

KNOWLEDGE AND PRACTICE OF NURSES REGARDING PREVENTION OF DEEP VEIN THROMBOSIS IN TERTIARY CARE HOSPITAL LAHORE

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Deep vein thrombosis, nursing knowledge, preventive practices, anticoagulants, compression stockings, patient education, DVT prevention.

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Abstract**Background:**

Deep vein thrombosis (DVT) is a preventable yet significant health concern, and nurses play a crucial role in its early detection and prevention. Despite the availability of evidence-based guidelines, gaps in knowledge and practice among nurses may contribute to inadequate preventive care and increased patient risk.

Aim:

To assess the knowledge and practices of nurses regarding DVT prevention in a tertiary care hospital.

Methods:

A descriptive cross-sectional study was conducted among 114 nurses selected through convenient sampling. Data were collected using a structured questionnaire assessing demographic characteristics, knowledge, and practices related to DVT prevention. Descriptive statistics were used to summarize frequencies and percentages. Ethical considerations were maintained throughout the study.

Results:

The findings revealed limited knowledge among nurses regarding key DVT preventive measures. Most participants did not recognize the preventive role of foot and leg exercises (61.4%), leg elevation (59.6%), or early ambulation (55.3%). Knowledge of pharmacological prophylaxis was also low, with only 39.5% identifying the role of heparin and LMWH. Practice results showed inconsistent implementation of preventive measures. Patient education was poorly performed, and only 43.0% encouraged early ambulation. While 58.8% administered anticoagulants, monitoring for side effects was low (33.3%). Mechanical prophylaxis practices, such as the use and teaching of compression stockings, were insufficient.

Conclusion:

The study identified significant gaps in both knowledge and practice of DVT prevention among nurses. Strengthened training, standardized protocols, and enhanced patient education are essential to improve preventive care and reduce DVT-related complications.

INTRODUCTION

Deep vein thrombosis (DVT) is a clinical syndrome which is defined by the occurrence of blood clots in the deep veins, mostly in the lower limbs. Mechanical approaches, including graduated compression stockings and intermittent pneumatic compression, and pharmacological ones, like anticoagulants can be considered the preventive strategies (Morris and Roberts, 2020; Prandoni et al., 2022). Nurses are in strategic position to make patient risk assessment, use evidence-based preventive measures and educate patients and their families about the risks and prevention of DVT. In this regard, knowledge implies the knowledge of nurses about the etiology of DVT, its risk factors, clinical manifestations, and prevention practices, and practice is the direct application of the said interventions in clinical environments (Chen et al., 2018; Yesuf et al., 2021).

DVT is a widespread complication in hospitalized patients particularly in tertiary care hospitals where patients are frequently immobilized, traumatized, and subjected to surgery. Studies show that without the use of proper prophylaxis, hospitalized or postoperative patients are at risk of developing venous thromboembolism (Li et al., 2022; Liu and Peng, 2022). In such countries as Pakistan and other LMICs, low compliance with preventive measures and awareness deficiency also increase the risk of patients (Parveen et al., 2023). DVT and its outcomes, including long hospitalization, higher healthcare expenditures, and the possibility of systemic pulmonary embolism, emphasize the significance of the quality of nursing-based preventive treatment (Scheres et al., 2018).

Knowledge possessed by nurses is a key factor that determines patient outcomes because nurses with adequate knowledge can identify high-risk patients, prophylaxis, and compliance with clinical recommendations (Alyousef et al., 2022; Al-Mugheed and Bayraktar, 2018). Knowledge gaps have been associated with late detection of the initial symptoms of thrombosis and a lack of preventive measures. To bolster clinical care, it is vital to improve the knowledge of nurses by providing updated guidelines and continuous

professional development and formal educational programs (Lehan and Lehan, 2021; Barp et al., 2018).

The institutional support and the personal competency influence nursing practice. The primary elements of the DVT prevention are effective preventive measures: regular risk evaluation, early mobility, proper use of compression equipment, and patient education (Luo et al., 2021; Machin et al., 2021). Nevertheless, insufficient training, workload problems, resource constraints, and an inconsistent institutional policy are common barriers to best practice (Kiflie et al., 2022; Khodier et al., 2022). First-person observation and competency scale are sound methods used in assessing compliance with the DVT prevention guidelines in all clinical units.

