

Intravenous Therapy: Nursing Students' Knowledge and Confidence

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ABSTRACT

Introduction: Intravenous therapy is important in the modern medicine. Millions of patients are receiving infusion therapy for life saving and for correcting the metabolic disorders through drugs, nutrition, solutions and blood products. As the frequent inserters of PIVC, nurses play a significant role in preventing PIVC failure and complications. Therefore, it is paramount that nurses have sufficient knowledge, confidence, and PIVC insertion and care skills.

Methods: This study was done as a descriptive method. This study was carried out in College of Applied Medical Science, Muhayil. King Khalid University, Kingdom of Saudi Arabia January 2023. The study population consisted of 132 third and final year Baccalaureate nursing students. No sampling was performed in the study, and the study was completed with 117 students who agreed to participate in the research. A structured knowledge multiple choice questionnaire was prepared to assess the knowledge level among student nurses regarding Intravenous Therapy.

Results: It shows that 26 (22.2%) having Inadequate knowledge level, 78 (66.7%) having moderate knowledge level and adequate knowledge level were 13 (11.1%). This reveals majority of the student nurses have moderate level of knowledge regarding intravenous IV therapy and the confidence level in starting IV therapy implies majority of the student nurses have moderate level of confidence in starting IV therapy, still the students need skill to improve their confidence level.

Conclusion: This suggest that students nurses need to improve the knowledge and also need to increase the practice in bedside to increase the confidence level.

Keywords: confidence, intravenous therapy, knowledge, nursing students

INTRODUCTION

To provide the best possible patient care, infusion therapy is a fast developing area of nursing practice. Many infusion therapy advancements stay confined to a small area when they ought to be distributed more widely. The dissemination of evidence via publishing, presentation, or other media in order to alter practice and enhance patient outcomes is one of the main features of the evidence-based practice (EBP) movement [1]. The most often done invasive technique by registered nurses in hospitals is peripheral venous cannulation.[2] It is a

challenging process that calls for technical expertise, knowledge of anatomy (appropriate veins and avoiding nerve and artery injury), cleanliness (aseptic method), and technical skills (Choice of size of PVC and insertion techniques).[3]

The most often used intravenous (IV) device in medical settings is the peripheral venous catheter.[4,5] Invasive treatment known as peripheral intravenous cannulation (PIC) is carried out on hospitalized patients. [6,7,8] where the patient's skin is punctured with a needle to allow insertion of a temporary plastic tube into a vein. It is a crucial

component of professional nursing practice in all healthcare facilities.^[9] It is done for a variety of reasons, including IV infusions and medication administration.^[10] The length of time it is kept varies depending on the patient's condition and the risk of microbial growth.^[7]

A hollow catheter known as a peripheral intravenous (IV) cannula is inserted into a vein to deliver medications, fluids, blood, electrolytes, and nourishment temporarily. Although being a straightforward treatment, there is a substantial danger of infection since the damaged skin and vein wall allow for direct germ entrance into the bloodstream.^[11] Phlebitis, infiltration, and thrombus development are complications that can prolong hospital stays and increase morbidity.^[12]

In modern medicine, intravenous treatment is crucial. Millions of patients use infusion treatment to prolong their lives and treat metabolic diseases using medications, food, fluids, and blood products (Poter) The most often utilized procedure in a hospital or in a community environment is peripheral intravenous cannulisation. Around 40 years have passed since the introduction of peripheral venous devices (pettit janet). Intravenous catheters are a necessary piece of equipment for today's hospitals to give intravenous drugs, blood products, and nutritional fluids. Almost all areas of healthcare use intravenous cannulisation as a critical treatment, but when done improperly, it can have its own drawbacks. Many consequences are brought on by these vascular access devices, including sepsis, intravenous (IV) phlebitis, thrombophlebitis, catheter embolism, haemorrhage, nerve, tendon, or ligament damage, and more^[13].

