Peripheral Intravenous Catheter-Related Phlebitis, Infiltration, and its Contributing Factors among Patients at Port Said Hospitals

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ABSTRACT

Background: Up to 80% of hospitalized patients require intravenous therapy, making peripheral venous catheters the most widely used endovascular device in hospitals. Peripheral Intravenous Catheters is a safe device and have a low risk of life-threatening consequences when appropriately used, but it frequently experiences peripheral intravenous catheters problems such as phlebitis and infiltration. **aimed** : This study aimed to assess peripheral intravenous catheter related phlebitis, infiltration and its contributing factors among patients at Port-Said hospital. **Subjects and method: Design**: The study design was descriptive. **Setting:** The study was conducted at the Universal Health Insurance Hospital in Port-Said medical and surgical departments. **Subjects:** The convenient sample contained (364) adult patients with intravenous catheters. **Tools:** Tool I: Contributing factors include four parts (patient characteristics, nurses' characteristics, intravenous characteristics, medication and fluid characteristics).Tool II: Part I Phlebitis Scale, Part II: Infiltration Scales. **The Results:** This study showed that 45.6% of studied patients developed phlebitis, and 25.5% of them developed infiltration. There were statistically significant relation between phlebitis, infiltration, and patients' age, Type of chronic diseases, nurses' years of experience, the IV catheter site, extension tube, medications as antibiotics, and infusion method. **Conclusion**: patients' age, body mass index, type of chronic diseases, nurses' years of experience, the IV catheter site, medications, and infusion method were contributing factors of phlebitis and infiltration. **Recommendations**: Provide a continuing continual education for nurses to teach them how to manage IV catheters and the problems of phlebitis and infiltration.

Key words: Contributing factors, Infiltration, Peripheral venous catheter, Phlebitis.

INTRODUCTION

The prevention and promotion of health, patient safety, and the restoration of health and well-being all depend on hospital care. This comprises maintenance and monitoring of the peripheral venous catheter (PVC), as well as care connected to its implantation (Liu et al., 2022). In the United States, 80% of hospitalized patients have one or more intravenous catheters inserted during their stay (Blauw, Foxman, Wu, Rey, Kothari & Malani, 2019).

The most popular method of drug delivery is through a peripheral intravenous catheter (PIVC). 80.6% to 86.4% of hospitalized patients received an intravenous bolus/push medicine, and almost 60% of hospitalized patients received at least one her PIVC (Lee, Kim, & Kim, 2019). The most frequent invasive procedure in patients in the UK is peripheral venous access, which has historically been the caregiver's job (Smith, 2021). More than 2 billion peripheral venous catheters are purchased annually, and the current high failure rate constitutes significant economic and environmental waste(Marsh, et al., 2021).

Peripheral intravenous (PIV) cannulation is the process of inserting an indwelling single-lumen plastic tube through the skin into a peripheral vein to deliver fluids, medications, and other therapies like blood products directly into the vascular system and to bypass barriers; it is absorbed and enters the majority of target organs very quickly(Beecham & Tackling, 2019).

The use of a peripheral venous catheter (PIVC) is crucial for the intravenous infusion of drugs and blood components as well as for maintaining the required fluid balance in hospitalised patients. The use of contrast agents during radiographic imaging is another example of a need for intravenous infusions, along with hemodynamic monitoring, fluid maintenance or replacement, pharmaceutical administration, the administration of blood or blood products, and nutritional management (Lv & Zhang, 2020).

Up to 69% of hospitalized patients experience early access failure due to PIVC complications (infiltration and extravasation, blockage, dislocation, and phlebitis), which necessitates the insertion of replacement devices, delays therapy, and raises costs. Additionally, bloodstream infections (BSIs) caused by catheters present a threat to medical outcomes on a global scale (Ray-Barruel, Xu, Marsh, Cooke, & Rickard, 2019).

Phlebitis is the most prevalent and significant PIVC-related complication, and it affects 7–44% of catheters (Yasuda et al., 2021). Phlebitis is an inflammation of the veins that is characterized by swelling, redness, warmth, and/or discomfort around the veins(Salma, Sarker, Zafrin & Ahamed, 2019).

The severity of phlebitis is typically based on the presence of erythema, discomfort, swelling, and thrombosis in the veins. Chemical substances like medications or injectables may be the cause of the problem. mechanical components such as the material, position, and size of the PIVC biological illnesses; or health-related aspects of the patient, like age and gender (Lv & Zhang, 2020).

The major four categories of factors that affect the development of phlebitis include patient factors, such as age, gender, and underlying disorders. chemical elements like the substance or liquid kind. Mechanical considerations include catheter size, material, length of cannulation, and medical professional practices (Mandal & Raghu, 2019). To avoid severe phlebitis, early phlebitis symptoms must be promptly identified and treated. In order to design procedures to avoid infusion-associated phlebitis, numerous risk factors, including patient factors and intravenous infection factors, should be taken into consideration (Lee & Lee 2019).

