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EFFECTIVENESS OF EDUCATIONAL SESSION ON NURSES' KNOWLEDGE REGARDING DEEP VENOUS THROMBOSIS PREVENTION IN A TERTIARY CARE HOSPITAL

Original Research

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ABSTRACT

Background: Deep vein thrombosis (DVT) is a serious and preventable condition that affects millions globally each year and poses significant clinical risks, including pulmonary embolism (PE), which can be life-threatening. Nurses are essential frontline providers in DVT prevention, yet evidence suggests considerable gaps in their knowledge and practice. Structured educational interventions offer a promising approach to bridging these gaps and enhancing patient outcomes in hospital settings.

Objective: To evaluate the effectiveness of an educational session on improving nurses' knowledge regarding DVT prevention in a tertiary care hospital.

Methods: A quantitative, quasi-experimental pretest-posttest study was conducted over a period of four months in a government tertiary care hospital. Using a convenience sampling technique, 140 registered nurses working in medical wards, surgical wards, ICUs, and HDUs were recruited. Inclusion criteria included registered nurses of either gender who consented to participate. A validated self-administered questionnaire consisting of demographic data and 33 knowledge statements was used to assess participants' understanding before and after the educational intervention. The session was delivered using a PowerPoint presentation, and data were analyzed using descriptive and inferential statistics.

Results: Among the participants, 92.85% were over 25 years of age, and 71.42% had more than 10 years of professional experience. The majority (82.85%) held BSN degrees, while only 15.1% had diplomas. Pre-intervention, less than 60% of participants demonstrated adequate knowledge of DVT prevention. Following the session, over 80% of nurses achieved good knowledge scores. All 33 knowledge items showed statistically significant improvement with p-values < 0.001, confirming the intervention's effectiveness.

Conclusion: The educational intervention significantly enhanced nurses' knowledge regarding DVT prevention. The findings underscore the need for regular training and the development of institutional policies to support DVT prophylaxis compliance and reduce patient risk.

Keywords: Deep Vein Thrombosis, Education, Knowledge, Nursing Staff, Patient Safety, Prevention and Control, Tertiary Care Centers.

INTRODUCTION

Deep vein thrombosis (DVT) represents a critical global health challenge, affecting millions annually and contributing significantly to patient morbidity and mortality (1). Characterized by the formation of blood clots in the deep veins—most commonly in the lower extremities—DVT poses a serious risk of pulmonary embolism (PE), a potentially fatal complication that can occur when a clot dislodges and travels to the lungs (2). The burden of DVT is particularly concerning in hospitalized patients, where immobility and underlying comorbidities increase susceptibility. Despite the availability of effective preventive measures, the incidence remains high, with studies emphasizing the importance of early identification and prevention strategies in high-risk populations (3). Among healthcare professionals, nurses play an essential frontline role in mitigating the risk of DVT. Their responsibilities span from assessing patients' risk profiles to implementing appropriate prophylactic interventions and educating patients and families about prevention strategies (4). However, discrepancies in knowledge and practice among nurses have been documented, with factors such as clinical experience and educational background contributing to these variations. Research indicates that many nurses may lack the necessary knowledge or confidence to apply evidence-based DVT prevention practices effectively (5). The Centers for Disease Control and Prevention (CDC) reports that venous thromboembolism (VTE) is the fifth leading cause of unplanned hospital readmissions following surgery and that nearly 70% of hospital-acquired VTE cases are preventable through appropriate prophylaxis (6).

Recent studies further underscore the issue. In Egypt's Aswan Oncology Center, a study assessing nurses' knowledge and practices regarding DVT prevention in cancer surgery patients revealed substantial deficiencies, raising concerns about the adequacy of nurse training in this domain (7). Similarly, in Ethiopian teaching hospitals, while 93% of patients had at least two risk factors for VTE, only 40% received thromboprophylaxis, and even fewer benefitted from successful prevention outcomes (8). As DVT ranks as the third most prevalent cardiovascular condition after myocardial infarction and stroke, its management carries significant financial implications and adds to the healthcare system's burden (9). Given the preventable nature of many DVT cases and the central role nurses play in clinical care delivery, this study aims to assess the level of knowledge and practices of nurses regarding DVT prevention. Understanding these dimensions is critical to inform targeted educational interventions and ultimately reduce the incidence of DVT in hospitalized patients.

