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VISUAL OBSERVATION OF PHLEBITIS TO IDENTIFY FACTORS CONTRIBUTING TO THE DEVELOPMENT OF PHLEBITIS AMONG ADULT INPATIENT IN HCG HOSPITALS

Clinical Research

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ABSTRACT

Introduction: Peripheral intravenous catheters are used for administration of fluid-electrolytes, blood and blood products, medications and parenteral nutrition. Phlebitis is the most common complication affects 75% of inpatients and is a significant clinical problem. It negatively affects the comfort of the patient, the duration of catheter use, the hospitalization period, and treatment costs. The purpose of this study is to determine the effect of PVC duration on the development of phlebitis in infectious diseases

Materials and methods: A descriptive cross-sectional study was done among 652 samples to determine the effect of peripheral venous catheter (PVC) duration on the development of phlebitis in HCG hospitals. Patients between 18-80 years of age, who were on IV parenteral therapy were included according to inclusion and exclusion criteria.

Results: Development of phlebitis was observed more during night shifts (p=0.049) and it was due to the solution used for site preparation(p=0.003), material of the needle(p=0.002), indwelling time of the catheter (0.001). Further, the number of attempts made for IV insertion(p=0.001) was showing statistically significant association with the development of phlebitis.

Conclusion: The results suggest that it is very important to focus on the problems associated with the development of phlebitis especially taking care of patients during night shifts by restricting hand movements. Furthermore, it is also noted that by reducing the number of attempts while inserting IV cannulas can lower the complications related to IV cannulation.

KEYWORDS

IV catheter, phlebitis, hospitalization, complications.

INTRODUCTION:

Inpatients are exposed to many interventions for diagnosis and treatment. Administration of parenteral medicine is the most commonly used intervention method. More than 80% of inpatients receive intravenous (IV) treatment by insertion of a catheter into the vein[1,2,3]. Administration of parenteral medicine is an integral part of nursing. Nurses administer intravenous liquids or medications prescribed by doctors or clinicians to patients and monitor the patients[4,5]. Intravenous catheters are indispensable tools of modern medicine. Catheters are necessary for administration of liquid treatments, blood and blood products, as well as for parenteral feeding, close monitoring, and infusion of various medicines. Although IVs have a multitude of uses, they can cause complications that may lead to serious problems such as extravasation, ecchymosis, hematoma, infection, and phlebitis. The most common among these complications is phlebitis[6,7,9].

Phlebitis is defined as inflammation of the venous tunica intima, is a common but unavoidable complication in individuals receiving IV treatments. It is generally associated with peripheral venous catheter (PVC) use. Phlebitis is caused by various factors such as wide, thick, and long catheter lumens; catheter material composition; insertion site; number of insertions; indwelling duration; concentration of medicine and solutions; flow rate; contravention of aseptic methods; type of covering used for stabilization; and the rate of infusion set exchange [2,10,11,12,13,14].

The study aimed to assess the effect of PVC duration on the development of phlebitis in infectious diseases. This study also evaluated the individual, chemical, mechanical, and infectious factors associated with PVC-related phlebitis.

MATERIALS AND METHODS

A cross-sectional study was conducted between May 2011 to November 2011 to determine the effect of catheter indwell time on the development of phlebitis during PVC (**HCG/SRC/2020/55**). This study includes, catheters administered to inpatients admitted to HCG hospitals. Patients between 18-80 years of age, who were on IV parenteral therapy were included according to inclusion and exclusion criteria.

Data were collected using Patient Information Form, Information Form on Peripheral Venous Catheter and Treatment, Visual Infusion Phlebitis Assessment Scale (VIPAS) Staging Key for Peripheral IVs, and the Peripheral Venous Catheter Nurse Observation Form. The Patient Information Form included demographic features such as age, gender, and medical diagnosis.

The peripheral venous catheter (PVC)and treatment information form contains the details of number of catheters; anatomical site and frequency of catheter administration per site; use of antibiotics and fluids; duration of catheter stays in the vein; phlebitis development; phlebitis level; and whether the catheter has instruments like triple taps, vein valve, and Dosi-flow.

