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A Study To Assess The Occurrence And Risk Factors Of Phlebitis Among Peripheral Intravenous Cannulated Patients Admitted In Apollo Hospital Of Ahmadabad, Gujarat

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Abstract:

Introduction: Almost half of the patients who are administered intravenous fluid infusion or blood transfusion via IV cannula insertion develop phlebitis. This study was conducted to assess the occurrence and risk factors of phlebitis among peripheral Intravenous cannulated patients admitted in Apollo Hospital of Ahmadabad, Gujarat with a view to develop phlebitis prevention protocol.

Methodology: A non-experimental descriptive research design was used for the study. Convenient sampling technique was used for the selection of 170 patients. The prepared tool (semi-structured observation checklist) was validated by experts. Pre-testing and pilot study was conducted on patients other than the study sample. The data collected were analyzed using descriptive and inferential statistics.

Results: The results of our study showed that phlebitis occurred in nearly one third of the patients (27%). Among these, grade-2 phlebitis was seen in most of the patients (47.83%) and grade 1 phlebitis was seen in only 41.30%. Most of the patients developed phlebitis within the first 12 hours (45.65%) and 6 hours (39.13%) of cannulation time. There was a significant association of phlebitis with age and gender, site of cannulation, disinfection of cannula site, size/ gauge of cannula, infusion of ionotropic drugs and blood and its products, mode of infusion of IV fluids potassium chloride, and phenytoin, administration of piperacillin/tazobactam, vancomycin, metronidazole, and imipenem.

Conclusion: Staff nurses should be made aware of the various risk factors associated with phlebitis. Appropriate training and education Programmes should be implemented.

Keywords: Phlebitis, Risk Factors, Occurrence of Phlebitis, Peripheral Intravenous Cannulation, Nursing Practice.

I. INTRODUCTION

Intravenous therapy is a technical-scientific process eminently executed by the nursing staff in a hospital for intravenous fluid infusion or blood transfusion. Intravenous (IV) catheter is one of the most commonly used ways of treatment in patients admitted to hospitals.1,2,3 These are about 50% of patients who develop phlebitis after IV cannula insertion. 4 The peripheral venous access is performed by inserting a catheter in a peripheral vein. Peripheral venous access (PVA) is characterized as an invasive procedure due to the disruption of the skin and consequently leads to the communication of the venous system with the external environment. The superficial veins of the upper extremities are preferred to those of the lower extremities for peripheral venous access because cannulation of upper extremity veins interferes less with patients' mobility and poses a lower risk for phlebitis. Phlebitis is the inflammation of the vein and is a common complication associated with the use of peripheral intravenous catheters. It can cause infection or thrombus

formation. Symptoms develop in hours to days and resolve over days to weeks. According to the clinical signs present in the patient, phlebitis is classified into the following four degrees:

•Degree 1: Erythema around the peripheral intravenous catheter with or without local pain
•Degree 2: Local pain with erythema and or swelling
•Degree 3: Local pain with erythema, hardening and palpable venous cord formation
•Degree 4: Local pain with erythema, hardening and palpable venous cord formation > 1 inch in length with purulent drainage

OBJECTIVES

• To assess the occurrence of phlebitis among the peripheral intravenous cannulated patients admitted in Apollo hospitals Ahmadabad
• To identify demographic variables (age, gender, area of admission) as the possible risk factors of phlebitis among the peripheral intravenous cannulated patients admitted in Apollo hospitals Ahmadabad
• To associate selected demographic variables (age, gender, area of admission) with the occurrence of phlebitis among the peripheral intravenous cannulated patients admitted in Apollo hospitals Ahmadabad
• To identify the risk factors of phlebitis and associate selected risk factors (use of hand rub, use of gloves, cannulation site away from joint, disinfection of cannula site, documentation, vein of cannulation, size/ gauge of cannula, fixation material, method of infusion, types of intravenous drugs and antibiotics given and any combination of intravenous infusion, drugs and antibiotics given) with the occurrence of phlebitis among the peripheral intravenous cannulated patients
admitted in Apollo hospitals Ahmadabad.

METHODOLOGY

Research Approach

In view of the nature of problem under study and to accomplish the objectives of the study, quantitative research approach was found to be appropriate.

