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A study to assess the effectiveness of infusion experts on the nursing interventions of peripheral intravascular devices among patients admitted to a tertiary care hospital of the city

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Abstract

Aim: The study aimed to scrutinize best practices in infusion nursing among the nurses in a private tertiary care center hospital in Mumbai, India.
Materials and Methods: A total of 400 IV cannulation were evaluated on the basis of the IV therapy monitoring chart among the nurses. 20 nurses were included in the study. 10 IV cannulation of each nurse was assessed and then infusion expert training was imparted to them with 4 days training in which pre and post evaluation of knowledge test was done. Later 10 IV cannulation from the same experts were evaluated to see the effectiveness of training. The evaluation was based on Visual Thrombophlebitis Score (VTS) and rate of grades of phlebitis.
Result: The result of knowledge score of the nurses regarding infusion practices were evaluated and it was found in the pre-test that 65% of nurses were rated average and 35%poor.After infusion expert training, knowledge of nurses was re-evaluated and it was increased. It was found in the post-test that 55% of nurses were rated average and45%good. The training also showed a significant difference of $p < 0.05$ in the phlebitis grade, whereas in pre-evaluation grade 3 phlebitis was found but after training grade 0 has increased, which indicates an improvement in the IV cannulation practices.
Conclusion: Infusion nursing is the newer perspective and primary need of the patient in the hospital. Infusion experts are the skilled nurses for phlebotomy and maintenance of IV line. The study paved to fulfill our nursing vision in the verticalization of infusion nursing by their best practices in our hospital.

Keywords: Visual Thrombophlebitis score, Infusion nursing, Phlebitis, Infusion experts, Intravenous cannulation.

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1. Introduction

Infusion nursing verticalization is the vision of nursing in our hospital and to fulfill the vision there are infusion experts who work round the clock with patients and provide competent and best practices in the field of infusion nursing in the hospital. Infusion experts are supported by Infusion Nursing Society (INS) and Centers for Disease Control and Prevention (CDC) guidelines for the specialized team in the hospital to prevent complication in infusion therapy.

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It is evidenced that specialized trained IV experts, handling the peripheral catheters lead to reduce the risk of infection and rate of thrombophlebitis. Infusion experts provide good skillful insertion of IV cannula and maintenance. Infusion experts have highly specialized from the insertion of IV cannula till the removal of the, and they will more emphasize on the selection of site, size of IV cannula and maintenance throughout the hospitalization [1, 2, 3].

Infusion experts should be more innovational and evidence-based oriented for the current advancement of infusion practices. Vascular access procedures are the invasive procedure and many a time this is the first invasive procedure patient encounters. The confidence of infusion expert and patient approach will also be the major factors for healthy infusion practices. Peripheral venous

access is the easiest and preferred one in the hospitalization for blood collection, administration of medications, fluids, blood products, and chemotherapy. Sample collection can be performed during cannula insertion, and cannula also provides access for administration of medication and fluids. It has a higher risk to develop an infection, site irritation and other complications, which can be prevented by effective infusion practices. [4, 5]

Knowledge and skill of a person completely reflect on the fruitful insertion of the cannula and healthy maintenance of IV cannula throughout the hospitalization with minimum complication and effective patient outcome with the treatment.

Objectives:

1. To assess the knowledge and practice of intravenous cannulation among nurses.
2. To evaluate the effectiveness of infusion expert course on the knowledge and practice of intravenous cannulation among nurses.
3. To correlate the VIP score with the selected demographic variables of the patient.

Need of the study

Intravenous (IV) cannulation is the commonest and first invasive procedure among hospitalized patients. It is however associated with risks and complications that can delay the prognosis and have an adverse impact on the clinical outcome of the patient.

In the most healthcare setting, short Peripheral Intravenous Catheters (PIVCs) are a critical tool in the delivery of patient care. A study reported in the Journal of Infusion Nursing, found an overall complication rate for PIVCs in place for 96 hours to be close to 50%. Current data available on PIV-BSI (Peripheral Venous Catheter – Blood Stream Infection) suggest incidence density rate of 0.2-0.7 episode per 100 device days, which appear low when compared with other catheters. However, some studies report absolute PVC-BSI numbers in the range of central line-associated infections [16, 17, 18].

More research is needed both to capture the dimension of the problem and to provide efficient control measures, so the researcher felt the need to do this study.

2. Material and methods

Research approach- For the above study we adopted a quantitative research approach.

Research Design- The research design adopted for the study was one group pre-test, post-test design.

Independent variable- IV Therapy Refresher Course for a group of nurses

Dependent variable– The IV cannulation skills of nurses reducing the incidence of thrombophlebitis.

