

Deep Vein Thrombosis Prevention: A Study of Nurses' Knowledge, Attitudes, and Practices in a Tertiary Health Care Facility, KSAMustafa AlDhoon¹, Diana S. Lalithabai²

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Abstract– Background: Deep vein thrombosis (DVT) is a major global health problem and an important cause of morbidity and mortality, particularly because of its association with pulmonary embolism (PE). **Aim:** This study aimed to assess nurses' knowledge, attitudes, and self-reported practices regarding DVT prevention and to identify demographic and professional factors associated with DVT-related knowledge, attitude and practice. **Methods:** A descriptive cross-sectional study was conducted among registered nurses working in inpatient at a tertiary healthcare facility in Riyadh, Saudi Arabia. The validated 41-item DVT Knowledge, Attitudes, and Practices questionnaire was used, and 335 nurses completed the survey. Data were analyzed using SPSS version 26, with descriptive statistics, non-parametric tests, Spearman's correlation, and logistic regression applied as appropriate. **Results:** The mean scores were 26.69 ± 4.22 for knowledge, 37.45 ± 3.88 for attitude, and 29.58 ± 4.63 for practice. Most participants demonstrated adequate knowledge (91.34%), positive attitudes (94.03%), and positive practices (87.76%). Knowledge was positively correlated with attitude ($p = 0.315$, $p < 0.001$) and practice ($p = 0.433$, $p < 0.001$), while attitude was more strongly correlated with practice ($p = 0.572$, $p < 0.001$). Knowledge independently predicted positive attitude (adjusted OR = 1.24, $p < 0.001$), and knowledge, attitude, and prior DVT patient experience independently predicted practice. In regression analysis, no variables were statistically significant predictors of knowledge in the univariate model, although DVT training approached significance. **Conclusion:** Nurses demonstrated strong overall knowledge, attitudes, and practices related to DVT prevention. Knowledge appears to be a key driver of both attitudes and practice, supporting the importance of structured education and ongoing professional development in thromboprophylaxis. By strengthening local DVT prevention

practices, this study will contribute to decreased morbidity and mortality from PE, a critical organizational and national patient-safety priority.

Keywords: Deep vein thrombosis; nursing care; nurses' practice; nurse's knowledge; venous thromboembolism.

1. Introduction

Deep vein thrombosis (DVT), a condition caused by a thrombus in the deep veins—primarily in the legs—is a potentially life-threatening complication. Pulmonary embolism (PE), the most serious complication, occurs when a piece of a clot breaks off and moves to the lungs, where it may cause a potentially fatal obstruction [1]. DVT is a significant global burden, and data from 123 nations with a combined population of 2,602,561,422 revealed that 86,930 (0.46%) of the 18,726,382 recorded deaths were attributable to PE [2]. DVT is the third most common cause of cardiovascular disease-related deaths, and recurrent thrombosis and "post-thrombotic syndrome" are significant causes of morbidity, even in patients who do not experience pulmonary emboli [3]. It was reported that patients with simultaneous DVT had higher all-cause and PE-specific mortality at three months than those without concomitant DVT, according to a prospective analysis of 707 patients with acute PE. [4]. Patients with PE, who also have deep vein thrombosis (DVT), including upper extremity DVT, are at increased risk for death [5].

While multiple acquired risk factors contribute to a VTE episode. [6,7], immobilization, and having a serious medical condition elevated the incidence of venous thromboembolism (VTE) by 11 times [8]. Epidemiological research over the last five decades has significantly expanded the understanding of VTE risk factors, identifying both genetic and acquired contributors. These include Factor V Leiden, the prothrombin G20210A mutation, obesity, smoking, diabetes, hormone therapy, immobilization, infection (e.g., SARS-CoV-2),

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trauma, and surgery. Despite this, the occurrence of DVT among patients without identifiable risk factors—and the absence of disease in others with multiple risks—underscores the multifactorial complexity and incomplete understanding of its pathogenesis [9-11]. While major surgery and active malignancy are strong risk factors for venous thromboembolism, and Prophylactic pharmacological treatment for venous thromboembolism is typically recommended for patients undergoing major orthopedic or cancer surgery, most cases are spontaneous. [12].