Research Design

In this study, a non-experimental research design was used for the overall research process as it was found to be the most suitable. A subtype of this design; descriptive research design was selected from this broad area and was implemented in this study. A semi-structured observational checklist and Infusion Nurses Society (INS) phlebitis scale (2006) were administered to peripheral intravenous cannulated subjects admitted in Apollo hospitals Ahmadabad.

Setting of the Study

The present study was conducted in Apollo hospitals Ahmadabad. from 1st October 2025 to 30th December 2025. The selection of setting was done on the basis of set criteria like problem statement, feasibility of conducting the research study, availability of the sample, study subjects, nature and purpose of research study, and familiarity of the researcher with the research setting.

Study Population

In the present study, the population consists of adult patients admitted in Apollo hospitals Ahmadabad.

Sampling Technique and Sample

Non-probability convenient sampling technique was used for the selection of study subjects during the study because the study was restricted by the short duration of time and it was not possible to get the list of patients who would get admitted from emergency areas. The sample size for the present research study comprised 170 adult patients admitted in Apollo hospitals Ahmadabad, Gujarat.

Criteria for Selection of Sample

The following criteria were set for the selection of study subjects in the research study:

Inclusion Criteria

The study subjects included in the research study were:

• In the adult age group, i.e. from 18 years onwards
• Admitted to Apollo hospital, Ahmadabad
• Available for 72 hours after admission
• Conscious
• Willing to participate in the study

Exclusion Criteria

The study subjects were excluded in the research study on the basis of the following criteria:

• Admitted from pediatrics department
• Available for less than 72 hours after admission
• Unconscious

• Not willing to participate in the study

Plan for Data Analysis

The data analysis was planned based on the objectives of the study. It was planned to organize, tabulate, analyses and interpret data by using both descriptive and inferential statistics. The following plan of analysis was developed with the opinion of experts:

• The collected data was coded and transferred to a master sheet for statistical analysis
• To describe the sample characteristics, occurrence and incidence rate of risk factors for the development of phlebitis were noted
• The phlebitis occurrence rate was analyzed in terms of percentage
• The association of risk factors was calculated using Chi-square test
• The per cent agreement method was used to determine the inter-ratter reliability of the tool
• The findings were interpreted and presented with the help of tables and graphs. The level of significance was set as the conventional level of $p \leq 0.05$

Ethical Consideration

In order to proceed with the research study, prior permission was obtained from the Institutional ethics committee to conduct the research study. The ethical committee of Ahmedabad, Gujarat has exempted some of the research from ethical approval and hence ethical clearance and permission were exempted in the case of the present study.

A letter was forwarded to the cooperating department for permission to conduct the study at their department which here refers to the Apollo hospital Ahmadabad. The purpose of the study was informed and explained to the selected patients.

Informed consent was individually obtained from them, prior to their inclusion as sample in the study. Privacy, confidentiality and anonymity were guarded.

3.4Statistical tools and econometric models

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then Manually analyzed with use of Microsoft excel. Categorical variables were summarized as frequencies and percentages. Graphically, the data was presented by bar and pie diagrams. Chi-square test was applied to associate the selected risk factors with the occurrence of phlebitis.

The data presented in **Table 1** depict that out of 150 peripheral intravenous cannulated patients, 46 (27%) developed phlebitis while 124 (73%) patients did not have phlebitis. Thus, the occurrence rate of phlebitis was 27% among 150 peripheral intravenous cannulated patients.

Table 2 shows that most (12.94%) of the patients with phlebitis developed Grade 2 phlebitis followed by Grade 1 in 11.18%, Grade 3 in 2.94% and Grade 4 in 0% of the subjects.

The data presented in **Table 3** depict that most of the patients, i.e. 45.65%, developed phlebitis within 12 hours of cannulation followed by 39.13% of patients who developed phlebitis within 6 hours of cannulation, and 15.22% of patients developed phlebitis within 24 hours of cannulation. Thus, it can be reported that most patients developed phlebitis within the first 12 hours of cannulation.

