Associated Risk Factors of Phlebitis among Registered Nurses at PMC Hospital Nawabshah, Experience and Education Based Study
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Abstract

Introduction: Intravenous catheterization or Peripheral venous catheterization is one of the most being procedures by health care providers during patient hospitalization. For the purpose of sampling, fluids, diagnostic procedure medication administration, and nutritional supplement. Phlebitis is the most common peripheral catheter related complication. It appears to local edema and inflammation, discomfort, redness of skin or subcutaneous. Phlebitis can be chemical, mechanical and biological at the site of puncture. Objectives: Determine the associating factors of phlebitis among registered nurses on the basis of experience and nursing education. Material and Methods: This study was an analytical cross-sectional study and conducted at Peoples Medical College Hospital Nawabshah. In this study, a purposive sampling method was used, and the sample size of the study was 90 Registered nurses. Results: The gender distribution among subjects was male 50 (55.6%) and females were 40 (44.4%). Designation among study subjects was 80(88.8%) were staff nurses and only 10(11.1%) were head nurses. A slum of subjects said antibiotics 70(77.8%) develop phlebitis, and found significant with experiences. Conclusion: The study, examined; nurses have significant awareness of the phlebitis [8]. Several studies also reported that associated with workload, patient burden, site/area of insertion, size of peripheral catheter and emergency condition, and other factors are also related such as age gender and skin integrity of the patients [4]. Additional factors related factors such as education of the health care provider, experiences, department, and patient admission via emergency or elective [5]. The triggering factors of phlebitis are such as infusion flow rate, pre and post bolus, 3 to 4 days of peripheral catheter retained are associated and medical department and surgical department [6]. Further, it is also reported that 20 to 80% of phlebitis occurs in the United Kingdom due to poor identification or late reporting [7]. The major complication of phlebitis is hospital-acquired infections such as bacteremia, thrombosis, and hematoma, further several guidelines have been developed for the assessment, diagnosis, and treatment of the phlebitis [8]. Several studies also reported that

INTRODUCTION

Intravenous catheterization or Peripheral venous catheterization is one of the most being procedures by health care providers during patient hospitalization. For the purpose of sampling, fluids, diagnostic procedure medication administration, and nutritional supplement [1]. Phlebitis is the most common peripheral catheter related complication [2]. It appears to local edema and inflammation, discomfort, redness of skin or subcutaneous. Phlebitis can be chemical, mechanical and biological at the site of puncture [3]. Phlebitis is inflammation of the vein and appears at veins venture site, It increases the patient hospital stay and work burden on the health care providers. Phlebitis is reported in the US, Iran, Spain, Sweden, Chandigarh, Brazil, and Portugal as 41%, 27% to 70%, 1.9%, 62%, 29.8%, 16.7%, and 11.9% and associated with workload, patient burden, site/area of insertion, size of peripheral catheter and emergency condition, and other factors are also related such as age gender and skin integrity of the patients [4]. Additional factors related factors such as education of the health care provider, experiences, department, and patient admission via emergency or elective [5]. The triggering factors of phlebitis are such as infusion flow rate, pre and post bolus, 3 to 4 days of peripheral catheter retained are associated and medical department and surgical department [6]. Further, it is also reported that 20 to 80% of phlebitis occurs in the United Kingdom due to poor identification or late reporting [7]. The major complication of phlebitis is hospital-acquired infections such as bacteremia, thrombosis, and hematoma, further several guidelines have been developed for the assessment, diagnosis, and treatment of the phlebitis [8]. Several studies also reported that

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nurse’s skills do not only reduced the incidence of phlebitis but also decreases the burden from the hospital [6]. Nurses center goal is patient, its good skills and knowledge improve the patients’ health, minimum the peripheral catheter complication and also improve the quality of care [9]. In Pakistan, the prevalence of phlebitis is 7% in 2006 which is shifted to 17% in the year of 2016 [10].

According to a study, phlebitis-associated sepsis and mortality in later it leads to morbidity and mortality, furthermore, male compare to female to prone to develop the phlebitis [10, 11].