Training and education have also been a major tool in enhancing knowledge and practice of nurses. It has been proven that educational programs, such as workshops and capacity-building initiatives, have a great impact on increasing the confidence and adherence of nurses to the guidelines on DVT prophylaxis (Elkattan and Elderiny, 2017; Huang et al., 2022). Hospitals with organized training interventions also show increased compliance with the preventive guidance and decreased the DVT rates (Wang et al., 2021; Alhomayani et al., 2022). The continuous training process will keep the nurses in the line with best practices and constantly evolving evidence.

The enhanced patient outcomes are closely linked with effective nursing interventions. The prevention of complications, decreased mortality rates, and general patient safety are supported through the early detection of risks, timely administration of anticoagulant therapy, and close attention to thromboembolism symptoms (McRae et al., 2021; Moumneh et al., 2020). The active role of nurses in the implementation of preventive measures is thus the key to decreasing the clinical and economic costs of DVT.

Although the global context on the DVT prevention is sound, the research on the knowledge and practice of nurses in tertiary care

hospitals in Lahore is scarce. Knowledge Leveraging the gaps in knowledge and practice is necessary to influence the policies of the hospital, staff competencies, and patient outcomes. Consequently, the proposed study will evaluate the knowledge and practices of nurses in the field of DVT prevention in tertiary care hospitals in Lahore and lead to evidence-based changes in nursing care (Yesuf et al., 2021; Yohannes et al., 2022).

Methodology

A descriptive cross-sectional study design was employed to assess the knowledge and practice of nurses regarding the prevention of deep vein thrombosis (DVT) in a tertiary care hospital in Lahore. The study population included staff nurses working in the hospital, excluding student nurses, nursing interns, newly appointed nurses, and head nurses. Convenience sampling was used to recruit 114 participants from a total population of 160 nurses. The sample size was calculated using Slovin's formula with a margin of error of 0.05. Inclusion criteria comprised all staff nurses actively working in clinical areas, while exclusion criteria excluded individuals not meeting these requirements. The study was conducted over a period of approximately nine months.

Data were collected using an adopted structured questionnaire divided into three sections: demographic characteristics, knowledge, and practice. The demographic section included questions on age, education level, and clinical experience. The knowledge questionnaire consisted of eight items addressing preventive measures for DVT, such as mechanical and pharmacological interventions, foot and leg exercises, leg elevation, post-surgical bed rest, administration of heparin or low-molecular-weight heparin (LMWH), use of elastic compression stockings, and intermittent pneumatic compression devices. Each correct answer was scored as 1, and incorrect or "don't know" answers were scored as 0. Knowledge levels were classified as good (above 66.6%), moderate (33.3%–66.6%), and poor (below 33.3%) (Al-Mugheed & Bayraktar, 2018). The practice questionnaire included items assessing clinical behaviors, such as

patient education, risk assessment, administration and monitoring of anticoagulants, promotion of leg exercises, and use of compression devices. Practice responses were scored as 1 for "done" and 0 for "not done," with the same percentage thresholds applied to categorize practice levels.

Data Collection

Data collection was conducted after obtaining permission from the hospital administration. Participants were approached individually, informed about the purpose of the study, and written consent was obtained. Confidentiality was maintained, and participants were informed that they could withdraw at any time without consequences. The questionnaires were self-administered, and responses were collected anonymously to ensure honesty and accuracy. The data collection process allowed for the identification of gaps in nurses' knowledge and practice regarding DVT prevention and highlighted areas needing further education or intervention.

Data Analysis

Collected data were analyzed using SPSS version 21. Descriptive statistics were used to summarize the demographic characteristics, knowledge, and practice levels of the participants. Frequencies, percentages, and bar charts were generated for qualitative variables, while means and standard deviations were calculated for quantitative variables. The analysis provided an overview of nurses' competence in preventing DVT and supported the identification of potential areas for professional development and improved clinical practices.