Clinicians are challenged to balance management of infection with prophylactic and therapeutic approaches to reduce thromboembolic events. Currently, anticoagulation remains the cornerstone of treatment for DVT, though it carries the risk of serious bleeding events, and mechanical methods such as compression stockings or pneumatic devices serve as additional or alternative strategies [13,14]. Non-instrumental early mobilization is beneficial in reducing the incidence of deep vein thrombosis in hospitalized patients [15]. A narrative review on DVT prevention in acute ischemic stroke patients with lower limb paralysis recommends that effective prevention requires individualized risk stratification, integrating clinical assessment, biomarkers, and imaging tools. Current prophylactic strategies include pharmacological anticoagulation (primarily low-molecular-weight heparin), mechanical interventions (such as intermittent pneumatic compression), and early mobilization and rehabilitation [16]. PE and DVT differ significantly in several patient features, risk factors, clinical symptoms, and outcomes. The current guidelines for managing DVT and PE remain the same for both diagnosis and treatment, except for the prescription for advanced reperfusion therapies [17].

As the first line of assessment and intervention for deep vein thrombosis (DVT), nurses play a crucial role in their management. Nurses perform comprehensive patient evaluations, applying clinical judgment to pinpoint DVT risk factors, and identifying symptoms, their possible side effects, and the need for prompt treatment. [18]. A study conducted among community nurses found that training based on the offset model can effectively improve VTE prevention and compliance among nurses and standardize patients' self-prevention [19]. While advances in nursing care strategies facilitate tailored treatment plans, they are crucial for managing the complex needs of DVT patients [2024].

The literature suggests that, despite awareness of VTE's clinical significance, nurses' knowledge and practices remain inconsistent worldwide. Crucially, gaps persist in their ability to conduct risk assessments, implement effective prophylactic measures, and integrate pharmacological and non-pharmacological strategies. Recent Saudi Arabian studies have presented conflicting findings on nursing preparedness, further emphasizing the need for context-specific investigations.

As King Fahad Medical City (KFMC) prepares to launch the 'PE Code', a landmark initiative as the first of its kind in the Kingdom the success of this program hinges on the readiness of our frontline nursing staff. This study is essential to evaluate the current knowledge, attitudes, and practical skills of our nurses. By bridging the gap between clinical theory and

bedside practice, this research will provide the empirical foundation necessary to ensure the PE Code project achieves its goal of zero preventable deaths from pulmonary embolism.

Study Aim: To assess the current knowledge, attitudes, and self-reported practices regarding deep vein thrombosis prevention among clinical nurses and to identify demographic and professional factors associated with DVT knowledge and practice scores.

Objectives: *The primary objective:* To quantify the level of knowledge, attitudes, and self-reported practices regarding DVT prevention among registered nurses working in all inpatient and critical care units at KFMC during the study period, using a validated KAP questionnaire.

The secondary objectives:

- To examine the association between exposure to DVT related professional development activities and DVT knowledge, attitude, and practice scores.
- To assess the relationships between knowledge, attitudes, and self-reported practices regarding DVT prevention by calculating correlation coefficients and regression models.
- To determine the association between nurses' work setting (e.g., medical, surgical, critical care, emergency) and DVT knowledge and practice scores, after adjusting for key nurse characteristics (e.g., years of experience, highest qualification) using multivariable regression.

2. MATERIALS AND METHODS

Design and setting: This cross-sectional study was conducted in an oncology unit of a tertiary healthcare setting in Riyadh, KSA. This study was approved by the Institutional Review Board (IRB) of King Fahad Medical City, Riyadh (IRB approval # 25-095).

Sample: Nurses working in tertiary health care were invited to participate in the study. Convenience sampling method was used. The inclusion criteria were nurses Registered nurses working in inpatient units with minimum 6 months' clinical experience. Administrative nurses without direct patient care responsibilities and registered nurses working in outpatient units were excluded from the study.

