

# Pictorial Flashcard Regarding Self-Care of Peripheral Intravenous Cannula (PIVC): Is it Effective in Terms of Indwelling Time and Related Complications?

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## Abstract

**Background:** Peripheral Intravenous Catheters (PIVC) are a vital tool in the delivery of patient which are associated with number of complications including insertion difficulty, phlebitis, infiltration, occlusion, dislodgment, bloodstream infection and known to increase morbidity and mortality risk and decreased in indwelling time of PIVC. The present study was undertaken with aim to evaluate the effectiveness of a pictorial flashcard regarding self-care of PIVC on its indwelling time and related complications among inpatients.

**Method:** A quasi experimental study using post-test only comparison group research design. Data were collected at selected general wards of Institute of Liver and Biliary Sciences, New Delhi by non-probability sampling technique i.e. convenience sampling technique to select 80 subjects i.e. 40 in each experimental and comparison group using tools such as subject's data sheet, V.I.P. Score, Infiltration Scale, Universal Pain Assessment Scale and self-developed PIVC documentation tool. Parametric and non-parametric test were applied to analyze the collected data using SPSS version 22.

**Results:** Mean indwelling time of PIVC in experimental group was significantly higher (66.7 hours) as compared to comparison group (59.4 hours) at p value of 0.038 ( $p < 0.05$ ). In experimental group, PIVC were removed on the routine basis among 77.5% of the subjects and in 22.5% of subjects PIVC was removed due to complications. In comparison group PIVC was removed on routine basis in 57.5% of subjects whereas for 42.5% of the subjects, the reasons for removal of PIVC was due to complications which was found to be significant ( $p = 0.047$ ) at  $p < 0.05$ . PIVC complications such as Phlebitis (7.5%), Infiltration (10%) and Pain (15%) were present among more number of subjects in experimental group. Patients who paid hospital expenses out of pocket expenses had significantly higher indwelling time as compare to patients who paid through some insurances.

**Conclusion:** Study concluded that Pictorial flashcard on self-care of PIVC was effective in increasing the indwelling time of PIVC and reducing the occurrence PIVC related complications.

**Keywords:** *Peripheral Intravenous Cannula, Indwelling time of PIVC, Complications related to PIVC, Pictorial flashcard, Self-care of PIVC.*

## Introduction

Peripheral Intravenous Catheters (PIVC) are vital tool in the delivery of patient care within the hospital or care facility. PIVCs quickly and effectively provide medication, nutrition and fluids to patients through the

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bloodstream. PIVCs are also associated with number of complications including insertion difficulty, phlebitis, infiltration, occlusion, dislodgments and bloodstream infection leading to reduced indwelling time of PIVC which can affect the patient's health and increase healthcare costs<sup>4</sup>. Approximately 90 percent of the hospitalized patients, required peripheral cannula for their treatment during their admission due to changes in prescribing patterns and the acute nature of the cases<sup>17</sup>.

PIVC failure before the end of intravenous therapy is unacceptably high. PIVC failure disrupts treatment and reinsertion may be distressing for the patient, therefore prevention of PIVC failure is an important patient outcome<sup>13</sup>. Nurses are involved in the insertion of PIVC, administration of medication or fluids using PIVC, assessment of PIVC and if required in the early recognition of complications and removal of PIVCs. The Nursing role includes, to explain the patient and the family about the device, its care, management of complications and the ability to advocate the patient when necessary<sup>4,7</sup>.

Comprehensive routine assessment is important for the early detection and management of PIVC related complications and prompt removal of redundant PIVCs. Patient education and engagement in PIVC assessment is another area that needs attention<sup>16</sup>. Involving patients in self-care of PIVC using information in the form of pictorial flashcard may reduce PIVC failure, the infections, increase indwelling time and decrease PIVC related complications as well as discomfort. Current study was undertaken with an aim to evaluate the effectiveness of a pictorial flashcard regarding self-care of PIVC on its indwelling time and related complications among inpatients.

## Material and Method

**Research Approach and Design:** Quantitative research approach with Quasi experimental research design was used in the study. Two groups were taken i.e. experimental and comparison group. In experimental group, manipulation was done using pictorial flashcard on self-care of PIVC among inpatients along with standard care as per hospital protocol.

**Population and settings:** Study was conducted in the general wards of Institute of Liver and Biliary Sciences (ILBS), New Delhi. Population of the study comprised of inpatients with PIVC admitted in the general wards of ILBS for at least 72 hours.