Infiltration and extravasation are additional causes of peripheral venous catheter failure. accidental solution leakage into the tissue around it. These wounds could develop if the catheter pierces the vascular wall while being inserted. When administering intravenous (IV) fluids, the catheter may come partially or entirely out of the vein, or if the vascular wall does not close it. PVC-related infiltration and extravasation injuries can cause severe functional impairment, and lifelong scarring, requiring repair surgery (Marsh, et al., 2020). The placement of the catheter in locations with little underlying soft tissue, the use of big needles, and frequent use are additional risk factors for infiltration. Infiltration can cause shedding, skin ulceration, or necrosis, and it may also harm deeper structures that give the limb function, like tendons and nerves (Gibian, Zakria, March, Shaheen, and Drolet, 2020).

Swelling, color changes, such as redness or whiteness at the site of the PIV catheter, soreness, an increase or reduction in temperature at the site of invasion, or an altered pulse quality below the site of invasion are signs that infiltration and extravasation are frequently characterized by. (Özalp, et al., 2018) are present.

Nurses should be knowledgeable in IV administration and preparation (Osti, Khadka, Wosti, Gurung & Zhao, 2019).

Significance of The Study

Around 2 billion peripheral venous catheters (PIVCs) are used annually globally, mostly for short-term intravenous therapy, making them the most often used medical device during hospitalization. These catheters increase the clinical workload and healthcare expenses for healthcare systems by resulting in major adverse outcomes like needless morbidity and ultimately patient fatality. Approximately 40–70% of these catheters experience mechanical and chemical problems (such as venous inflammation, dislocation, blockage, and infiltration) or fail prematurely as a result of infection, making PIVC failure a frequent side effect of PIVC use (Blanco-Mabilado et al., 2021). Medical emergencies such as phlebitis and infiltration have been shown to cause impairment and worse quality of life (Atay, en, & Cukurlu, 2018). As a result, this study is being done to assess adult patients' peripheral venous catheter-related phlebitis, infiltration, and contributing variables.

AIM OF THE STUDY

Assess peripheral intravenous catheter-related phlebitis, infiltration and its contributing factors among patients at port said hospital.

Research Objectives:

1) Determine the degree of peripheral intravenous phlebitis among patients with peripheral intravenous catheter

2) Determine the degree of peripheral infiltration among patients with peripheral intravenous catheter

3) Identify factors that contribute to the occurrence of peripheral intravenous catheter phlebitis and infiltration among patients with peripheral intravenous catheter

SUBJECTS AND METHOD

The methodology followed in carrying out the study is described under:

A- Technical design:

The description of the research design, the study setting, the subjects, and the data collection tools are all included in this design.

Study design:

A descriptive design was used in conducting the aim of the current study.

Study setting:

This study was carried out in the medical and surgical wards of five hospitals affiliated with the universal health insurance hospitals in the port-said governorate namely (Al Hayat Hospital, Al Salam Hospital, Al Tadamon Hospital, Al Mobara Hospital, and Al Zohor Hospital).

Study subjects:

A convenience sample study included adult patients with an intravenous catheter in a medical and surgical ward at the previously mentioned setting.

Sample size:

The sample size was determined by using the following equation

Sample size $= \frac{z1-\alpha\therefore 2\ \rho 2\ (1-p)}{d2}$ (Charan and Biswas, 2013)

Where:

$z1-\alpha\therefore 2 =$ apercentile of standard normal distribution by confidence level $=$ 1.96

P=Expected proportion in population based on previous studies (prevalence of Phlebitis among adult patients =30 % (WHO, 2020).

D: absolute error or precision (5%)

Sample size = $\frac{1.96^2 x 0.30(1-0.30)}{(0.005)2} = 323$

Assuming a 10% attrition rate:

10% = 32.3

323 + 32.3 = 355.3

Increased to 364 to increase power

The final sample size was (364) patients.

Tools of data collection:

The data of this study was collected by three tools

Tool I: Structure Interview Questionnaire

After reviewing recent relevant articles, the tool was adapted from (Mandal & Raghu, 2019; Gargar, Cutamora & Abocejo, 2017; Enes, Opitz, de Faro & Pedreira, 2016). It aimed to assess patients' demographics characteristic and identify the causes of peripheral venous catheterization problems. This is made up of two parts:

Part (1): Patient's demographic characteristics:

It was concerning age, sex, diagnosis, and educational level.

Part (2): Contributing factors Assessment:

These factors are classified into four categories: patient health associated characteristics (body mass index and chronic disease), nursing staff (level of nursing education, years of nursing experience), influencing variables related to venous characteristics (venous catheter size, venous catheter site laterality), and insertion factors relating to drug and fluid properties, such as (location, catheter position) (type of fluid, method of infusion, number of drugs, type of infusion, blood product).

