International Journal of Research in Medical Sciences
Alrashid F et al. Int J Res Med Sci. 2025 May;13(5):1869-1876
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20251283

Original Research Article

Assessment of venous thromboembolism awareness among surgical ward patients in Hail, Saudi Arabia: a cross-sectional study

Fauwaz Alrashid, Saadeldin Ahmed Idris, Dalal Saad Alshammari, Maryam Abdullah Alshammari*, Shog Khalid Alahmed

Department of Surgery, College of Medicine, University of Hail, Saudi Arabia

Received: 11 March 2025
Revised: 14 April 2025
Accepted: 21 April 2025

***Correspondence:**
Dr. Maryam Abdullah Alshammari,
E-mail: mshmaily55@gmail.com

ABSTRACT

Background: Venous thromboembolism (VTE), including deep vein thrombosis (DVT) and pulmonary embolism (PE), is a major cause of morbidity and mortality among hospitalized patients in Saudi Arabia. However, there is limited data on VTE awareness in the northern region. This study aimed to assess the awareness and perceptions of VTE and thromboprophylaxis among surgical ward patients in Hail, Saudi Arabia.
Methods: A descriptive cross-sectional study was conducted at King Khalid Hospital from September to December 2024, involving 300 patients hospitalized in the surgical ward for more than three days. Patients with shorter hospital stays, cognitive impairments, language barriers, or a previous VTE diagnosis were excluded.
Results: Patients with higher education and those who had received pharmacological or non-pharmacological thromboprophylaxis showed significantly greater knowledge of VTE ($p<0.05$). No significant associations were found between knowledge scores and age, gender, admission reason, or personal/family VTE history ($p>0.05$). A positive correlation was observed between knowledge and attitude scores ($r=0.132$, $p=0.037$).
Conclusions: The study revealed low awareness of VTE, its symptoms, and risk factors among surgical patients. It highlights the importance of educational initiatives by healthcare providers to enhance patient understanding and support VTE prevention.

Keywords: Patient health awareness, Patient safety, Pulmonary embolism, Deep vein thrombosis, Venous thromboembolism

INTRODUCTION

Venous thromboembolism (VTE), often known as deep vein thrombosis (DVT), arises from blood clots developing in the veins and can lead to death if associated with pulmonary embolism (PE).[1] It is the third-leading cause of cardiovascular disease and the leading source of morbidity and mortality among hospitalized patients globally. Annual VTE incidence rates in Europe are projected to range from 104-183 per 100,000 people.[3] The true incidence of VTE in the Kingdom of Saudi Arabia (KSA) is unknown. Assuming similar rate to those present in other parts of the world, approximately 25,000 people are affected in the KSA annually.[4] Risk factors for VTE can be subdivided into factors that promote venous stasis, factors that promote blood hypercoagulability, and factors causing endothelial injury or inflammation. These three broad categories, frequently taught as "Virchow's triad", have formed the basis for understanding and categorizing the risk factors of VTE for over a century.[5] The most common symptoms of PE are chest discomfort and shortness of breath.[6] Around 50% to 60% of the burden of disease from VTE is linked to recent hospitalization.[6] Enhancing patient knowledge about VTE prevention and the importance of thromboprophylaxis will probably raise their readiness to engage in VTE management via early

mobilization and calf-pump exercises.[7] Nonetheless, there remains a deficiency in public awareness regarding VTE. Just 28% of those surveyed in a poll across six developing countries recognized PE symptoms, while merely 19% knew about DVT symptoms.[7,8] A cross-sectional study took place in Riyadh, Saudi Arabia from 2015 to 2016 to evaluate patients' knowledge of VTE and their satisfaction. The provided related information indicated that patients in the hospital had a poor comprehension of DVT and PE.[9] A descriptive cross-sectional study involved 301 patients admitted to the surgical ward at Al-Noor Hospital for over three days between September and November 2021, revealing a low level of awareness among hospitalized patients regarding VTE, its clinical presentation, and associated risk factors.[10] At present, there is a lack of literature regarding VTE knowledge and awareness among hospitalized patients in the Hail region of Saudi Arabia.

