the study are presented in terms of practice: 60.5% of the participants had moderate practice, while 22.4% had poor practice and 17.1% had good practice (Table 1).

Table 1: Demographic Characteristics of Participants, Knowledge level on PIVCs and Practice level on PIVCs Among Intern Nurses (n=152)

Variables	Category	n (%)
Gender	Male	106 (69.7%)
	Female	46 (30.3%)
	Total	152 (100%)
Age (years)	24–27	105 (69.1%)
	28–30	37 (24.3%)
	Above 30	10 (6.6%)
	Total	152 (100%)
Marital Status	Single	111 (73.0%)
	Married	39 (25.7%)
	Divorced	2 (1.3%)
	Total	152 (100%)
CGPA	2.5–2.9	20 (13.2%)
	3.0–3.4	90 (59.2%)
	3.5 & above	42 (27.6%)
	Total	152 (100%)
Working Unit	Surgical	26 (17.1%)
	Pediatric ward	38 (25.0%)
	ER department	47 (30.9%)
	Medical Ward	25 (16.4%)
	Other wards	16 (10.5%)
	Total	152 (100%)
Knowledge Level	Poor Knowledge	28 (18.4%)
	Moderate Knowledge	96 (63.2%)
	Good Knowledge	28 (18.4%)
	Total	152 (100%)
Practice Level	Poor Practice	34 (22.4%)
	Moderate Practice	92 (60.5%)
	Good Practice	26 (17.1%)
	Total	152 (100%)

Most of them (60.5%) practiced moderately, 22.4% practiced poorly, and 17.1% practiced well (Table 2).

Table 2: Frequency Distribution of IV Cannulation Care Practices Among Participants (n=152)

Items	Always, n (%)	Sometimes, n (%)	Not at All, n (%)
I changed the IV cannula after 72 hours of insertion	47 (30%)	29 (19.1%)	76 (50.0%)
I change the cannula immediately when signs of phlebitis appear	59 (38.8%)	87 (57%)	6 (3.9%)
I use a transparent dressing to secure the IV cannula	48 (31.6%)	87 (57.2%)	17 (11.2%)
I document date, time, site, size, and name after cannulation	48 (31.6%)	100 (65.8%)	4 (2.6%)
I use the administration set within 72 hours	27 (17.8%)	82 (53.9%)	43 (28.3%)
I am aware of complications (infiltration, phlebitis, extravasation)	49 (32.2%)	82 (53.9%)	21 (13.8%)
I maintain aseptic technique during preparation, insertion, and removal	49 (32.2%)	74 (48.7%)	27 (19.1%)
I change the dressing when wet or dislodged	46 (30.3%)	45 (29.6%)	61 (40.1%)
I educate patients on IV cannula care	24 (15.8%)	68 (44.7%)	60 (39.5%)
I educate patients on the signs and symptoms of IV infection	29 (19.1%)	77 (50.7%)	46 (30.3%)
I perform hand hygiene before IV cannulation	43 (28.3%)	85 (55.9%)	24 (15.8%)
I perform skin preparation before IV insertion	103 (67.8%)	34 (22.4%)	15 (9.9%)

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I am aware of factors influencing infection risk	110 (71.7%)	40 (27%)	2 (1.3%)
I follow institutional IV cannulation guidelines	109 (72.4%)	41 (26.3%)	2 (1.3%)
I am confident in performing IV cannulation	50 (32.9%)	34 (22.4%)	68 (44.7%)

n means=frequency and the sample % means= percentage

Most participants correctly identified key aspects of peripheral IV cannulation and infection prevention; however, notable knowledge gaps were observed in hand hygiene, patient education, appropriate glove use, and the effect of repeated cannulation attempts on infection risk (Table 3).