Tool II: Clinical Assessment Data:

Part I : Phlebitis Scale

A standardized Likert scale, the Infusion Nurses Society Phlebitis Scale has been adopted form(2010) Groll, Davies, Donald, Nelson, and Virani. It aimed to assess degree ofperipheral intravenous phlebitis among patients with peripheral intravenous catheter and includes five grades

Scoring system:

There are five grades of the scale, as follow: Grade 0 denotes no symptoms, grade 1 when there is pain at the access site but no erythema, grade 2 when there is pain at the access site together with erythema and/or edema, and grade 3 when the access site is erythematous. Grade 3 if there is concomitant pain, edema, banding, and palpable venous trunk; Grade 4 if there is pain, erythema, and/or edema at the access site; palpable venous trunk >1 inch); and purulent discharge.

part II: Infiltration Scales:

It was adopted by (Groll, et al., 2010). And aimed to assess. The Infusion Nurses Society helped advance and post infiltration scales for use in acute care and network care settings. It includes five grades

Scoring system:

The scale ranges from 0 (no symptoms) to 4 (severe symptoms) (all signs and symptoms present). to look into infiltration indicators, symptoms, and signs of infiltration. This scale includes 5 grades divided as follows; Grade 0 indicates that there are no symptoms, grade 1 indicates that the skin has blanched, edema is 1 inch (2. five cm) in any direction, cool to the touch without or with pain, grade 2 indicates that the edema is 1 to 6 inches (2. five to 15 cm) in any direction, cool to the touch without or with pain, and grade 3 indicates that there are no symptoms at all. grade 3 While skin blanching, transparent, significant edema measuring 6 inches (15 cm) in any direction, coolness to the touch, moderate to mild pain, and possible numbness are possible, Grade 4 is when the skin may be blanched, translucent, tight, leaking, discolored, bruised, swollen, and grossly edematous, measuring 6 inches (15 cm) in any direction. It also includes circulatory impairment, mild to severe pain, and infiltration of any amount of blood product, irritant, or vesicant.

B- Operational design:

The operational design includes the preparatory phase, content validity, reliability, pilot study, and field of work.

1- Preparatory phase:

It included reviewing of related literature of various aspects of the study using all official websites, including PUBMED, GOOGLE SCHOLAR, MEDLINE, CINAHL, EBSCO Cochrane, Scopus, books, papers, journals, etc to prepare tools for data collection. The phase of preparation was from January to March 2021. Also, this phase included; content validity and relability and pilot study

-Content validity

They were able to prepare the data-gathering equipment needed data and become more familiar with the research topic as a result. provided to The tool was subsequently modified following this professional advice.

-Reliability:

The tool was evaluated internally using Cronbach's alpha test, using Tool I (Contributing Factors Questionnaire), was 0.88, Tool II (The Infusion Nurses Society Phlebitis Scale) = 0.91, and Tool III (The Infusion Nurses Society Infiltration Scale) = 0.89, indicating that this version showed good scale reliability.

- Pilot study:

After the development and validation of the research tool and before the start of the datacollection phase, a pilot study was carried out. On 10% or so of the study samples, this was done. As a result, the pilot sample, which included 36 patients from his five hospitals linked with the Universal Health Insurance Hospital in Port Said, was excluded from the main study sample. The two-week pilot inquiry was placed in early April to mid-April. The results of the pilot research were taken into account when necessary revisions were made.

2- Fieldwork:

Once the permission had been obtained from the previously mentioned setting, the researcher met the participants and introduced her/ his self, then explained the aim and nature of the study , and their approval to participats in the study was taken. Data collection was started , and continued for a period of May 2021 to the end of October 2021. Each patient was interviewed to collect data every 12 hours for three consecutive days during the week. 15 to 20 patients per week were assessed. The 364 patients came from five hospitals in Port Said that are linked with Universal Health Insurance Hospitals. The questionnaire (Tool I) was fulfiled by the researcher, it was comprised demograpgic data and contributing factors. Clinical assessment data including phlebitis and infiltration scale were assessed by the researchers using tool II.

C- Administrative design:

Before conducting the study, the Dean of the Nursing Faculty officially wrote to the Director of the Universal Health Insurance Hospital in Port Said and to the directors of each hospital to request their participation and approval. after explaining the aim.

Ethical Consideration:

The Scientific Research Ethics Committee of the College of Nursing at the University of Port Said gave its approval to the study protocol. The university dean wrote to the director of the Port Said universal hospital first, then to the directors of each hospital. All of the patients granted their informed consent after she explained the study's aim to them. The study's patients were informed of its aim and methodology by the researchers. Patient's willingness to participate was demonstrated by the fact that they were made aware of their freedom to withdraw from the study at any time. It has been confirmed that the information obtained would be kept private and utilized only for scientific study. Additionally, the consistency of the abovementioned hospital work was unaffected by the process of collecting data. The data were then statistically examined, and the results were then presented as appropriate.