METHODS

Study design, setting, and time frame

A descriptive cross-sectional study was carried out in king Khalid Hospital, Hail, Saudi Arabia, between September 2024 and December 2024.

Study size

The study sought to estimate the awareness and perception of VTE and thromboprophylaxis among hospitalized patients in Hail. The average number of patients who receive thromboprophylaxis in one month at King Khalid Hospital is 800. The participants were selected via convenience sampling. With a confidence level of 95%, a margin of error of 5%, and a response distribution of 50%, the minimum recommended sample size for our study was determined to be 280.

Study population

Patients admitted to the surgical ward of King Khalid Hospital in Hail, Saudi Arabia, between September 2024 and December 2024 were included. The inclusion criteria included patients who were admitted to the surgical ward, over 18 years of age, and who were hospitalized for more than 72 hours. Exclusion criteria were critically ill patients, patients receiving ambulatory care or patients with cognitive impairment.

Data collection

Data were collected through a previously validated questionnaire in Arabic. The questionnaire was taken from a study conducted in Riyadh, Saudi Arabia. 15 Permission was obtained from the author of the study. We reviewed the questionnaire and found it suitable for our objective and population. The questionnaire is made up of three sections. The first included items about demographic data and family or personal history of VTE and thromboprophylaxis. The second included items to assess knowledge about PE and DVT, including symptoms, causes, risk factors, and prevention. The third section included items to assess the patients' attitude on the perceptions of pharmacologic thromboprophylaxis, information received on VTE, level of satisfaction about receiving pharmacological venous thromboembolism prophylaxis, and the explanation that preceded it.

For knowledge items, every right answer was assigned a score of "1" and every wrong one, a score of "0". The respondent's level of knowledge about venous thromboembolism was defined as good if the study participant correctly responded to more than or equal to 80% of the knowledge assessment items; conversely, if their score was less than 80%, their knowledge was considered poor. 15 As for the participants' attitudes, "strongly agree" and "agree" answers were assigned a score of "1" and "neutral", "disagree", and "strongly disagree" answers were assigned a score of "0".

The sample was classified into two groups depending on their level of satisfaction. They were categorized as being "satisfied" if their level of satisfaction was equal to or above 80%, and "unsatisfied" if below 80%.[15]

Ethical consideration

Ethical approval for the study was obtained from the institutional review board (IRB) of the Hail University, Hail, Saudi Arabia. To ensure that all survey items were clear and comprehensive, the participants were interviewed by one of the researchers. A full description of the study and its objectives was provided to patients before asking them to participate in the study. Patients were interviewed after the third day of admission to ensure that they had the chance to receive any kind of information about VTE or thromboprophylaxis.

Statistical analysis

SPSS Statistics v. 26 (IBM Corp, Armonk, NY) was used for statistical analysis. Data were summarized by standard descriptive summaries: means and standard deviations (mean ± SD) for continuous variables, numbers, and percentages for categorical variables. A chi-squared test ($\chi 2$) was used for categorical values. Comparison between quantitative non-parametric variables was conducted using the Mann-Whitney U and Kruskal Wallis tests. Correlation analysis was performed using Spearman's test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Demographic characteristics

The demographic characteristics in Table 1 reveal that 44.4% of participants are aged 18-30, 40.4% are 31-50, 12.0% are 51-70, and 3.3% are 71 or older. Gender distribution shows 34.2% male and 65.8% female.

Education levels include 1.8% uneducated, 6.2% with less than high school, 17.8% high school graduates, 34.2% undergraduates, and 40.0% postgraduates. Admission reasons indicate 10.9% for chemotherapy, 7.3% for nonsurgical oncology, and 81.8% for surgical purposes. The personal history of VTE is absent in 67.3%, unknown in 12.0%, and present in 20.7%, while a family history of VTE is absent in 50.2%, unknown in 14.9%, and present in 34.9%. Currently, 59.3% are not receiving pharmacological/non-pharmacological treatments, 4.7% have unknown treatment status, and 36.0% are receiving treatment. Regarding treatment history, 52.7% have no history, 8.0% have unknown history, and 39.3% have a history of receiving such treatments.

