

PATIENT CHARACTERISTICS RELATED TO PHLEBITIS IN THE EAST COAST OF PENINSULAR MALAYSIA HOSPITAL

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Abstract

The insertion of peripheral intravenous catheters (PIVCs) is common for treatment among hospitalized patients. However, this procedure usually fails before the end of therapy because of several complications, including phlebitis. Therefore, this study aimed to determine the incidence and associated factors of phlebitis among patients with PIVC. A prospective cohort study was conducted in one of the hospitals located in East Coast Malaysia. The presence of phlebitis was assessed using the visual infusion phlebitis score checklist. The patients were followed until PIVC removal. A total of 321 data were collected among patients who received a new PIVC in the medical, gynecology, and orthopedic wards. The incidence of phlebitis was 36.1% (n= 116), and 96.6% of which were grade II. Patients aged 60 years (51.5%), men (42.2%), no known phlebitis history (47.4%), and with chronic disease record (46.8%) were determined as the highest percentage with phlebitis. This study demonstrated that age, gender, and chronic diseases were risk factors of developing phlebitis.

Keywords: adult patient, peripheral intravenous catheter, phlebitis

Abstrak

Karakteristik Pasien yang Berhubungan dengan Flebitis di Rumah Sakit Pantai Timur Semenanjung Malaysia. Di antara pasien yang dirawat di rumah sakit, penyisipan kateter intravena perifer (PIVC) umum untuk pengobatan. Namun, prosedur ini seringkali gagal sebelum terapi selesai karena beberapa komplikasi. Salah satu komplikasi yang terjadi adalah flebitis. Oleh karena itu, penelitian ini bertujuan untuk menentukan kejadian dan faktor-faktor terkait flebitis di antara pasien dengan PIVC. Sebuah studi kohort prospektif dilakukan di salah satu rumah sakit yang berlokasi di Pantai Timur Malaysia. Kejadian flebitis dinilai menggunakan daftar periksa skor Visual Infusion Phlebitis (VIP). Para pasien ditindaklanjuti sampai pengangkatan PIVC. Terdapat 321 data yang dikumpulkan di antara pasien yang menerima PIVC baru di bangsal medis, ginekologi, dan ortopedi. Insiden flebitis ditemukan 36,1% (n= 116), 96,6% di antaranya adalah grade II. Pasien berusia 60 tahun (51,5%), pria (42,2%), pasien tidak memiliki riwayat flebitis (47,4%) dan pasien dengan catatan penyakit kronis (46,8%) tercatat sebagai persentase tertinggi dengan flebitis. Studi ini menunjukkan bahwa usia, jenis kelamin, dan pasien dengan penyakit kronis kemungkinan besar mengalami flebitis.

Kata Kunci: flebitis, kateter intravena perifer, pasien dewasa

Introduction

The indispensable usage of peripheral intravenous catheters (PIVCs) plays a significant aid in administering non-oral fluids, nutrition, and medications. It poses an essential risk to the health and safety of millions of hospitalized patients (Ho & Cheung, 2012; Tee et al., 2015). However, up to 75% of hospitalized patients developed phlebitis, which is a common PIVC complication (Enes et al., 2016). Phlebitis is an

issue that influences patients with PIVC and impacts hospital cost and treatment process, which may lead to further complications such as catheter-related infection (Wallis et al., 2014). This issue is also notable among low-middle countries. Nobre and da Silva Martins (2018) defined phlebitis as inflammation of the vein wall and can be accompanied by symptoms such as pain, edema, and erythema near the catheter insertion site or along the affected vein, sometimes progressing to a palpable venous cord, in-

tense redness, tenderness, and fever.

In Malaysia, there is a lack of study regarding phlebitis and its risk factors, and only a few studies regarding thrombophlebitis or an advanced stage of phlebitis and its risk factor were conducted. Tan et al. (2012) reported a 32.5% incidence of thrombophlebitis among patients with PIVC in tertiary hospitals in Malaysia. The significant risk factors that contributed to the high incidence were dwelling time, infusate type, and gender. In Indonesia, the incidence rate of phlebitis was 40%, and a relationship between nurses' knowledge about infusion therapy and phlebitis percentage was found (Wayunah et al., 2013). A study in South Korea identified four significant predictive factors (six categories) of PIVC-related phlebitis for orthopedic patients, namely, vein quality, contrast agent use, hand hygiene, and nursing experience (Lee et al., 2019).