METHODS

A quantitative, cross-sectional research design was employed to evaluate the knowledge and practices of nurses regarding the prevention of deep vein thrombosis (DVT). This design allowed for the collection of data at a single point in time, offering a rapid and cost-effective approach to capture a snapshot of the current situation within a tertiary care hospital setting. The study was conducted using a structured, self-administered online questionnaire adapted from a validated source (10). The reliability of the questionnaire was confirmed with Cronbach's alpha values ranging from 0.890 to 0.960, and the overall reliability score was 0.934, indicating a high level of internal consistency. Data collection was carried out between 10 December 2024 and 13 February 2025. A pretest was administered in December, followed by an educational intervention delivered via a PowerPoint presentation covering DVT, its associated risk factors, and preventive strategies. Subsequently, a post-test was conducted in January to assess the impact of the intervention. The study population comprised registered nurses working in various clinical departments, including medical and surgical wards, emergency, ICU, and CCU units. Participants were selected using convenience sampling. The inclusion criteria were registered nurses of either gender who were currently employed in the aforementioned departments and willing to participate. Nursing students and interns were excluded to ensure the responses reflected professional nursing experience.

The required sample size was calculated using Slovin's formula, resulting in the recruitment of 140 registered nurses. The research instrument consisted of two primary sections: the first part captured socio-demographic and professional data, such as gender, educational qualifications, years of clinical experience, and departmental affiliation. It also included yes/no questions assessing whether participants had prior knowledge of DVT or access to a protocol/guideline on DVT in their clinical settings. The second section evaluated participants' knowledge regarding DVT prevention through 33 statements addressing general knowledge, prophylactic measures, and risk factors. Respondents were asked to answer using true, false, or don't know options. Ethical approval for the study was obtained from the Institutional Review Board (IRB) of the respective tertiary care hospital. Participation was entirely voluntary, and informed

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consent was obtained electronically through the online questionnaire's cover page, which clearly outlined the purpose of the study, confidentiality assurances, and potential benefits and risks associated with participation. To maintain anonymity and privacy, no personally identifiable information was collected. The survey link was disseminated via the official WhatsApp group of the hospital's nursing staff. Data analysis commenced once the complete sample of 140 responses had been received.

RESULTS

A total of 140 registered nurses participated in the study. The majority were female (92.8%), while only 7.1% were male. In terms of academic qualifications, 82.85% of the participants held a Bachelor of Science in Nursing (BSN), 15.1% held a diploma, and 2.14% had a Master of Science in Nursing (MSN). All participants were employed in a government tertiary care hospital. Among them, 28.57% worked in the Emergency Assessment Room, 35.71% in the Intensive Care Unit (ICU), and 35.71% in the High Dependency Unit (HDU). Regarding professional development, 42.85% of the respondents had attended training sessions on DVT prevention, whereas 57.14% had not. Furthermore, only 28.57% reported reading professional literature on DVT prevention, while 71.42% had not. When asked about the existence of a protocol or guideline for DVT prevention within the hospital, responses were equally split, with 50% answering "yes" and 50% "no." Most participants (92.85%) were over the age of 25, and 71.42% had more than 10 years of professional experience. Participants' knowledge of DVT prevention was assessed before and after an educational intervention. In the pretest, the majority of nurses demonstrated poor knowledge (<60%) regarding DVT prevention and treatment. However, post-test results showed a significant improvement, with most responses scoring above 80%, indicating a shift from poor to good knowledge levels. For instance, understanding of the etiology of DVT (venous stasis, vessel injury, and hypercoagulability) increased from 29% in the pretest to 89% in the post-test. Awareness that VTE is a fatal complication of DVT improved from 42% to 86%, while knowledge of early ambulation as a preventive measure rose from 41% to 87%.