The setting for the study was conducted at Dr. L H Hiranandani Hospital, Hiranandani Gardens, Powai, Mumbai, India 400076.

Sampling technique- The sampling technique will be adopted for the study is Non-probability convenient sampling Technique.

Sample size: The study was conducted on 400 IV cannulation done by 20 Nurses in the IV team.

Tool

(a) Intravenous therapy monitoring chart and the visual thrombophlebitis score.

(b) Structured questionnaire

Inclusion criteria:

- Staff nurses working in Dr. L.H. Hiranandani Hospital
- Staff nurses who are willing to participate in this study
- The nurse who can read and understand English

Exclusion criteria: Nurses who had attended any other training in IV therapy.

Data collection: Data was collected using the IV Therapy monitoring Chart from 200 IV cannulation done by 20 nurses prior to IV training. A 4 days IV Therapy Refresher course was conducted where the 20 nurses were trained with theoretical & Practical aspects of IV Therapy. Pre and Post evaluation of knowledge was done with structured questionnaires. Post training, 200 more cannulation performed by these 20 nurses were taken and assessed using the IV Therapy monitoring chart.

Data analysis: Data analysis was done by using descriptive and inferential statistics. Mann Whitney test was used in order to analyze data, and the level of significance was found to be corresponding to $p<0.05$. Fisher's exact test for the association of phlebitis grade with selected demographic variables.

3. Result

The present study was conducted to assess the effectiveness of infusion experts in the reduction of thrombophlebitis rate and give best practices in infusion nursing. 20 nurses were included in the study in which each of their 10 IV cannulation records was evaluated with the IV therapy-monitoring chart in the month of January and February 2018. Then infusion expert training was imparted to them in the month of March 2018. Before and after the infusion expert training, knowledge of nurses on infusion practice was evaluated on the basis of a structured questionnaire. Post-training again 10 IV cannulation records were evaluated in the month of April and May 2018.

The study was conducted in different phases in which the first section of the study was the patient's demographic data which includes patient age, gender, IV cannula size, IV cannula site, medication administered. Then the ongoing assessment was done during each shift to evaluating the rate of thrombophlebitis among the patient admitted to the hospital by an infusion expert before and after the training.

Table 1 shows the variables of the patients who were cannulated during the hospitalization. Out of the total pre-training IV cannulation, the maximum was for female patients (104), whereas the total post training IV cannulation included maximum male patients (133).

In pre-training IV cannulation records, the 20G cannula was used maximum whereas after the training the short gauge cannula 22G were used more. The patients in both the groups had a majority of left-hand IV cannulation, which is the non-dominant hand of the patient. The antibiotic administrations were more in both the groups as compared to other medications.

Table No. 1: Variables of Patients in the pre-test and post-test.

Variable	Pre Test	Post Test
Gender (A) Male	96	133
(B) Female	104	67
IV Cannula Gauze(A)18G	3	3
(B) 20G	110	88
(C) 22G	82	108
(D) 24G	5	3
IV Site (A) Left Hand	120	111
(B) Right Hand	80	89
Medications A)Antibiotics	103	88
(B) Steroids	7	23
(C) Antipyretics	29	2
(D) Others	8	9

Present study states, there is the highly significant difference between pre and post-training phlebitis grade as the p-value is <0.05(Mann Whitney test). It indicates that the team of infusion experts after the refresher course was effective in reducing the incidence of Phlebitis among the patients. It also states that there was no significant correlation between the Phlebitis grade and demographic variables of patients.

Table No. 2: Knowledge score of infusion training

Marks Obtained	Pre Test %	Post Test %
0-10 (Poor)	35	0
11-20 (Average)	65	55
21-30 (Good)	0	45

The result of knowledge score of the nurses regarding infusion practices was evaluated, and it was found in the pre-test that 65% of nurses were rated average and 35%poor. After infusion expert training, knowledge of nurses was re-evaluated and it was increased. It was found in the post-test that 55% of nurses were rated average and 45% good. Thus, the training was effectively showing a considerable increase in the knowledge level of nurses in improving their IV cannulation skills.

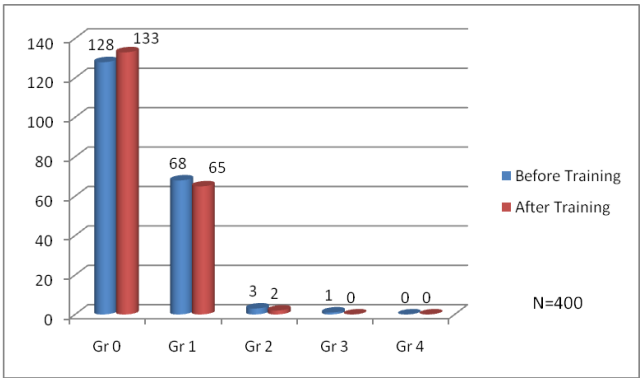

Figure No. 1: Comparison of the incidence of phlebitis before and after training.

