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A survey of knowledge of prevention of venous thromboembolism in patients undergoing major orthopedic surgery

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Abstract

Background: Patients undergoing major orthopedic surgery are at an extremely high risk of developing venous thromboembolism, which deserves adequate attention. However, few studies have focused on knowledge of prevention of venous thromboembolism. The study had three objectives: (1) to investigate knowledge of prevention of venous thromboembolism in patients undergoing major orthopedic surgery, (2) to analyze its influential factors, and (3) to provide evidence for interventions.

Methods: The convenience sampling method was adopted to select 464 patients who underwent major orthopedic surgery in a third-level first-class hospital in Beijing. A self-designed questionnaire was administered to these patients to investigate their knowledge of prevention of venous thromboembolism.

Results: Of the 464 respondents, 32.1% had good knowledge of prevention of venous thromboembolism, and 30.8% had poor knowledge of it. In total, 40.1% of the participants had a clear understanding of the risk factors for venous thromboembolism, and 31% had a poor understanding. The clinical manifestations of venous thromboembolism were well understood by 29.3% participants and poorly understood by 40.9% participants. In total, 13.8% participants had knowledge of preventive measures for venous thromboembolism, and 31.2% had poor knowledge of such preventive measures. Living condition, knowledge of venous thromboembolism before hospitalization, and receiving knowledge of prevention of venous thromboembolism during hospitalization were important factors affecting the knowledge of prevention of venous thromboembolism in patients undergoing major orthopedic surgery.

Conclusions: The knowledge level of prevention of venous thromboembolism in patients undergoing major orthopedic surgery is poor, and medical personnel should pay full attention to this issue and disseminate knowledge of prevention of venous thromboembolism during hospitalization to improve patients' knowledge of this condition.

Introduction

Venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) and pulmonary embolism (PE), is the third leading cause of cardiovascular-associated deaths worldwide [1]. According to Virchow's triad [2], the pathogenesis of VTE includes three main factors: hypercoagulability, reduced blood flow or stasis, and vessel damage due to injury or disease. Patients undergoing major orthopedic surgery (total hip arthroplasty-THA, total knee arthroplasty-TKA, hip fracture surgery-HFS) have all three risk factors and are at an extremely high risk of developing VTE [3-6]. VTE is an important complication of major orthopedic surgery; thus, this condition deserves adequate attention and standard preventive efforts.

Patients undergoing major orthopedic surgery should receive thromboprophylactic interventions, including health education, properly implemented basic prevention strategies, physical prevention strategies, and appropriate antithrombotic drugs. Many studies have focused on preventive measures for VTE [7-10]; however, few have focused on knowledge of prevention of VTE in patients undergoing major orthopedic surgery. In a previous qualitative study [11], the understanding of VTE prevention in patients

undergoing major orthopedic surgery was shown to be poor. Subsequently, health education on VTE prevention was strengthened. However, there is still a lack of data clearly showing the knowledge levels of VTE prevention in patients undergoing major orthopedic surgery. To fill this research gap, the present study aimed to investigate knowledge of prevention of VTE in patients undergoing major orthopedic surgery, to analyze its influential factors and provide evidence for continuous quality improvement.

Methods

Design

A survey design was used in this study. It was conducted from December 2018 to October 2019. The study was approved by the institutional review board of the China-Japan Friendship Hospital (2019-107-K75) and adhered to the Helsinki Declaration.

Survey sample

Convenience sampling was adopted to select 464 patients who underwent major orthopedic surgery in a third-level first-class hospital in Beijing. Inclusion criteria were as follows: patients who (1) underwent major orthopedic surgery (THA, TKA, HFS), (2) were older than 18 years, and (3) provided written informed consent and voluntarily participated. Exclusion criteria were as follows: patients who (1) underwent previous major orthopedic surgery, (2) had VTE previously, and (3) dropped out. Of these, 156 participants were included in a preliminary experiment to test the reliability of a questionnaire designed by experts from the China-Japan Friendship Hospital.

Survey questionnaire

The questionnaire was designed by experts from the China Pulmonary Embolism and Deep Vein Thrombosis Prevention Capacity Building Program office, and it had a high Cronbach's alpha coefficient (0.885). The questionnaire consisted of two parts and 42 items. The first part intended to collect demographic data (11 items), which included sex, age, highest level of education attained, marital status, living condition, payment of hospital expenses, experience in hospital, surgical experience, knowledge of VTE before hospitalization, having received knowledge of VTE prevention during hospitalization, and operation method. The second part intended to investigate knowledge of VTE prevention in patients undergoing major orthopedic surgery (31 items), which included risk factors for VTE (10 items), clinical manifestations of VTE (12 items), and preventive measures for VTE (9 items). The questionnaire did not ask for any personally identifying information. The second part of the questionnaire was a judgment question; a correct answer was awarded 1 point, and an incorrect one did not receive a point. The results were classified into three grades: good, qualified, and poor. A correct response rate of more than 80%, 60%–80%, and less than 60% was considered as good, qualified, and poor, respectively. Higher scores represented better knowledge.