Very few studies have been done throughout the Pakistan on phlebitis. This study will find the gap among the nurse’s knowledge and skills and find those associating factors which become cause of phlebitis.

Phlebitis is common hospital based problem, and its risk factors decreases which level of education and fine practice.

**Objective**

Determine the associated risk factor of phlebitis on the basis of experience and nursing education.

**MATERIAL AND METHODS**

**Study setting:** This is analytical cross sectional study have conducted at Peoples Medical College Nawabshah, Shaheed Benazir Abad.

**Sampling technique & sample size:** Purposive Sampling method have been used for the data collection and data have been collected from 90 nursing staff working in various department of this Hospital.

**Inclusion Criteria**
1. Registered Nurse.
2. Have more than 1 years of experiences.
3. Worked more than 3 department of Hospital.

**Exclusion Criteria**
1. Student nurses
2. Less than one years of experience.

**Duration of study:** Duration of study was December 2019 and January 2020.

**Data Collection Tool**
A self-structure questionnaire has been used for data collection from every participant of study. It contains both open ended and close ended questionnaire. Further questionnaire consists of two categories.

**Data Collection Procedure**
This study was conducted after the written permission taken from the Medical Superintendent of Peoples Medical College Hospital Nawabshah. Further, a formal written consent /agreement have been taken from every subject/individual for participation in the study.

**Data Analysis Procedure**
After collection of target number of data, the data will be analyzed in statistical Package for Social sciences (SPSS) for windows version 23. All continuous variables analyzed for frequency, mean and standard deviation and for categorical variables, frequency and percentage was calculated. For the association of variables Chi-square was computed, and <.05 is kept significant.

**Data presentation:** In the form of results, the data have been presented by tables.

**Ethical Consideration**
- Permission have been taken from the Medical Superintendent of this Hospital.
- Informed consent will be taken at the time of data collection.
- Confidentially of particular will be kept secret.
- No any force will be used to refused participants.

**RESULTS**
The sample size of the subjects was 90. The mean age of the study population was 33.78 with the SD + 5.9. The gender distribution among subjects was male 50 (55.6%) and females were 40 (44. 4%). Designation among study subjects was 80(88.8%) were staff nurses and only 10(11.1%) were head nurses. According to nursing education among the study population was 60(66.7%) were just completed RN, and BSc Nursing 24(26.7%) were and masters were 6 (6.7%), and their experiences were as up to 5 years 30 (33.3%), 5 to 10 years (22.2%) and above 10 years 40(44.4%) Table-1.

**Change of peripheral vascular catheterization (PVC)**
Among the study subjects, 30(33.3%) change the PCV up to 48 hours, 17 (18.9%) said 48 to 72 hours, 72 hours to 96 hours were 37(41.1%), and only 6(6.7%) were agreed for the changing of peripheral cannula above 96 hours. Duration of PVC statically significant (p=.001) Table-2.

**Drug can increase phlebitis**
Slum of the study subjects said antibiotics 73(81.1%) develops phlebitis and 17(18.8%) agreed for KCL. It is statically strongly significant with experience (p=.000) Table no.02, and also significant with nursing education (p=.020) Table-3.

**Phlebitis found in**
The study subjects said Female 53(58.9%) as compare to male 37(41.1%) develop phlebitis, and statistically significant (p=.036) Table-3.
Most frequently phlebitis develops in:
Most of the subjects said Kids 30 (33.3%), Adults 10(11.1), Older age 9(10) Obesity 22(24.4%) and medical illness 19(19), and also statistically significant with nursing education (p = < .05) Table-3.

Pattern of fluid develop phlebitis
Majority of the subjects said continues peripheral fluid 80(88.9%) and intermittent fluid 10(11.1%) develop the phlebitis, and found significant with experiences (p = .001) Table-2, and nursing education (p = .001) Table-3.

Phlebitis Leads to Bacteremia
Among 80(88.9%) of the subjects said yes and only 10(11.1%) said no, and also and found significant with experiences (p = .001) Table-2, and nursing education (p = .020) Table-2.