Further improvements were observed across a wide range of knowledge statements. Recognition of risk factors such as major surgery (45% to 90%), smoking (46% to 84%), and cancer or cancer treatment (39% to 82%) also increased notably. Other areas with substantial gains included the role of anticoagulants like LMWH (31% to 89%), the utility of elastic compression stockings (46% to 82%), and mechanical prophylaxis devices (47% to 84%). Each of the 33 knowledge items showed statistically significant improvement, with all p-values <0.001, indicating the effectiveness of the educational session. Overall, the results demonstrated a clear enhancement in nurses' knowledge following the intervention, supporting the acceptance of the alternate hypothesis and the rejection of the null hypothesis. The findings also suggest that demographic and professional characteristics, including experience, training exposure, and academic background, played a substantial role in influencing baseline knowledge levels.

Table 1: Distribution of Demographic and Professional Characteristics of Study Participants.

Variables	Categories	N	%
Gender	Male	10	7.1
	Female	130	92.8
Current academic qualifications	Diploma	21	15.1
	Bachelor's	116	82.85
	Master's	3	2.14
	Doctorate	0	0
Current hospital you work at?	Private	0	0
	Govt.	140	100
Unit	Emergency	40	28.57
	ICU	50	35.71
	HDU	50	35.71
Have you ever attended any training about DVT prevention?	Yes	60	42.85
	No	80	57.14
Did you ever read any professional literature on DVT prevention?	Yes	40	28.57
	No	100	71.42
Is there any protocol/guideline in the hospital for prevention of DVT?	Yes	70	50
	No	70	50
Age	a) <25	10	7.14

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Variables	Categories	N	%
	b) >25	130	92.85
Experience	a) <10 years	40	28.57
	b) >10 years	100	71.42

Table 2: Nurses Knowledge regarding DVT Prevention

Sr. #	Items	Pretest %	Posttest %	P-Value
1	DVT occurs as a result of stasis of blood (venous stasis); vessel wall injury; and altered blood coagulation.	29	89	0.001
2	Venous thromboembolism (VTE) is a fatal complication of DVT.	42	86	0.001
3	DVT occurs most frequently in the veins of the lower extremities.	47	88	0.001
4	There is no relationship between cancer or cancer treatment and DVT/VTE.	39	82	0.001
5	There is no relationship between respiratory diseases and DVT.	62	79	0.001
6	Deep vein thrombosis also occurs frequently in the upper limbs.	36	82	0.001
7	Foot and leg exercises may prevent DVT.	40	84	0.001
8	Elevating legs is necessary to prevent DVT/VTE.	39	80	0.001
9	Early ambulation after surgery may prevent DVT development.	41	87	0.001
10	Bed rest is necessary after major surgery to prevent DVT.	45	83	0.001
11	Heparin or low molecular weight heparin (LMWH) may prevent DVT development.	31	89	0.001
12	Fluid restriction is necessary to prevent DVT.	45	87	0.001
13	Elastic compression stockings may prevent DVT development.	46	82	0.001
14	The use of intermittent pneumatic compression devices may prevent DVT development.	47	84	0.001
15	Prolonged immobilization predisposes to DVT in hospitalized patients.	34	85	0.001
16	VTE is a major cause of sudden death in hospitalized patients.	25	79	0.001
17	Surgical patients are more prone than medical patients to DVT/VTE.	48	78	0.001
18	Indwelling intravenous devices such as central venous catheters may predispose to DVT.	33	69	0.001
19	Paralysis, paresis, or recent plaster cast on lower extremities may predispose to DVT.	38	83	0.001
20	Obesity may predispose to DVT.	49	86	0.001
21	Low body mass index may predispose to DVT.	49	84	0.001
22	Advancing age may predispose to DVT.	28	75	0.001
23	Previous DVT/VTE history may predispose to DVT.	52	85	0.001
24	Major surgery may predispose to DVT.	45	90	0.001
25	Varicose veins may predispose to DVT.	37	86	0.001
26	Exercise may predispose to DVT.	35	78	0.001
27	Trauma may predispose to DVT.	28	82	0.001
28	Smoking may predispose to DVT.	46	84	0.001
29	Alcohol may predispose to DVT.	22	84	0.001
30	Cardiac diseases may predispose to DVT.	37	89	0.001
31	Infections or inflammations may predispose to DVT.	45	85	0.001
32	Pregnancy or post-partum may predispose to DVT.	49	89	0.001
33	Oral contraceptives or hormone replacement therapy may predispose to DVT.	31	80	0.001