D- Statistical design:

Upon completion of data collection variables included in the sheet are added before computerized. For qualitative factors, data were presented using descriptive statistics in the form of frequencies and percentages, whereas for quantitative variables, mean and standard deviation were employed. Utilizing the Social Science Program Statistics Package (SPSS) package version 22.0, statistical analyses were carried out on a computer. The computer program was running on the right version. The qualitative variables were compared using a chi-square test. When the P.value was 0.05, Cronbach's alpha coefficient was utilized to evaluate the tool's internal consistency and dependability.

RESULTS:

Results show that (56.3%) of the studied patients were male. And (54.4%) of them age ranged from 60 years or more with a mean of 59.392±19.231, also (22.5%) of the studied patients had liver and GIT disease. Looking at their level of education, (38.2%) of the studied patients had secondary education. Clinical characteristics of the studied patients illustrated that (71.7%) of the studied patients had chronic diseases, and (56%) of them had HTN. Also, (34.3%) of them had overweight with a mean of 27.567±4.749.

Figure 1 shows that 54.4% of studied patients had not developed phlebitis, and 74.5% of them had not developed infiltration.

Figure 2 shows that 54.4% of studied patients had not developed phlebitis, and;74.5% of them had not developed infiltration. Also, 21.7% of them had second-degree phlebitis, and 11.7% of them had second-degree infiltration.

Table 1 refers statistically significant relation between the studied patient's characteristics and phlebitis regarding the chronic disease, type of chronic disease, body mass index (P= 0.049, 0.003, 0.012, 0.000, 0.000 respectively), patient involuntary movement, and patient hyperactivity were highly considered (p = 0.0000). concerning infiltration shows that was a statistically significant relation between the studied patient's characteristics and infiltration regarding the type of chronic disease, patient involuntary movement, and patient hyperactivity were highly considered (P = 0.000).

Table 2 describes the statistically significant positive correlation between the intravenous catheter characteristics and phlebitis regarding the situation, IV site (p=0.001, o.o18recpectively), and use of extension tube, cannulation attempts were highly considered (p = 0.000). concerning infiltration shows that was a statistically significant relation between intravenous catheter characteristics and infiltration regarding the situation, IV site, improper securement (P=0.019, 0.033, 0.015), and extension tube, and cannulation attempts were highly considered (p = 0.000).

Table 3 describes the statistically significant positive correlation between the medication and fluid characteristics and phlebitis regarding infusion type (p = 0.014) and infusion methods, blood products, and Intravenous antibiotics, which were highly considered (P=0.000). concerning infiltration shows that was a statistically significant relation between medication and fluid characteristics and infiltration regarding infusion methods, infusion type, blood products, and IV antibiotics were highly considered (P=0.000).

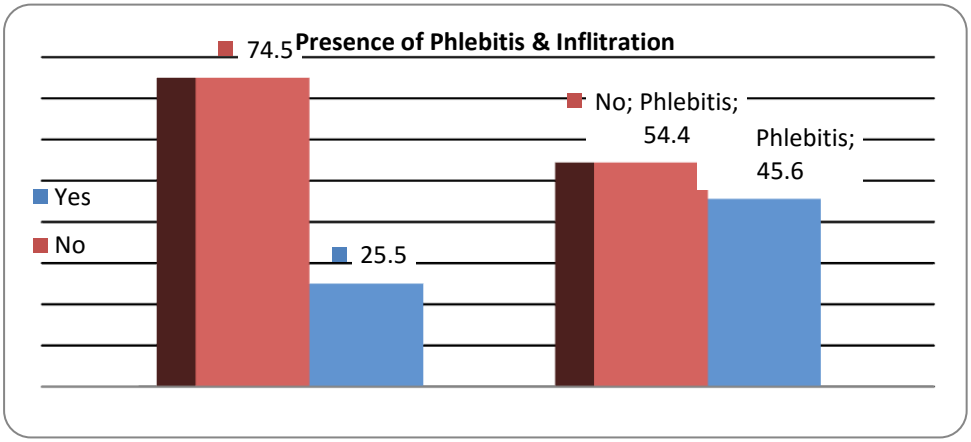

Figure (1): distribution of the presence of phlebitis and infiltration among studied patients.