Data Analysis: Data was analyzed using SPSS version 11.0 (SPSS, Inc., Chicago, IL, USA). The incidence of phlebitis was compared to individuals' gender and age groups, duration of venous catheter, whether the patient received any medicine or fluid, catheter size, and site of catheterization. The chi-square test was used to test the

significance of the associations. Seven variables determined to be significantly associated with phlebitis development in PVC were evaluated using logistic regression analysis. Incidence of phlebitis was treated as the dependent variable, and patient sex, number of catheterizations, catheter sites, use of antibiotics, number and types of IV fluids administered, and catheter duration were analyzed as independent variables by modeling using the "Enter" method.

RESULTS

A total of 652 patients between 18-80 years of age and on IV parenteral therapy were included according to inclusion and exclusion criteria. Among 652 participants, phlebitis increased during night shift with a smaller number of cannulations i.e.,10 in 43 cannulations and is showing statistically significant association with phlebitis (p=0.040) (**table 1**). Visual infusion phlebitis with two halves of a shift is described in **table 2** and is not showing statistically significant association(p=0.405). Gauge of the cannula also shows that there was no statistically significant association with phlebitis(p=0.069) (**table 3**).

Among 336 cannulations only 31 patients developed phlebitis with OH solution which is used for site preparation before cannulation and is showing statistically significant association with a smaller number of phlebitis cases (p=0.003) (**table 4**). Type of dressing material used with number of cannulations were not showing statistically significant association with phlebitis(p=0.554) (**table 5., table 6).** It is evident that there was no statistically significant association found between phlebitis according to selection of site during cannulations (p=0.189). Among 652 samples majority of the patients i.e., 633 were cannulated with PU plastic needle and only 53 patients developed phlebitis. So, the material of the needle is showing statistically significant association with phlebitis (p=0.002) (**table 7**). There was no tip damage among 624 cannulas but still there was 72 phlebitis cases were noticed and it was not showing significant association(p=0.311) (**table 8**).

The nurses experience was not showing association with the phlebitis (Mean=8.567, p=0.492) but indwelling time was showing association with the development of phlebitis (Mean= 22.319, p=0.001) (**table 9**). Among 652 patients, 62 patients developed phlebitis with 1st attempt and 14 developed in 2nd attempt and only 1 developed in 3rd attempt. This indicates that number of attempts of IV insertion was associated with the development of phlebitis (0.001) (**table 10**).

Table 1 Association between the Visual observation of Phlebitis during each shift with number of cannulations.

N = 652

Number of cannulations and phlebitis identified	Morning	Evening	Night	Chi-square value	'p' value & inference
Number of Phlebitis	45	22	10	6.022	0.049 S*
Number of cannulations	380	162	33		
	425	184	43		

S*- Significant p<0.05

From the above table it is evident that there was statistically significant association found between phlebitis increased during night shift with a smaller number of cannulations at the level of p<0.05.

Table 2: Association between the Visual observation of Phlebitis during each halves of a shift with number of cannulations.

N = 652

VISUAL INFUSION PHLEBITIS WITH TWO HALVES OF A SHIFT	Two halves of all shift			
	1st half	2nd half	Chi-square value	'p' value & inference
Number of cannulations	368	207	0.693	0.405 NS*
Number of phlebitis	53	24		
	421	231		

NS*- Not significant p<0.05

From the above table it is evident that there was no statistically significant association found between phlebitis with number of cannulations during each halves of all shift at the level of p<0.05.

Table 3: Association between visual observation of Phlebitis according to different gauges of needle with number of cannulations.

N = 652

VISUAL INFUSION PHLEBITIS WITH DIFFERENT GAUGES OF NEEDLES	Different gauges of needle					
	18	20	22	24	Chi-square value	'p' value & inference
Number of cannulations	15	253	299	8	7.077	0.069 NS*
Number of Phlebitis	0	44	31	2		
	15	297	330	10		

NS*- Not significant p<0.05

From the above table it is evident that there was no statistically significant association found between phlebitis according to different gauges of needle with number of cannulations at the level of p<0.05.

Table 4: Association between visual observation of Phlebitis according to different antiseptic solutions used for site preparation with number of cannulations.

N = 652

VISUAL INFUSION PHLEBITIS WITH SITE PREPARATION	Site preparation			
	OH only	OH+ CHG	Chi-square value	'p' value & inference
Number of cannulations	336	239	9.117	0.003S*
Number of Phlebitis	31	46		
	367	285		

S*- Significant p<0.05

From the above table it is evident that there was statistically significant association found between phlebitis according to different antiseptic solutions used for site preparation with number of cannulations at the level of p<0.05.