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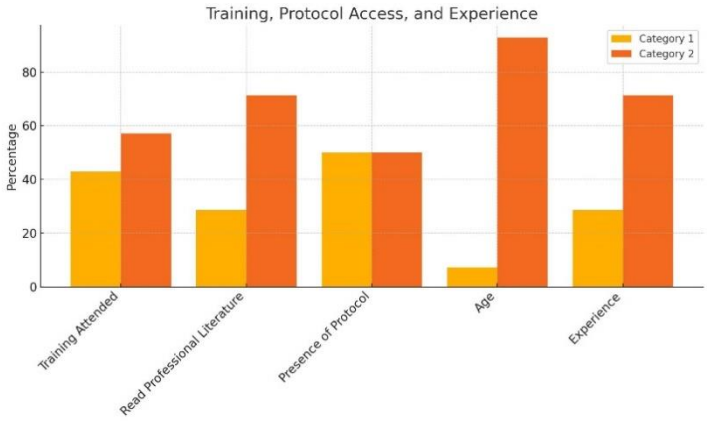

Figure 1 Training, Protocol Access, and Experience

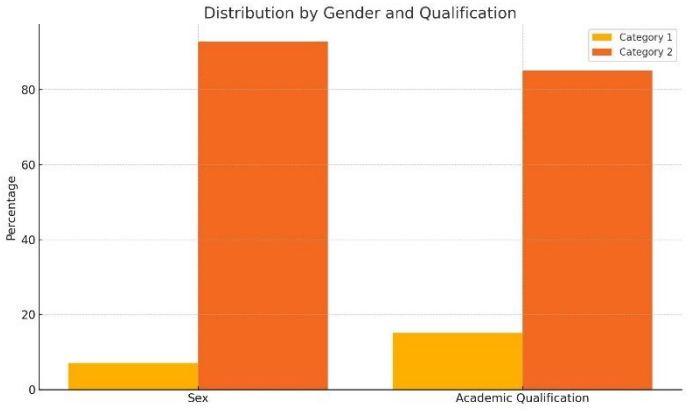

Figure 2 Distribution by Gender and Qualification

DISCUSSION

The findings of the present study revealed that nurses demonstrated poor baseline knowledge regarding the prevention of deep vein thrombosis (DVT), with pretest scores indicating less than 60% adequacy. This level of knowledge is notably lower compared to studies conducted in Kochi, India and São Paulo, where 58% and 53.3% of participants, respectively, demonstrated good knowledge regarding DVT prevention (11). This variation may be attributed to differences in socioeconomic context, healthcare system development, and access to continuing education, as Pakistan remains a developing country where structured in-service training and resources may be more limited. When compared to studies from China, where knowledge levels among nurses reached 72.8% and 68.9%, the results of the current study were also lower (12). A possible explanation lies in methodological differences, particularly regarding the study population and data collection tools. The Chinese studies were confined to orthopedic nursing staff and used tools with only nine knowledge-related questions, whereas the current study involved nurses from diverse departments and utilized a more extensive questionnaire comprising 33 items. The increased complexity and breadth of the assessment tool in this study may have contributed to the lower performance in the pretest phase (13,14).