According to a recent scoping analysis there were differences in nurses' awareness of vascular access devices. Their investigation revealed that nurses lacked awareness of the recommended procedures for routine management of vascular access devices^[14]. Similar findings were made by another researcher who discovered that while most

nurses had acceptable knowledge and/or bad habits when it came to caring for and maintaining IV cannulations.^[15] The Infusion Nurses Society made the observation that nurses' awareness of and behaviour toward identifying risk factors for the emergence of PIT could lessen difficulties.^[16]

In order to get a representative sample of the blood that is circulating for haematological, biochemical, or bacteriological investigation, a needle must be inserted into a vein.^[17] Equipment called a vascular access device (VAD) allows patients access to their vascular systems.^[18] The most popular devices are peripheral venous catheters (PVC).^[19] The most frequent invasive hospital operation carried out globally is the insertion of a peripheral intravenous catheter.^[20] Medications, intravenous fluids, and blood products are administered using it.^[21]

When it comes to IV therapy, nurses are leading the way.^[21] IV or cannula care is only to be performed by skilled professionals adhering to stringent aseptic procedures (RCN, 2005) [Royal College of Nursing Indwelling devices]. For safe and effective practice, the Nursing and Midwifery Council (NMC) guaranteed that all practitioners must give care based on the best evidence and/or best practices, and that this information must be kept current throughout each health professional's working life.^[22] Improved nursing knowledge and skills can reduce infusion-related problems and impact patient safety, satisfaction, healthcare expenditures, and hospital stay length.^[21]

During their studies, nursing students are expected to be familiar with a number of nursing-related activities.^[3] The education of nursing students should be current, of high calibre, and consistent with their intended careers.^[23] A nursing or medical student needs a comprehensive set of theoretical knowledge and practical abilities to carry out their professions successfully.^[24] Notwithstanding the value of clinical recommendations, it is acknowledged that

there is still a knowledge gap about their adherence.^[25] Pupils' degrees of knowledge vary.^[26] It is crucial to evaluate nursing students' PVC management knowledge in order to determine their degree of understanding.^[3] Unfortunately, there is scant evidence that nursing students are knowledgeable about evidence-based recommendations for using peripheral venous catheters.^[26]

Nursing is an applied profession that calls for the right and effective blending of theoretical knowledge with application abilities. Education in nursing necessitates in-depth and broad knowledge across several disciplines. The complicated organizational structure of the modern healthcare system has an impact on the practical training of students due to the limited clinical application areas, the shortened hospital stays of patients, medical errors, patient safety, and legal regulations. When the aforementioned problems are combined with those caused by the educational system, it is sometimes difficult for students to obtain the necessary clinical experience since they spend less time in the clinical setting.^[27] Yet, despite these limitations, it is anticipated that graduates will be able to fulfil all nursing-related tasks in a thorough and accurate manner.

When students perform IV therapy skills nurse educators have opportunities to provide feedback on students' performance. Students also have an opportunity to perform skills prior to entering the complex, dynamic patient care areas after graduation. Determining what type of educational offering are most helpful for improving knowledge & confidence with IV therapy can help faculty reduce curricular gaps in program. In this context, it is expected that nursing students, who will be part of the health team in the future, should be knowledgeable about the IV therapy, study formulated to evaluate the students competence and confidence in IV therapy.

MATERIALS & METHODS

Design and Setting: A descriptive study design was adopted to assess nursing student's knowledge and confidence in administration of intravenous therapy. This research was conducted in the College of Applied Medical Science, Muhayil campus, King Khalid University, Kingdom of Saudi Arabia.

Participants: Students who is undergoing Baccalaureate nursing degree program and who is in the third and final year of studies participated in the study. There are 132 nursing students in the third and final year made up the study population. The study was completed with 117 students who agreed to engage in the research, and there was no sampling done. The students who had lecture, demonstration and clinical training regarding intravenous therapy took part and who was absent for lecture ,demonstration and training was excluded from the study.

Data Source:

Tool 1: Students basic demographic information such as age, year of study was collected

Tool 2: To evaluate the degree of knowledge among student nurses regarding intravenous therapy, a structured knowledge multiple choice questionnaire was developed. Evaluation of the Items: There were 30 items in the knowledge assessment. Each question contains four possible answers, only one of which is correct. Each item had a "one" score for the correct response, and "zero" for the incorrect response. So, given a set of 30 items, the highest possible score was 30 and the lowest score was 0. The categories for the knowledge tests include anatomy, pre-procedure preparation, needle selection, insertion, post-procedure care, and complications.

Tool 3: The Peripheral Intravenous Catheter (PIVC) Insertion Confidence Evaluation for Students consists of 10 statements; the scale

ranges from 1-Never Confident to 4-Everytime Confident. The nursing students were invited to complete a questionnaire supplied using Google Form after being informed about the study.

Ethical Principles of the Study

After explaining the research to the students, their verbal agreement was gained. Students who were willing to participate in the study and who were enthused about it were told that it was secret and that their data would only be utilized for research purposes.

