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Original Article

Knowledge and Practice of Oncologists Toward Inpatient Thromboprophylaxis for Cancer-Associated Thrombosis at National Cancer Centers in Sudan: A Cross-Sectional Study

Tasneem K. Elamin [1], Amal Abdulbagi [1], Elgaylani Abdalla Eltayeb [2], Bashir A. Yousef [3,4]

[1]Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Gezira, Wad Medani, Sudan.
[2]National Cancer Institute, University of Gezira, Wad Medani, Sudan.
[3]Department of Clinical Pharmacy and Pharmacology, Ibn Sina National College of Medical Studies, Jeddah, Saudi Arabia.
[4]Department of Pharmacology, Faculty of Pharmacy, University of Khartoum, Khartoum, Sudan.

*Corresponding Author: Bashir A. Yousef; *bashiralsiddiq@gmail.com*

Abstract

Objective: Cancer and chemotherapy are known risk factors for venous thromboembolism (VTE), and 75% of VTE-related deaths among cancer patients have been shown to occur in-hospital and 14% due to confirmed pulmonary embolism. In this study, oncologists' awareness and practice of inpatient thromboprophylaxis of cancer-associated thrombosis (CAT) in National Cancer Centers in Sudan were assessed. ***Design:*** A cross-sectional study. ***Subjects/Patients:*** All practicing oncologists at national cancer centers in Sudan. ***Methods:*** A total of fifty-six oncologists filled out the study questionnaire. Data were collected through a structured online questionnaire developed using Google Forms. Responses were analysed using SPSS version 24. ***Results:*** 53.6% of the respondents possessed good overall knowledge. Percentages of correct responses regarding CAT risk factors, prophylactic options, and contraindications to pharmacologic thromboprophylaxis were 55.4%, 55.4%, and 75%, respectively. NCCN guidelines were consulted most frequently (62.5%), and the same proportion reported occasional inpatient prophylaxis with anticoagulants. Cost issues were the most common reason for withholding thromboprophylaxis. There was an interesting correlation between the years of experience and the perception of CAT risk factors. ***Conclusion:*** Although oncologists in general had good knowledge, gaps in practice remain. The study recommends more education and national programs to improve access to anticoagulants and promote evidence-based thromboprophylaxis in cancer patient.

Keywords: ***Cancer-associated thrombosis, Knowledge, Oncologists, Practice, Sudan, Thromboprophylaxis.***

Introduction

Cancer is a large group of diseases that can affect any part of the body. One of its defining features is a rapid creation of abnormal cells that grow beyond their usual boundaries and can then invade adjoining parts of the body and spread to other organs (metastasis) [1]. It is the second leading cause of death worldwide, accounting for nearly 10 million deaths in 2020 [1]. Cancer-associated thrombosis (CAT) is a preventable illness by using safety thromboprophylaxis methods specifically for patients with established criteria, making them at greater risk for developing venous thromboembolism (VTE) such as hospitalization for acute medical illness and surgical setting [2]. The incidence of thromboembolic diseases among general patients is about 117case per 100,000 inhabitants per year, but in cancer patients, it is about 4 times higher, specifically for those who are receiving chemotherapy [3]. So that VTE in oncology patients represent a higher risk of morbidity and mortality [4]. Although the long-known association between malignancy & thrombosis, but thromboprophylaxis in hospitalized oncology patients remains a major knowledge and practice gap [4]. The thromboprophylaxis interventions involve using anticoagulants such as LMWH, UFH, fondaparinux, or mechanical prophylaxis such as graded compression stockings (GCS) or intermittent pneumatic compression (IPC) devices only for patients with contraindication to anticoagulants [5].

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The second leading cause of death among oncology patients was thromboembolic events, and the median overall survival of the affected patients significantly reduced from two years to only six months [6]. Despite the availability of guidelines, thromboprophylaxis remained significantly underutilized in oncology practices, due to doctors' limited knowledge of evidence-based recommendations for VTE prevention and lack of priority compared with cancer treatment [7]. There is no published data on this topic in Sudan.

Several studies have shown that the awareness of healthcare providers about CAT is low, and their knowledge gaps include a general overview about CAT, its risk factors, prevention strategies, and treatment recommendations [8]. Therefore, a recent study demonstrated that the effectiveness of thromboprophylaxis for hospitalized patients extremely depends on the knowledge and awareness of healthcare professionals about VTE risk factors, risk assessment tools, and thromboprophylaxis guidelines, in addition to the full adoption of these guidelines in their practice [9]. This study was conducted to assess knowledge and practice of oncologists towards inpatient prophylaxis of cancer- associated venous thromboembolic diseases at National Cancer Centers - Sudan.