Table 1: Demographic characteristics.

Variables	Characteristics	Frequency	Percentage
Age (years)	18–30	122	44.4
	31-50	111	40.4
	51-70	33	12.0
	71	9	3.3
Gender	Male	94	34.2
	Female	181	65.8
Education level	Uneducated	5	1.8
	Less than high school	17	6.2
	High school	49	17.8
	Undergraduate	94	34.2
	Postgraduate	110	40.0
Reason for admission	Chemotherapy	30	10.9
	Oncology (nonsurgical)	20	7.3
	Surgical	225	81.8
Personal history of VTE	No	185	67.3
	Unknown	33	12.0
	Yes	57	20.7
Family history of VTE	No	138	50.2
	Unknown	41	14.9
	Yes	96	34.9
Currently receiving pharmacological/ non-pharmacological	No	163	59.3
	Unknown	13	4.7
	Yes	99	36.0
History of receiving pharmacological/ non-pharmacological	No	145	52.7
	Unknown	22	8.0
	Yes	108	39.3

Table 2: Distribution of studied patients according to their response to knowledge items regarding VTE.

Variables	Characteristics	Frequency	Percentage
Do you know what DVT or a blood clot in your leg is?	No	174	63.3
	Yes	101	36.7
Which of the following causes DVT?	Blood clot in the vein *	114	41.5
	Lack of oxygen in the vein	45	16.4
	A tumour in the vein	22	8.0
	Not sure	82	29.8
	None of the above	12	4.4
Which of following are signs/symptoms of DVT?	Swelling of leg*	60	22.3
	pain/tenderness in leg*	51	18.8
	Noticeable changes	45	16.8
	leg paralysis	34	12.7
	Itching of leg	20	7.3
	The leg feels warm*	28	10.5

Continued.

Variables	Characteristics	Frequency	Percentage
	Not sure	31	11.5
Do you know what PE or a blood clot in your lung is?	No	140	50.9
	Yes	135	49.1
Which of following are signs/symptoms of PE?	Coughing up blood*	20	7.2
	Chest pain may be worse with deep breathing*	55	20.0
	Shortness of breath*	42	15.2
	Slow, shallow breathing	19	7.0
	Light headedness*	19	7.0
	Pain radiating down arm	28	10.1
	Passing out	27	10.0
	Rapid heart rate*	33	12.1
	Frequent headaches	15	5.6
	Other	15	5.6
Which of the following might increase your risk of developing a blood clot?	Surgery*	27	9.9
	Not moving for a long time*	48	17.3
	Pregnancy/ giving birth*	27	9.7
	Cancer*	22	8.1
	A hospital stay*	14	5.2
	Taking estrogen-based medicines*	24	8.8
	Family history of blood clots*	34	12.5
	High blood cholesterol Older age (65+)*	33	11.9
	Don't know	30	10.9
Which of following helps prevent a blood clot?	Bed rest	30	10.8
	Walking/stretching legs*	94	34.1
	Washing/bathing regularly	36	13.1
	Drinking plenty of fluids*	53	19.2
	Eating lots of fiber	44	15.9
	Don't know	19	6.9

*The correct answer

Table 3: Patients' perception and satisfaction with pharmacological thromboprophylaxis and information received about VTE.