Table 3: Knowledge Regarding Peripheral Intravenous Cannulation and Infection Prevention Among Internee Nurses (n=152)

Items	Always, n (%)	Sometimes, n (%)	Not at All, n (%)
Cannula Gauges 14G, 16G, 18G, 20G, and 22G are Suitable For Peripheral IV Cannulation	130 (85.5%)	19 (12.5%)	3 (2.0%)
Veins for IV Cannulation are Normally Located on the Dorsal and Ventral Surfaces of the Upper Extremities	130 (85.5%)	4 (2.6%)	18 (11.8%)
Peripheral Intravenous Catheters Should be Replaced When Clinically Indicated Rather than Routinely at Fixed Time Intervals	109 (71.7%)	40 (26.3%)	3 (2.0%)
Phlebitis is the Most Identifiable Infection Related to IV Cannulation	129 (84.9%)	18 (11.8%)	5 (3.3%)
Environmental Cleanliness Influences Infection Risk	119 (78.3%)	30 (19.7%)	3 (2.0%)
Hand Hygiene Before IV Insertion Prevents Infection	72 (47.4%)	78 (51.3%)	2 (1.3%)
Maintaining Aseptic Technique During Insertion, Maintenance, and Removal of The IV Cannula Helps Prevent Infection	139 (91.4%)	9 (5.9%)	4 (2.6%)
Wearing Non-Sterile Gloves During Insertion is Advisable	48 (31.6%)	12 (7.9%)	92 (60.5%)
Skin Preparation is Required Before IV Cannula Insertion	97 (63.8%)	22 (14.5%)	33 (21.7%)
Increased Attempts at Cannulation Increase Infection Risk	59 (38.8%)	9 (5.9%)	84 (55.3%)
Transparent Dressing Helps Identify Early Signs of Infection	135 (88.8%)	13 (8.6%)	4 (2.6%)
Removing an IV Cannula When Not in Use Reduces Infection Risk	89 (58.65)	57 (37.5%)	5 (3.3%)
Staphylococcus Aureus is Commonly Associated with Infected Cannula Tips	103 (67.8%)	46 (30.3%)	3 (2.0%)
Catheter Size, Material, Duration, And Staff Experience Influence Infection Risk	117 (77.0%)	32 (21.1%)	3 (2.0%)
IV Therapy Increases Infection Risk Through PIVC	107 (70.4%)	39 (25.7%)	6 (3.9%)
Patients Receiving IV Therapy are at High Risk for Nosocomial Infection	141 (92.8%)	5 (3.3%)	6 (3.9%)
Patient Education on IV Cannula Care Reduces Infection Risk	59 (38.8%)	11 (7.2%)	82 (53.9%)

n means=frequency and the samble % means=percentage

The mean scores for both knowledge (10.63 out of 17) and practice (27.79 out of 45) reflect a moderate level of competency among intern nurses in PIVCs. The relatively modest standard deviations for both domains, 2.31 for knowledge and 4.93 for practice, indicate that responses were fairly consistent across participants, with limited variability in scores (Table 4).

Table 4: Descriptive Statistics of Knowledge and Practice Scores on PIVCs Among Intern Nurses (n=152)

Variable Domains	Total Score Range		Mean ± SD
Practice Mean	Min=15	Max=45	27.79 ± 4.93
Knowledge Mean	Min=0	Max=17	10.63 ± 2.31

Min=Minimum, Max=Maximum, SD=Standard deviation

The relationship between knowledge and practice scores was examined using Pearson correlation analysis. The mean knowledge score was 10.63 (SD=2.31), and the mean practice score was 27.79 (SD=4.93). Results showed a statistically significant positive correlation ($r=0.52$, $p<0.001$), indicating that intern nurses with higher knowledge levels in peripheral intravenous catheter management also demonstrated better self-reported practice scores (Table 5).

Table 5: Pearson Correlation Between Knowledge and Practice Scores on PIVCs Among Intern Nurses (n=152)

Variables	Mean ± SD	Correlation Coefficient (r)	p-value	Interpretation
Practice Mean	10.31 ± 2.31	0.52*	<0.001	Significant positive correlation
Knowledge Mean	27.79 ± 4.93			

DISCUSSION

This study was conducted with the aim of assessing the level of knowledge and practices of internee nurses regarding PIVCs care at Liaquat University Hospital, Jamshoro. The study revealed that the majority of participants were young (24-27 years) and male (69.7%). This is consistent with the typical profile of nursing interns, who are new to clinical practice, in their early stages of training. These demographic trends are also known from Massey *et al.* in which mostly young nurses were found who are making the shift from academic studies to their clinical practice [17]. In terms of the CGPA variable in table one, our