Methods

Study design and setting: This is a cross-sectional study conducted to assess knowledge and practice of oncologists towards inpatient prophylaxis of cancer-associated venous thromboembolic diseases at National Cancer Centers - Sudan (2024). These centers are in Khartoum state (Radiation and Isotopes Center), Al-Gezira state (National Cancer Institute, University of Gezira), Gedaref state (East Oncology Hospital) and Northern state (Merowe Center), there is also a private center in Atbara, Wadialnile state.

Study population: The study targeted all oncologists working at National Cancer Centers in Sudan and agreed to participate in the research.

Data collection form and study variables: Data were collected using a validated structured Google form questionnaire adopted from previous studies. Three experts reviewed the questionnaire for relevance, clarity, and validity before data collection. The questionnaire consists of three parts: Part one (oncologists demographics: age, gender, professional classification, years working in specialty, academic work, and place of work). Part two (data regarding oncologists' knowledge about CAT: overview or definition, risk factors, prophylactic options, contraindications for their use and guidelines). Part three (data regarding oncologists' practice: how often prescribed thromoprophylaxis and variables to identify their reasons behind non-prescribing of thromoprophylaxis among hospitalized cancer patients).

Data collection method: Data were collected through sending the questionnaire to all oncologists (estimated to be fewer than 100) via personal emails. Regular reminder messages were sent approximately every three days over a period of two months. As a result, 56 oncologists responded and completed the questionnaire.

Data management: A scoring system was implemented to provide a more comprehensive evaluation of overall knowledge. The knowledge domain contained 38 questions to assess oncologists' level of knowledge regarding inpatient prophylaxis of CAT. Within this domain, the participants were asked to respond to any choices as they could think might be correct (using yes, no, or I don't know answers). Therefore, "No" responses were considered as incorrect answers for "Yes" items and vice versa, while "I don't know "responses were considered as neutral answers and were scored zero. Each correct answer was received 1 point, while incorrect answers received 0 points, resulting in a total score of knowledge for each study participant ranged from 0-38. Then the scores of knowledges were expressed as medians and subsequently oncologists' overall knowledge score equals to or above the median, considered to have good knowledge, and those whose overall knowledge score was less than the median were considered to have poor knowledge.

Statistical analysis: All statistical analysis were conducted using Statistical Package for Social Sciences program (SPSS) version 24.0 (IBM SPSS Inc., Chicago, IL), Descriptive statistics were carried out, and the results were presented as percentages & frequencies. A chi-square test was utilized to determine the association of knowledge level with demographic characteristics of participants and a P-value of < 0.05 was considered statistically significant.

Ethical considerations: This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by Health-Sector Ethical Review Committee, University of Gezira (date: 09/02/2025, approval number: 12/2025). Informed consent forms were obtained from all participants.

Results

General characteristics of the study population: The study sample compromised 56 oncologists, with a significant majority being female (60.7%). More than half of the participants (51.8%) were over 35 years old; and (57.1%) of them were registrars. Regarding work experiences, (55.4%) of oncologists had less than 5 years of experience, and (57%) of them were working at National Cancer Institute – University of Gezira (NCI- UG); while (60%) of them had never worked in academic teaching (**Table 1**).

Knowledge assessment: The assessment indicated that participants had a high level of knowledge (over 80%) regarding the general overview (definition and pathophysiology) of CAT, with 87.5% of them opted that the tumor compressing vessels and creating turbulent blood flow as reason for thrombus formation and subsequent development of CAT. 55.4% of oncologists correctly identified CAT-related risk factors, and history of VTE and major surgery were the most commonly recognized risk factors. Also, 55.4% of participants were knowledgeable about inpatient prophylactic options of CAT, with 76.8% of them referred to enoxaparin as commonly used agent. A high proportion of oncologists (75%) had good knowledge regarding contraindications of pharmacological thromboprophylaxis use among hospitalized cancer patients, and active bleeding was the most identified contraindication by the majority (92.9%) of participants. The study demonstrated that participants are aware of international guidelines for preventing CAT among hospitalized patients, and 62.5% of them cited the NCCN guidelines (**Table 2**). Overall, 53.6% of oncologists achieved a good knowledge score, while 46.4% had a poor score.