Nursing practice for the prevention of phlebitis
The nursing practice for prevention of phlebitis, and maintains of well-intended peripheral vascular catheterization. Table-4. It shows that among study subjects majority were agreed and strongly agree regarding the nursing practice for the prevention of phlebitis regarding care and peripheral cannula safe usage.

| Item                        | Frequency | Percentage |
|-----------------------------|-----------|------------|
| Gender                      |           |            |
| Male                        | 50        | 55.6       |
| Female                      | 40        | 44.4       |
| Total                       | 90        | 100.0      |
| Designation                 |           |            |
| Staff Nurse                 | 80        | 89.9       |
| Head Nurse                  | 10        | 11.1       |
| Total                       | 90        | 100.0      |
| Experience                  |           |            |
| Up to 5 years               | 30        | 33.3       |
| 5 to 10 years               | 20        | 22.2       |
| Above 10 years              | 40        | 44.4       |
| Total                       | 90        | 100.0      |
| Nursing Education           |           |            |
| RN                          | 60        | 66.6       |
| BSC Nursing                 | 24        | 26.7       |
| MSN/MSPH                    | 6         | 6.6        |
| Total                       | 90        | 100.0      |

Table-1: Distribution of study subjects

| Item                        | Frequency | Percentage |
|-----------------------------|-----------|------------|
| Change of Peripheral I.V cannula |           |            |
| Up to 48 Hours              | 09        | 11         | 30 | .001 |
| 48 to 72 Hours              | 03        | 00         | 14 | 17   |
| 72 to 96 hours              | 18        | 09         | 01 | 37   |
| Above 96 years              | 10        | 01         | 05 | 6    |
| Total                       | 40        | 20         | 30 | 90   |
| Drug can Increase phlebitis |           |            |
| Antibiotics                 | 27        | 9          | 37 | .000 |
| KCL                         | 3         | 11         | 3  | 14   |
| Total                       | 30        | 20         | 40 | 40   |
| Phlebitis mostly develop in |           |            |
| Male                        | 14        | 9          | 14 | 37   | .59 |
| Female                      | 16        | 11         | 26 | 53   |
| Total                       | 30        | 20         | 40 | 90   |
| More Frequently found in    |           |            |
| Kids                        | 13        | 13         | 22 | 48   |
| Adults                      | 4         | 2          | 4  | 10   | .19 |
| Old age                     | 4         | 0          | 5  | 9    |
| Obesity                     | 6         | 4          | 5  | 15   |
| Medical Illness             | 3         | 1          | 4  | 8    |
| Total                       | 30        | 20         | 40 | 90   |
| Which periphery fluid develops phlebitis |       |            |
| Continuous                  | 30        | 20         | 30 | .001 |
| Intermittent                | 7         | 3          | 0  | 10   |
| Total                       | 37        | 23         | 30 | 90   |
| Bacteremia Leads to phlebitis |           |            |
| Yes                         | 30        | 20         | 30 | .001 |
| No                          | 6         | 4          | 0  | 10   |
| Total                       | 36        | 24         | 30 | 90   |

Table-2: Contingency table of Experience and study variables

Table-3: Distribution of study subjects
Table-3: Contingency table of Nursing education and study variable