Findings and Interpretations

Demographic Characteristics of Nurses

The study included 114 nurses working in a tertiary care hospital in Lahore. The majority of participants were aged 26–30 years (41.2%), followed by 30–40 years (35.1%) and 20–25 years (23.7%). Most participants were female (64.0%) compared to male nurses (36.0%). Regarding educational qualifications, 57.9% of participants held a nursing diploma, while 42.1% had a BS

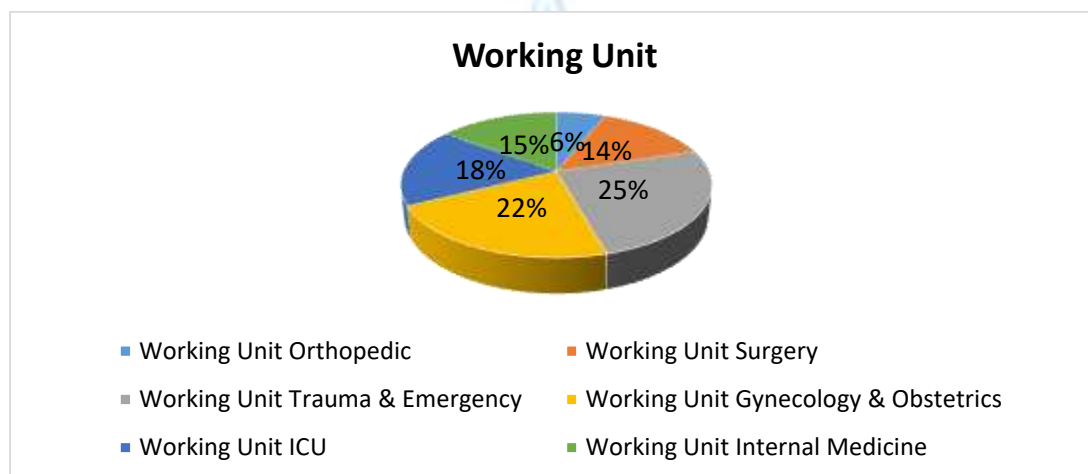
degree in nursing. The work experience of the majority of nurses ranged between 6–10 years (49.1%), followed by less than 5 years (40.4%), and more than 10 years (10.5%). Nurses were employed across various departments, including

trauma and emergency (25.4%), gynecology and obstetrics (21.9%), ICU (17.5%), internal medicine (14.9%), surgery (14.0%), and orthopedic unit (6.1%).

Table 1: Demographic Characteristics of Nurses (n=114)

Demographic Variable	Category	Frequency	Percent (%)
Age	20-25	27	23.7
	26-30	47	41.2
	30-40	40	35.1
Gender	Male	41	36.0
	Female	73	64.0
Educational Level	Diploma	66	57.9
	BS Degree	48	42.1
Experience	<5 years	46	40.4
	6-10 years	56	49.1
	>10 years	12	10.5
Working Unit	Orthopedic	7	6.1
	Surgery	16	14.0
	Trauma & Emergency	29	25.4
	Gynecology & Obstetrics	25	21.9
	ICU	20	17.5
	Internal Medicine	17	14.9

Figure 1: Working Unit of Participants



The data show that most participants were working in Trauma & Emergency (29), followed by Gynecology & Obstetrics (25) and ICU (20).

Fewer staff belonged to Internal Medicine (17), Surgery (16), and Orthopedic units (7).

Table 2: Knowledge of Nurses Regarding DVT Prevention (n=114)

Knowledge Item	True	False
Foot and leg exercises may prevent DVT	44 (38.6%)	70 (61.4%)
Elevating legs is necessary to prevent DVT/VTE	46 (40.4%)	68 (59.6%)
Early ambulation after surgery may prevent DVT	51 (44.7%)	63 (55.3%)
Bed rest is necessary after major surgery to prevent DVT	44 (38.6%)	70 (61.4%)
Heparin or LMWH may prevent DVT development	45 (39.5%)	69 (60.5%)
Fluid restriction is necessary to prevent DVT	52 (45.6%)	62 (54.4%)
Elastic compression stockings may prevent DVT development	75 (65.8%)	39 (34.2%)
Use of intermittent pneumatic compression devices may prevent DVT	37 (32.5%)	77 (67.5%)

Knowledge of Nurses Regarding DVT Prevention

Participants' knowledge regarding deep vein thrombosis (DVT) prevention varied across different measures. Most nurses (61.4%) did not recognize that foot and leg exercises could prevent DVT, while 38.6% correctly identified this preventive measure. Knowledge about elevating legs was low, with 59.6% of nurses unaware of its importance. Early ambulation after surgery was correctly identified by 44.7% of participants, while 55.3% did not recognize its

benefit. Bed rest as a preventive measure was incorrectly reported by 61.4% of nurses. Only 39.5% of participants knew that heparin or low-molecular-weight heparin (LMWH) could prevent DVT, and 45.6% were aware that fluid restriction was unnecessary. Knowledge was higher regarding elastic compression stockings, with 65.8% of nurses correctly identifying their role in DVT prevention. The use of intermittent pneumatic compression devices was recognized by only 32.5% of participants, indicating a gap in knowledge regarding mechanical prophylaxis.