Practice assessment: In term of the rate of oncologists' prescribing of anticoagulants as inpatient thromboprophylaxis, the majority of them (62.5%) reported "sometimes prescribed them", (23.2%) reported "always prescribed them", (12.5%) of participant reported "rarely prescribed them", and only (1.8%) reported "never prescribed them". In addition to that, there was notable reasons behind non-prescribing of anticoagulant for hospitalized patients, with 36% of participants reported "their cost is too much." (**Table 3**).

Cross-tabulation analysis: The cross-tabulation analysis revealed no significant associations between the demographic data of participants and their overall knowledge score (**Table 4**). However, a significant association was found between the oncologists' years of experience and their knowledge about the risk factors of CAT, indicating that participants with less than five years of experience demonstrated better knowledge than those with more experience (**Table 4**).

Table 1: General characteristics of study population (n= 56)

Characteristics		Frequency (%)
Gender	Male	22 (39.3)
	Female	34 (60.7)
Age (years)	25- 35	27 (48.2)
	More than 35	29 (51.8)
Current position	Registrars	32 (57.1)
	Consultants	24 (42.9)
Years of experience	< 5	31 (55.4)
	5- 10	16 (28.6)
	> 10	9 (16.1)
Place of work	Atbara center	1 (1.8)
	East Oncology hospital	2 (3.6)
	Merowe Center	5 (8.9)
	Khartoum Oncology Center	16 (28.6)
	National Cancer Institute- University of Gezira	32 (57.1)
Academic working	Teaching	23 (41.1)
	Non-teaching	33 (58.9)

Table 2: Knowledge of oncologists regarding cancer-associated thrombosis (n= 56)

Knowledge questions	Answers*	Frequency (%)
Etiology and pathophysiology of cancer-associated thrombosis (CAT)		
It includes venous thromboembolic events (VTE) and arterial thrombotic events.	Yes	48 (85.7)
	No	7 (12.5)
	I don't know	1 (1.8)
The etiology of CAT originates from ability of malignant cell to excrete pro-coagulants or stimulate the immune system to release cytokines that increase coagulation.	Yes	46 (82.1)
	No	1 (1.8)
	I don't know	9 (16.1)
One of the causes of CAT is that the tumor compressing vessels creating turbulent blood flow.	Yes	49 (87.5)
	No	4 (7.1)
	I don't know	3 (5.4)
The causes still unknown.	Yes	19 (33.9)
	No	25 (44.6)
	I don't know	11 (21.5)
Risk factors of cancer-associated thrombosis		
Age	Yes	53 (94.6)
	No	3 (5.4)
	I don't know	0
Obesity	Yes	55 (98.2)
	No	0
	I don't know	1 (1.8)
Pregnancy	Yes	51 (91.1)
	No	4 (7.1)
	I don't know	1 (1.8)
Exercise	Yes	14 (25)
	No	40 (71.4)
	I don't know	2 (3.6)
Hospitalization	Yes	51 (91.1)
	No	2 (3.6)
	I don't know	3 (5.4)
Genetic factors	Yes	39 (69.6)
	No	6 (10.8)
	I don't know	11 (19.6)
Poor performance status	Yes	48 (85.7)
	No	6 (10.7)
	I don't know	2 (3.6)

History of VTE	Yes	56 (100)
	No	0
	I don't know	0
Cancer type	Yes	47 (83.9)
	No	5 (9)
	I don't know	4 (7.1)
Advance stage of cancer	Yes	46 (82.1)
	No	8 (14.3)
	I don't know	2 (3.6)
Active cancer	Yes	40 (71.4)
	No	5 (9)
	I don't know	11 (19.6)
Major surgery	Yes	56 (100)
	No	0
	I don't know	0
Use of central venous catheter	Yes	44 (78.6)
	No	6 (10.7)
	I don't know	6 (10.7)
Radiation therapy	Yes	18 (32.1)
	No	21 (37.5)
	I don't know	17 (30.4)
Use of Aspirin	Yes	4 (7.1)
	No	48 (85.7)
	I don't know	4 (7.1)
Use of contraceptive pills	Yes	47 (83.9)
	No	6 (10.7)
	I don't know	3 (5.4)
Use of corticosteroids	Yes	21 (37.5)
	No	25 (44.6)
	I don't know	10 (17.9)
Smoking	Yes	46 (82.1)
	No	3 (5.4)
	I don't know	7 (12.5)
Chemotherapy	Yes	40 (71.4)
	No	11 (19.6)
	I don't know	5 (9)
Prophylactic options of cancer-associated thrombosis		
Pharmacological prophylaxis only	Yes	11 (19.6)
	No	43 (76.8)
	I don't know	2 (3.6)
Mechanical prophylaxis only	Yes	1 (1.8)
	No	50 (89.2)
	I don't know	5 (9)
Both (Mechanical + pharmacological prophylaxis)	Yes	47 (83.9)
	No	4 (7.1)
	I don't know	5 (9)
Pharmacological prophylaxis unless presence of contra-indications	Yes	48 (85.7)
	No	5 (9)
	I don't know	3 (5.3)
Selection of prophylactic method depend on the risk stratification of the patient	Yes	52 (92.8)
	No	2 (3.6)
	I don't know	2 (3.6)
Enoxaprin is the most used in pharmacological options	Yes	43 (76.8)
	No	10 (17.9)
	I don't know	3 (5.3)
Standard dose for LMWH about 40mg/S.C/OD.	Yes	35 (62.5)
	No	12 (21.4)
	I don't know	9 (16.1)
In case of renal impairment the most suitable option is UFH.	Yes	30 (53.8)
	No	10 (17.9)
	I don't know	16 (28.3)