Based on the nursing workforce (approximately 2,500 clinical nurses) at KFMC, using a 95% confidence level, a 5% margin of error, and a 50% response rate, the minimum required sample size is 333 nurses. Accounting for a 20% non-response rate, the target enrollment was 400 nurses. The final sample comprised of 335 nurses.

Data collection: Data were collected between April and June 2025 using a socio professional characteristics questionnaire and specific instrument to measure the knowledge, attitudes, and self-reported practices regarding DVT prevention among registered nurses working in all inpatient and critical care units. The research team met with nurses during the nursing endorsement and described the purpose of the study, potential risks and benefits, confidentiality and the privacy of

participants. The team distributed the consent form and surveys after the meeting and asked the nurses to fill out the questionnaire if they were willing to participate in this study. No participant names or identifiers were collected. Participants were asked to place their survey responses in specific boxes kept in the room to ensure confidentiality.

Data Collection Tool: The validated 41-item "DVT Knowledge, Attitudes, and Practices Questionnaire," developed by Hu et al., (2025), [21] was utilized. This instrument demonstrates excellent reliability (Cronbach's $\alpha = 0.949$) and includes:

Section A: Demographics (10 items), which consists of age, gender, education level, years of nursing experience, Current work unit, and Previous DVT training history

Section B: Knowledge will be assessed by a 15-item questionnaire. It has questions covering DVT risk factors, prevention methods, and clinical management.

Section C: contains 9 items which assess the attitude using a 5-point Likert scale assessing perceptions of DVT prevention importance.

Section D: contains 7 items that assess self-reported practices using a 5-point Likert scale to measure the frequency of DVT prevention activities, including risk assessment implementation and patient education delivery.

Scoring Methodology: The study evaluated participants using a three-part scoring system focused on knowledge, attitude, and practice. Knowledge was tested through 15 items, awarding 2 points for being "very familiar" with a topic, 1 point for having "heard of" it, and 0 for being "unclear," with a total of 21 or more marks labeled as "Adequate." Attitudes were measured using nine questions on a 5-point scale; while most followed a standard format, item 8 was reverse-scored to ensure accuracy, with total scores grouping participants into Negative (9–22), Neutral (23–31), or Positive (32–45) categories. Finally, Practice was assessed through seven questions on a 5-point scale, where total scores categorized habits as Negative (7–17), Moderate (18–24), or Positive (25–35).

Statistical Analysis: Data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 26 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the data, with categorical variables presented as frequencies and percentages, and continuous variables reported as means and standard deviations. The normality of continuous variables was assessed using the Kolmogorov-Smirnov test. The internal consistency reliability of the study instrument was evaluated using Cronbach's alpha coefficient. For group comparisons, non-parametric tests were applied: the Mann-Whitney U test was used to compare differences between two independent groups, while the Kruskal-Wallis test was used for comparisons across more than two groups. Correlations between knowledge, attitude, and practice scores were assessed using Spearman's rank correlation coefficient. Furthermore, logistic regression analysis was performed to identify factors associated with adequate knowledge, positive attitudes, and good practices. Variables with a p-value < 0.05 in univariate analysis were entered into multivariate models to

determine independent predictors, and results were presented as odds ratios (ORs) with 95% confidence intervals (CIs). A p-value of less than 0.05 was considered statistically significant.

The reliability analysis demonstrated high internal consistency of the instrument, with an overall Cronbach's alpha of 0.91 and strong subscale reliability for knowledge (0.89) and practice (0.94), while attitude showed acceptable reliability (0.69).

3. RESULTS

Table 1 presents the demographic characteristics for the participants. A total of 335 nurses participated in the study. Most participants were female (76.42%), non-Saudi (74.03%), and aged 31–40 years (47.76%). The majority held a bachelor's degree (85.37%) and worked as registered nurses (85.67%), while 89.25% reported previous experience caring for patients with DVT and 58.51% had received DVT-related training.