**Sample and Sampling Technique:** With Power 80% and Alfa 5% total 80 participants were enrolled and included in the study according to selection criteria. Non probability sampling technique i.e. convenience sampling technique was used to select study participants.

Inclusion criteria included the subjects who: i) were conscious & oriented, ii) could understand Hindi or English, iii) were between the age group of 18 to 60 years, iv) were admitted in general wards and scheduled for PIVC insertion and v) expected to receive IV infusion and/or medication for at least 3 days (72 hours). And the exclusion criteria was the subjects who i) were on physical restraints, ii) were on sedative drugs, iii) got PIVC removed for the sole purpose of discharge before 72 hours and iv) had short admission period.

**Tool for data collection:** Total five tools were used for data collection. Tool 1: Subject Data Sheet which includes demographic variables and clinical variables. Tool 2: Visual Infusion Phlebitis (V.I.P.) Score to assess phlebitis, Tool 3: Infiltration Scale to assess degree of infiltration, Tool 4: Universal Pain Assessment Tool (UPAT) is used to assess the level of pain among subjects. Tool 5: PIVC Documentation Tool which is self-developed used to assess the documentation of indwelling time and complications of PIVC. Validity and Reliability of the all five tools were calculated and found to be valid and reliable for the study. Pictorial flashcard is prepared with size of 29.7cm x 42.0 cm with relevant pictures and written instructions regarding self-care of PIVC in English and Hindi language.

**Data collection Process:** Pilot study was conducted on 10 subjects and was found feasible with few modification in the study tool, after that final study was conducted from October to December 2018. According to sampling criteria 80 (i.e. 40 in each group) subjects with PIVC were selected for the study. Subject data sheet were filled using interview and medical record and time of PIVC insertion was recorded. In the experimental group, researcher explained self-care of PIVC using pictorial flashcard on one to one basis during or within one hour of insertion of PIVC. After that a copy of pictorial flashcard was given to the subjects for further read in Experimental group. Participants was followed every 24 hourly, till 72 hours or in between if need to be removed. Collected data was analyzed using SPSS version 22. Descriptive statistics including frequency, percentage, Mean and SD and inferential statistics, Fisher's exact, Chi-square, Independent t-test and one

way ANOVA were applied to calculate the indwelling time of PIVC and related complications in both the groups where it applicable.

## Results

Demographic characteristics of the subjects which is showing in the Table 1. And for clinical variables the vein used for PIVC, cephalic vein was used among less than half (40% in experimental and 42.5% in comparison group) of subjects. As per side of PIVC insertion, non-dominant hand was used among half (52.5%) of the subjects in experimental group and one third (32.5%) of subjects in comparison group. Majority of the subjects in both groups 20G size of PIVC was used. Majority of the subjects in both groups (87.5% in experimental and 92.5% in comparison group) dressing of PIVC was done with Tegaderm. For the vein condition during PIVC insertion, vein was visible and palpable among (47.5%) subjects in experimental group and (47.5%) in comparison group. For the vein quality at the time

of PIVC insertion in majority of the subjects the vein quality was good i.e. (70%) in experimental and (75%) in comparison group. Aseptic techniques were used in all subjects before cannulization in both the groups.

The mean indwelling time of PIVC in experimental group was significantly higher (66.7 hours) as compared to comparison group (66.7 hours) at p value of 0.038 ( $p < 0.05$ ). Pictorial Flashcard regarding self-care of PIVC was effective in increasing the indwelling time of PIVC (Table 2).

Reasons for removal and complications related to PIVC, on the routine basis among 77.5 percent of the subjects and in 22.5 percent of subjects PIVC was removed due to complications in experimental group. But in comparison group PIVC was removed on routine basis in 57.5 percent of subjects whereas for 42.5 percent of the subjects, the reasons for removal of PIVC was due to complications which was found to be significant ( $p = 0.047$ ) at  $p < 0.05$  (Table 3).

