

## Nurses' Knowledge and Practice in Relation to Peripheral Intravenous Catheter Care

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### ABSTRAK

*Periferal intravena kateter (PIK) digunakan secara meluas untuk terapi dalam amalan jagarawatan klinikal. Jururawat harus mempunyai pengetahuan yang kukuh dengan amalan jagarawatan dalam pencegahan jangkitan aliran darah dalam kalangan pesakit. Tujuan kajian ini adalah untuk mengenalpasti tahap pengetahuan dan amalan jururawat terhadap penjagaan PIK. Kajian deskriptif keratan rentas yang melibatkan 84 responden telah dijalankan. Soalan selidik terdiri daripada dua domain: 11 item berkaitan dengan pengetahuan dan 15 item amalan kejururawatan. Hasil kajian melaporkan skor yang lebih tinggi dalam kalangan responden unit jagarawatan khas dengan pengetahuan ( $M = 49.19$ ,  $SD = 3.44$ ) dan amalan ( $M = 66.38$ ,  $SD = 5.15$ ), berbanding dengan responden daripada wad perubatan pembedahan dengan pengetahuan ( $M = 46.25$ ,  $SD = 4.68$ ) dan amalan ( $M = 63.17$ ,  $SD = 4.63$ ) ke arah penjagaan PIK. Terdapat perbezaan yang signifikan di antara responden daripada unit jagarawatan khas dan wad perubatan pembedahan iaitu pengetahuan ( $t = -2.641$ ; nilai  $p = 0.010$ ); dan amalan jagarawatan PIK ( $t = -2.670$ , nilai  $p = 0.009$ ). Terdapat juga perbezaan yang signifikan antara penyelia jururawat dan pengetahuan jururawat berdaftar dalam pengetahuan ( $t = -3.068$ ; nilai  $p = 0.003$ ); dan amalan ( $t = -3.325$ ; nilai  $p = 0.001$ ) ke arah jagarawatan PIK. Walau bagaimanapun, tidak terdapat perbezaan yang signifikan di antara kelayakan pendidikan, umur dan tahun pengalaman responden terhadap jagarawatan PIK dengan nilai  $p > 0.05$ . Kesimpulannya, responden daripada unit jagarawatan khas dan penyelia jururawat boleh disifatkan memiliki pengetahuan yang lebih kukuh dan amalan jagarawatan dalam penjagaan PIK di hospital swasta ini.*

Kata kunci: periferal intravena kateter, radang urat darah, amalan, pencegahan, jururawat berdaftar

### ABSTRACT

Peripheral Intravenous Catheters (PIC) are widely used. Nurses are required to possess appropriate knowledge and practice. The present study aimed to determine

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nurses' knowledge and practice towards care of PIC. A cross-sectional descriptive study was conducted and 84 respondents participated in the study. A 26-item questionnaire comprising 11 items on knowledge and 15 items related to nursing practice was adapted and modified. The findings reported higher mean score from specialty unit respondents, with knowledge ( $M = 49.19$ ,  $SD = 3.44$ ) and practice ( $M = 66.38$ ,  $SD = 5.15$ ), compared to medical surgical wards with knowledge ( $M = 46.25$ ,  $SD = 4.68$ ) and practice ( $M = 63.17$ ,  $SD = 4.63$ ) towards the care of PIC, which was significant ( $p$  value = 0.010 and  $p$  value = 0.009, respectively). The study indicated a higher mean score of charge nurse respondents as compared with registered nurse with knowledge ( $M = 49.68$ ,  $SD = 3.23$ ); ( $M = 46.20$ ,  $SD = 4.62$ ) and practice ( $M = 67.11$ ,  $SD = 4.84$ ); ( $M = 63.06$ ,  $SD = 4.61$ ), which was significant ( $p$  value = 0.003 and  $p$  value = 0.001, respectively). There were no significant differences between respondents' education qualification towards care of PIC with  $p > 0.05$ . However, the findings reported that respondents who possessed Bachelor of Nursing were deemed to score slightly higher in their knowledge and practice towards the care of PIC. In conclusion, the specialty unit and charge nurse respondents were deemed to possess better knowledge and practice towards the care of PIC in the hospital.