Table 2a and 2b report the descriptive statistics of KAP scores. Knowledge, attitude, and practice scores were high overall. The mean knowledge score was 26.69 ± 4.22 , the mean attitude score was 37.45 ± 3.88 , and the mean practice score was 29.58 ± 4.63 . Most nurses demonstrated adequate knowledge (91.34%), positive attitudes (94.03%), and positive practices (87.76%).

Table 3 presents the correlations among knowledge, attitude, and practice scores (Spearman's ρ). Knowledge was positively correlated with attitude ($\rho = 0.315$, $p < 0.001$) and practice ($\rho = 0.433$, $p < 0.001$), while attitude showed a stronger positive correlation with practice ($\rho = 0.572$, $p < 0.001$). These results indicate that higher knowledge levels are associated with more positive attitudes and better clinical practices, and that favorable attitudes are strongly linked to improved practices.

Table 4,5,6 presents the mean score of knowledge, attitude and practice by demographic characteristics. Knowledge scores were significantly associated with gender, age, years of experience in the current setting, total clinical experience, previous experience with DVT patients, and DVT training. Attitude scores were significantly associated with age, total clinical experience, and DVT training. Practice scores were significantly higher among nurses with prior DVT experience and those who had received training.

The demographic factors were highly significant in mean comparisons as the demographic groups may exhibit variations in the outcome because they differ in underlying factors. When entered the multivariate model, the demographic variable's significance drops as the true causal mechanisms are properly accounted for (Table 8,9).

The questionnaire showed high reliability overall, with strong subscale reliability for knowledge and practice and acceptable reliability for attitude.

Table 1: Demographic characteristics for the participants (N=335)

		Number	%
Gender	Male	79	23.58
	Female	256	76.42
Nationality	Saudi	87	25.97
	Non-Saudi	248	74.03
Age	Below 30 years	108	32.24
	31year-40 years	160	47.76
	Above 40 years	67	20.00
Education Status	Diploma	36	10.75
	Bachelor	286	85.37
	Master	10	2.99
	Other	3	0.90
Job Title	Registered Nurse	287	85.67
	Shift Manager	37	11.04
	Unit Manager	11	3.28
Years of experience in the current setting	Less than 5 Years	150	44.78
	5-10 years	98	29.25
	More than 10 Years	87	25.97
Total clinical experience	Less than 5 Years	82	24.48
	5-10 years	104	31.04
	More than 10 Years	149	44.48
Working Unit	Medical	91	27.16
	Surgical	55	16.42
	Specialty	97	28.96
	critical care	92	27.46
Experience with DVT Patients	Yes	299	89.25
	No	36	10.75
DVT Training	Yes	196	58.51
	No	139	41.49

Table 2a. Descriptive statistics of KAP scores	Mean ± SD	Minimum	Maximum
Knowledge Score (0–30)	26.69 ± 4.22	9.00	30.00
Attitude Score (9–45)	37.45 ± 3.88	17.00	45.00
Practice Score (7–35)	29.58 ± 4.63	7.00	35.00

Table 2b: Classification of Knowledge, Attitude, and Practice Levels

		Number	%
Knowledge	Adequate	306	91.34
	inadequate	29	8.66
Attitude	Negative	1	0.30
	Neutral	19	5.67
	Positive	315	94.03
Practice	Negative	3	0.90
	Moderate	38	11.34
	Positive	294	87.76

Table 3: Correlations Among Knowledge, Attitude, and Practice Scores (Spearman's ρ) (N = 335)

	Knowledge	Attitude	Practice
	r	r	r
Knowledge	1		
Attitude	0.315**	1	
Practice	0.433**	0.572**	1

r = Spearman's rank correlation coefficient

**. Correlation is significant at the 0.01 level (2-tailed)

4. Discussion

The literature consistently highlights the pivotal role of nurses in DVT and VTE prevention. Nurses are central to VTE risk assessment, the delivery of prophylaxis, and patient education, with studies suggesting that increased nurse engagement in routine risk assessment can significantly reduce DVT incidence [22]. This study examined knowledge and practice gaps among nursing staff at King Fahad Medical City, generating actionable data to improve key quality indicators, including DVT/PE incidence rates, staff compliance with risk assessment tools, and patient safety event rates related to venous thromboembolism (VTE). The results indicate high mean scores for knowledge, attitude, and practice. In the present study, the majority of participants demonstrated adequate knowledge (91.3%), positive attitudes (94.0%), and positive practices (87.8%), reflecting overall strong performance across all domains. This is in line with other international and regional study findings, in which nurses demonstrated sufficient knowledge, optimistic attitudes, and proactive behaviors. [21,23].