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study reported that 59.2% of the graduates had 3.0–3.4, indicating good theoretical knowledge. In terms of placement, the majority of internees were placed in the ER (30%), followed by 25%, which may influence their exposure to IV cannulation practices. Due to this diversity of placement, different theoretical knowledge, and workload at clinical sites, the difficulty of PIVCs implementation increases. Previous research suggests that academic achievement does not always directly translate into strong clinical competency [18-20]. These findings are similar to those of other recent studies showing moderate knowledge in this area among nurses. Comparisons can be used to suggest similar educational programs and clinical experiences, and differences between studies can be attributed to differences in training opportunities, institutional protocols, workload, and clinical resources. The findings of this study reported that 63.2% of participants had a moderate level of knowledge (mean ± SD, 10.63 ± 2.31), which showed an overall satisfactory level due to an overflow of patients and low resources. Moreover, this knowledge reflects an understanding of appropriate cannula sizes, identification of veins, recognition of phlebitis, and understanding of infection risks [21, 22]. These results are consistent with those who found that nurses generally possess adequate theoretical knowledge of IV therapy principles. In addition, earlier research conducted in KPK, Pakistan 77%, Nepal 55.2%, and Malaysia 58.8% supports our findings [23-25]. However, important deficiencies were observed in areas such as hand hygiene effectiveness, appropriate use of gloves, and the role of patient education in infection prevention, which resulted in a better outcome. Moreover, multiple studies on nurses' knowledge of PIVCs reveal moderate levels of understanding. For instance, Marsh *et al.* who similarly identified moderate knowledge among the nurses studied [15]. Furthermore, a validated 17-item knowledge questionnaire used among qualified nurses in Australia yielded a mean knowledge score of 12.4 out of 17 (SD = 2.1), reflecting a moderate level of knowledge, with a scoring range and structure comparable to those adopted in the present study. Regarding the practice of internee nurses about PIVC care standards, the current study reports that 60.5% of internees had a moderate level of practice (mean and SD 27.79± 4.93), indicating moderate compliance with recommended PIVC care standards, skin preparation before cannulation, awareness of infection risk factors, and following institutional guidelines. Our findings are in line with the findings of Osti *et al.* who reported that nurses generally perform basic aseptic procedures correctly but do not always consistently follow complete evidence-based protocols; this was due to different factors such as low resources, time constraints, and overburden [26]. On the other hand, the findings of Ethiopia reported that 84.72% of the nurses practice according to guidelines. However, previous literature highlighted by (30)emphasized that poor compliance with catheter care guidelines significantly increases infection risk and disease burden. In addition, we found a moderate positive correlation (r=0.52, p<0.001) between knowledge and practice of PIVCs scores. Studies by Tegegne *et al.* found significant differences in nurses' practice scores and a positive correlation between their general knowledge and practices in peripheral catheter care, highlighting that knowledge underpins clinical practice [10]. The findings underscore the essentiality of having structured training programmes, structured supervision, and reinforcement of evidence-based guidelines in order to enhance knowledge and practice. It is crucial to respond to these gaps in practice by providing targeted training and clinical supervision to ensure patient safety and better quality of nursing care [27-29].

This study was, however, conducted within a single tertiary care hospital; thus, the results may not be generalizable to other settings. Convenience sampling also might not capture the characteristics of the larger population of internee nurses. The study employed a cross-sectional design, which only reflects a snapshot in time and does not show any changes over time. Moreover, self-reported data can cause some overestimation of actual practice. Furthermore, the practice was not directly observed but was assessed by a self-reported questionnaire, which could have led to reporting bias, social desirability bias, and overestimation of actual clinical practice.

CONCLUSIONS

Based on the results of this study, most intern nurses possessed moderate knowledge and self-reported practice on the care of peripheral intravenous catheter (PIVC). There was a significant positive correlation between knowledge and practice ($r = 0.52$, $p < 0.001$) suggesting that with increase in knowledge, there was an increase in practice. The results suggest that intern nurses need ongoing education and competency-based training to enhance the provision of PIVC care. As this is a cross sectional study, however, causal relationships between knowledge and practice cannot be inferred.

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Authors' Contribution

Conceptualization: ARS
Methodology: ARS, HBC, AM
Formal analysis: IAC
Writing and Drafting: ARS, IAC
Review and Editing: ARS, HBC, IAC, AM, PB, SM

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

The authors declare no conflict of interest.

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