Variables	Questions	Strongly agree (%)	Agree (%)	Either agree nor disagree (%)	Disagree (%)	Strongly disagree (%)
Perception	Daily injection helps my health and safety	65 (25.7)	105 (41.5)	53 (20.9)	23 (9.1)	7 (2.8)
	I need these injections	46 (18.2)	87 (34.3)	77 (30.4)	33 (13)	10 (4)
	Possible side effects of this treatment	50 (19.8)	104 (41.1)	65 (25.7)	26 (10.3)	8 (3.2)
Satisfaction	The reason for injection was adequately explained	58 (22.9)	103 (40.7)	64 (25.3)	23 (9.1)	5 (2)
	Satisfied with the information given about deep vein thrombosis and pulmonary embolism	54 (21.3)	105 (41.5)	63 (24.9)	25 (9.9)	8 (2.4)
	Acceptable time for injection	55 (21.7)	101 (39.9)	69 (27.3)	20 (7.9)	8 (3.2)

Knowledge items regarding VTE

Among the studied patients, 63.3% did not know what DVT (deep vein thrombosis) is, while 36.7% did. Regarding the causes of DVT, 41.5% correctly identified it as a blood clot in the vein, while 29.8% were unsure. For DVT symptoms, swelling of the leg (22.3%), pain or tenderness in the leg (18.8%), and the leg feeling warm (10.5%) were the most correctly identified signs. Knowledge about PE (pulmonary embolism) was evenly split, with 50.9% unaware and 49.1% aware. The most recognized PE symptoms were chest pain worsening with deep breathing (20.0%), shortness of breath (15.2%), and rapid heart rate (12.1%). For risk factors, prolonged immobility (17.3%), family history (12.5%), and older age (11.9%) were commonly identified, while for prevention, walking or stretching legs (34.1%) and drinking fluids (19.2%) were the most recognized measures.

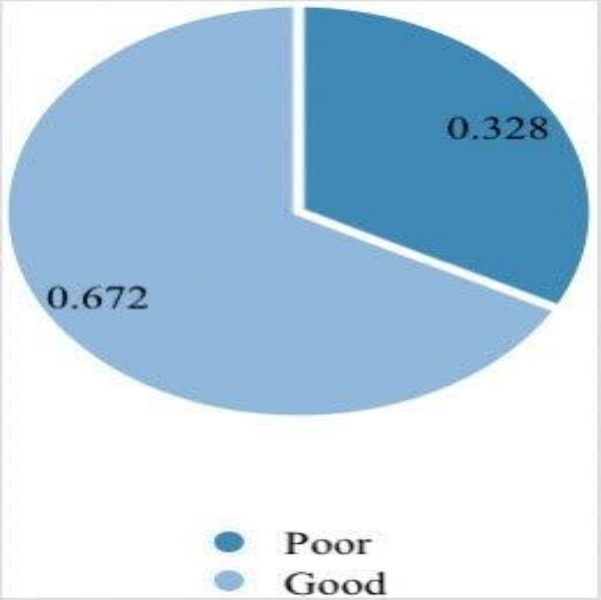

Figure 1: Distribution of responses (%) regarding patients' awareness.

The results in Figure 1 show that 30.5% of respondents correctly identified that blood clots cause death, while 16.7% recognized them as a medical emergency. Only 12.8% incorrectly believed untreated blood clots do not travel to the lung, and 26.4% acknowledged that most blood clots can be prevented. However, 13.6% mistakenly thought there is no need to worry about blood clots.

Patients' perception and satisfaction with pharmacological thromboprophylaxis and information received about VTE.

The Table 3 presents the patients' perceptions and satisfaction with pharmacological thromboprophylaxis, and the information received about venous thromboembolism (VTE) show the following trends: 67.2% of patients agreed that daily injections help their health and safety, while 52.5% agreed they need these injections. Regarding the possible side effects of treatment, 60.9% either strongly agreed or agreed. On satisfaction, 63.6% felt the reason for the injection was adequately explained, 62.8% were satisfied with the information about VTE, and 61.6% found the injection timing acceptable. In conclusion, most patients have a positive perception of the treatment and the provided information, though there is room for improvement in areas such as explaining side effects and ensuring satisfaction with injection timing.