While the majority of nurses demonstrated good general knowledge of VTE, notable gaps were observed in their risk assessment capabilities. Results from recent Saudi Arabian studies on nursing expertise in DVT prevention are conflicting. A systematic analysis revealed that nurses had inadequate and unacceptable VTE levels, a limited understanding of VTE risk assessment, low self-efficacy, and

varied beliefs. [24]. A study by Ahmed, Ghanem & Khalil (2020) [25] reported that nurses' knowledge and practice regarding venous thromboembolism prevention and management in patients undergoing cancer surgery were inadequate and required improvement. In terms of fundamental prophylaxis, basic knowledge, and risk assessment for VTE, respondents performed satisfactorily; however, their understanding of physical and pharmaceutical prophylaxis was lacking [26]. Another study found that nurses' understanding and application of deep vein thrombosis prophylaxis were insufficient [27].

The global picture presents mixed results, with wide variability in nursing practice and understanding. For instance, Alharazi et al. (2024) reported a 71.92% practice level among nurses, with a mean score of 18.7. Yet, systematic reviews highlight significant gaps in knowledge, including a poor understanding of risk assessment tools, low self-efficacy, and variability in attitudes toward prophylaxis [28]. Evidence indicates that nurses generally demonstrate inadequate knowledge and practice regarding DVT prevention [29]. Therefore, increasing nurses' academic standing, offering training, and fostering an atmosphere that encourages the sharing of experiences are all ways to improve their understanding and application of deep vein thrombosis prevention. [27].

Table 4: Mean score of knowledge by demographic characteristics

		Mean	SD	P value
Gender	Male	26.32	3.90	0.046*
	Female	26.81	4.31	
Nationality	Saudi	26.20	4.02	0.059
	Non-Saudi	26.87	4.28	
Age	Below 30 years	25.87	4.44	0.013*
	31 year-40 years	26.99	4.10	
	Above 40 years	27.30	3.99	
Education Status	Diploma	26.78	5.15	0.441
	Bachelor	26.67	4.16	
	Master	27.00	2.75	
	Other	26.67	3.21	
Job Title	Registered Nurse	26.54	4.26	0.097
	Shift Manager	27.46	4.27	
	Unit Manager	28.18	2.32	
Years of experience in the current setting	Less than 5 Years	26.15	4.28	<0.001*
	5-10 years	26.42	4.56	
	More than 10 Years	27.93	3.44	
Total clinical experience	Less than 5 Years	25.83	4.31	0.014*
	5-10 years	26.76	3.98	
	More than 10 Years	27.12	4.29	
Working Unit	Medical	26.74	4.11	0.089
	Surgical	27.31	3.63	
	Specialty	26.96	4.43	
	critical care	26.00	4.40	
Experience with DVT Patients	Yes	26.93	4.09	0.001*
	No	24.69	4.78	
DVT Training	Yes	27.69	3.52	<0.001*
	No	25.28	4.70	

* Significant p value

A systematic analysis revealed that nurses had inadequate and unacceptable VTE levels, a limited assessment capabilities. Results from recent Saudi Arabian studies on nursing expertise in DVT prevention are demonstrated sufficient knowledge, optimistic attitudes, and proactive behaviors. [21,23].

While most nurses demonstrated good general knowledge of VTE, notable gaps were observed in their risk assessment capabilities. Results from recent Saudi Arabian studies on nursing expertise in DVT prevention are conflicting. A systematic analysis revealed that nurses had inadequate and

unacceptable VTE levels, a limited understanding of VTE risk assessment, low self-efficacy, and varied beliefs. [24]. A study by Ahmed, Ghanem & Khalil (2020) [25] reported that nurses' knowledge and practice regarding venous thromboembolism prevention and management in patients undergoing cancer surgery were inadequate and required improvement. In terms of fundamental prophylaxis, basic knowledge, and risk assessment for VTE, respondents performed satisfactorily; however, their understanding of physical and pharmaceutical prophylaxis was lacking [26]. Another study found that nurses' understanding and application of deep vein thrombosis prophylaxis were insufficient [27].