Survey procedure

Before the formal investigation, two investigators attended a unified training program. After the training, the investigators handed out questionnaires on site and collected them once they had been completed. It took about 30 minutes to fill out the questionnaires anonymously. The data were recorded immediately on the day after the questionnaires were collected, and any questions expressed by the patients were clarified immediately. The survey period lasted for 11 months, and during this time, the 464 patients undergoing major orthopedic surgery responded to the survey.

Statistical analysis

All data analyses were performed using IBM SPSS Statistics for Windows version 25.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the patients' demographic characteristics. Categorical data were reported as absolute numbers and proportions, and comparisons were made using Pearson's chi-squared test. A two-tailed p-value of < 0.05 was considered statistically significant.

Results

Descriptive results

The demographic characteristics are shown in Table 1. The data indicated that the majority of the sample was female (65.3%), elderly (64.7%), married (93.1%), and underwent THA/TKA (98.7%). Among the participants surveyed, 71.8% lived in urban areas, 93.5% had insurance payments, 66.4% had a hospital experience, 73.3% had knowledge of VTE before hospitalization, and 82.5% received VTE prevention knowledge during hospitalization.

Knowledge of VTE prevention in patients undergoing major orthopedic surgery

Figure 1 shows participants' knowledge of VTE prevention. Of the 464 respondents, 32.1% had good knowledge of VTE prevention, and 30.8% had poor VTE prevention knowledge. In total, 40.1% participants had a clear understanding of the risk factors for VTE, and 31% had a poor understanding. The clinical manifestations of VTE were well understood by 29.3% participants and poorly understood by 40.9% participants. In total, 13.8% participants had knowledge of preventive measures for VTE, and 31.2% had poor knowledge of preventive measures.

Influence of patients' demographic characteristics on knowledge of VTE prevention

The influence of patients' demographic characteristics on knowledge of VTE prevention is shown in Table 2.

Discussion

Poor knowledge of prevention of VTE in patients undergoing major orthopedic surgery

As Fig.1 shows, patients undergoing major orthopedic surgery had poor knowledge of VTE prevention. The results are consistent with those of previous studies [12-13]. Other than poor knowledge of VTE preventive measures, the findings also indicated poor knowledge of the risk factors for VTE and its clinical manifestations, and the percentage of participants with poor knowledge was greater than 30%; these findings are serious enough to warrant the attention of medical staff. In particular, among the 464 respondents, 40.9% had poor knowledge of clinical manifestations of VTE. These results might be related to the lack of such knowledge among medical staff [14]. Patients with major orthopedic surgery are at high risk of VTE, so health education on VTE prevention must be strengthened. There is a lot of room for improvement in clinical work for patients undergoing major orthopedic surgery.

Attention to patients' demographic characteristics

Table 2 indicates the association of participants' demographic characteristics with VTE prevention knowledge. The study showed that patients' living condition, knowledge of VTE before hospitalization, and receiving VTE prevention knowledge during hospitalization were important factors associated with the knowledge of VTE prevention in patients undergoing major orthopedic surgery. The findings suggest that it is necessary to popularize VTE-related knowledge outside the hospital setting, and patients should be provided with VTE-related knowledge during hospitalization. As things stand, this is clearly not enough. Ways of homogenizing the training program for patients undergoing major orthopedic to prevent VTE is the next avenue of investigation.

Conclusion

The study focused on investigating the knowledge of VTE prevention in patients undergoing major orthopedic surgery. Clearly, the situation is not encouraging. Medical personnel should pay full attention to this knowledge deficit and provide knowledge of VTE prevention during hospitalization. Meanwhile, we suggest that it is necessary to popularize VTE-related knowledge outside the hospital setting.

Our study has some limitations worth noting. First, participants were purposively selected from patients undergoing major orthopedic surgery in the orthopedic department of a level III, first-class hospital. Due to the uneven distribution of medical resources, the overall situation of the knowledge of VTE prevention in patients undergoing major orthopedic surgery may be even less optimistic in China. Second, the sample size was not large enough, which may limit the generalizability of our results. Considering these limitations and issues, we will explore the establishment of a homogeneous training path to improve knowledge of VTE prevention in patients undergoing major orthopedic surgery.

List Of Abbreviations

VTE: Venous thromboembolism

DVT: deep vein thrombosis and

PE: pulmonary embolism

THA: total hip arthroplasty

TKA: total knee arthroplasty

HFS: hip fracture surgery

Declarations

Ethical approval and consent to participate: All procedures performed were in accordance with the ethical standards of an appropriate institutional research committee and with the 1964 Helsinki declaration and its later amendments. The study was approved by the institutional review board of the China-Japan Friendship Hospital (2019-107-K75). Written informed consent was required obtained.

Consent for publication: Not applicable

Availability of data and materials: Data collected from the survey were anonymized. The dataset supporting the conclusions of this article can be made

available on request.

Competing interest: The authors declare that they have no conflict of interest.