STATISTICAL ANALYSIS

Descriptive statistics were used to describe the level of knowledge and confidence level in administration of intravenous infusion among nursing students. The internal consistency of all items of the questionnaire was measured by Cronbach's alpha

reliability test. Statistical analysis was done using IBM SPSS version 20

RESULT

Table 1: Characteristics of the respondents (n = 117)

S. No	Item	Percentage
1	Age : 19 20	40 60
2	Year of the student 3 rd year 4 th Year	40 60
3	Gender Female	100
4	Course Baccalaureate Nursing	100

The study included third- and fourth-year students, with 60% of the fourth-year students participating and 40% of the third-year students. In terms of age, 60% of the students were 20 years old and 40% were 19 years old. All of the participants were female and enrolled in a baccalaureate nursing program (Table1).

Table 2: Knowledge level among student nurses regarding Intravenous Therapy

Level of Knowledge	Range	Frequency	Percentage
Inadequate Knowledge	0-10	26	22.2
Moderate Knowledge	11-20	78	66.7
Adequate Knowledge	21-30	13	11.1

According to Table 2, there were 26 (22.2%) people with inadequate knowledge, 78 (66.7%) people with moderate knowledge, and 13 (11.1%) people with

adequate knowledge. This indicates that the majority of nursing students have a good amount of understanding about intravenous IV therapy.

Table 3: Mean and standard deviation of knowledge level regarding Intravenous Therapy among student nurses

Level of Knowledge	Mean	Standard Deviation	Minimum	Maximum
	16.22	4.447	5	30

According to table 3 above, among student nurses, the mean and standard deviation values for knowledge level were 16.22 and

4.447, respectively. This indicates that most nursing students have a fair amount of understanding about intravenous therapy.

Table 4: Students' Peripheral Intravenous Catheter (PIVC) Insertion Confidence Assessment

Items	Mean	SD
Start an IV within 1 or 2 attempts.	2.99	1.021
Select the most appropriate catheter for the prescribed treatment plan.	3.26	0.885
Assist my peers with difficult IV starts.	2.86	1.016
Select an ideal vein for peripheral IV access.	3.08	0.911
Prepare the insertion site per hospital protocol	3.30	0.864
Insert the catheter correctly.	3.26	0.986
Advance the catheter correctly.	3.28	0.879
Remove the needle stylet with minimal blood exposure.	3.44	0.770
Dress and secure the IV catheter and tubing per hospital policy.	3.56	0.747
Document my IV insertion per hospital policy.	3.50	0.877

The information in table 4 above demonstrates that there was high confidence in the removal of the needle stylet, securing and dressing of the IV catheter, and documentation. The confidence level was moderate with regard to vein selection, site preparation, catheter insertion, and advancement. The other component, such as starting the IV line in one or two attempts and helping a peer with a challenging IV start, had low confidence. This demonstrates that the ability needs to be improved to

boost the level of confidence while initiating the IV line.

Table 5: Mean and standard deviation of confidence level regarding insertion of Intravenous Therapy among student nurses

Mean	Variance	Std. Deviation	N of Items
32.54	33.992	5.830	10

The confidence level shown in Table 5 for initiating IV therapy suggests that the majority of student nurses have a moderate level of confidence in initiating IV therapy; however, students still need to develop their confidence level.

Table 6: Reliability of the confidence scale regarding insertion of intravenous therapy

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.846	.848	10

The scale used to determine the level of confidence is High reliability (0.846), as shown in Table 6.

Table 7: Coefficients of confidence regarding insertion of intravenous therapy

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
	(Constant)	1.291	.307				4.205
Start an IV within 1 or 2 attempts.	-.082	.071	-.147	-1.155	.251	-.223	.059
Select the most appropriate catheter for the prescribed treatment plan.	.155	.081	.241	1.906	.059	-.006	.316
Assist my peers with difficult IV starts.	.272	.068	.485	3.971	.000	.136	.407
Select an ideal vein for peripheral IV access.	-.147	.074	-.235	-1.992	.044	-.293	-.001
Prepare the insertion site per hospital protocol	-.020	.071	-.030	-.276	.783	-.161	.122
Insert the catheter correctly.	-.114	.085	-.198	-1.345	.181	-.282	.054
Advance the catheter correctly	-.103	.095	-.159	-1.081	.282	-.291	.086
Remove the needle stylet with minimal blood exposure	.046	.086	.062	.527	.599	-.126	.217
Dress and secure the IV catheter and tubing per hospital policy.	.024	.084	.032	.290	.773	-.143	.192
Document my IV insertion per hospital policy	.155	.063	.239	2.453	.016	.030	.280

Table 7: This shows that the student nurses have confidence in IV cannulation when the peer group assist them in difficult IV start, select an ideal vein for peripheral IV access and document the IV insertion procedure according to the hospital policy, the remaining steps they are not having confidence this shows that they need intense training.