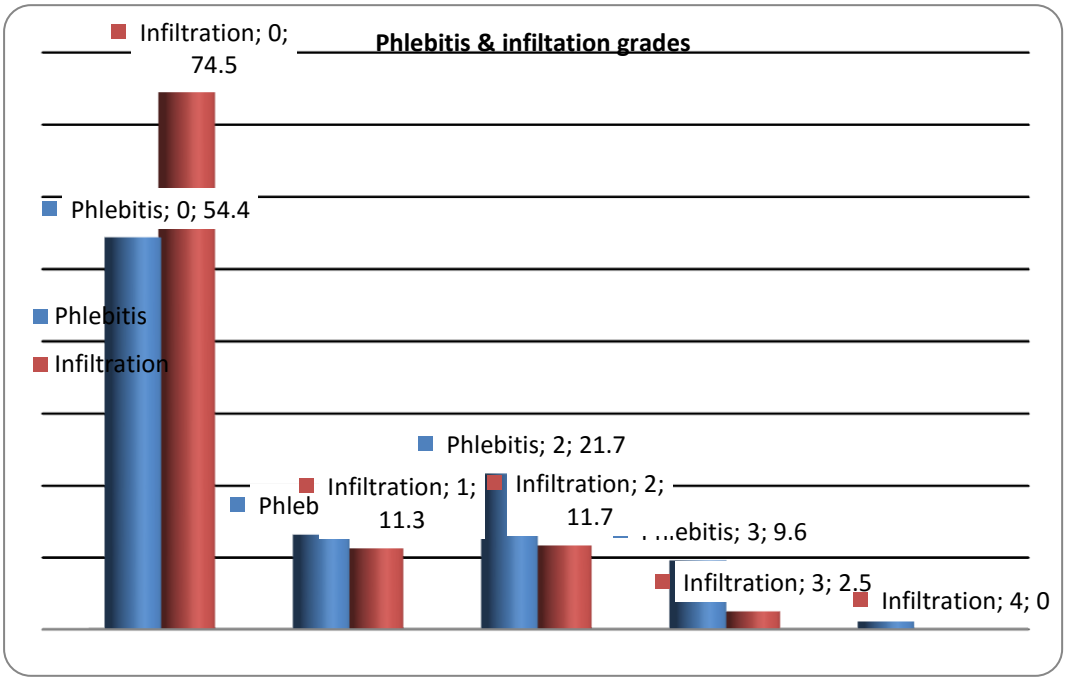

Figure (2): Frequency distribution of the studied patients according to their phlebitis and infiltration grades.

Table (1): Relation between studies patients' characteristics and both their phlebitis & infiltration**.**

Items	Number	Phlebitis				Significance	Infiltration				Significance
		Yes		No			Yes		No		
		No	%	No	%		No	%	No	%	
Age group											
• 20:<30 years	29	10	6.4	19	9.2	X^2=9.467	2	2.2	27	9.9	X^2=12.189
• 30: < 40 years	23	7	4.5	16	7.7	*p*=0.049*	3	3.3	20	7.3	*p*=0.016*
• 40: < 50 years	38	16	10.2	22	10.6		9	9.9	29	10.6	
• 50: < 60 years	76	25	15.9	51	24.6		15	16.5	61	22.3	
• ≥ 60 years	198	99	63.1	99	47.8		62	68.1	136;	49.8	
Chronic diseases						X^2=3.167					X^2=1.990
• Yes	261	105	66.9	156	75.4	*p*=0.049*	60	65.9	201	73.6	*p*=0.102
• No	103	52	33.1	51	24.6		31	34.1	72	26.4	
Type of chronic diseases #											
• HTN	204	93	45.6	111	54.4		51	25	153	75	
• DM	162	85	52.2	77	47.5	X^2=21.88	49	30.2	113	69.8	X^2=34.149
• Liver	26	19	73.1	7	26.9	4	15	57.7	11	42.3	*p*=0.000**
• Cardiac	101	49	48.5	52	51.5	*p*=0.003*	30	29.7	71	70.3	
• COPD	2	1	50	1	50		1	50	1	50	
• Urinary (renal)	22	12	54.5	10	45.5		8	36.4	14	63.6	
• None	103	36	35	67	65		14	13.6	89	86.4	
Body mass index											
• Underweight	5	3	1.9	2	1	X^2=10.90	2	2.2	3	1.1	X^2=3.152
• Normal weight	117	37	23.6	80	38.6	7	23	25.3	94	34.4	*p*=0.369
• Overweight	125	56	35.7	69	33.3	*p*=0.012*	33	36.3	92	33.7	
• Obese	117	61	38.9	56	27.1		33	36.3	84	30.8	

X^2 refers to the chi-square test, * refers to significance if $p < 0.05$, ** refers to highly significance if $p < 0.001$

not mutually exclusive

Table (2): Relation between intravenous catheter characteristics, and both their phlebitis and infiltration.