Table 3: Practices of Nurses Regarding DVT Prevention (n=114)

Practice Item	Done	Not Done
Providing information to patients/relatives about DVT	44 (38.6%)	70 (61.4%)
Encouraging foot and leg exercises	44 (38.6%)	70 (61.4%)
Encouraging early ambulation after surgery	49 (43.0%)	65 (57.0%)
Assessing DVT risk regularly	54 (47.4%)	60 (52.6%)
Administering anticoagulants	67 (58.8%)	47 (41.2%)
Monitoring side effects of anticoagulants	38 (33.3%)	76 (66.7%)
Educating patients on anticoagulants	43 (37.7%)	71 (62.3%)
Educating patients to avoid injury	39 (34.2%)	75 (65.8%)

Practices of Nurses Regarding DVT Prevention

The findings revealed suboptimal practice in DVT prevention among nurses. The majority of nurses (61.4%) did not provide information to patients or relatives about DVT risks and preventive measures. Similarly, 61.4% did not encourage foot and leg exercises among patients. Early ambulation after surgery was promoted by only 43.0% of participants. Assessment of DVT

risk was conducted regularly by 47.4% of nurses, while 52.6% did not perform regular assessments. Preventive administration of anticoagulants was practiced by 58.8% of nurses; however, monitoring anticoagulant side effects was low, with only 33.3% compliance. Patient education regarding anticoagulants and injury prevention was performed by 37.7% and 34.2% of nurses, respectively.

Table 4: Practices of Nurses Regarding DVT Prevention (Continued) (n=114)

Practice Item	Done	Not Done
Encouraging patients to elevate legs	64 (56.1%)	50 (43.9%)
Educating patients on sufficient fluid intake	60 (52.6%)	54 (47.4%)
Use of graduated compression stockings	51 (44.7%)	63 (55.3%)
Teaching proper use of graduated compression stockings	36 (31.6%)	78 (68.4%)
Assessing patients for DVT/VTE signs and symptoms	50 (43.9%)	64 (56.1%)

Nurses showed moderate adherence to preventive practices, with leg elevation encouraged in just over half of cases. Patient education on fluid intake was performed by slightly more than half of the staff. The use of graduated compression stockings was relatively low, and proper teaching about their use was done by only one-third of nurses. Assessment for DVT/VTE signs was not consistently practiced, with more than half reporting it as not done.

Discussion

The results of the presented research display high knowledge gaps among nurses in terms of the key elements of the prevention of the deep vein thrombosis (DVT). A significant percentage of the respondents were not aware of the basic preventive steps like foot and leg exercises, elevation of legs and early ambulation. These findings are consistent with the research that indicated that nurse knowledge of non-pharmacological prevention of DVT, such as mobility exercises and ankle pump movements, are still scarce, yet they are also prophylactic measures (Li et al., 2022). Previous literature also points to the fact that the importance of

interventions related to mobility are frequently underestimated by nurses because of insufficient training and structural flaws in education (Lehan and Lehan, 2021). The fact that early ambulation is not highly identified in this study is similar to the results observed in orthopedic and post-operative hospitals where nurses have little knowledge about mobility-related prevention strategies (Liu and Peng, 2022).

The information on the pharmacological prophylaxis was also not ideal, as less than half of nurses recognized the preventive effect of heparin and low-molecular-weight heparin. Similar researches have demonstrated that nurses often do not feel confident about their ability to understand anticoagulant guidelines when there is overwhelming evidence to support pharmacological prophylaxis in patients at high-risk (Huang et al., 2022). Such results contrast with the results of the studies that are carried out in high-resource conditions in which the level of awareness increases based on specific training and competency-based assessments (Kiflie et al., 2022). Concurrently, the level of awareness of the elastic compression stockings was slightly higher, and it is consistent with the researchers across the world

reporting the higher level of familiarity with mechanical interventions compared to the pharmacological ones (Machin et al., 2021).