DISCUSSION

The patient who is admitted to the hospital as well as the community in the future are entirely and totally the responsibility of the student nurses. The goal of the current study

was to evaluate student nurses' knowledge and confidence regarding IV therapy. In the current study, it was discovered that there were 26 (22.2%) participants with inadequate knowledge, 78 (66.7%) with moderate knowledge, and 13 (11.1%) with adequate knowledge. This indicates that most nursing students have a basic understanding of intravenous IV therapy.

To determine the level of knowledge and practice about intravenous cannulation researcher conducted a descriptive cross-sectional study on 290 staff nurses at a Tertiary Care Hospital at the Delta Medical College Hospital, Bangabandhu Sheikh

Mujib Medical University, in Dhaka, Bangladesh. The majority of nurses, 49.7%, had good knowledge levels, followed by 25.5% of nurses with average knowledge, 21.7% of nurses with exceptional knowledge, and 3.1% of nurses with bad knowledge. Regarding the indications and contraindications for IV cannulisation, approximately 53.8% had poor knowledge, followed by 39.3% who had average knowledge and 5.9% who had good knowledge. Just 1.0% had exceptional knowledge in this area. Just 12% of respondents had poor practice, whereas 73.33% had average practice, 12% had good practice, and about 2.67% had excellent practice.^[28]

A study with a sample size of 250 nurses was done to evaluate their expertise. The study revealed that 25% of the samples conducted cannulisation well but were unaware of the complications associated with peripheral venous cannulisation, and that 42% of the samples did not care about aseptic techniques.^[29] Another study compared the IV cannulisation expertise of nurses with and without graduate degrees. The study revealed that 57.6% of graduates completed IV cannulisation aseptically compared to 32% of undergrad nurses, and that almost half of graduate nurses had insufficient information concerning complications such as infiltration and phlebitis.^[30]

The other component, such as starting the IV line in one or two attempts and helping a peer with a challenging IV start, had low confidence. This demonstrates that the ability needs to be improved to boost the level of confidence while initiating the IV line.

The outcomes of this study about the degree of student nurses' confidence in IV cannulation were quite interesting. Low confidence made it difficult to start an IV line in just one or two tries and help a peer with a challenging IV start. This suggests a need for enhanced instruction, including better vein recognition. Methods like using a "vein visualiser" or inserting under

ultrasound guidance may also be taken into consideration.^[31,32,33]

The removal of the needle stylet, fastening and dressing the IV catheter, and documentation all revealed high levels of trust. The confidence level was moderate with regard to vein selection, site preparation, catheter insertion, and advancement.

The majority of PIVCs were placed by nurses (65%), the forearm was the most popular location for PIVC placement in North America and Asia (50%), and 12% of patients had at least one phlebitis symptom, including pain (3%) and erythema (3%) according to the findings of this study, which were supported by a study conducted by another researcher.^[34] In addition, in the audit, just a few PIVCs were placed on general wards, and all dressings were clean and intact. In the audit, 91% of PIVCs were placed on general wards. In the study, 9% of patients from Western Europe had gauze and tape applied, which represents regional variations in therapeutic practice.^[34] However, there is a lack of evidence about recommendations for PIVC dressings.^[35]

The existing educational system may need to place greater focus on vein selection and insertion techniques, and student hands-on practice is crucial for boosting confidence. The effectiveness of the direct observation of procedural skills approach will, however, also impact clinical education outcomes, such as nursing students' confidence in PIVC insertion and care

CONCLUSION

It is crucial to have skilled nurses who can properly start IVs on time as the demand for healthcare rises and patient happiness is sought for. This will speed up medical treatment, enhance patient satisfaction, and improve patient outcomes. This study was done to evaluate the level of IV success knowledge and confidence among student nurses. According to the study's findings, the majority of the students have a decent level of expertise, and the success rates of IV starts were similarly high among the

nurses who responded to the survey. This suggests that nursing students need to strengthen their knowledge and bedside practice in order to boost their confidence.

Declaration by Authors

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