More evidence is needed to explore and identify the significant risk factors that contribute to phlebitis among patients with PIVC. Therefore, this study aimed to determine phlebitis incidence and the contributing factors among patients with PIVCs. One of the main objectives of the Ministry of Health (MOH) of Malaysia is to reduce the incidence of PIVC-related infection. The study findings will support the revision of the guidelines of PIVC management by the MOH to minimize the risk of phlebitis and subsequently reduce infections on the ward, provide safer hospital environments, and reduce costs to hospitals in infection control management (Choong et al., 2010). Phlebitis leads to increased discomfort in patients, more extended hospital stay, and higher healthcare costs (Wallis et al, 2014), and these risks can be minimized with risk factor modifications.

Methods

A prospective cohort study was conducted in one of the hospitals in East Coast Malaysia. The data were collected for 5 months. Approval from the Institutional Research Committee Board was

obtained before data collection. A consecutive sampling method was used to recruit 321 respondents, and the participants were among patients who had PIVC in the medical, gynecology, and orthopedic wards. The inclusion criteria for this study were patients who received a new PIVC upon assessment, voluntarily agreed to participate in the study, and signed the written informed consent, which consists of the study details and participants' rights. The study excluded patients who were critical, on IV chemotherapy drugs, and with current infection.

The PIVC assessment of eligible participants was performed daily, starting from the first day of PIVC insertion to the day of PIVC removal. The assessment continued for 3 days post-PIVC removal. A data collection sheet was used to collect data on patient-related and outcome (phlebitis) characteristics. The incidence of phlebitis was evaluated using a modified visual infusion phlebitis (VIP) score checklist adapted from the Royal College of Nursing (2010). The VIP score checklist measures the presence, location, and severity of phlebitis. A score of 0 implies no signs of phlebitis; 1, possible first signs of phlebitis; 2, early stage of phlebitis; 3, medium stage of phlebitis; 4, advanced stage of phlebitis/start of thrombophlebitis; 5, advanced stage of thrombophlebitis. The phlebitis score was recorded for each PIVC.

SPSS software version 25.0 was used for data entry and analysis. Descriptive statistics were used to analyze the data. The associated factors of phlebitis were analyzed using the Pearson Chi-square test.

Results

The mean age of the patients in this study was 47 (± 17.9) years, with most of the patients aged 60 years and above (30.2%). Most participants were women (52.0%), from the medical ward (55.5%), and have no phlebitis history (50.5%). In this study, 43.3% of patients were diagnosed with chronic diseases, such as diabetes mellitus, hypertension, chronic kidney disease, and heart

disease. Table 1 shows detailed information on patient characteristics.

Of patients with PIVCs, 36.1% (116/321) experienced phlebitis. The reason for PIVC removal was discharged, dislodged, treatment completion, leakage, and patient request. Most phlebitis

patients had a VIP score of two (96.6%), and the rest had three (3.4%). The details of the results are shown in Table 2.

The incidence of phlebitis, according to patient characteristics, is exhibited in Table 3. Patients aged 60 years and above recorded the highest

Table 1. Patient Characteristics (n= 321)

Characteristics	Patients with PIVC	
	N (%)	Mean (SD)
Age (years)	321 (100)	
Age (categorical), years		47 (\pm 17.9)
18–29	72 (22.4)	
30–39	63 (19.6)	
40–49	32 (10.0)	
50–59	57 (17.8)	
\geq 60	97 (30.2)	
Gender		
Male	154 (48.0)	
Female	167 (52.0)	
History of phlebitis		
Yes	64 (19)	
No	162 (50.5)	
Unknown	95 (29.6)	
Type of admission		
Medical	178 (55.5)	
Orthopedic	54 (16.8)	
Gynecology	89 (27.7)	
Presence of chronic disease		
Yes	139 (43.3)	
No	182 (56.7)	

*PIVC, peripheral intravenous catheter; SD, standard deviation.

