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Original Research Article

Impact of rigorous nursing training and reinforcement on incidence of thrombophlebitis at tertiary care centre

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ABSTRACT

Background: Peripheral venous cannulation (PVC) is one of the commonest procedures carried out in hospital. It allows rapid and accurate administration of medication. However, there is dearth of formal training to nurses There are few studies which has shown benefits of offering formal training to improve clinical practice and patient care.
Methods: In view of rising cases of thrombophlebitis, nurses were trained in hand hygiene, patient skin preparation, wearing gloves and aprons, establishing a clean environmental field, using sterile equipment, disposing of contaminated or soiled equipment and linen appropriately, safe disposal of sharps and adherence to universal precautions. Retrospective, observational, single centre study to analyse data of inpatients for 4 years duration was carried out. This included 2 years data prior to offering nursing training and 2 years post training.
Results: There is statistically significant improvement in number of thrombophlebitis event for 2 years prior and 2 years post training. Total events in 2 years prior to training were 63 which reduced to 22 in later 2 years due to nursing training. A p value was 0.0297. Out of total 87 thrombophlebitis incidences, 40 and 47 incidences in males and females respectively were observed. Mean age for men was 58.39 and mean age for female was 52.62 with SD 27.39 and 22.06 respectively.
Conclusions: When nurses were trained in patient assessment, Insertion site selection (prefer hand and forearm; to avoid joints and lower limbs), catheter selection, dwell time, early identification of phlebitis and appropriate corrective measures and compliance with best practice guideline, thrombophlebitis rates drastically reduced.

Keywords: Nurses training, Peripheral venous cannulation, Thrombophlebitis

INTRODUCTION

Peripheral venous cannulation (PVC) is one of the commonest procedures carried out in hospital. It allows rapid and accurate administration of medication.[1] However, there is dearth of formal training to nurses There are few studies which has shown benefits of offering formal training to improve clinical practice and patient care. Proper education in this area has shown encouraging results in reduction of cross-infection, improve hospital hygiene and help combat nosocomial infections.[2]

There are hardly few studies which has compared impact of training such as knowledge, confidence, and skills of staff nurses versus no such formal training. Also, there is need of proper studies comparing those who receive more extensive education versus those received little formal training. Few studies concluded that knowledge, confidence, and skills of nurses has direct proportional

impact on first attempt success and that if nurses are trained in such aspects to patient complication rates are less observed.[3-5] There are few studies which have identified knowledge and insertion skill deficits. Knowledge is also deficit in patient assessment, catheter selection and insertion, complication identification, insertion site selection, catheter securement, dwell time, and treatment, and compliance with best practice guidelines.[3,5,6-9]

This is known fact that Learners would able to perform better in collaboration with more experienced compared to when they would be doing it alone.

Though few studies have depicted the dire need of such formal training, innovative peripheral vascular access education is seldom. Some researchers have explored technological solution such as effective simulation tools for PIVC insertion training.[10,11] More recently, few researchers have studied technology versus traditional methods.[12,13]

METHODS

Aim of this study was to the primary aim of the study was to determine impact of nursing training as intervention strategy on outcome of Peripheral venous cannulation. Design and Methodology the study was conducted at Bhaktivedanta hospital and Research Institute which is 200 beded multispecialty tertiary care centre, at Mira Road, Thane, Maharashtra, India. It was a retrospective, observational, single centre study to analyse data of inpatients for 4 years duration.

This included 2 years data prior to offering nursing training and 2 years data, post nursing training with respect to best practices of Peripheral venous cannulation. Baseline measurements included analysis of incidence forms pertaining to cases of thrombophlebitis submitted to nursing dept. Thrombophlebitis was graded according to phlebitis grading scale. Authors intend to analyse effectiveness of Nursing Training as intervention strategy to improve incidence of thrombophlebitis cases

Inclusion criteria

- All age group patients
- Both gender Patients
- Patients with intravenous cannulation in hospital stay.
- Patients for whom thrombophlebitis grading is available.

Exclusion criteria

- An inherited blood-clotting disorder
- Being immobile for long periods, such as during an injury or a hospital stay
- varicose veins
- Have a family history of a blood-clotting disorder or a tendency to form blood clots

Intervention and assessment of intervention

In view of rising cases of thrombophlebitis, Bhaktivedanta hospital and Research Institute administration arranged 3 months nursing training program to address the issue. Nurses were trained in hand hygiene, patient skin preparation, wearing gloves and aprons, establishing a clean environmental field, using sterile equipment, disposing of contaminated or soiled equipment and linen appropriately, safe disposal of sharps and adherence to universal precautions. Assessment of knowledge using verbal interview was conducted. Actual training by investigators using a training module consisting of PowerPoint presentations, videos and hands-on training on a manikin was conducted. The discussion contained theoretical as well as practical aspects and was active in nature.

Data collection

As per the standard operating procedure of nursing care at the Institute, incidence form is filled and submitted to head nurse by treating nurse whenever there is occurrence of thrombophlebitis. In incidence form, treating nurse mentions patient demographics, date of occurrence of thrombophlebitis, grade of thrombophlebitis, intervention administered to treat thrombophlebitis, name of nurse administering intervention, history of medical illness which may be predisposing factors for thrombophlebitis. Head nurse inspects the case as soon as incidence form is received and follows up till resolution. Follow up details are recorded in Incidence form. Head nurse also interviews patient to note, if there are any predisposing factors for occurrence of thrombophlebitis. Following mentioned standard grading system is used while grading thrombophlebitis. (Jackson's Visual Infusion Phlebitis scale was used to assess grades of phlebitis and Pain assessment scales (FLACC, FACES or Numerical rating pain scale) were used to determine intensity of pain in response of phlebitis).