Table 5. Mean score of attitudes by demographic characteristics

		Mean	SD	P value
Gender	Male	37.30	4.61	0.866
	Female	37.50	3.63	
Nationality	Saudi	37.08	4.04	0.228
	Non-Saudi	37.58	3.82	
Age	Below 30 years	36.60	3.98	0.009*
	31year-40 years	37.94	3.54	
	Above 40 years	37.64	4.32	
Education Status	Diploma	37.67	4.24	0.535
	Bachelor	37.41	3.70	
	Master	37.10	7.32	
	Other	39.67	1.53	
Job Title	Registered Nurse	37.51	3.66	0.178
	Shift Manager	36.43	5.40	
	Unit Manager	39.27	2.65	
Years of experience in the current setting	Less than 5 Years	36.95	3.95	0.089
	5-10 years	37.94	3.50	
	More than 10 Years	37.76	4.11	
Total clinical experience	Less than 5 Years	36.37	4.31	0.021*
	5-10 years	37.87	3.29	
	More than 10 Years	37.76	3.92	
Working Unit	Medical	37.70	4.06	0.652
	Surgical	37.64	3.66	
	Specialty	37.16	4.14	
	critical care	37.39	3.56	
Experience with DVT Patients	Yes	37.58	3.61	0.570
	No	36.36	5.62	
DVT Training	Yes	38.04	3.69	<0.001*
	No	36.62	4.00	

The global picture presents mixed results, with wide variability in nursing practice and understanding. For instance, Alharazi et al. (2024) reported a 71.92% practice level among nurses, with a mean score of 18.7. Yet, systematic reviews highlight significant gaps in knowledge, including a poor understanding of risk assessment tools, low self-efficacy, and variability in attitudes toward prophylaxis [28]. Evidence indicates that nurses generally demonstrate inadequate knowledge and practice regarding DVT prevention [29].

Therefore, increasing nurses' academic standing, offering training, and fostering an atmosphere that encourages the sharing of experiences are all ways to improve their

understanding and application of deep vein thrombosis prevention. [27].

The study revealed significant positive relationships among all three domains. Knowledge was moderately correlated with attitude and practice. Additionally, attitude showed a stronger positive correlation with practice. These findings indicate that higher knowledge levels are associated with more positive attitudes and better clinical practices, while favorable attitudes are strongly linked to improved practices. These findings corroborate a study that reports a positive association between total knowledge and the reported practice score, but it is not statistically significant [23].

Table 6: Mean score of practice by demographic characteristics

		Mean	SD	P value
Gender	Male	29.86	4.48	0.496
	Female	29.50	4.68	
Nationality	Saudi	29.37	4.55	0.652
	Non-Saudi	29.66	4.67	
Age	Below 30 years	29.16	4.51	0.401
	31year-40 years	29.63	4.84	
	Above 40 years	30.16	4.31	
Education Status	Diploma	29.75	4.62	0.232
	Bachelor	29.55	4.66	
	Master	28.60	4.17	
	Other	34.00	1.73	
Job Title	Registered Nurse	29.57	4.47	0.869
	Shift Manager	29.46	5.85	
	Unit Manager	30.18	4.73	
Years of experience in the current setting	Less than 5 Years	29.47	4.33	0.869
	5-10 years	29.27	5.46	
	More than 10 Years	30.13	4.11	
Total clinical experience	Less than 5 Years	28.87	4.58	0.263
	5-10 years	29.75	4.72	
	More than 10 Years	29.86	4.60	
Working Unit	Medical	29.34	4.38	0.473
	Surgical	29.78	5.96	
	Specialty	29.53	4.84	
	critical care	29.76	3.73	
Experience with DVT Patients	Yes	29.91	4.44	0.001*
	No	26.86	5.32	
DVT Training	Yes	30.47	4.54	<0.001*
	No	28.32	4.49	