Table 2. The Incidence Rate of Phlebitis, Reasons of PIVC Removal, and Score of Phlebitis (n= 321)

Variables	Frequency (n)	Percentage (%)
Phlebitis		
Yes	116	36.1
No	205	63.9
Reasons of PIVC removal		
Phlebitis	116	36.1
Discharged	121	37.7
Dislodged	44	13.7
Treatment completion	3	9.0
Leakage	19	5.9
Patient request	5	1.5
Not removed/not changed	13	4.0
Phlebitis score (n =116)		
2	112	96.6
3	4	3.4

Table 3. The Incidence of Phlebitis Related to Patient Characteristics (n= 116)

Variables	Phlebitis			
	Yes		No	
	N	(%)	N	(%)
Age (categorical), years				
18–29	13	18.1	59	81.9
30–39	19	30.2	44	69.8
40–49	12	37.5	20	62.5
50–59	22	38.6	35	61.4
≥60	50	51.5	47	48.5
Gender				
Male	65	42.2	89	57.8
Female	51	30.5	116	69.5
History of phlebitis				
Yes	29	45.3	35	54.7
No	42	25.9	120	74.1
Unknown	45	47.4	50	52.6
Type of admission				
Medical	69	38.8	109	61.2
Orthopedic	21	38.9	33	61.1
Gynecology	26	29.2	63	70.8
Presence of chronic disease				
Yes	65	46.8	74	53.2
No	51	28.0	131	72.0

Table 4. Associated Factors of Phlebitis Related to Patients Characteristics (n= 116)

Variables	Phlebitis				p
	Yes		No		
	N	(%)	N	(%)	
Age (categorical), years					< 0.001*
18–29	13	18.1	59	81.9	
30–39	19	30.2	44	69.8	
40–49	12	37.5	20	62.5	
50–59	22	38.6	35	61.4	
≥60	50	51.5	47	48.5	
Gender					0.03*
Male	65	42.2	89	57.8	
Female	51	30.5	116	69.5	
History of phlebitis					< 0.001*
Yes	29	45.3	35	54.7	
No	42	25.9	120	74.1	
Unknown	45	47.4	50	52.6	
Type of admission					0.28*
Medical	69	38.8	109	61.2	
Orthopedic	21	38.9	33	61.1	
Gynecology	26	29.2	63	70.8	
Presence of chronic disease					< 0.001*
Yes	65	46.8	74	53.2	
No	51	28.0	131	72.0	

*Pearson Chi-square test, p< 0.05 is significant at 95% confidence interval

phlebitis percentage (51.5%) and the largest population with PIVCs in this study. Besides, of 116 phlebitis patients, 42.2% were men and had a higher incidence rate of phlebitis than women, and 47.4% of patients had no known history of phlebitis but developed the condition later on. Most of the patients with phlebitis were admitted to the orthopedic ward (38.9%). Meanwhile, patients with a chronic disease record had the highest incidence of phlebitis (46.8%).

Table 4 shows the associated factors of phlebitis related to patient characteristics. The findings determined that patients' age ($\chi^2= 21.33$; $p < 0.001$), gender ($\chi^2= 4.73$; $p= 0.03$), history of phlebitis ($\chi^2= 14.85$; $p < 0.001$), and presence of chronic diseases ($\chi^2= 11.99$; $p < 0.001$) gave a significant association in the development of phlebitis.

Discussion

This current study underlined a 36.1% incidence of phlebitis among patients with PIVC. Globally, the incidence rate was reported between 0.5% and 59.1%. Danski, Oliveira, Johann, Pedrolo, and Vayego (2015) and Enes et al. (2016) identified a 36.5% and 31.1% incidence rates of phlebitis in Spain and Brazil, respectively, which support the rate reported in the current study. However, both studies had a smaller sample size of 92 and 122, respectively, compared with this study.