Table 5: Association between visual observation of Phlebitis according to different type of dressing material used with number of cannulations.

N = 652

VISUAL INFUSION PHLEBITIS WITH TYPE OF DRESSING	Type of dressing			
	Transparent	Optyfix	Chi-square value	'p' value & inference
Number of cannulations	438	137	0.351	0.554 NS*
Number of Phlebitis	61	16		
	499	153		

NS*- Not significant p<0.05

From the above table it is evident that there was no statistically significant association found between phlebitis according to different type of dressing material used with number of cannulations at the level of p<0.05.

Table 6: Association between visual observation of Phlebitis according to selection of site during cannulations.

N = 652

VISUAL INFUSION PHLEBITIS WITH SITE OF INFUSION	Site of Infusion				
	Basilic	Cephalic	Meta carpal	Chi-square value	'p' value & inference
Number of cannulations	107	183	285	3.331	0.189 NS*
Number of Phlebitis	9	31	37		
	116	214	322		

NS*- Not significant p<0.05

From the above table it is evident that there was no statistically significant association found between phlebitis according to selection of site during cannulations at the level of p<0.05

Table 7: Association between visual observation of Phlebitis according to different type of IV catheter with number of cannulations.

N = 652

VISUAL INFUSION PHLEBITIS WITH MATERIAL OF NEEDLE	Material of needle				
	PU Plastic	Siliconized	Violon	Chi-square value	'p' value & inference
(a) Number of cannulations	370	36	169	12.892	0.002 S*
(a) Number of Phlebitis	53	12	12		
	633	48	181		

S*- Significant p<0.05

From the above table it is evident that there was statistically significant association found between phlebitis according to different type of IV catheter with number of cannulations at the level of p<0.05.

Table 8: Association between number of tip damage in visual observation of Phlebitis with number of cannulations.

N = 652

VISUAL INFUSION PHLEBITIS WITH TIP DAMAGE	Tip damage			
	No	Yes	Chi-square value	'p' value & inference
Number of cannulations	552	23	1.027	0.311 NS*
Number of Phlebitis	72	5		
	624	28		

NS*- Not significant p<0.05

From the above table it is evident that there was no statistically significant association found between number of tip damage in phlebitis with number of cannulations at the level of p<0.05.

Table 9: Association between visual observation of Phlebitis with nurse's experiences and indwelling time.

N = 652

Comparing two or more unrelated groups using Kruskal Wallis test					
Domains	Visual Infusion Phlebitis	Number	Mean	Chi-square value	'p' value
Nurse's experience	No	575	8.567	1.417	0.492 NS*
	Yes	77	8.648		
Indwelling time	No	575	22.3197	31.954	0.001S*
	Yes	77	38.5660		

S*- Significant p<0.05, NS*- Not significant p<0.05

From the above table it is evident that though there was no statistically significant association found between nurse's experience with phlebitis, there was significant association found between indwelling time with visual observation phlebitis at the level of p<0.05.

Table 10: Association between visual observation of Phlebitis with number of attempts for IV insertion.

N = 652

VISUAL INFUSION PHLEBITIS WITH ATTEMPTS FOR INFUSION	Attempts for IV insertion				
	1	2	3	Chi-square value	'p' value
Number of cannulations	535	39	1	30.891	0.001 S*
Number of Phlebitis	62	14	1		
	597	53	1		

S*- Significant p<0.05

From the above table it is evident that there was statistically significant association found between phlebitis with attempts for IV insertion at the level of p<0.05.

DISCUSSION

The Centers for Disease Control and Prevention in 2011[17] called attention to 2 points related to PVC duration: it is not necessary to change PVCs more frequently than 72–96 hours unless there is a risk of phlebitis, and that there is no recommendation to replace PVCs except for clinical indications.[17]

Other studies have also reported on the relationship between IV catheterization and phlebitis: Lai (1998) detected a phlebitis rate of 3.2 after 24 hours of catheter indwell time, 3.5 at 48 hours, 3.3 at 72 hours, and 2.6 after 96 hours, asserted that IVs can be used safely in these periods. Uslusoy (2006), however, found that phlebitis rates were lowest at 0–24 hours. Maki and Ringer (1991) detected phlebitis risk after 48 hours. Tohid et al. (2005) established a 3% rate of phlebitis during 96 hours of catheterization.[2,19,20]

The VIPAS Staging Key for Peripheral IVs, developed by Alyce Schultz and Paulette Gallant and published by the Intravenous Nurses Society in 2006, is still valid and widely used. It includes an evaluation of potential risks during catheterization, defines and describes phlebitis grades, and offers recommendations for each grade.[18] The results showed that Phlebitis was detected in 41.2% of peripheral intravenous catheters, and the rate decreased with increased catheter indwell time. Analyses showed that catheter indwell time, antibiotic usage, sex, and catheterization sites were significantly associated with development of phlebitis.