Keywords: peripheral intravenous catheter, phlebitis, practice, prevention, registered nurses

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## INTRODUCTION

Peripheral intravenous catheters (PIC) are widely used for therapy in current clinical practice. The Centers for Disease Control and Prevention (CDC) has stated that an estimated 250,000 catheter-related infections occur annually (O'Grady et al. 2011). The peripheral intravenous catheters are mostly used for therapy to maintain electrolyte imbalance which include fluid infusion, blood transfusion, medications, and nutritional support (do Rego Furtado 2011). The insertion of PIC requires the breaking of skin barriers to allow insertion of temporary plastic tube into a vein. This will affect the hosts' defenses against infection at the skin layers (Dougherty 2000). A previous study by Dychter et al. (2012)

highlighted that nurses' awareness of infusion-related complications can significantly affect patients' outcomes and health care costs. The study also emphasized that complications of intravenous therapy are costly in terms of patient quality of life, morbidity, mortality, treatment expense, and extended length of hospital stay.

According to the World Health Organization (WHO 2009), routine hand washing in patient care is to remove dirt and organic material as well as micro-bacterial contamination acquired through contact with patients or the environment. A study by Hadaway (2012a) claimed that nurses' lack of standardization in practice and knowledge of PIC care directly affects patients' safety risks and outcomes. There were instances where patients

experienced inadequate nursing care due to unsuccessful peripheral intravenous catheter insertion by inexperienced nurses. Another study by do Rego Furtado (2011) found that about 25% of unused peripheral intravenous catheters were placed in patients, or left there for a period of time. The standard guidelines and practice in the placement and maintenance of PIC is a major problem within the clinical setting. Several studies reported that PIC-associated bloodstream infections had endangered the hospitalized patients with prolonged hospital stay, increased cost, morbidity, and mortality (Woody & Davis 2013). Although there are guidelines on insertion of PIC, the effectiveness of the implemented guidelines in nursing and allied health professions has received relatively little attention.

The risk factors of phlebitis due to peripheral intravenous catheter can be classified into four groups: catheter-related, drug-related, patient-related, and healthcare-related (Milutinovi et al. 2015). It was reported that the incidence rate of infiltration was low but the rate of phlebitis was high. The study is consistent with findings by Maki and Ringer (1991) with phlebitis rate of 41.8%; Karadag and Gorgulu (2000) with 36.8%; and Uslusoy and Mete (2008) with 54.5%. According to Fitzgerald et al. (2012), although several physician-oriented researchers exist, the adherence and the effectiveness of implementation of guidelines in nursing context are relatively unknown.

Similar studies by Wilfong et al. (2011) and Hadaway (2012b) reported that nurses' knowledge and early

recognition of risk factors for the development of phlebitis could reduce complications. If the PIC is in situ without proper flushing and usage, it may lead to unnecessary complications and discomfort. Additionally, it would aggravate patients' discomfort, stress and loss of confidence towards nurses. With that in mind, this study hoped to gauge nurses' knowledge and practice in the prevention of PIC-associated bloodstream infections among hospitalized patients. Thus, main aim of the study was to determine nurses' knowledge and practice towards the care of the PIC.

## **MATERIALS AND METHODS**

### **DESIGN**

A descriptive cross-sectional design was conducted from April to June 2016. This hospital is a multi-disciplinary hospital with 365 beds and approximately 1,000 registered nurses. A convenience sampling of 90 respondents was recruited; 84 respondents (93%) had successfully completed the questionnaire and 6 (7%) respondents did not complete the questionnaire.

### **DATA COLLECTION AND INSTRUMENTS**

The research instrument consisted of the respondents' socio-demographic data which included age, years of experience, academic qualification, designation and department. A 26-item questionnaire was adapted and modified based on the Guidelines

For The Prevention Of Intravascular Catheter-Related Infections from O'Grady et al. (2011). It comprised 11 items related to knowledge of hand hygiene and aseptic technique, and another 15 items on practice of PIC care. Items were scored according to a 5-point Likert-type scale, which included strongly disagree = 1, disagree = 2, unsure = 3, agree = 4, strongly agree = 5. The questionnaire was piloted and Cronbach Alpha .80 was suggested that the items have relatively high internal consistency and reliability.

### ETHICAL APPROVAL

The research was approved by the Research Ethics Committee of International Medical University (IMU) (BN 1/2016: PR-05) and the Director of the private hospital in Selangor. The privacy and confidentiality of each respondent was maintained and the respondents were given the rights to withdraw from participating in the study.