The data presented in **Table 4** depict The table presents the demographic distribution of 46 patients studied. Most participants were aged 31–50 years (32.61%), 51–70 years (32.61%), and 71 years and above (32.61%), while only 2.17% were in the 18–30 age group. The majority were female (73.91%), and 26.09% were male. Regarding location, 60.87% of patients were admitted in wards, whereas 39.13% were in the ICU.

Table 5 reveals that a statistically significant association of phlebitis was seen with age ($p = 0.50$) and gender ($p = 0.190$), whereas no association of phlebitis was established with the area of admission ($p = 0.153$) among peripheral intravenous cannulated patients admitted in emergency wards. Thus, it can be interpreted from the association table that age and gender can be responsible for the development of phlebitis.

The **table 6** shows the association between selected variables and phlebitis among 170 IV cannulated patients. Most factors, including hand hygiene, skin condition, and vein quality, were not statistically significant ($p > 0.05$). However, the number of attempts was significantly associated with phlebitis ($\chi^2 = 43.96$, $p = 0.010$), indicating higher risk with multiple attempts.

The data presented in **Table 7** depict that majority (46.15%) of patients in whom 18G cannula was used developed phlebitis, 21.90% of patients in whom 20G cannula was used, 29.73% of patients in whom 22G cannula was used developed phlebitis.
A statistically significant association was found between phlebitis and size/ gauge of cannula ($p = 0.045$).
Thus, it can be interpreted from the findings that the size/ gauge of cannula can have an important role in the development of phlebitis. The rate of phlebitis decreases with a decrease in the gauge of cannula. A 18-gauge cannula is more likely to cause phlebitis

The data presented in **Table 8** show that an average number (19.58) of patients in whom adhesive were used to fix cannula developed phlebitis. 28.57% of patients in whom Dynaplast was used and 38.98% of patients in whom Tegaderm was used to fix the cannula developed phlebitis.
No statistically significant association was found between phlebitis and fixation material ($p > 0.228$).
Thus, it can be interpreted from the findings that fixation material may not have a role in the development of phlebitis. However, Tegaderm is less likely to cause phlebitis.

The data presented in **Table 9** show that all patients (50%) who received bolus infusion, 37.86% of the patients who received continuous infusion, and 7.94% of patients who received intermittent infusion developed phlebitis.
A statistically significant association was found between phlebitis and mode of infusion.
Thus, it can be interpreted that the method of infusion
can have a role in the development of phlebitis with bolus method being the most potent cause of phlebitis.

The data presented in **Table 10** exhibit that 100% of patients who received blood and blood products, 75% of patients who received potassium chloride, and 37.93% of patients who received antibiotics developed phlebitis. A statistically significant association was established between phlebitis and Blood and blood products ($p = 0.047$), Potassium chloride ($p = 0.043$), and antibiotics ($p \leq 0.001$).
Thus, it can be interpreted that blood and blood products, potassium chloride, and antibiotics can have a role and can be equally potent in the development of phlebitis.

The data presented in **Table 10** reveal that maximum (100%) patients who received Levofloxacin developed phlebitis. 75.0% of patients who received Vancomycin, 37.93% of patients who received piperacillin/ tazobactam, 14% of patients who received imepenem, 3.7% of total patients who received antibiotics developed phlebitis.
A statistically significant association was found between phlebitis and piperacillin/ tazobactam.
Thus, it can be interpreted that intravenous infusion of piperacillin/ tazobactam, vancomycin, imipenem, and metronidazole through a peripheral intravenous cannula can have a role in the development of phlebitis with metronidazole and imipenem more likely to cause phlebitis.

The data presented in **Table 11** shows that 37.14% of patients who received any combination of blood, blood products, continuous infusion, KCL, phenytoin, inotropes and antibiotics developed phlebitis and 10.77% of patients who didn't receive any combination of blood, blood products, continuous infusion, KCL, phenytoin, inotropes and antibiotics developed phlebitis.

Table 12 depicts a statistically significant association between phlebitis and any combination of blood, blood products, continuous infusion, KCL, phenytoin, inotropes and antibiotics (p value < 0.001).
Thus, it can be interpreted that patients receiving any combination of intravenous infusion, drugs and antibiotics through peripheral intravenous cannula have more chances of developing phlebitis.