Since there is lack of information in the literature about catheter indwell time, duration of PVC indwell time is also unknown. The results of our study support 96 hours of indwell time; this study is also a resource for related issues.

CONCLUSION:

Firstly, phlebitis is associated with the type of needle material used by the hospitals, solution used for site preparation, indwelling time of the catheter and number of attempts while inserting the IV cannula. On the other hand, it is not associate with the size of the needle, type of dressing to secure the cannula, site of infusion and nurses experience.

The results suggest that it is very important to focus on the problems associated with the development of phlebitis especially taking care of patients during night shifts by restricting hand movements. Furthermore, it is also noted that by reducing the number of attempts while inserting IV cannulas can lower the complications related to IV cannulation.

Conflict of interest
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REFERENCES

1. Aygün G, Karaşahin K, Dikmen Y, Yaşar H, Midilli K, Can G, et al. Evaluation of peripheral venous catheter infection in intensive care unit. J Infect Dis Clin Microbiol. 2004;9(1):43–46. [Google Scholar]
2. Uslusoy E. Evaluation of phlebitis development and efecting factors during peripheral intravenous catheter placement. Unpublished Master's Thesis. Dokuz Eylul University, Institute of Health Sciences ; 2006. pp. 5–17. [Google Scholar]
3. Çakar V. Infection control practices at peripheral venous catheters and intravasculer catheters. J Nurs Educ Res. 2008;5(1):24–33
4. Çelik Z, Anil C. Complications of intravenous administration. Daily J Gastroenterol. 2004;8(2):158–164. [Google Scholar]
5. Abbasoğlu O. Acces Routes in Support Treatment of Parenteral Nutrition. Türkiye Klinikleri J Surg Med Sci. 2007;3(18):32–44
6. Roper N, Logan WW, Tierney AJ. A Model For Nursing Based On A Model of Living. 4th edition. New York: Churchill Living Stone Publish; 2000. [Google Scholar]
7. Karagözoğlu S. Nursing care and place of hot and cold application in thrombophlebitis as a complication of intravenous liquid treatment. C.U. School Nurs J. 2001;5(1):18–25. [Google Scholar]
8. Uzun S. Intravenous fluid therapy. In: Asti AT, Karadağ A, editors. Fundamentals of Nursing, Nursing Science and Art. Istanbul: Akademi Press and Publishing; 2012. [Google Scholar]
9. Dougherty L, Bravary K, Gabriel J, Kayley J, Malster M, Scales K, et al. Standarts for infusion therapy. Third edition. London: Royal collage of nursing; 2010
10. Maki D, Ringer M. Risk factors for infusion-related phlebitis with small peripheral venous catheters A randomized controlled trial. Ann Intern Med. 1991;114(10): 845–853. DOİ:10.7326/0003-4819-114-10-845. [PubMed] [Google Scholar]
11. Tagalakis V, Kahn SR, Libman M, Blostein M. The epidemiology of peripheral vein infusion thrombophlebitis: A critical review. Am J Med. 2002;113(2):146–151. DOI: 10.1016/S0002-9343(02)01163-4. [PubMed] [Google Scholar]
12. Abbas Z, Vries T, Shaw S, Abbas Q. Use and complications of peripheral vascular catheters. Br J Nurs. 2007;16(11):648–652. [PubMed] [Google Scholar]
13. Karadeniz G, Kutlu N, Tatlisumak E, Özbakkaloğlu B. Nurses' knowledge regarding patients with intravenous catheters and phlebitis intervenions. J Vasculer Nurs. 2003;21(2):44–47. [PubMed] [Google Scholar]
14. Olson KL, Gomes V. Intravenous Therapy Needle Choices in Ambulatory Cancer Patients. Clin Nurs Res. 1996;5(4):453–461