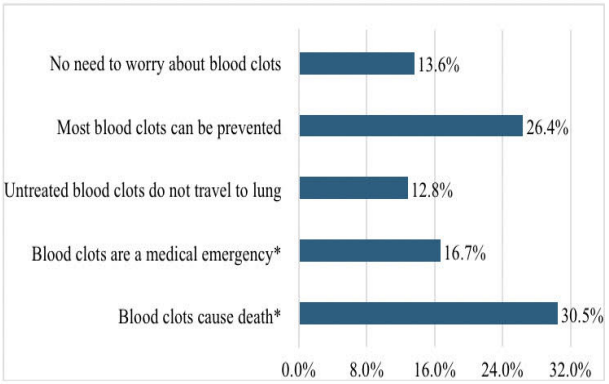

Figure 2: Distribution of patients (%) according to their attitude level towards VTE.

Figure 2 shows patients' perception and satisfaction with pharmacological thromboprophylaxis and information received about venous thromboembolism (VTE), 32.8% of patients reported a poor perception, while 67.2% reported a good perception. In conclusion, the majority of patients were satisfied with the pharmacological thromboprophylaxis and the information provided regarding VTE.

Relationship between patients' knowledge level about VTE and their demographic

The relationship between patients' knowledge level about VTE and their demographic variables showed varying results. The results presented in Table 4 show that for the age, the median knowledge score was similar across all age groups, with no significant difference (p=0.063). In terms of gender, females had a slightly higher median score (0.428) compared to males (0.285), but this difference was not statistically significant (p=0.104). Regarding education level, the median knowledge scores were mostly the same across all groups, with no significant difference observed (p=0.167). Overall, the results indicate no statistically significant relationships between the demographic variables and the knowledge level about VTE.

Table 4: Relationship between patients' knowledge level about VTE and their demographic.

Variables	Characteristics	Knowledge Score		Test	P value
		Median	I.R.		
Age (years)	18–30	0.285	0.43	7.29*	0.063
	31-50	0.428	0.43		
	51-70	0.428	0.32		
	71	0.428	0.29		
Gender	Male	0.285	0.39	-1.627**	0.104
	Female	0.428	0.43		
Education level	Uneducated	0.428	0.14	6.46*	0.167
	Less than high school	0.357	0.29		
	High school	0.285	0.43		
	Undergraduate	0.428	0.43		
	Postgraduate	0.428	0.43		

*Kruskal Wallis test; **Mann-Whitney test

Table 5: Relationship between patients' attitude toward VTE and their demographic characteristics.

Variables	Characteristics	Attitude level		$\chi 2$	P value
		Poor N (%)	Good N (%)		
Age (years)	18-30	31 (28.4)	78 (71.6)	7.271	0.049
	31-50	35 (32.7)	72 (67.3)		
	51-70	11 (37.9)	18 (62.1)		
	71	6 (75)	2 (25)		
Gender	Male	28 (34.6)	53 (65.4)	0.168	0.774
	Female	55 (32)	117 (68)		
Education level	Uneducated	4 (80)	1 (20)	6.655	0.171
	Less than high school	5 (41.7)	7 (58.3)		
	High school	12 (28.6)	30 (71.4)		
	Undergraduate	24 (28.6)	60 (71.4)		
	Postgraduate	38 (34.5)	72 (65.5)		

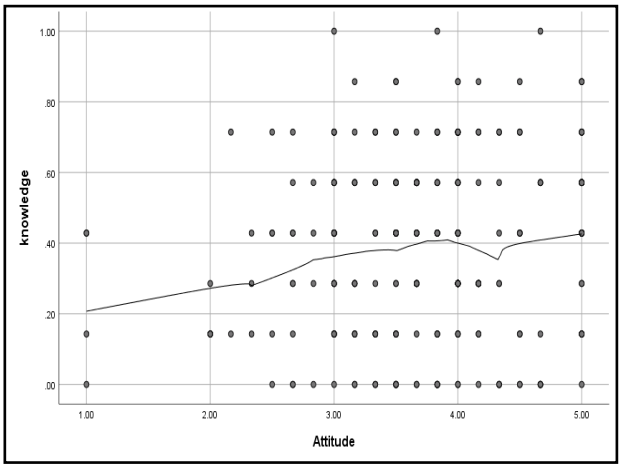

Figure 3: Knowledge and attitude scores.