IV. RESULTS AND DISCUSSION

Results: The results of our study showed that phlebitis occurred in nearly one third of the patients (27%). Among these, grade-2 phlebitis was seen in most of the patients (47.83%) and grade 1 phlebitis was seen in only 41.30%. Most of the patients developed phlebitis within the first 12 hours (45.65%) and 6 hours (39.13%) of cannulation time. There was a significant association of phlebitis with age and gender, site of cannulation, disinfection of cannula site, size/ gauge of cannula, infusion of ionotropic drugs and blood and its products, mode of infusion of IV fluids potassium chloride, and phenytoin, administration of piperacillin/tazobactam, vancomycin, metronidazole, and imipenem. Conclusion: Staff nurses should be made aware of the various risk factors associated with phlebitis. Appropriate training and education Programmes should be implemented.

DISCUSSION

The present study revealed that more than half (27.06%) of the patients (N = 170) developed phlebitis and 73% had no phlebitis. Thus, the incidence rate of phlebitis is 27%, which is more than the accepted rate of phlebitis (5%) given by the Infusion Nurses Society (2006).

The above findings are further supported by a prospective observational study conducted by Abdul-Hak CK et al.7 to assess the incidence of phlebitis among peripheral cannulated patients in a medical clinical unit at a regional hospital in Brazil among 100 admitted patients. The findings of the study revealed that 60 patients developed phlebitis with an incidence rate of 60%. The study revealed that similar percentages of patients developed phlebitis within 48 hours (26.4%) of cannulation and 72 (20.4%) hours of cannulation while 11.2% of patients developed phlebitis within 24 hours of cannulation.

Thus, according to the current study, most of the subjects develop phlebitis within the first 48 and 72 hours of cannulation time. The above findings are comparable with the findings of a descriptive cross-sectional study conducted by Erdogan BC et al.8 to investigate the development of phlebitis and infiltration in patients with peripheral intravenous cannula in Neurosurgery Clinic of Education and Research Hospital in the capital of Turkey, among 325 patients.

The findings of the study revealed that 14.2% of the patients developed phlebitis within 24 hours of cannulation followed by 11.1% in 25-48 hours and 32.9% in 49-72 hours. The study revealed that in the age group of 44-56 years, 70.17% of patients developed phlebitis followed by 65.51% of patients in the age group of 31-43 years, 64.10% of patients in the age group of 57-69 years, 33.33% of patients in the age group of 18-30 years, and 28.57% of patients in the age group of 70 years and more developed phlebitis.

A statistically significant association was seen between phlebitis and age. The above findings are comparable with the results of a prospective observational study conducted by Singh R et al.9 among 230 adult patients admitted in Kathmandu University Teaching Hospital.

The study revealed that among 140 male patients, 73 (52.1%) developed phlebitis and among 110 female patients, 72 (65.5%) developed phlebitis. A statistically significant association was seen between phlebitis and gender. Thus, it can be said that females have an increased risk of developing phlebitis.

The above findings are supported by a prospective observational study conducted by Mandal A et al. in the medical and surgical division at Air Force Hospital, Kalaikunda, West Bengal, among 150 patients. The aim of the study was to investigate the incidence of phlebitis and evaluate factors contributing to its development. The findings revealed that female gender was associated with a higher risk of phlebitis (OR = 1.21).

Another study among 186 patients from emergency medical wards reported that 103 (55.4%) developed phlebitis, while among 64 patients from emergency surgical wards, 42 (65.6%) developed phlebitis. Statistically, no significant association was observed between phlebitis and the area of admission. These findings are related to a prospective observational study conducted by Neopane A among 100 admitted patients in the inpatient ward of the Department of Medicine at a medical college in Kathmandu, Nepal. The aim was to assess the risk-reducing role of handwashing in phlebitis incidence. The study revealed that among 77 patients cannulated from wards, 61 developed phlebitis, and among 23 patients cannulated from emergency, 18 developed phlebitis. No significant association was found between phlebitis and the area of cannulation ($p = 0.912$).