### DATA ANALYSIS TECHNIQUES

Data analysis for this study was done using Statistical Package for Social Science (SPSS) version 22. The respondents' demographic data were analyzed by descriptive statistics and independent t-test to identify the association between respondents' demographic data with knowledge and practice towards the care of PIC.

### RESULT

A total of 84 respondents completed the questionnaire. The respondents' demographic data is shown in Table 1.

There were 45 (54%) respondents aged between 21-26 yrs, and 39 (46%) who were more than 26 yrs. The majority of respondents (60; 71%) possessed Diploma in Nursing, and 24 (29%) held Bachelor of Nursing qualifications. A total of 63 respondents (75%) were from medical surgical wards while 21 respondents (25%) were from specialty units. A total of 32 respondents (38%) had working experience between 1-3 years; 21 respondents (25%) had 3-5 years working experience while 31(37%) of them had more than five yrs of working experience. There were 65 (77%) registered nurses and 19 (23%) charge nurses.

The findings in Table 2 showed higher mean score from specialty unit respondents, with knowledge ( $M = 49.19$ ,  $SD = 3.44$ ) and practice ( $M = 66.38$ ,  $SD = 5.15$ ), compared to the medical surgical wards with knowledge ( $M = 46.25$ ,  $SD = 4.68$ ) and practice ( $M = 63.17$ ,  $SD = 4.63$ ) towards the care of PIC, which was significant ( $p$  value = 0.010 and  $p$  value = 0.009, respectively). The study indicated a higher mean score of charge nurse respondents as compared with registered nurse with knowledge ( $M = 49.68$ ,  $SD = 3.23$ ); ( $M = 46.20$ ,  $SD = 4.62$ ) and practice ( $M = 67.11$ ,  $SD = 4.84$ ); ( $M = 63.06$ ,  $SD = 4.61$ ), which was significant ( $p$  value = 0.003 and  $p$  value = 0.001, respectively). There was no significant difference between respondents' education qualification towards care of PIC with  $p > 0.05$ . However, the findings reported that respondents who possessed Bachelor of Nursing were deemed to score slightly higher in their knowledge and practice towards the care of PIC.

Table 1: Respondents' demographic data (n=84)

Characteristic	Variables	Respondents (n) (%)
Age	21 years – 26 years	45(54)
	More than 26 years	39(46)
Academic Qualification	Diploma in Nursing	60(71)
	Bachelor of Nursing	24(29)
Discipline	Medical Surgical	63 (75)
	Specialty units	21(25)
Years of experience	1-3 year	32(38)
	3-5 year	21(25)
	More than 5 year	31(37)
Designation	Registered nurse	65 (77)
	Charge Nurse	19 (23)

Table 2: Respondents' demographic data with the total knowledge and practice scores towards the care of PIC

Variable		Mean ± SD	t	p
<b>Discipline</b>				
Knowledge	Medical Surgical	46.25 ± 4.68	2.641	.010*
	Specialty Units	49.19 ± 3.44		
Practice	Medical Surgical	63.17 ± 4.63	-2.670	.009*
	Specialty Units	66.38 ± 5.15		
<b>Qualification</b>				
Knowledge	Diploma in Nursing	46.53 ± 4.78	-.646	.521
	Bachelor of Nursing	47.54 ± 4.76		
Practice	Diploma in Nursing	64.01 ± 4.82	-.321	.750
	Bachelor of Nursing	64.55 ± 6.12		
<b>Designation</b>				
Knowledge	Registered Nurse	46.20 ± 4.62	-3.068	.003*
	Charge Nurse	49.68 ± 3.23		
Practice	Registered Nurse	63.06 ± 4.61	-3.325	.001*
	Charge Nurse	67.11 ± 4.84		

\*p value <0.05 significant differences

## DISCUSSION

Nurses' roles and responsibilities are to ensure the delivery of optimum quality nursing care to hospitalized patients with PIC. The findings from

this study indicated that nurses' were knowledgeable and skillful in relation to the care of peripheral intravenous catheters in the hospital. Congruent with Woody and Davis (2013) study,

it was found that insertion and maintenance of the PIC are considered essential nursing skills for all practicing nurses. O' Grady et al. (2011) stated that it is important for nurses to have knowledge and good skills in nursing practice, in addition to frequent monitoring, checking and ability to identify complications associated with phlebitis, in order to prevent life-threatening consequences. According to do Rego Furtado (2011), nurses' non-compliance to the guidelines on prevention of PIC-related phlebitis was associated with the catheter insertion technique and subsequent nursing care. The process of insertion, monitoring and assessing PIC should be an ongoing nursing activity. Therefore, the role of nurses is to constantly monitor the PIC site and patients' feedback in order to ensure patients receive optimum care during hospitalization.