Figure 3 shows the correlation analysis between patients' knowledge and attitude scores revealed a significant positive correlation of 0.132 (p=0.037), indicating a weak but statistically significant relationship between the two variables.

Relationship between patients' attitude toward VTE and their demographic characteristics

Table 5 shows the relationship between patients' attitudes toward VTE, and their demographic characteristics shows significant variation in age, with a χ^2 of 7.271 and a p-value of 0.049, indicating that younger patients (18–30 years) had a higher proportion of good attitudes compared to older age groups. However, gender and education level did not show significant associations with attitude, as the p-values for both variables (0.774 for gender and 0.171 for education) were above 0.05. Specifically, the attitude toward VTE was more positive among those with higher educational levels, but the differences were not statistically significant.

DISCUSSION

The main findings of this study were that hospitalized patients in the surgical ward in the king Khalid Hospital have poor awareness of DVT and PE (63.3% and 50.9% respectively). Correspondingly, they demonstrate a lack of understanding of the signs and symptoms of DVT and PE.

These findings are consistent with previous similar studies done among the general population in different countries.[11] Another two cross-sectional surveys conducted among hospitalized patients in Jordan and Saudi Arabia found that hospitalized patients have poor knowledge of and awareness of VTE.[12] Moreover, the lack of awareness of DVT and PE is not limited to specific types of patients, as there have been studies conducted among, for example, cancer patients, pregnant women, and postpartum women showing similar results.[13]

Our findings show that patients have insufficient knowledge about the risk factors of VTE and prevention measures. This is unfortunate, as hospitalized patients should actively participate in VTE prevention. The most commonly reported risk factor of VTE among the study participants was immobility, which corroborates with findings reported in a previous study.[14] This result reflects the attempts of healthcare providers to encourage hospitalized patients to move as much as possible.

However, participants were less familiar with other risk factors, such as cancer, pregnancy, and surgery, even though this study was conducted among patients hospitalized in the surgical ward. These results could be attributed in part due to health care providers' tendency to pay more attention to immobility than any other risk factors when educating their patients.

Our study showed that the participants were more likely to agree that blood clots could be prevented (26.4%). This result is consistent with an earlier study, in which 55% of participants agreed that blood clots could be prevented.[12]

However, only 30.5% of our patients agreed that untreated blood clots could spread to the lungs. This result is in agreement with a study by Almodaimegh et al which found that only 37% of their participants knew that untreated blood clots could spread to the lungs.[15] These findings indicated that the relationship between DVT and PE is unknown, probably because of the pathophysiological nature of PE.

Regarding the perception of thromboprophylaxis, nearly half of the studied patients received information about DVT and PE. Such findings likely explain the current study participants' lack of awareness of VTE and its manifestations, highlighting the need for education to improve the patient's knowledge of VTE and thromboprophylaxis.

The current study also investigated factors that affect the awareness of VTE. A significant relationship was found between the patients' knowledge about VTE and higher educational levels. A randomized controlled study showed that after nurses provided educational programs to postpartum women, awareness and knowledge regarding VTE increased and improved dramatically, from 8% to 87%.[16] This finding suggests that encouraging patients to participate in educational programs on VTE and its symptoms can reduce the incidence of hospital-acquired VTE.

DVT and PE are common preventable causes of morbidity and mortality in hospitalized patients and many healthcare systems are trying to decrease their event rates. Raising the level of awareness among the general population, especially among hospitalized and high-risk patients, could have a significant impact on patient compliance regarding prophylaxes, early immobilization, and self-reported signs and symptoms. A randomized clinical trial conducted among hospitalized patients showed a significant increase in the level of awareness and knowledge about DVT and PE after the implementation of educational programs.[16]

Limitations

Our study has several limitations. First, the closed-ended questions accompanied by a provided list of options may help the participants make a guess rather than responding based on their knowledge. Additionally, the recommended sample size was achieved, but increasing the sample size may allow for a more reliable conclusion. Also, the study was conducted at one hospital, so the findings may not apply to all hospitals in Saudi Arabia.