- Grade 0 No symptoms,
- Grade 1 Erythema at access site with or without pain,
- Grade 2 Pain at access site with erythema and/or oedema
- Grade 3 Pain at access site with erythema and/or oedema, streak formation, palpable venous cord
- Grade 4 Pain at access site with erythema and/or oedema, streak formation, palpable venous cord greater than one inch in length and purulent drainage, Fever.

Ethical considerations

Approval from in-house Institutional Ethics Committee was taken before initiation of study.

Statistical analysis

Descriptive statistical analyses were performed for the study sample. This is retrospective observational study. The numeric data was summarized by descriptive statistics like; n and Mean±SD. The Gender and Age distribution was presented in percentage, mean and SD respectively. Chi-square test was used to assess significant between before training and after training event with year wise at 5% level of significant.

RESULTS

Thrombophlebitis incidences forms for two years prior and 2 years post intervention were studied. Table 1 depicts demographic characteristics of total 87 patients studied who experienced thrombophlebitis while in hospital stay.

Table 1: Demography of the study population.

Parameter	Male	Female	Total
Gender@	40 (41.25)	47 (58.75)	87 (100)
Age*	58.39 (27.39)	53.42 (21.49)	52.62 (22.06)

*: Mean (SD) @: N (%)

Table 2 depicts impact of impact of nursing training as intervention strategy on outcome of Peripheral venous cannulation.

Table 2: Comparison of thrombophlebitis event before and after training.

Study group	Number of thrombophlebitis event (year)		p-value
Before training	33 (2014)	32 (2015)	0.0297
After training	17 (2016)	5 (2017)	

DISCUSSION

Peripheral intravenous catheter insertion remains a fundamental nursing skill that is largely learned during the post educational period in the clinical setting.[3] Rigorous training and reinforcement mechanisms must be instituted in health care organizations to ensure continuous clinical proficiency with this skill.

Nurses need to acquire knowledge and skill in various aspects of PVC

- Patient assessment (Age extremes of age makes cannulation difficult; contour and texture of skin-peripheral veins tend to slip in thin and dry skin, while in obese patients' visibility is an issue)
- Insertion site selection (prefer hand and forearm; to avoid joints and lower limbs)
- Catheter selection (depending on quantum, osmolality and duration of infusion fluids; large quantity with multiple injections with high osmolality require large bore cannulas)
- Dwell time (duration for which the patient needs I.V. medication)
- Early identification of phlebitis and appropriate corrective measures
- Compliance with Best practice guidelines.

Complications other than Phlebitis may also occur:

- Misplacement leading to infiltration of subcutaneous tissue
- Catheter dislodgement
- Catheter occlusion.

However, the most common and distressing complication of PVC is Phlebitis. Phlebitis occurs due to inflammation of the tunica intima of the superficial vein. Thrombophlebitis literally means (thrombus-clot, phlebitis-inflammation of the vein) i.e. inflammation of the vein due to clot formation. Phlebitis occurs due to 3 reasons

- Mechanical: due to rupture of the superficial vein or trauma due to friction and subsequent venous inflammation
- Chemical: drugs with lower ph are known to cause inflammation like Pottassium infusions, amiodarone infusions, antibiotics (due to low ph), total parenteral nutrition (high osmolarity)
- Infective phlebitis: occurs due to introduction of Bacteria into the vein allowing colonisation of inflammatory debris. This primarily occurs due to poor training of health personnel regarding asepsis i.e. improper hand hygiene (commonest preventable cause for phlebitis), improper handling of the cannula, inappropriate cleansing of the skin prior to PVC.

Another important factor is the total financial burden that is incurred due to improper PVC or it's related complications. Certain research has shown from 2.18to 2.35 PVC insertion attempts to secure a patent peripheral line (14-15). The chances of successful 1st attempt is better with more experienced nurses than with health care workers with inadequate training especially hands on training at the bedside.

Most important factor is the discomfort and pain endured by the patient. To quote few examples,

- A patient suffering from an acute anterior wall Myocardial Infarction with ventricular tachycardia would heal well post coronary angioplasty by day 4 or day 5 but return home with a sore hand due to peripherally injected IV Amiodarone.
- A patient undergoing laproscopic cholecystectomy would go home with a healing abdomen but a sore

hand due to antibiotics infused through an improperly placed PVC.

Hence the compelling need to have a robust, evidence based educational strategy to empower our health care providers with knowledge confidence and skill for PVC insertion to maximise patient comfort and outcomes in this area. Many researchers have explored on blended learning techniques combining didactic demonstration, simulation-based learning tools to a see one do one training technique.

There are certain limitations of the present study. As the study was conducted in a single private hospital, it limits generalizability. Conduct of the study in more diverse settings/populations would certainly further refine for its more general applicability.

CONCLUSION

When nurses were trained in Patient assessment, Insertion site selection (prefer hand and forearm; to avoid joints and lower limbs), Catheter selection, Dwell time, Early identification of phlebitis and appropriate corrective measures and Compliance with Best practice guideline, thrombophlebitis rates drastically reduced.

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