The study also noted that staff performed hand rub for only 4 patients before cannulation, among whom 2 (50%) developed phlebitis. Out of the remaining 246 patients, 143 (58.1%) developed phlebitis. Similarly, 50% of patients cannulated using sterile gloves developed phlebitis, compared to 58.1% of those cannulated without sterile gloves. No statistically significant association was observed between phlebitis and the use of hand rub or sterile gloves. These findings align with a prospective observational study conducted by Safro SK et al. among 200 patients in the outpatient department of a multispecialty hospital in the College of Health Sciences, Dhahran, Kingdom of Saudi Arabia. The study aimed to estimate risk factors for phlebitis in IV

cannulated patients and found no significant association between phlebitis and handwashing (p = 0.96) or sterile glove use (p = 0.84).
Additionally, the study showed that inotropic drugs were administered to 13 subjects, of whom 11 (84.6%) developed phlebitis, compared to 134 (56.5%) out of 237 subjects who were not given inotropic drugs. A statistically significant association was observed between phlebitis and infusion of inotropic drugs through a peripheral IV cannula. These findings are contradicted by a prospective observational study conducted by Kaur P et al. among 200 patients.
The study was conducted among patients in the Emergency Medical and Surgical Outpatient Department of Nehru Hospital, Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh. The aim was to assess risk factors leading to phlebitis among peripheral intravenous cannulated patients. Findings revealed that among patients who developed phlebitis, 17 (15%) had received ionotropic drugs; however, no significant association was observed between phlebitis and infusion of ionotropic drugs.
In the present study, blood and blood products were administered to 15 subjects, of whom 13 (86.7%) developed phlebitis, compared to 132 (56.2%) out of 235 subjects who did not receive blood products. A statistically significant association was observed between phlebitis and infusion of blood and blood products through a peripheral IV cannula. These findings align with a prospective observational study by Atay S et al. among 317 patients with 532 peripheral IV catheters at the internal disease clinic of a state hospital in Turkey.
The present study also showed that 81.5% of subjects who received potassium chloride developed phlebitis, compared to 55.2% of those who did not. A statistically significant association was observed between phlebitis and potassium chloride infusion. Similarly, 92.0% of subjects who received phenytoin developed phlebitis, compared to 54.2% of those who did not, indicating a significant association. These findings are supported by a randomized controlled study by Jamerson BD et al. at the University Hospital Clinical Research Unit in the USA among 12 healthy volunteers, which revealed that phenytoin was associated with a significantly higher degree of pain and phlebitis ($p < 0.05$).
Furthermore, the study showed that 48.5%, 55.4%, 64.4%, 74.4%, 85.0%, and 93.8% of subjects who received piperacillin/tazobactam, levofloxacin, ceftriaxone, vancomycin, imipenem, and metronidazole respectively developed phlebitis. In comparison, 68.8%, 60.5%, 56.0%, 55.0%, 55.7%, and 55.6% of subjects who did not receive these drugs developed phlebitis. Statistically significant associations were observed between phlebitis and the administration of piperacillin/tazobactam, vancomycin, imipenem, and metronidazole.
The above findings are compatible with a prospective observational study conducted by Mandal A et al. in the Medical and Surgical Division at Air Force Hospital, Kalaikunda, West Bengal, among 150 patients. The aim of the study was to investigate the incidence of phlebitis and evaluate factors contributing to its development. The findings revealed that administration of intravenous antibiotics substantially increased the risk of phlebitis (37.93%, OR = 2.70).
The study also showed that 84.4% of subjects who received any combination of blood and blood products, continuous infusion, high-osmolarity electrolytes, vesicants, and antibiotics developed phlebitis. These findings are consistent with those of a descriptive study conducted by Furtado L in the General Surgery Department of Divino Espirito Santo Hospital at Delgada Azores, Brazil, among 171 admitted patients. The aim of that study was to determine the incidence of phlebitis related to peripheral cannula and its predisposing factors. The results revealed that phlebitis was more associated with the administration of intravenous hypertonic solutions or vesicant and irritating drugs (p = 0.002).

IIV. Nursing Implications

The findings of the study have several implications for nursing practice, education, administration, and research:

Nursing Practice

- Nurses with adequate knowledge and skills can significantly reduce the occurrence of phlebitis, thereby improving healthcare standards. They should be proficient in aseptic techniques such as hand washing/hand rub, use of sterile gloves, and proper disinfection of the cannulation site.
- Nurses have the responsibility to use standardized scales for assessing and grading phlebitis and to make informed decisions to improve patient care processes and outcomes.
- Accurate documentation of the date and time of cannulation is essential to maintain continuity of care and safeguard nurses from legal implications.