Direct oral anticoagulants (DOACs) not approved to be used as inpatient thromboprophylaxis.	Yes No I don't know	12 (21.4) 31 (55.4) 13 (23.2)
Contraindication of pharmacological prophylaxis use.		
Active bleeding	Yes No I don't know	52 (92.9) 4 (7.1) 0
Acute DVT	Yes No I don't know	10 (17.9) 42 (75) 4 (7.1)
Thrombocytopenia (PLts counts less than 50.000)	Yes No I don't know	40 (71.4) 9 (16.1) 7 (12.5)
Underline hemorrhagic coagulopathy	Yes No I don't know	49 (87.4) 5 (9) 2 (3.6)
Lumber puncture	Yes No I don't know	25 (44.6) 23 (41.1) 8 (14.3)
Large hematoma	Yes No I don't know	43 (76.8) 8 (14.2) 5 (9)

** The underlined answers represent the right answers for each statement.*

Table 3: Barriers to prescribing of anticoagulants as inpatient thromboprophylaxis (n= 25)

Reasons	Frequency (%)
Their cost is too much	9 (36)
Un availability of anticoagulant options in pharmacies.	7 (28)
No indication for their use	2 (8)
Fear from their side effects	3 (12)
The risk from them overbalances their benefits	2 (8)
Others (Senior advice)	1 (4)
Others (Lack of information about doses)	1 (4)

Table 4: Association between participants' demographic data and knowledge score

Demographic data		Percent of good knowledge	P-value
Gender	Male Female	50 50	0.068
Age (Years)	25- 35 More than 35 years	56.7 43.3	0.137
Current position	Registrars Consultants	53.3 47.7	0.364
Years of experience	< 5 5- 10 > 10	63.3 20 16.7	0.298
Academic working	Teaching Non-teaching	43.3 56.7	0.462
Association between participants' years of experience and their knowledge about risk factors of CAT among hospitalized cancer patients			
Demographic data		**Frequency (%) of participants with good knowledge about risk factors of CAT**	**P-value**
Years of experience	< 5 5- 10 > 10	19 (61.3) 5 (16.1) 7 (22.6)	**0.049**

Discussion

Venous thromboembolism is a commonly encountered medical condition among hospitalized patients and sixty percent of cases are hospital-acquired, either occur during admission or within 90 days after discharged, fortunately these events are preventable when using optimal prophylactic methods [9].

In the current study, 53.6% of participants had a good overall knowledge score. Recent studies from Saudi-Arabia have reported that the overall knowledge score among health professionals regarding VTE prevention were 74% [9] and 86.8% [10]. However, our findings are superior to those of a study among Ethiopian health professionals who reported a reasonable level of knowledge of 49.8% and a study among orthopaedic residents from Sudan who

reported a knowledge score of 36.5% about VTE prophylaxis [11]. Noteworthy, variation in the research population's sample size and the tools used to evaluate knowledge could be the cause of this divergency in knowledge levels.