| Item                                      | RN Specialty | BSC Nursing | MSN/ MSPH | Total | p = value |
|-------------------------------------------|--------------|-------------|-----------|-------|-----------|
| Change of peripheral IV cannula           |              |             |           |       |           |
| Up to 48 hours                           | 18           | 11          | 01        | 30    | .20       |
| 48 to 72 hours                           | 15           | 1           | 01        | 17    |           |
| 72 to 96 hours                           | 23           | 10          | 04        | 37    |           |
| Above 96 hours                           | 4            | 2           | 00        | 06    |           |
| Total                                    | 60           | 24          | 06        | 90    |           |
| Drugs can increase phlebitis             |              |             |           |       |           |
| Antibiotics                              | 43           | 23          | 06        | 72    | .020      |
| KCL                                      | 17           | 01          | 00        | 18    |           |
| Total                                    | 60           | 24          | 06        | 90    |           |
| Phlebitis mostly develop in              |              |             |           |       |           |
| Male                                     | 22           | 7           | 8         | 37    | .036      |
| Female                                   | 33           | 17          | 3         | 53    |           |
| Total                                    | 55           | 20          | 6         | 90    |           |
| More Frequently found in                 |              |             |           |       |           |
| Kids                                     | 24           | 6           | 0         | 30    | .080      |
| Adults                                   | 7            | 3           | 0         | 10    |           |
| Old age                                  | 4            | 3           | 2         | 9     |           |
| Obesity                                  | 13           | 7           | 2         | 22    |           |
| Medical Illness                          | 12           | 5           | 2         | 19    |           |
| Total                                    | 60           | 24          | 06        | 90    |           |
| Which periphery fluid develops phlebitis |              |             |           |       |           |
| Continuous                               | 60           | 14          | 6         | 80    | .000      |
| Intermittent                             | 0            | 10          | 0         | 10    |           |
| Total                                    | 60           | 24          | 06        | 90    |           |

Table-4: Nursing practice for the prevention of phlebitis

| S.no | Questions                                              | Strongly disagree | Disagree | Nor Agree or Disagree | Agree | Strongly agreed |
|------|--------------------------------------------------------|-------------------|----------|-----------------------|-------|----------------|
| 01   | Phlebitis increases the finical burden on the hospital. | 7 (7.7%)          | 13 (14.4%) | 8 (8.8%)             | 19 (21.1%) | 43 (47.7%)    |
| 02   | Phlebitis increases patient stay in the hospital.      | 15 (16.6%)        | 29 (29.7%) | 12 (13.3%)           | 15 (16.6%) | 19 (21.1%)  |
| 03   | Experience & expertise reduce the occurrence of phlebitis. | 8 (8.7%)         | 9 (9.8%)   | 13 (14.4%)           | 26 (28.8%) | 34 (37.3%)   |
| 04   | Assessing daily punctured area reduce the phlebitis.   | 3 (3.3%)          | 6 (6.6%)   | 10 (11.1%)           | 13 (14.4%) | 58 (64.4%)  |
| 05   | Routine documentation decreases the risk of phlebitis? (date, time) | 2 (2.2%)         | 7 (7.7%)   | 16 (17.7%)           | 17 (18.8%) | 48 (53.3%)  |
| 06   | Vascular catheter size (gauge) increases the risk of phlebitis. | 4 (4.5%)         | 16 (17.7%) | 31 (34.4%)           | 28 (31.1%) | 11 (12.2%)  |
| 07   | Pre- bolus administration reduces the risk of phlebitis. | 7 (7.7%)          | 10 (11.1%) | 21 (23.3%)           | 39 (43.3%) | 13 (14.4%)  |
| 08   | Post bolus administration reduces the risk of phlebitis. | 13 (14.4%)        | 19 (21.1%) | 31 (34.4%)           | 20 (22.2%) | 7 (7.7%)    |
| 09   | Vascular cannula for insertion should be selected as per site (area) of puncture. | 1 (1.1%)         | 5 (5.5%)   | 11 (12.2%)           | 42 (46.6%) | 31 (34.4%)  |
| 10   | Before cannulation no need of skin preparation.         | 49 (54.4%)        | 28 (31.1%) | 6 (6.6%)             | 4 (4.4%)   | 3 (3.3%)     |

**DISCUSSION**

Phlebitis is one of the most frequent complications of peripheral I.V cannula, it occurs due to poor nursing practice, long intacted, and a longer stay of patients stay in the hospital. Phlebitis; increase the burden on the hospital, and ultimately affect the nursing practice too.

Experience and nursing education is directly associated with nursing practice, increasing the level of experiences, and education does not enhance the nursing practice but also increases the level of patient
center care. The current study revealed that; the majority completed RN 66.7%, and BSc Nursing 26.7% were and masters were 6.7%, and their experiences were as up to 5 years 33.3%, 5 to 10 years 22.2% and above 10 years 44.4%, which compares with a study conducted for assessing the nurse’s knowledge in Lahore stated that education and nursing practice is directly associated with the incidence of phlebitis. Further stated diplomas in nursing and post-Rn were 48% and 23% were respectively.