- The study helps nurses develop insight into various factors associated with phlebitis, enabling them to prevent its occurrence, recognize early symptoms, and take necessary actions to prevent complications.

Nursing Education

- Nurse educators in hospital settings should initiate in-service education programs on the occurrence and prevention of phlebitis, assessment scales, and management strategies.
- Information booklets containing details on phlebitis assessment scales, risk factors, prevention, and management guidelines should be distributed among nurses.

Nursing Administration

- Nursing administrators play a key role in planning, organizing, and conducting in-service education programs. Educational materials such as booklets and pamphlets should be made available to nurses.
- Administrators should encourage staff participation in conferences, workshops, and training programs to update knowledge and skills.
- Nursing administrators should support the development of health policies, protocols, and standing orders related to the prevention and management of phlebitis.

Nursing Research

- The present study revealed that phlebitis continues to be a major clinical problem. Further research should focus on treatment modalities according to risk factors and.
- The findings can help nurse researchers develop prevention protocols and evidence-based practice guidelines for phlebitis management.

Limitations

- The study was limited to a small sample size (170), which restricts generalization.
- The sample was selected only from Apollo hospital Ahmadabad; hence, findings apply only to this setting.
- A non-experimental descriptive design was used, limiting causal inference.
- Cannula sites were observed only up to 72 hours' post-cannulation, making it impossible to assess phlebitis beyond this period.
- Post-infusion phlebitis was not included in the study.

CONCLUSION

- The present study revealed a high incidence of phlebitis (27%) among patients admitted to Apollo Hospital, Ahmadabad, with Grade 1 being the most common and most cases occurring within the first 12 hours. A significant association was observed between phlebitis and factors such as age, gender, site of cannulation and its disinfection, size of cannula and fixation material, and infusion of ionotropic drugs, antibiotics, blood and blood products, potassium chloride, and phenytoin, along with their mode of administration. These findings emphasize the need for staff nurses to be educated about these risk factors and to implement a standardized phlebitis prevention protocol in daily practice.

Conflict of Interest: None
Source of Funding: None

Figures and Tables

Table 1.Frequency and Percentage Distribution of Occurrence of Phlebitis among Peripheral Intravenous Cannulated Patients

Occurrence of Phlebitis	Frequency	Percentage
yes	46	27.05882
no	124	72.94118
total	170	100

Table 2.Frequency and Percentage Distribution among Peripheral Intravenous Cannulated Patients with Phlebitis according to Grade of Phlebitis

Degree of Phlebitis	frequency	percentage
1	19	11.18
2	22	12.94
3	5	2.94
4	0	0.00
total	170	27.06

Table 3.Frequency and Percentage Distribution among Peripheral Intravenous Cannulated Patients with Occurrence of Phlebitis according to Time Interval

Time of occurrence	frequency	percentage
within 6 hours	18	39.13
within 12 hours	21	45.65
within 24 hours	7	15.22
within 48 hours	0	0.00
total	46	100

Table 4.Frequency and Percentage Distribution among Peripheral Intravenous Cannulated Patients according to their Age, Gender and Area of Admission

Demographic variables	46	frequency	Percentage
AGE	18-30	1	2.17
	31-50	15	32.61
	51-70	15	32.61
	71 and more	15	32.61
GENDER	Male	12	26.09
	Female	34	73.91
Location	ICU	18	39.13
	Ward	28	60.87

Table: 5 Association between Demographic Variables and Phlebitis among Peripheral Intravenous Cannulated Patients

Demographic variables		frequency N=170	n=46		N=total sample Percentage	Chi Square Value	n=total patient with phlebitis df	P value	Result
AGE	18-30	15	14	1	7.142857				
	31-50	62	47	15	31.91489	5.387681771	3	0.508484	S

	51-70	52	37	15	40.54054				
	71 and more	41	26	15	57.69231				
GENDER	Male	62	50	12	24				
	Female	108	74	34	45.94595	2.934715582	1	0.190584	S
Location	ICU	57	36	21	58.33333				
	Ward	113	88	25	28.40909	4.15846241	1	0.153287	NS