**Table 1: Comparison of experimental and comparison group according to demographic variables.**

( $n_{1v} + n_2 = 40 + 40$ )

Demographic Variables	Experimental group f (%)	Comparison group f (%)	$\chi^2$ /Fisher exact test	df	p-value
<b>Age (in years)</b>					
18-32	11 (27.5)	4 (10)	4.45	2	0.12
33-46	09 (22.5)	14 (35)			
47-60	20 (50)	22 (55)			
<b>Gender</b>					
Male	30 (75)	31 (77.5)	0.68	1	0.50
Female	10 (25)	09 (22.5)			
<b>Marital Status</b>					
Married	31 (77.5)	37 (92.5)	3.48	1	0.06
Unmarried	9 (22.5)	03 (7.5)			
<b>Educational Status</b>					
No formal education	04 (10)	02 (5)	4.40	3	0.63
Higher secondary	07 (17.5)	12 (30)			
Senior secondary	16 (40)	09 (22.5)			
Graduate or above	13 (32.5)	17 (42.5)			
<b>Place of living</b>					
Rural	14 (35)	11 (27.5)	0.51	1	0.47
Urban	26 (65)	29 (72.5)			
<b>Occupation</b>					
Non Healthcare professional	40 (100)	40 (100)	-	-	-
<b>Mode of Payment of Healthcare costs</b>					
Out of pocket expense	25 (62.5)	22 (55)	4.15	2	0.86
CGHS/DGHS/TPA	09 (22.5)	16 (40)			
EWS	06 (15)	2 (05)			

Non-Significant;  $p \geq 0.05$

**Abbreviations:**  $\chi^2$ , Chi square test, CGHS, Central Government Health Scheme; DGHS, Directorate General of Health Services; TPA, Third Party Administrator; EWS, Economically Weaker Section.

$n_1$  = Sample size of Experimental group and  $n_2$  = Sample size of Comparison group

**Table 2: Comparison of indwelling time (in hours) of PIVC in Experimental and Comparison group. (n<sub>1</sub>+n<sub>2</sub>=40+40)**

Group	Mean±SD	MD	df	t-value	p-value
Experimental	66.7±12.3	7.3	78	2.11	0.038*
Comparison	59.4±17.9				

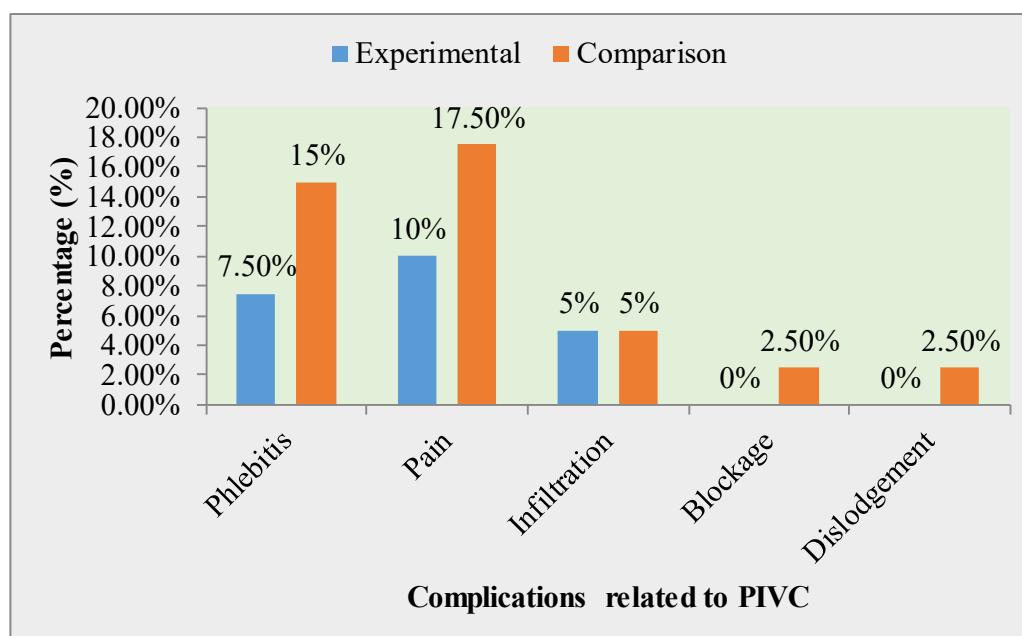
\*Significant; p<0.05

**Table 3: Comparison of reasons for removal of PIVC in experimental and comparison group. (n<sub>1</sub>+n<sub>2</sub>=40+40)**

Reasons for removal of PIVC	Experimental group f (%)	Comparison group f (%)	$\chi^2$	df	p-value
Routine removal	31 (77.5)	23 (57.5)	3.6	1	0.047*
Due to Complications	9 (22.5)	17 (42.5)			

\*Significant; p<0.05

Complications; Visual infusion Phlebitis, Infiltration, Pain, Blockage and Dislodgement.