As previously explained, the difference in the incidence of phlebitis between studies may be related to differences in sample size. However, the reasons can also be the different printing tools to identify the level of phlebitis and the slightly different definition and grade of phlebitis. In line with this study, phlebitis was defined as grade two and above based on the VIP scores by Arias-Fernández et al. (2017). In their study, they calculated 5.6% ($n= 10$) incidence of phlebitis, which is lower than this study. Another study by Kaur et al. (2011) found a higher incidence of phlebitis (56%; $n= 112/200$) by applying a similar VIP score tool. Also, the Infusion

Nursing Society proposes the use of phlebitis scale by including grade one as phlebitis, whereas Enes et al. (2016) reported phlebitis as the most frequent complication (31.1%). Summarizing the results of some of these studies agrees with this research, including varying phlebitis levels from 5.6% to 56%. However, in this study, the incidence of phlebitis was considered high compared with that in previous studies by Arias-Fernández et al. (2017), Danski et al. (2015), and Enes et al. (2016).

A significant relationship was found between age groups and phlebitis incidence in this study. The age group of 40 years and above was a predictor factor for developing phlebitis. This finding was compatible with the results of Wallis et al. (2014) in which they reported a p-value of 0.05. Wallis et al. (2014) reported that the mean age of patients with the highest incidence rate of phlebitis in their study was 51.6 years, but it was 52.8 years in our study. In this study, the significant relationship between age and phlebitis incidence may be because most of the participants were from the advanced age group, who have fragile skin and are more vulnerable to phlebitis compared with younger patients (Pagán, 2016). However, many previous studies did not determine a significant relationship between age and phlebitis incidence, which could indicate that the high prevalence of phlebitis among the advanced age group could be reduced and prevented.

In this study, a significant relationship was found between gender and phlebitis development, which agrees with the studies of Abolfotouh, Salam, Bani Mustafa, White, and Balkhy (2014), Roca et al. (2012), and Wallis et al. (2014). In these previous studies, the portion of male participants was more significant than female participants, but in the current study, male patients had a higher incidence rate of phlebitis than female patients. It may be because there were more male patients in the orthopedic and medical wards, which were categorized as busy and hectic wards, compared with female patients who were more often from the gynecology

wards (Wallis et al., 2014). However, some studies by Kaur et al. (2011) and Saini et al. (2011) determined that the percentage of phlebitis among male patients was higher than among female patients, which was similar to this study. Nevertheless, the p-value showed no significant relationship between gender and phlebitis incidence in these studies (Kaur et al., 2011; Saini et al., 2011).

This study revealed that patients with phlebitis history significantly contributed to phlebitis incidence (45.3%). In comparison with other studies, Wallis et al. (2014) found no significant relationship between the history and incidence of phlebitis, with only 0.53% reported. In this study, the data were assessed by directly interviewing patients, which may also have contributed to bias due to overreporting or underreporting issues. However, it may be necessary to record patients' history of phlebitis on a PIVC-related form in the hospital to make nurses aware that these patients are prone to develop phlebitis quickly and to encourage nurses to take precautionary steps to minimize the risk of phlebitis.

Patients with chronic disease conditions showed a significant association with the incidence of phlebitis. This study finding corroborates another study by Enes et al. (2016), which determined that patients with chronic diseases had a significantly higher risk of developing phlebitis. Nevertheless, few studies found a contradictory result to the current study findings, in which the presence of chronic disease does not give significant results regarding the development of phlebitis. However, Danski et al. (2015) suggested that patients without comorbidities or chronic diseases quickly recovered during hospitalization, which resulted in a lower occurrence of phlebitis. Therefore, it has been reported that patients with chronic disease conditions were at higher risk of phlebitis compared with patients without chronic diseases (Karina et al., 2014).

Conclusion

The high incidence rate of phlebitis acknowledged in this study indicated a worrying result for our healthcare system. It can also be concluded that the most significant risk factors for phlebitis are men, aged 40 years and above, and chronic disease history. These findings demonstrate that patients' characteristics also contribute to the development of phlebitis, although catheters and intravenous therapy cause phlebitis.

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