Table 6. Frequency and Percentage Distribution of Risk Factors (Use of Hand Rub, Use of Gloves, Cannulation Site away from Joint, Disinfection of Cannula Site, Documentation) among Peripheral Intravenous Cannulated Patients and their association with Phlebitis

Variables	N=170		n=46					
	Total No. Of Samples		f	%	Chi Square Value	df	P value	Result
Hand Hygiene	Yes	143	105	38				
	No	27	19	8	0.107481475	1	0.566932	NS
Skin Condition	Preserved integrity	135	97	38				
	excessive hairiness	30	27	3				
	impaired	5	0	5	17.98263727	2	0.119996	NS
Vein Quality	good	116	97	19				
	fair	50	27	23				
	bad	4	0	4	26.57447284	2	0.075962	S
Number of attempts	1	135	114	21				
	2	35	10	25	43.9617979	1	0.010025	S
Antiseptic used for skin preparation	YES	170	124	46				
	NO	0	0	0	0	1	1	NS

Table 7. Frequency and Percentage Distribution of Risk Factor (Size/ Gauge of Cannula) in Peripheral Intravenous Cannulated Patients and its association with Phlebitis

Size/ Gauge of Cannula	total collected sample		total observations	
16G	2	2	0	0
18G	26	14	12	46.15
20G	105	82	23	21.90
22G	37	26	11	29.73

Table 8. Frequency and Percentage Distribution of Risk Factor (Fixation Material) in Peripheral Intravenous Cannulated Patients and its association with Phlebitis

Fixation Material	N=170	n=46					
	Total No. Of Samples	f	%	Chi Square Value	df	P value	Result
Adhesive	97	19	19.58763				
Tegaderm	59	23	38.98305				
Dynaplast	14	4	28.57143				
	170	46	3.695652	7.009919	3	0.449201	S

Table : 09 Frequency and Percentage Distribution of Risk Factor (Method of Infusion) in Peripheral Intravenous

Type of IV Fluids	Total No. Of Samples	f	%	Chi Square Value	df	P value	Result
Bolus	4	2	50	18.83	3	0.23	S
Continuous	103	39	37.86				
Intermittent	63	5	7.94				
Total	170	46					

Table 10. Frequency and Percentage Distribution of Risk Factors (Types of Intravenous Drugs) in Peripheral Intravenous Cannulated Patients and their association with Phlebitis

Drug combinations	Total No. Of Samples	f	%	Chi Square Value	df	P value	Result
Antibiotics	87	33	37.93				
Blood Product	3	3	100.00				
Inotrops	11	0	0.00				
KCL	4	3	75.00				
None	65	7	10.77				
Total	170	46	3.70	14.06	3	0.29	S

Table 11. Frequency and Percentage Distribution of Risk Factors (Antibiotics) in Peripheral Intravenous Cannulated Patients and their association with Phlebitis

Drug combinations	Total No. Of Samples	f	%	Chi Square Value	df	P value	Result
Piperacillin/ tazobactam	87	33	37.93103	31.92063	5	0.341796	S
Levofloxacin	3	3	100				
Ceftriaxone	11	0	0				
Vancomycin	4	3	75				
Imipenem	50	7	14				
Metronidazole	15	0	0				
Total	170	46	3.695652				

Table 12. Frequency and Percentage Distribution of Risk Factors [Any Combination of Intravenous Infusion, Drugs and Antibiotics (Blood, Blood Products, Continuous Infusion, KCL, Phenytoin, Inotropes and Antibiotics)] in Peripheral Intravenous Cannulated Patients and their association with Phlebitis

Drug combinations		f	%	Chi Square Value	df	P value	Result
Yes	105	39	37.14	14.15	1	0.05	S
No	65	7	10.77				
Total	170	46	3.70				

II. Acknowledgment

I sincerely thank the nursing staff and administration of Apollo Hospitals, Ahmedabad, for their support during data collection. I am grateful to my guide and colleagues for their valuable suggestions and encouragement throughout the study. Finally, I acknowledge the patients who participated willingly, making this research possible.

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