**Figure 1: Stacked column diagram illustrating comparison of occurrence of PIVC related complications in Experimental and comparison group.**

## Discussion

The present study shows that indwelling time of PIVC in experimental group (66.7 hours) was significantly higher as compared to comparison group (59.4 hours). This finding was similar with the study conducted by Abdelaziz et al. (2017)<sup>1</sup> to find out the predisposing factors of peripheral venous catheter complications in children, results of which showed that the mean lifespan of PIVC was 68.8 hours and in another study conducted by Chhugani et al. (2015)<sup>3</sup> to find effectiveness of Vialon

cannula versus Polytetrafluoroethylene cannula in terms of indwelling time and complications in inpatients, findings showed that mean indwelling time of PIVC was 52.9 hours with Vialon cannula. In this study Vialon cannula (PIVC) were used in patients.

In the current study, PIVC removal was done due to complications 42.5 percent of subjects in experimental group. With the intervention PIVC removal due to complication was decreased in experimental group. These findings were consistent with a descriptive study

conducted by Makafi (2017)<sup>6</sup> on the incidence rate of occurrence of PIVC related complications, where it was found that 43.5 percent of the subjects developed PIVC related complication. This study findings was also similar to the study done by Miliani et al. (2017)<sup>7</sup> which shows that 52.5 percent of subjects developed PIVC related complications.

In present study, phlebitis was present among 7.5 percent of subjects, pain was present among 10 percent of subjects and infiltration was present in 5 percent of subjects in experimental group. In comparison group 15 percent of subjects had phlebitis, 17.5 percent had pain, 5 percent had infiltration, 2.5 percent had blockage and 2.5 percent had dislodgement. Findings related to comparison group are almost similar to the study done by Abolfotouh et al. (2014)<sup>2</sup> to find out the incidence of PIVC related phlebitis and other complications among patients, the results shows that phlebitis was present among 17.6 percent of patients, followed by pain 7.6 percent, dislodgement 2.4 percent, extravasations 0.5 percent.

There was no association of indwelling time of PIVC with age, gender, marital status, place of living, educational status, body mass index, size of the PIVC, PIVC insertion side, type of IV fluid given, clinical experience of staff who did cannulization, vein condition at time of PIVC insertion and vein quality at time of PIVC insertion. Dissimilar results were found in another study conducted by Pasalioglu et al. (2014)<sup>8</sup> findings of which showed that catheter indwell time, antibiotic usage, sex and catheterization sites were significantly associated with development of phlebitis.

There was a significant association of indwelling time of PIVC with mode of payment of healthcare costs. Subjects paying expense of healthcare cost from out of the pocket had significantly higher indwelling time (70 hours) as compared to subjects in whom mode of payment was through CGHS/DGHS/TPA (57.9 hours). From these findings of present study it was clear that the subjects who paid healthcare expenses out of pocket were more sensitized about self-care of PIVC, while this behavior was not seen much among subjects in whom mode of payment for healthcare expense was through CGHS/DGHS/TPA and EWS.

There was no significant association of phlebitis was found with age, gender, educational status, PIVC insertion site, size of PIVC and type IV fluid administered.

Dissimilar results were found in another study conducted by Pasalioglu et al. (2014)<sup>8</sup> findings of which showed that antibiotic usage, sex and catheterization sites were significantly associated with development of phlebitis. Findings were also incongruent with another prospective cohort study conducted by Abolfotouh et al. (2014)<sup>2</sup> results of which showed that a significant association of complications was present with gender and catheter size.

For infiltration, there was no significant association found between infiltration and educational status, history of previous cannulization in current admission, vein quality at the time of PIVC insertion, type of IV fluid administered, PIVC insertion side. A significant association was seen between infiltration and mode of payment, Infiltration was present significantly more in the subjects who paid healthcare expenses by EWS as compared to other modes of payment of healthcare costs. In terms of pain, there was no significant association of Pain with educational status, mode of Payment, history of previous cannulization in current admission, vein quality at the time of PIVC insertion and PIVC insertion side.

## Conclusions

Study concluded that Pictorial flashcard on self-care of PIVC was effective in increasing the indwelling time of PIVC and reducing the occurrence PIVC related complications. Patients who paid hospital expenses out of pocket had significant higher indwelling time as compare to patients who paid through some insurances. Patient education and their involvement in self-care may bring positive health related outcomes. Nurses must enable patients to participate in PIVC related self-care.

**Ethical Considerations:** The study was approved by College of Nursing Ethical Committee, ILBS, New Delhi, after getting approval of Scientific Review Committee. Written informed consent were obtained from the subjects and assumed for confidentiality of data.

**Conflict of Interest:** There are no conflicts of interest between the authors of this study.

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