* Significant p value

Knowledge emerged as a significant independent predictor of positive attitudes in both univariate and multivariate analyses. Likewise, demonstrates that both knowledge and attitude were significant predictors of practice, in addition to prior experience with DVT patients. Overall, these findings highlight strong levels of knowledge, attitudes, and practices among nurses, with knowledge playing a central role in influencing both attitudes and clinical practices. In the current study, Knowledge scores were significantly associated with gender, age, years of experience in the current setting, total clinical experience, previous experience with DVT patients, and DVT training. Attitude scores were significantly associated with age, total clinical experience, and DVT training. Practice scores were significantly higher among

nurses with prior DVT experience and those who had received training. However, no variables were statistically significant predictors of knowledge in the univariate model, although DVT training approached statistical significance. This is in alignment with a study which revealed no statistically significant association between sociodemographic characteristics and practice, according to a study in Saudi Arabia [23].

A study summarizes the 38 most compelling pieces of evidence for the prevention of DVT in patients with cerebral hemorrhage, and recommends that healthcare professionals implement these evidence-based practices in clinical settings

Table 7: Univariate analysis for knowledge dimension

		OR (95% CI)	P value
Gender	Male	1.20 (0.47–3.06)	0.701
	Female**	1	
Nationality	Saudi	1.38 (0.54–3.51)	0.499
	Non-Saudi	1	
Age in Years	Below 30**	1	
	31year-40 year	1.28 (0.55–2.98)	0.563
	Above 40	1.41 (0.47–4.24)	0.545
Education Status	Diploma**	1	
	Bachelor & above	2.40 (0.91–6.36)	0.078
Job Title	Registered Nurse**	1	
	Shift Manager	1.82 (0.41–7.98)	0.429
Years of experience in the current setting	Less than 5 Years**	1	
	5-10 years	0.91 (0.39–2.13)	0.821
	More than 10 Years	1.69 (0.59–4.86)	0.332
Total clinical experience	Less than 5 Years**	1	
	5-10 years	0.88 (0.32–2.41)	0.800
	More than 10 Years	1.07 (0.40–2.82)	0.898
Working Unit	Medical**	1	
	Surgical	1.90 (0.49–7.35)	0.351
	Specialty	1.22 (0.45–3.31)	0.695
	critical care	1.01 (0.38–2.68)	0.981
Experience with DVT Patients	Yes	1.85 (0.66–5.19)	0.244
	No**	1	
DVT Training	Yes	2.14 (0.99–4.63)	0.054
	No**	1	

** Used as a reference

to effectively reduce the incidence of DVT among patients suffering from cerebral hemorrhage. [30]. The study underscores the crucial role of nursing staff in the early detection and prevention of VTE in orthopedic patients. Despite advancements in prophylaxis, the quality of nursing education and adherence to VTE prevention protocols remain pivotal. Improving nurse training and optimizing the NTP ratio in hospitals are essential to reducing VTE-related mortality [31].

Limitations: This study offers insights into nurses' knowledge, attitudes, and self-reported practices regarding DVT prevention. The cross-sectional nature of the study shows correlations but not causality. The use of self-reported questionnaires could lead to measurement inaccuracy and social desirability bias. Generalizability to other healthcare systems and resource situations is limited by the very small geographic reach. In addition, this study involves the potential for self-reporting bias, as the subjective nature of the survey

may lead to an overestimation of actual knowledge levels among participants

5. Conclusion

The results will directly inform nursing education needs, enabling targeted interventions that support ongoing quality improvement efforts and help the organization maintain compliance with accreditation standards set by the Central Board for Accreditation of Healthcare Institutions (CBAHI) and other regulatory authorities.

By strengthening local DVT prevention practices, this study will contribute to decreased morbidity and mortality from PE, a critical organizational and national patient-safety priority. Ultimately, it reduces DVT and PE morbidity, improves patient safety, and aligns the organization with the quality standards of the Ministry of Health and CBAHI, thereby advancing healthcare outcomes and institutional excellence.