Items	Number	Phlebitis				Significance	Infiltration				Significance
		Yes		No			Yes		No		
		No	%	No	%		No	%	No	%	
Situation											
• Emergency	**60**	**39**	**65**	**21**	**35**	**X^2=10.895**	**22**	**36.7**	**38**	**63.3**	**X^2=5.215**
• Non-emergency	**304**	**127**	**41.8**	**177**	**58.2**	***p*=0.001***	**69**	**22.7**	**235**	**77.3**	***p*=0.019***
IV site						**X^2=8.001**					**X^2=6.822**
• Hand	**171**	**67**	**39.2**	**104**	**60.8**	***p*=0.018***	**32**	**18.7**	**139**	**81.3**	***p*=0.033***
• Forearm	**116**	**54**	**46.6**	**62**	**53.4**		**35**	**30.2**	**81**	**69.8**	
• Antecubital fossa	**77**	**45**	**58.4**	**32**	**41.6**		**24**	**31.2**	**53**	**68.8**	
Extension tube						**X^2=23.390**					**X^2=45.575**
• Yes	**39**	**32**	**82.1**	**7**	**17.9**	***p*=0.000****	**27**	**69.2**	**12**	**30.8**	***p*=0.000****
• No	**325**	**134**	**41.2**	**191**	**58.8**		**64**	**19.7**	**261**	**80.3**	
Cannulation attempts						**X^2=16.924**					
• One attempt	**341**	**146**	**42.8**	**195**	**57.2**	***p*=0.000****	**73**	**21.4**	**268**	**78.6**	**X^2=37.144**
• Two attempts	**23**	**20**	**87**	**3**	**13**		**18**	**78.3**	**5**	**21.7**	***p*=0.000****
Improper securement						**X^2=0.541**					**X^2=9.075**
• No	**361**	**164**	**45.4**	**197**	**54.6**	***p*=0.434**	**88**	**24.4**	**273**	**75.6**	***p*=0.015***
• Yes	**3**	**2**	**66.7**	**1**	**33.3**		**3**	**100**	**0**	**0**	

X^2 refers to the chi-square test, * refers to significance if $p < 0.05$, ** refers to highly significance if $p < 0.001$

Table3: Relation between medication and fluid characteristics, and both phlebitis and infiltration.

Items	Number	Phlebitis				Significance	Infiltration				Significance
		Yes		No			Yes		No		
		No	%	No	%		No	%	No	%	
Infusion methods											
• Infusion pump	**5**	**1**	**20**	**4**	**80**		**1**	**20**	**4**	**80**	
• Bolus	**49**	**6**	**12.2**	**43**	**87.8**	**X^2=45.979**	**3**	**6.1**	**46**	**93.9**	**X^2=24.817**
• Gravitational	**27**	**5**	**18.5**	**22**	**81.5**		**0**	**0**	**27**	**100**	***p*=0.000****
• Gravitational+ bolus	**275**	**153**	**55.6**	**122**	**44.4**	***p*=0.000****	**86**	**31.3**	**189**	**68.7**	
• None	**8**	**1**	**12.5**	**7**	**87.5**		**1**	**12.5**	**7**	**87.5**	
Infusion type											
• Continuous	**3**	**1**	**33.3**	**2**	**66.7**	**X^2=10.691**	**1**	**33.3**	**2**	**66.7**	**X^2=30.652**
• Intermittent	**310**	**136**	**43.9**	**174**	**56.1**		**65**	**21**	**245**	**79**	***p*=0.000****
• Continuous + Intermittent	**43**	**28**	**65.1**	**15**	**34.9**	***p*=0.014***	**25**	**58.1**	**18**	**41.9**	
• None	**8**	**1**	**12.5**	**7**	**87.5**		**0**	**0**	**8**	**100**	
Blood products						**X^2=29.628**					**X^2=35.288**
• Yes	**49**	**40**	**81.6**	**9**	**18.4**		**29**	**59.2**	**20**	**40.8**	***p*=0.000****
• No	**315**	**126**	**40**	**189**	**60**	***p*=0.000****	**62**	**19.7**	**253**	**80.3**	
IV antibiotic						**X^2=52.882**					**X^2=20.791**
• Yes	**227**	**137**	**60.4**	**90**	**39.6**		**75**	**33**	**152**	**67**	***p*=0.000****
• No	**137**	**29**	**21.2**	**108**	**78.8**	***p*=0.000****	**16**	**11.7**	**121**	**88.3**	

X^2 refers to the chi-square test, * refers to significance if p < 0.05, ** refers to highly significance if p < 0.001

DISCUSSION

In order to administer fluid therapy, peripheral venous catheters (PVCs) are the most often utilized vascular device, with more than 70% of hospitalized patients needing at least one catheterization (Liu et al., 2022). However, individuals frequently experience difficulties and give up before finishing their treatment (Marsh et al., 2021). Additionally, the following factors are listed by Larsen et al. (2022) as being related to peripheral venous catheter failure: As a result, this study is being done to assess adult population phlebitis, infiltration, and its variables connected to peripheral venous catheters.