Long duration intacted of peripheral IV cannula increases the risk of phlebitis and also increase hospital stay of the patient in the hospital “CDC”. The current study revealed that 33.3% change the PCV up to 48 hours, 18.9% said 48 to 72 hours, 72 to 96 hours were 41.1%, and only 6.7% change the peripheral cannula after 96 hours. The majority of the nursing staff believed that frequently change of cannula reduces phlebitis, which is comparable with a study conducted sated that, long-duration more than 72 hours increase IV cannula blockage and leakage occurs in those peripheral IV cannulas were intacted more than 72 hours [12].

Drug administration is one of the most important skills of nursing staff, it reflects the nursing skills, and it's depending on nursing education as well as experience. The current study revealed that nurses believed that phlebitis due to antibiotics, KCL, and other drugs, (anticonvulsive, anticoagulants) 77.8%, 14.4%, and 7.8% respectively. According to a study shown that antibiotic-induced phlebitis was 85%, which is more frequently happening as compare to KCL 9% and high osmolality drugs [13].

Gender is one of the major risks of phlebitis, due to biological differences gender is key factor in phlebitis, the literature supports that gender is mild to moderate risk factor in it. The current study revealed that female 58.9% as compare to male 41.1% more prone to develop phlebitis, which compared with a study showed the similarity with results male and female were as 65% and female 35% more risk factors for phlebitis [11].

Further, this is seen in this study, nurses said that; kids 33.3%, Adults 11.1%, Older age 10%, 24.4% and medical illness 19% develop phlebitis, which compared with age group is another risk factor for phlebitis, the integrity of skin, disease process are risk factors of phlebitis [14].

Literature support the pattern infusion has a significant relation with phlebitis, continuous administration of peripheral fluid, and infusion flow rate increase the risk of phlebitis. The current study revealed that 88.9% of the subjects said for continuous fluid and 11.1% believed for intermittent fluid phlebitis, and found significant, which comparable which is the similarity with a cross-sectional study agreed that continuous peripheral infusion is increased the risk of phlebitis as compare to the intermittent flow of infusion [15].

Each year, more than 2 million mortality occurs throughout the world, and the incidence has been increasing every year. A safe practice, proper hand washing reduces the risk of nosocomial infection, phlebitis is one of the hospital-related infection, literature supports that 37% of phlebitis is related to nosocomial infection [16, 17]. Similarity, to current study, revealed that 88.9% of the subjects said yes, bacteremia leads to phlebitis and also and found significant [9].

CONCLUSION
The study, examined; nurses have significant skills for the prevention of phlebitis and maintenance of peripheral I.V. Further study also found the factors associated with phlebitis. The nurses had well knowledge and experience to minimize the incidence of phlebitis, and also can reduce the risk factors of phlebitis, but malpractice and ignorance decrease quality care.

RECOMMENDATION
Quality of Care enhanced by a higher level of Administration. Nurses –the patient ratio should have maintained according to WHO, and the Nursing council. In addition, health care providers are accountable for safety and quality care delivery to the patients, so they should be well resourced and enough trained nursing staff.

Limitation: This study is performed in a single health care setting, this can be generalized through multiple health care settings.

Conflict of interest: There is no any conflict of interest seen between the patients.

Funding: There is no source of funding governmental and non-governmental institution/organization.

Data availability: It is available from correspondence author on request as per ethical rules.
Acknowledgement regarding author contribution:

| Sno. | Name of author                          | Contribution                                      |
|------|----------------------------------------|---------------------------------------------------|
| 01.  | Parveen Imdad Memon                    | Study conception and design                       |
| 02.  | Bashir Ahmed Pirzada Khalid Nadeem     | Help in data collection                           |
| 03.  | Abdul Haque khuso Dr Masood Ali Qureshi | Data analysis and interpretation                   |
| 04.  | Shabnum Bibi Abdul Haque khuso         | Drafting & Final approval of the version          |

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