The same gaps were also noted in the nursing practice patterns. A huge percentage of nurses failed to educate patients in terms of DVT prevention such as foot exercise, leg elevation, and early mobilization. Previously conducted research proves that the area of patient education is one of the most poorly represented in the work of nurses because of workload pressures and insufficient institutional attention (Khodier et al., 2022). On the other hand, healthcare systems that have prepared patient education procedures are more compliant with the guidelines, and it demonstrates the significance of good organizational support (Luo et al., 2021). The prevalence of nurse assessment of patients at risk of developing DVT in the present study is less than a half, which is in line with the results where nurses rely on physicians to assess the risk of developing DVT instead of carrying out independent assessment (Elkattan and Elderiny, 2017).

Pharmacological practices were moderate with over half of nurses properly administering anticoagulants. This is in line with the studies that have shown that the administration of medication is more likely to be regular compared to non-pharmacological interventions (McRae et al., 2021). Nevertheless, the surveillance of such medication side effects as bleeding was not common, which is against studies highlighting the importance of monitoring in order to avoid adverse events (Moumneh et al., 2020). There was a lack of consistent application of mechanical prophylaxis practices with most nurses not wearing graduated compression stocking on a regular basis and only a minority educating patients on the correct application skills. The trends align with the studies that show poor training, poor sizing, and poor availing of devices as barriers (Machin et al., 2021).

Comprehensively, this research showed that there is a lack of knowledge as well as practice gaps in the prevention of DVT among nurses. These findings are consistent with a substantial body of literature reporting that mentions the presence of

such shortcomings in a variety of clinical settings, particularly in resource-constrained ones (Yesuf et al., 2021). On the other hand, they are in contrast with the reports of the healthcare systems that have effective training programs and preventative-care protocols. The identified gaps point to the necessity of the standardized guidelines, comprehensive educational intervention, and institutional assistance to reinforce the DVT prevention and enhance patient outcomes.

Conclusion

This study demonstrated notable gaps in both knowledge and practices of nurses regarding deep vein thrombosis (DVT) prevention. Many nurses lacked awareness of essential non-pharmacological preventive measures such as foot and leg exercises, leg elevation, and early ambulation. Pharmacological knowledge, particularly regarding heparin and low-molecular-weight heparin, was also limited among participants. Although nurses showed moderate adherence in administering anticoagulants, their monitoring of side effects and engagement in patient education remained insufficient. Mechanical prophylaxis practices, including the use and teaching of graduated compression stockings, were inconsistently implemented. Overall, the study findings highlight a combination of inadequate knowledge, inconsistent practice, and limited patient education efforts, suggesting the need for strengthened training programs, institutional support, and standardized guidelines to improve DVT prevention efforts. Addressing these gaps is essential to enhance patient safety, reduce preventable complications, and promote evidence-based nursing care.

Recommendations

1. **Implement Regular Training Programs:** Hospitals should provide structured and continuous in-service training focused on DVT prevention, including both pharmacological and non-pharmacological strategies.
2. **Introduce Standardized Protocols:** Institutions should develop and adopt standardized DVT prevention guidelines and

checklists to ensure consistent assessment and care practices among nurses.

3. **Strengthen Patient Education:** Nurses should be encouraged and supported to incorporate patient and family education on DVT risks, prevention strategies, and early warning signs into routine care.

4. **Promote Use of Risk Assessment Tools:** Routine use of standardized DVT risk assessment tools should be mandated to enhance early identification and management of at-risk patients.

5. **Enhance Monitoring of Anticoagulants:** Nurses should receive additional training on safe anticoagulant administration and monitoring for adverse effects to improve medication safety.

6. **Improve Access to Mechanical Prophylaxis:** Hospitals should ensure sufficient availability of compression stockings and pneumatic devices and provide training on their correct use and patient teaching.

7. **Establish Supervision and Audit Systems:** Regular audits, supportive supervision, and feedback mechanisms should be implemented to monitor practice adherence and promote continuous improvement.

8. **Integrate DVT Prevention into Curricula:** Nursing education programs should strengthen DVT prevention content to better prepare graduates for evidence-based clinical practice.

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