The findings from this study showed higher mean score of respondents from specialty units compared to the medical surgical wards in terms of knowledge and practice towards the care of PIC. A similar study by Deshmukh and Shinde (2014) reported that care of PIC demanded technical expertise, judgment skills and conscious, safe and efficient decision-making. It is a highly complex and specialized practice, and professionals who perform it should acquire theoretical and practical knowledge in continuing nursing education courses. This is supported by Glover (2000) who claimed in order to achieve continuous compliance and practice by nurses, better training, proper guidelines, and patient involvement are crucial. Furthermore,

the infection control unit from hospitals should be stringent in monitoring and complying with the standard guidelines of PIC care. Registered nurses who are assigned as infection control link persons must ensure the infection control practices are implemented effectively in the clinical setting.

There were also significant differences between charge nurse and registered nurses' knowledge and practice in this study. A charge nurse is considered an experienced nurse who has fulfilled the criteria of working more than five yrs with an excellent Key Performance Index (KPI) as required by the hospital. In accordance to the findings, charge nurses were deemed to possess better knowledge and higher practice score due to their expertise and ability to make appropriate decisions in difficult situations. This is congruent with Benner's (1984) 5 Stages of Clinical Competence. At Stage 1, a novice nurse is newly graduated at the initial stage with very limited ability to predict what might happen in a particular patient's situation. In Stage 2, as an advanced beginner, a nurse gradually acquires experience but still lacks knowledge. At this point, the nurse is guided by rules, oriented to complete nursing tasks, and requires mentor assistance in assessing difficult situations. At Stage 3, a competent nurse does not have the speed and flexibility of proficient nurses, but possess a certain level of mastery and can rely on advanced planning and organizational skills after two to three years of working experience. In Stage 4, a proficient nurse is capable to see situations as "wholes" rather than parts. It begins from three to five

working years and the nurse possess the ability to learn from experience is able to modify plans in response to different events. Finally, at Stage 5, an expert nurse no longer relies on analytical principles such as rules and guidelines to connect understanding of the situation to an appropriate action. The nurse would require more than five yrs of working experience to focus on the most relevant problems. Therefore, the findings of this study revealed that charge nurses were deemed to possess higher scores of their knowledge and practice, as supported by Benner's (1984) theory.

Respondents' academic qualification also has implications on their knowledge and practice of PIC care. Those with Bachelor of Nursing reported a higher score in knowledge and practice compared to Diploma of Nursing graduate students although statistically it was insignificant. The difference in prerequisite entry qualifications for Bachelor of Nursing and Diploma in Nursing programmes may be the contributing factors. The Bachelor of Nursing programme required students to have A-level, Malaysian Higher School Certificate (STPM) or Matriculation qualifications, whereas the Diploma of Nursing programme caters to Malaysian Certificate of Education (SPM) graduates. According to Lee et al. (2009), nurses who have higher education qualifications are better prepared to update themselves with the latest nursing practices, including the prevention of PIC complications. In the Malaysian nursing profession, there are two categories of registered nurses, namely Diploma in Nursing graduates

and Bachelor of Nursing graduates. The results of this study suggest that nurses with Bachelor of Nursing qualifications are better off in terms of knowledge and skills but this difference was not statistically significant. Perhaps a larger and more robust study would be able to confirm this.

## CONCLUSION

In conclusion, majority of the nurses possessed adequate knowledge and practice towards the care of PIC. The specialty unit and charge nurse respondents were deemed to possess better knowledge and practice towards the care of PIC in the hospital. The respondents' age and years of experience revealed no significant difference in their knowledge and practice towards care of PIC in this private hospital. Nurses should be encouraged and given the opportunity to attend continuing nursing education in order to gain more exposure to the latest nursing practice updates and increase their knowledge about PIC care.

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