Over 80% of participants in this study were correctly informed about the general overview (definition and pathophysiology) of CAT. This data agrees with a recent study conducted among nurses revealed that they had adequate knowledge about the pathophysiology, and clinical manifestations of venous thromboembolic diseases [12]. The study observed that 55.4% of oncologists answered correctly to knowledge questions about risk factors of CAT among hospitalized patients. These findings were slightly different from two studies found that the overall rate of correct responses to knowledge items about risk factors of CAT were 96% and 80%, respectively [5,13]. The current study demonstrated that 55.4% of participants were knowledgeable about inpatient prophylactic options for CAT. Therefore, these results align with a study among Southampton General Hospital (SGH) healthcare workers (doctors, pharmacists, and nurses) where 90% of participants were aware of different VTE prevention methods and available options [14]. According to this research, 75% of participants had good knowledge regarding contraindications of pharmacological thromboprophylaxis use among hospitalized patients. These findings are in agreement with a study conducted in China in which 67.5% of ICU staff are knowledgeable about the pharmacological thromboprophylaxis contraindications among critically ill patients [15]. The results of this study demonstrate that participants are aware of the international guidelines for preventing CAT in hospitalized patients. This result do not agree with a study conducted among Sudanese orthopaedic registrars which revealed that 42.3% of them were not aware about guidelines of VTE prophylaxis among orthopaedic patients [16].

The present study demonstrated that oncologists responded to question regarding prescribing prophylactic anticoagulants for hospitalized patients; of those, 62.5% reported "sometimes," 23.2% cited "always," while 12.5% of them reported "rarely," and 1.8% cited "never" prescribed prophylactic agents. Our findings are different from a study of oncology clinicians that found underutilization of anticoagulation prophylaxis because among participants, 67% of them reported "rarely", 21% reported "sometimes," 8% reported "usually," and 4% reported "always" prescribing thromboprophylaxis [17]. This study demonstrated that the reasons behind non-prescribing prophylactic anticoagulants for hospitalized patients were the following: 36% "their cost is too much", 28% " unavailability of anticoagulant options in pharmacies", 8% " no indication for their use", 12% " fear from their side effects," while 8% "the risk from them overbalances their benefits", and two participants opted for " other reasons"; " lack of information about doses" and another said " because she follows her senior's advice". Our findings are in line with a study conducted among oncologists which found that the main barriers for thromboprophylaxis use: (58.7%) Lack of perceived benefit of risk reduction with prophylaxis [17], (47.5%) fear from patient bleeding, (38.4%) increased patient cost [11], and (32.7%) unfamiliarity with guidelines [12].

Our results revealed no association between the demographic data of oncologists and their overall knowledge score regarding inpatient thromboprophylaxis, in contrast to a study among Ethiopian health professionals, which found that respondents' age, education level, and current profession significantly influenced their level of knowledge towards VTE prophylaxis among hospitalized patients [11]. This variation from our findings can be attributed to differences in the sample size of study populations. However, our study observed that participants with less than five years of experience demonstrated better knowledge about risk factors of CAT than those with more experience. This finding does not align with recent study revealed that, participants with over ten years of experience knew five times as much about VTE prophylaxis as those with less than five years of experience [11].

The current study has few limitations. firstly, relatively small sample size, secondly, the survey questions were not designed to assess the real clinical practice of oncologists, as the data collected online rather than from patient files. In addition, reliance on self-reported data may introduce response bias. However, we believe that these limitations have no or little impact the integrity of data. Despite these limitations, our strength of this study is that it was multi-centers cancer study conducted in Sudan. It also provided a detailed assessment of oncologists' knowledge across different domains, allowing for the identification of gaps in awareness and facilitating targeted educational interventions. Also, call for involving clinical pharmacists in healthcare team to enable their active participation and subsequently improvement of patient's clinical outcome.

In conclusion, this study sheds interesting light on the prevention of cancer associated thrombosis. It revealed that 53.6% of study participants demonstrated a good level of overall knowledge. Nevertheless, 62.5% of them reported they only sometimes prescribe anticoagulants for hospitalized patients. The primary barrier to optimal thromboprophylaxis implementation was identified as the high cost of medications. These findings suggest that healthcare organizations and health insurance providers should consider initiatives to improve the availability of anticoagulants, either free or at discounted price for cancer patients

Declarations

Ethical Clearance

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by Health-Sector Ethical Review Committee, University of Gezira (date: 09/02/2025, approval number: 12/2025). Informed consent forms were obtained from all participants.

Conflict of interest

The authors declare that there is no conflict of interest

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Contributors

TBE: Conceptualization, Methodology, Investigation, Data collection and curation, Writing original draft, AA and EAE: Conceptualization, Methodology, Supervision, Formal analysis, BAY: Supervision, Formal analysis, Data collection and curation, Writing - review and editing. All authors approved the final manuscript

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References

[1] WHO (2022). Cancer. Geneva: World Health Organization, (online) available at: https://www.who.int/news-room/fact-sheets/detail/cancer. (Accessed on 3rd January 2023).