CONCLUSION

This study has revealed a lack of awareness about DVT and PE among hospitalized patients. Patients were unaware of the disease, its manifestations, and its risk factors. The findings of this study should encourage health care providers to educate patients and public health organizations about DVT, PE, their risk factors, signs and symptoms, preventive measures, and the role of thromboprophylaxis in reducing the risk of VTE.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Schulman S, Ageno W, KonstanCnides SV: Venous thromboembolism: Past, present and future . Thromb Haemost. 2017;117:1219-29.
2. Heit JA, Spencer FA, White RH: The epidemiology of venous thromboembolism . J Thromb Thrombolysis. 2016;41:3-14.
3. Al-Hameed F, Al-Dorzi HM, Shamy A, et al.: The Saudi clinical pracCce guideline for the diagnosis of the first deep venous thrombosis of the lower extremity. Ann Thorac Med. 2015;10:3-15.
4. Serhal M, Barnes GD: Venous thromboembolism: A clinician update. Vasc Med. 2019;24:122.
5. Nicholson M, Chan N, Bhagirath V, Ginsberg J: PrevenCon of venous thromboembolism in 2020 and beyond . J Clin Med. 2020;9:2467.

6. Wendelboe AM, Raskob GE. Global burden of thrombosis: Epidemiological aspects. Circ Res. 2016;118(9):1340-7.
7. Cushman M. Epidemiology and risk factors for venous thrombosis. Semin Hematol. 2007;44(2):62-9.
8. Yusuf HR, Tsai J, Atrash HK, Boulet SL, Grosse SD. Venous thromboembolism in adult hospitalizations—United States, 2007–2009. Morb Mortal Wkly Rep. 2012;61(22):401-4.
9. Heit JA, Spencer FA, White RH. The epidemiology of venous thromboembolism. J Thromb Thrombolysis. 2016;41(1):3-14.
10. Klok FA, Huisman MV. How I assess and manage the risk of bleeding in patients treated for venous thromboembolism. Blood. 2020;135(9):724-34.
11. Public awareness of venous thromboembolism in Riyadh, Saudi Arabia. Alyahya KI, Alangari FS, Saja DK, Alothaim LO, Albugami SJ, Sama O. International Journal of Advanced and Applied Sciences. 2020;7:125-9.
12. Jarab AS, Azzam SA, Badaineh R, Mukattash TL, Bsoul R. Awareness and perception of thromboembolism and thrombo-prophylaxis among hospitalized patients in Jordan. Curr Clin Pharmacol. 2020;15:72–80.
13. Sousou T, Khorana AA. Cancer patients and awareness of venous thromboembolism. Cancer Invest. 2010;28:44–5.
14. Le Sage S, McGee M, Emed JD. Knowledge of venous thromboembolism (VTE) prevention among hospitalized patients. Dihub J Vasc Nurs. 2008;26:109–17.
15. Almodaimegh H, Alfehaid L, Alsuhebany N, Bustami R, Alharbi S, Alkatheri A, Albekairy A. Awareness of venous thromboembolism and thromboprophylaxis among hospitalized patients: a cross-sectional study. Thromb J. 2017;15:19.
16. Youness EM, Hassen GH, Youness HM, Azer SZ. Effect of educational nursing program on reducing the incidence of venous thromboembolism among postpartum women. IOSR Journal of Nursing and Health Science. 2016;5:53–62.

Cite this article as: Alrashid F, Idris SA, Alshammari DS, Alshammari MA, Alahmed SK. Assessment of venous thromboembolism awareness among surgical ward patients in Hail, Saudi Arabia: a cross- sectional study. Int J Res Med Sci 2025;13:1869-76.