The bar diagram figure 1 showed that there is a significant reduction in the rate of thrombophlebitis among the patient after the training of infusion experts. Before training, grade 0 in VTS was 128 and it was gradually increased after the training up to133. Where grade 1 was reduced from 68 to 65 and grade 2 also reduced from 3 to 2. Grade 3 was found before the training which was not found after the training.

4. Discussion

An analysis of the data has helped the investigator to get a clear understanding of the study undertaken. The interpretation drawn from the findings of the study were based on the objectives of the study.

The knowledge related to infusion practices regarding cannula size selection, site of insertion, maintenance of cannula line, assessment of phlebitis and prompt management of any signs of phlebitis were inadequate. The majority of nurses were not aware of the indwelling duration of cannula and current infusion practices, which gave rise to an increasing need for ongoing training. Though the knowledge of nurses was not up to the mark but after training it was improved. While performing IV cannulation the skill of the nurses was not adequate, and they were not adhering to the standards. All these factors like site selection, cannula size, indwelling time, cannula material, vein selection, and others account for an increase in the incidence of phlebitis.

Similarly, in this study, it was found that knowledge and practices regarding IV cannulation were inadequate. Training and follow up resulted in a remarkable improvement in the skillful cannulation in the hospital [7, 8, 9].

Infusion nursing newer perspective in nursing which brings the quality of care among healthcare professionals. In the study, it was shown that the pre-knowledge of the nurses regarding infusion practices was 35% poor and 65% average which was not up to the mark and then training was provided, and their knowledge has been gradually

increased up to 45% good and 55% average which was a good achievement. Similarly, in other studies also it was noted that pre-knowledge of nurses regarding infusion practices was less which directly reflects on the complication of IV cannulation. After the training Knowledge of nurses improved and their practices also improved and which resulted in decreased in the complication like phlebitis and others [2, 6, 15].

Clinical practices always play a vital role throughout the hospitalization. A best practice to show about any procedure is to minimize the complication of it. Intravascular cannulation if not done skillfully then there are chances of more complications. In our study also the phlebitis rate was noticed high before the training but after the training, it was decreased and gradually the practice of experts in cannulation was improved. Hence these showed good improvement in maintenance of IV line and reduction of complication and indwelling time. It was noted in the other studies too that experts in cannulation and maintenance will reduce the complications of IV cannula [10, 11].

Infusion experts team can take a lead in the prevention of complication, healthy insertion of line, evidence-based practices to follow, take in research activities, data collection. They can educate staff as well as a patient for maintenance of IV line and preventive aspects of complication. Their role is tracking cannulation, checking records of infection, regular audits, participating in research. The main things are needleless connector used and scrub the hub done, or the highly slandered practices were followed or not. Adequate use of materials and they should check adherence of sticking and indwelling time along with cannula placement time and other documents as per the hospital protocol [12, 13, 14].

Although the results show the development of phlebitis does not rely solely on nurses' practices. It is concluded that nursing professionals can have an important role in the prevention of phlebitis, reducing the number of risk factors through vigilance and compliance with guidelines. The careful selection of the cannulation site and total indwelling time is also an important risk factor for phlebitis. Moreover, in this study, it was found that the majority of the nurses were having poor knowledge but after the training, it was improved. In phlebitis, before training grade 1 was more, and grade 3 was noticed but after the training, it was improved and grade 0 were more and no grade 3 was noticed.

Initially, IV cannulation was done without expert knowledge, which led to the selection of inappropriate cannula size, improper site of cannula insertion and other factors which resulted in an increase in thrombophlebitis rate.
After the training, the improvement was found in proper cannula selection, cannula site and other factors contributing to thrombophlebitis were considered throughout. The rate of thrombophlebitis decreased and good infusion practices were evidenced.

Conclusion

The findings of this study show that there is highly statistical significant relation difference between pre and post-training phlebitis grade and no significant relation between the selected patient variables and phlebitis. Infusion nursing is the newer perspective and primary need of the patient in the hospital. Infusion experts play a vital role in phlebotomy and maintenance of IV line, and the study paved to fulfill the nursing vision of verticalization in infusion nursing with best practices in our hospital.

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