The findings revealed that the majority of the patients tested had an incidence of phlebitis, and around a quarter of them had an incidence of infiltrates, in terms of both the quantity and incidence of phlebitis and infiltrates. The preparation of the insertion site, the type of injection, the insertion technique, the type of dressing, and the insertion location all had a role in the occurrence of catheter failure (Lee, Kim, & Kim, 2019). According to research by Marsh et al. (2021), invasion/obstruction (23% of peripheral intravenous catheter complications) and phlebitis (12% each) were the most frequent. I was. Infiltration, blockage, and phlebitis were the three most common consequences of peripheral venous catheters, according to a different study by Liu et al. (2022). The majority of individuals evaluated, according to the most recent findings, had incidences of phlebitis, most of which are second-degree. One-fourth of them have an invasion frequency ranging from the second to the first degree. This is probably because phlebitis and infiltration can be avoided by early detection and fast treatment of undesired signs and symptoms. Comparing this rate to the research by Liu et al (2022). According to Kassahun et al. (2022), phlebitis or infiltration caused catheter failure in one-third of his initial peripheral intravenous catheters. It also revealed that the majority of phlebitis (88.4%) and infiltration (93.7%) consequences were grade 1.

The majority of the tested patients are older than 60 years old, according to parameters relating to the characteristics of the examined patients. The incidence of phlebitis and infiltration was found to be statistically significantly correlated with the age group of the patients tested. This observation could be the result of structural changes in the vein wall or age-related inflammatory response deterioration. The work of Marsh et al. (2021), who revealed that age was a significant patient factor related to a 1% rise in phlebitis risk with increasing age, supports these findings. According to (Anand et al., 2020), those aged 60 to 70 had a higher risk of developing phlebitis.

According to research findings, there was a statistically significant correlation between the occurrence of phlebitis and infiltration and chronic illness type. Patients with liver illness, urologic conditions, and diabetes mellitus had the highest incidence. These patients may have a higher frequency of phlebitis because diabetes causes endothelium dysfunction, which increases the risk of phlebitis. This conclusion is in line with reports that people with metabolic illness and hypertension often have phlebitis (Joaquin-Apaza et al., 2021). Additionally, (Salma et al., 2019) discovered that patients with normotensive, non-diabetic, and normal lipid profiles saw considerably lower rates of phlebitis than those with hypertension, diabetes, and dyslipidemia.

The current study showed a statistically significant relationship between phlebitis in terms of examined patient characteristics and body mass index. These results are consistent with Rodríguez-Calero et al. (2020) observed that obesity or a high body mass index (BMI) score are postulated to be risk factors for peripheral venous catheter complications.

The majority of the patients assessed manually inserted their intravenous catheters, according to the findings of aspects associated with intravenous catheter features.

An earlier study that was conducted by Gorski et al. (2021) concluded that infiltration is significantly associated with the insertion website online inside the wrist/hand or the

antecubital fossa, and with a smaller gauge, validated those findings. As shown by (Salgueiro-Oliveira et al., 2019), showed that the choice of the quality and the anatomical site used to insert the PVC in a few conditions were no longer those supported by the recommendations because the nurses typically chose the biggest PVC quality and inserted inside the lower limb.

The present analysis supported the statistically significant correlation between intravenous catheter characteristics and infiltration, cannulation attempts, usage of extension tubes, and improper securement. These consequences may result from poor nursing performance and safety precautions. The IV instrument is smooth, stable, and securely fastened, and the patient isn't always in pain, according to the analysis conducted by (Tertullian, et al., 2018). This study discovered that phlebitis identification and prevention had become unsatisfactory. This aspect demonstrates poor nursing performance since registered nurses allegedly no longer oversee the system or venous access care and protection and instead outsource venous punctures to auxiliary and technical nursing team members. While Banks (2015) suggested that using a peripheral intravenous catheter securement tool would make problems with the catheter's placement less problematic.

The present results identified that a statistically significant relation between intravenous medications administered to the studied patients, and each phlebitis and infiltration, have been relatively taken into consideration. According to Ozger et al. (2021), a few medications (such as amiodarone, potassium chloride, and positive antibiotics) had a statistically significant relation with phlebitis and infiltration, which is consistent with the infusion answers type (fluids with high osmolality).

According to the research findings, almost 75 percent of the patients underwent fluid administration in the form of both tablets and capsules as well as fluids infused using the force of gravity and bolus procedures with the intermittent infusion. While the outcome

showed that there was a statistically significant relation between medical characteristics, fluid types, and phlebitis concerning infusion type (p = 0.014), fluid types, and infusion techniques. These results are consistent with those reported by Enes, Opitz, Faro, and Pedreira (2016), who confirmed a relationship between the frequency of phlebitis and the type of infusion (answers and capsules), and who also found that the combined use of non-stop and intermittent infusion was more common than phlebitis.

Another study by Marsh et al. (2021) showed that the intermittent infusion mode is the most prone to phlebitis. It also shows how the continuous infusion method is more effective in preventing the development of peripheral venous catheter problems. This might be because while the infusion was stopped, a thrombus formed in the IV line.

According to the study, just a small portion of the patients was given blood products. This shows a statistically significant correlation between phlebitis and infiltration and the blood products given to the study subjects. These findings disagree with Mandalaland Raghu's findings (2019), who discovered that although not statistically significant, the proportion of study participants who received blood was much lower (53.33%) than those who experienced phlebitis.