[2] Roopkumar J, Khorana AA. Risk of Thrombosis in Cancer: Clinical Factors and Role of Primary Prophylaxis. Cancer Treat Res. 2019;179:55-68. doi: 10.1007/978-3-030-20315-3_4.

[3] Labianca A, Bosetti T, Indini A, Negrini G, Labianca RF. Risk Prediction and New Prophylaxis Strategies for Thromboembolism in Cancer. Cancers (Basel). 2020;12:2070. doi: 10.3390/cancers12082070.

[4] Gervaso L, Dave H, Khorana AA. Venous and Arterial Thromboembolism in Patients with Cancer: JACC: Cardio Oncology State-of-the-Art Review. JACC Cardio Oncol. 2021;3:173-190. doi: 10.1016/j.jaccao.2021.03.001.

[5] Mendoza E, Visperas JC. Knowledge, attitude and practices on venous thromboembolism prophylaxis among internists of the University of Santo Tomas hospital. Philippine Journal of Internal Medicine. 2012;50:1-10.

[6] Nichetti F, Ligorio F, Montelatici G, Porcu L, Zattarin E, Provenzano L, et al. Risk assessment of thromboembolic events in hospitalized cancer patients. Sci Rep. 2021;11:18200. doi: 10.1038/s41598-021-97659-9.

[7] Martin KA, Cameron KA, Lyleroehr MJ, Linder JA, O'Brien M, Hirschhorn LR. Venous thromboembolism prevention in cancer care: implementation strategies to address underuse. Res Pract Thromb Haemost. 2023;7:102173. doi: 10.1016/j.rpth.2023.102173.

[8] Bayadinova JA, Sardo LA, Penton L, Jenkins S. 'Spot the CLOT': Awareness of cancer-associated thrombosis in healthcare providers. Can Oncol Nurs J. 2022;32:325-330.

[9] Almarshad F, Bandy A, Alfaiz A, Alotaibi SF, Alaklabi SA, Alotaibi YF. A Multi-center Cross-Sectional Assessment of Healthcare Professionals' Knowledge, Attitudes, and Practices Toward Thromboprophylaxis. Cureus. 2024;16:e61835. doi: 10.7759/cureus.61835.

[10] Alameri M, Sulaiman SA, Ashour A, Al-Saati MA. Knowledge and attitudes of venous thromboembolism for surgeons in two Saudi Arabian medical centers. Archives of Pharmacy Practice. 2019;10:107-111.

[11] Kiflie AM, Mersha AT, Workie MM, Admass BA, Ferede YA, Bizuneh YB. Assessment of knowledge, attitude, practice and associated factors of venous thromboembolism prophylaxis among health professionals. A cross sectional study. International Journal of Surgery Open. 2022;39:100436. doi: 10.1016/j.ijso.2021.100436.

[12] Al-Mugheed K, Bayraktar N. Knowledge, risk assessment, practices, self-efficacy, attitudes, and behaviour's towards venous thromboembolism among nurses: A systematic review. Nurs Open. 2023;10:6033-6044. doi: 10.1002/nop2.1914.

[13] Vardi M, Dagna L, Haran M, Duckit R. Attitudes towards and practice of venous thromboembolism prevention in general internal medicine wards: a multinational survey from member countries of the European Federation of Internal Medicine. Thromb Res. 2012;129:573-576. doi: 10.1016/j.thromres.2011.07.043.

[14] Gao F, Kause J. Thromboprophylaxis awareness among hospital staff. Br J Nurs. 2010;19:1175-1178. doi: 10.12968/bjon.2010.19.18.79051.

[15] Sun B, Tang X, Liang L, Tong Z. A survey of knowledge and application of mechanical thromboprophylaxis among the medical staff of intensive care units in North China. Clin Respir J. 2018;12:1591-1597. doi: 10.1111/crj.12715.

[16] Gashi YN, Elgenaid SN, Suliman HH, Abdalrahman IB. Knowledge, attitude and practice of orthopedic registrars toward prophylaxis of venous Thromboembolism". International Journal of Current Research in Life Sciences. 2018;7:2735-2738.

[17] Martin KA, Molsberry R, Khan SS, Linder JA, Cameron KA, Benson A 3rd. Preventing venous thromboembolism in oncology practice: Use of risk assessment and anticoagulation prophylaxis. Res Pract Thromb Haemost. 2020;4:1211-1215. doi: 10.1002/rth2.12431.