Conversely, the findings of this study reflected higher knowledge levels compared to similar research conducted in Egypt, where knowledge scores were 27.5% and 28.9%, respectively, in two separate hospitals (15,16). Contributing factors may include sample size variations, as the Egyptian studies included smaller cohorts and limited their assessments to thromboembolism prophylaxis rather than broader DVT-related knowledge. The use of different measurement tools and inclusion criteria could also explain discrepancies in knowledge levels. Significant associations were observed between nurses' demographic and professional variables and their knowledge scores. Participants with higher academic qualifications, particularly those holding BSN and MSN degrees, demonstrated greater knowledge compared to diploma holders (17,18). Nurses working in departments such as surgical wards, where DVT prophylaxis is frequently practiced, exhibited higher awareness, indicating that clinical exposure enhances practical knowledge. Similarly, nurses with over ten years of experience showed better understanding of DVT prevention than those with less experience, suggesting that professional maturity contributes positively to knowledge retention.

Departmental variation in knowledge levels was also evident. Nurses working in medical wards were found to be over three times more likely to demonstrate good knowledge compared to those in obstetric and gynecologic units. This is consistent with findings reported in South Korean studies (19), which highlighted the higher exposure to DVT-related cases in medical units. However, contrasting evidence from a university hospital in China indicated that ICU nurses achieved the highest scores in DVT knowledge assessments (20), possibly due to the critical nature of patients and rigorous monitoring protocols in ICUs. These variations suggest that clinical environment significantly influences knowledge trends and point to the need for department-specific educational reinforcement. The current study adds valuable insight into the current knowledge gaps among nurses in a tertiary care setting and demonstrates the efficacy of targeted educational interventions in bridging these gaps. One of the strengths of this research is its relatively large sample size, inclusion of

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diverse departments, and use of a validated, comprehensive assessment tool, which enabled a robust evaluation of baseline knowledge and post-intervention outcomes.

Nevertheless, the study had limitations. The use of convenience sampling may have introduced selection bias, and the single-institution setting restricts generalizability. Furthermore, while the pretest and post-test effectively measured knowledge gains, the study did not capture changes in actual clinical practices or long-term knowledge retention, which are essential for sustainable improvements. Additionally, the absence of data on nurses' practice behaviors, despite being a stated objective, represents a missed opportunity for a more holistic evaluation. Future research should adopt longitudinal designs to assess the persistence of knowledge over time and incorporate direct observations or audits of clinical practices. Expanding the study to multiple institutions and including a more diverse nursing population would also enhance generalizability. Moreover, exploring barriers to knowledge application in practice—such as workload, availability of resources, and institutional protocols—would provide a more comprehensive understanding of the gaps between knowledge and behavior. In conclusion, this study underscores the critical need for continuous professional education and institutional support to enhance nurses' competence in DVT prevention. Findings advocate for the integration of structured, evidence-based training programs into routine hospital practice to ensure improved patient safety and reduced incidence of DVT-related complications.

CONCLUSION

The study concluded that the knowledge of staff nurses regarding the prevention and management of deep vein thrombosis significantly improved following the educational intervention. The findings highlight the effectiveness of structured training in enhancing nurses' understanding of DVT, reinforcing the importance of continuous professional development in clinical settings. Demographic factors such as academic qualifications, years of experience, and clinical departments played a key role in influencing baseline knowledge levels. These outcomes emphasize the need for targeted educational strategies and institutional support to ensure that nurses are well-equipped to implement evidence-based preventive measures, ultimately contributing to improved patient safety and care quality.

AUTHOR CONTRIBUTION

Author	Contribution
Shazia Karim*	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Asia Nazik	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Maria Gull	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Anwar Khatoon	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Rabia Karim	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Irfanullah	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published

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