The current study revealed a strong relation between the intravenous antibiotics administered to the tested patients and phlebitis with regard to the contributing elements of the type of intravenous antibiotics supplied to the patients. antibiotics made of cephalosporin (cefepim, cefotaxime, ceftriaxone). Cefepime hydrochloride and ceftazidi pentahydrate were found to be strongly related to vascular damage (occlusion, infiltration, or extravasation), as well as PVC problems, according to research done by Larsen et al. in 2022. in line with academic research. In a similar vein and Marsh et al. (2021) contend that intravenous antibiotics are linked to an increase in peripheral intravenous catheter failure due to infiltration and phlebitis as well as other causes.

Additionally, (Anand et al., 2020) discovered that receiving IV antibiotics markedly raised the likelihood of having phlebitis.

Conclusion and Recommendations

According to the findings of the current study, phlebitis developed in 50% of the individuals studied, with a further 25% having second-degree phlebitis. Additionally, a minority of the patients exhibited second-degree infiltrates, which were present in one-fourth of the individuals who were evaluated. Significant issues with peripheral intravenous treatment include phlebitis and infiltration. Patient characteristics such as age group, nurse characteristics such as years of experience, IV catheter characteristics such as IV site, and fluid characteristics such as drug and infusion method were the significant risk variables identified in this study.

In light of the results of the present study, the following recommendations are suggested:

To help nurses learn more about PVC patient care and practice it more effectively, offer ongoing education to them. Additionally, continuing education courses on the use of intravenous catheters and elements that can raise the risk of phlebitis and infiltration are offered to nurses. The associated risk variables, such as the catheter's size, length of stay, age, and intravenous administration, also need to be given more thought and care. The importance of checking venous catheters regularly and removing them if major issues arise should also be highlighted.

Further Research:-

Replication of the current study on a large sample from different geographic areas to achieve a more generalized result.

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الالتهاب الوريدي و التسريب المصاحب للقسطرة الوريدية الطرفية والعوامل المصاحبة بين مرضي مستشفيات بورسعيد

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الخلاصة

المرضى في المستشفى٨٠% منهم يحتاجون إلى علاج وريدي ، مما يجعل القسطرة الوريدية المحيطية من أكثر الأجهزة المستخدمة على نطاق واسع في المستشفيات. القسطرة الوريدية الطرفية هي جهاز آمن مع مخاطر منخفضة من العواقب التي تهدد الحياة عند استخدامه بشكل صحيح. لكنه كثيرًا ما يعاني من مشاكل القسطرة الوريدية الطرفية مثل التهاب الوريد ، والتسرب ، والتسلل ، والعدوى. هدف البحث: تهدف الدراسة إلى تقييم الالتهاب الوريدي و التسريب المصاحب للقسطرة الوريدية الطرفية والعوامل المصاحبة بين مرضي مستشفيات بورسعيد. طرق وأدوات البحث: أجريت الدراسة الوصفية على (٣٦٤) مريضاً بالغاً باستخدام قسطرة وريدية في الجناح الباطني والجراحي بمستشفيات التأمين الصحي الشامل ببورسعيد. تم تجميع البيانات باستخدام الأدوات التالية الأداة الأولى: تشمل العوامل المساهمة أربعة أجزاء (خصائص المريض ، وخصائص الممرضات ، وخصائص الحقن الوريدي ، والأدوية وخصائص السوائل) الأداة الثانية: الجزء الأول مقياس التهاب الوريد ، الجزء الثاني: مقاييس التسلل. النتائج: أظهرت هذه الدراسة أن ٤٥.٦٪ من المرضى الذين خضعوا للدراسة أصابوا بالتهاب الوريد و ٢٥.٥٪ منهم أصيبوا بالارتشاح. توجد علاقة ذات دلالة إحصائية بين التهاب الوريد ، والتسلل ، وعمر المريض ، ونوع الأمراض المزمنة ، وسنوات خبرة الممرضات ، وموقع القسطرة الوريدية ، وأنبوب التمديد ، والأدوية كمضادات حيوية ، وطريقة التسريب. الخلاصة: كان عمر المريض ، ومؤشر كتلة الجسم ، ونوع الأمراض المزمنة ، وسنوات خبرة الممرضات ، وموقع القسطرة الوريدية ، والأدوية ، وطريقة التسريب من العوامل المساهمة في التهاب الوريد والتسلل. لذلك، أوصت الدراسة علي إجراء برنامج تعليمي للممرضات حول كيفية التعامل مع القسطرة الوريدية والعوامل التي يمكن أن تزيد من خطر الإصابة بالتهاب الوريد والتسلل.

الكلمات المرشدة :العوامل المساهمة، تسريب، قسطرة وريدية طرفية، الالتهاب الوريدي.