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Authors' contributions: YPX and HYZ contributed to the study concept and design. YPX, HYZ, MF, and TTZ coordinated the sampling and data collection. YPX and MF contributed to the data analysis. YPX contributed to writing the manuscript. YPX and HYZ contributed to the critical review of the manuscript. All authors approved the final manuscript.

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Tables

Table 1 Characteristics of the respondents (N=464)

Characteristics	Categories	n	%
Sex	Male	161	34.7
	Female	303	65.3
Age(years)	<60	164	35.3
	≥60	300	64.7
Highest education attained	Secondary	251	54.1
	College	155	33.4
	Bachelor’s degree or above	58	12.5
Marital status	Married	432	93.1
	Single	10	2.2
	Divorced	2	0.4
	Widowed	20	4.3
Living condition	Urban	333	71.8
	Rural	131	28.2
Payment of hospital expenses	Insurance payments	434	93.5
	Out-of-pocket payments	30	6.5
Experience in hospital	For the first time	156	33.6
	Not the first time	308	66.4
Surgical experience	For the first time	228	49.1
	Not the first time	236	50.9
Knowledge of VTE before hospitalization	Yes	340	73.3
	No	124	26.7
Receiving VTE prevention knowledge during hospitalization	Yes	383	82.5
	No	81	17.5
Operation method	THA/TKA	458	98.7
	HFS	6	1.3

HFS hip fracture surgery

THA total hip arthroplasty

TKA total knee arthroplasty

VTE venous thromboembolism

Table 2 The influence of participants' demographic characteristics on knowledge of VTE prevention (N=464)

Characteristics	Knowledge of risk factors for VTE	Knowledge of clinical manifestations of VTE	Knowledge of VTE preventive measures	Knowledge of VTE prevention
Sex	0.522	0.004**	0.942	0.620
Age (years)	0.981	0.448	0.620	0.578
Highest education attained	0.000***	0.000***	0.295	0.000***
Marital status	0.010*	0.165	0.055	0.094
Living condition	0.000***	0.000***	0.014*	0.000***
Payment of hospital expenses	0.050	0.057	0.551	0.012*
Hospital experience	0.423	0.244	0.112	0.215
Surgical experience	0.072	0.001**	0.903	0.681
Knowledge of VTE before hospitalization	0.001**	0.000***	0.002**	0.000***
Receiving knowledge of VTE prevention during hospitalization	0.000***	0.000***	0.000***	0.000***
Operation method	0.116	0.930	0.000***	0.981

*p < 0.05; **p < 0.01; ***p < 0.001.

VTE venous thromboembolism

Figures

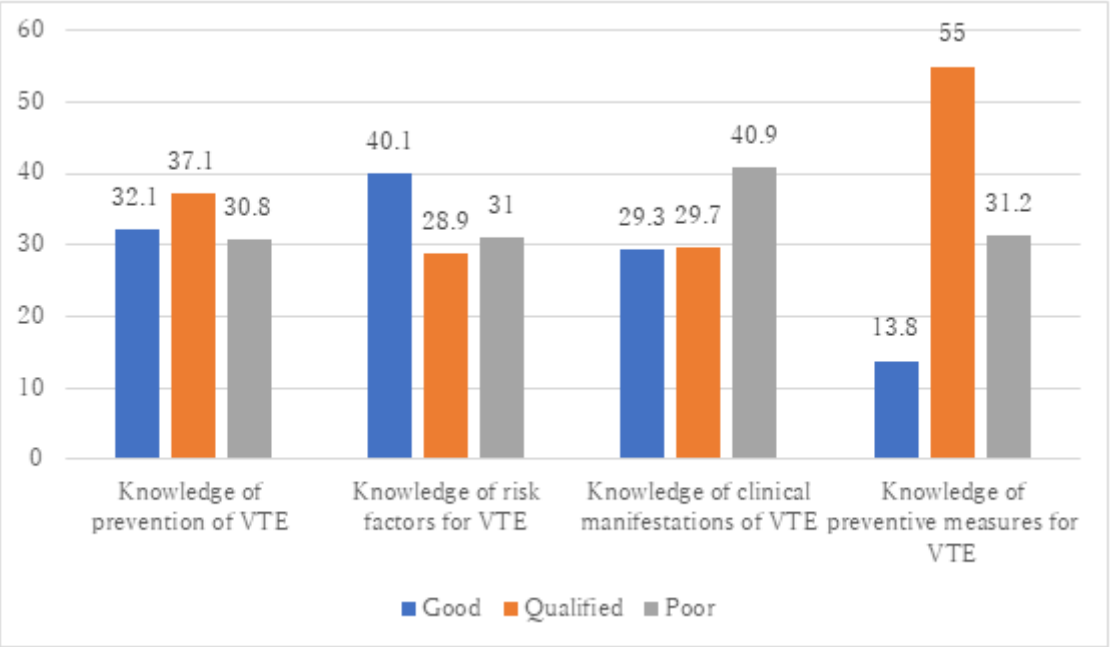


Figure 1

Participants' knowledge of VTE prevention (N=464)