Table 8: Univariate and Multivariate analysis for Attitude dimension

		Univariate analysis		Multivariate analysis	
		OR (95% CI)	P value	OR (95% CI)	P value
Knowledge		1.23 (1.13–1.34)	<0.001*	1.24 (1.13–1.35)	<0.001*
Gender	Male	0.70 (0.26–1.90)	0.488		
	Female**	1			
Nationality	Saudi	0.50 (0.20–1.27)	0.147		
	Non-Saudi	1			
Age in Years	Below 30**	1			
	31year-40 year	3.52 (1.19–10.43)	0.023*	1.08 (0.17–6.82)	0.933
	Above 40	1.79 (0.54–5.86)	0.338	0.34 (0.03–3.71)	0.376
Education Status	Diploma**	1			
	Bachelor & above	1.51 (0.42–5.42)	0.529		
Job Title	Registered Nurse**	1			
	Shift Manager	0.49 (0.15–1.54)	0.222		
Years of experience in the current setting	Less than 5 Years**	1			
	5-10 years	3.00 (0.83–10.83)	0.093		
	More than 10 Years	1.97 (0.62–6.24)	0.250		
Total clinical experience	Less than 5 Years**	1			
	5-10 years	3.47 (1.05–11.51)	0.042*	3.06 (0.56–16.82)	0.198
	More than 10 Years	3.31 (1.16–9.47)	0.025*	4.95 (0.50–48.99)	0.171
Working Unit	Medical**	1			
	Surgical	1.44 (0.36–5.83)	0.606		
	Specialty	1.53 (0.47–5.02)	0.480		
	critical care	1.45 (0.44–4.75)	0.539		
Experience with DVT Patients	Yes	3.05 (1.04–8.97)	0.042*	1.70 (0.52–5.51)	0.378
	No**	1			
DVT Training	Yes	1.44 (0.58–3.56)	0.428		
	No**	1			

* Significant p value

** Used as a reference

Table 9: Univariate and Multivariate analysis for Practice dimension

		Univariate analysis		Multivariate analysis	
		OR (95% CI)	P value	OR (95% CI)	P value
Knowledge		1.28 (1.19–1.38)	< 0.001*	1.17 (1.07–1.28)	< 0.001*
Attitude		1.46 (1.31–1.63)	<0.001*	1.38 (1.22–1.56)	< 0.001*
Gender	Male	0.95 (0.44–2.04)	0.896		
	Female**	1			
Nationality	Saudi	0.83 (0.40–1.70)	0.608		
	Non-Saudi	1			
Age in Years	Below 30**	1			
	31year-40 year	1.20 (0.58–2.47)	0.627		
	Above 40	1.38 (0.53–3.59)	0.506		
Education Status	Diploma**	1			
	Bachelor & above	1.18 (0.43–3.22)	0.749		
Job Title	Registered Nurse**	1			
	Shift Manager	0.69 (0.27–1.79)	0.449		
	Unit Manager	1.34 (0.17–10.83)	0.781		
Years of experience in the current setting	Less than 5 Years**	1			
	5-10 years	0.66 (0.31–1.37)	0.260		
	More than 10 Years	1.26 (0.52–3.06)	0.606		
Total clinical experience	Less than 5 Years**	1			
	5-10 years	1.59 (0.67–3.77)	0.289		
	More than 10 Years	1.46 (0.67–3.19)	0.338		
Working Unit	Medical**	1			
	Surgical	0.93 (0.37–2.32)	0.875		
	Specialty	1.29 (0.56–2.95)	0.550		
	critical care	2.61 (0.95–7.12)	0.062		
Experience with DVT Patients	Yes	5.47 (2.50–11.98)	<0.001*	5.46 (1.90–15.67)	0.002*
	No**	1			
DVT Training	Yes	2.20 (1.13–4.27)	0.002*	0.96 (0.40–2.35)	0.936
	No**	1			

* Significant p value

** Used as a reference

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