LEVEL OF NURSE PRACTICE AND PERCEIVED BARRIERS TOWARDS DEEP VEIN THROMBOSIS PREVENTION IN SELECTED ETHIOPIA ARMED FORCE HOSPITALS IN 2023

MSc THESIS

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HAWASSA UNIVERSITY, ETHIOPIA

NOVEMBER, 2023

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IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

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CERTEFICATE OF APPROVAL SHEET

I am nursing student, who is studying adult health nursing, and I confirm that I will present and summit my original thesis titled ‘’Nurses practice and perceived barriers to Deep vein thrombosis prevention in selected Ethiopian Armed Force Hospitals in 2023.

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ADVISORS' APPROVAL SHEET

This is to certify that the thesis entitled "Nurses practice and perceived barriers to deep vein thrombosis prevention in selected Ethiopian Armed Force Hospitals in 2023.'' Submitted in partial fulfilment of the requirements for the degree of Masters with specialization in adult health, the Graduate Program of the School of Nursing, and has been carried out by Andualem Teshome, under our supervision, Id. No 0002/14. Therefore, we recommend that the student has fulfil the requirements and, hence, can submit the thesis to the department.

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EXAMINERS' APPROVAL SHEET

We, the undersigned, members of the Board of Examiners of the final open defense by Andualem Teshome have read and evaluated his thesis Nurses practice and perceived barriers to deep vein thrombosis prevention in selected Ethiopian Armed Force Hospitals in 2023.'' and examined the candidate. This is, therefore, to certify the thesis has been accepted in partial fulfilment of the requirements for the degree.

Name of internal examiner

_____ Signature_____ Date

Name of external examiner

_____ Signature _____ Date _____

SGS approval

_____ Signature_____ Date _____

Final approval and acceptance of the thesis is contingent on the submission of the final copy of the thesis to the School of Graduate Studies (SGS) via the School Graduate Committee (SGC) of the candidate's department.

Stamp of SGS

Date: _____

DECLARATION

I declare and affirm that this thesis is my own work by signing below. In the preparation, data collection, data analysis, and conclusion of this thesis, I adhered to all ethical standards of scholarship. All scholarly material incorporated in the thesis has been acknowledged through citation. In the production of this thesis, every attempt has been made to avoid plagiarism. This thesis is submitted in partial fulfillment of a graduate degree requirement at Hawassa University College of Medicine and Health Science School of Nursing, Department of Adult Health. I hereby certify that this thesis has not been submitted to any other institution for the award of any academic degree, diploma, or certificate.

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ABERIVATION

DVT Deep vein thrombosis

PE Pulmonary embolism

VTE Venous thromboembolism

CDC Center of Disease Control

AHRQ Agency of Health care Research Quality

ICU Intensive Care Unit

GCS Graduated Compression Stocking

IPCD Intermittent Pneumatic Compression device

UFH Unfractionated Heparin

LMWH Low Molecular Weight Heparin

AOR Adjusted Odd Ratio

GCS Graduated Compression Stocking

IPCD Intermittent Pneumatic Compression Device

ABSTRACT

Background: Deep vein thrombosis is a preventable and treatable cause of death among hospitalized patients. Nurse deep vein thrombosis prevention practice plays a major role in improving prevention care. But there have been few studies on nurse's deep vein thrombosis prevention practice in Ethiopia that have revealed a low level.

Objective: To assess level of Nurses practice and perceived barriers to deep vein thrombosis prevention in selected Ethiopian armed forces hospitals.

Methods and Materials: An institutional-based mixed study design conducted from March 1 to 2 May 2023. For the quantitative study a simple random sampling technique was used to select 245 participants. Observational checklist adapted from National Institution for Health and Care Excellence guideline and different literature. Data was entered in Epi-Data version 3.1 software and exported to SPSS version 26.0. For analyses, bivariate and multivariate methods were used. For the qualitative study, eight participants who had work experience of at least six months in patient care were selected by using purposive sampling and semi-structured interview questions conducted in Amharic. Thematic analysis was applied using ATLAS.ti version 7. Finally triangulated with quantitative data.

Results: A total of 245 participant were involved in this study, with a 100% respondent rate. The result showed that 40.8%, with a 95% CI (34.6, 47.3) had good practice about deep vein thrombosis prevention. Age between 26 and 30 years [AOR=0.31; 95% CI (0.10, 0.99)], work experience ≤ 5 years [AOR=0.16; 95% CI (0.05, 0.51)], not having training [AOR=0.09; 95% CI (0.03, 0.33)], nurses who had poor knowledge [AOR= 0.30; 95% CI (0.13, 0.70)], and nurses who had a negative attitude [AOR=0.09; 95% CI (0.03, 0.28)] were significantly associated with deep vein thrombosis prevention practice. In the qualitative study, lack of training, lack of knowledge, work load, absence of supervision, and patient refusal are some barriers

Conclusion and Recommendation: This study reveals that more than half of the participants had poor practice in deep vein thrombosis prevention. Work experience, lack of training, poor knowledge, and a negative attitude are factors that affect prevention practice. Absence of guidelines, work load, absence of supervision, and patient refusal are perceived barriers. So, we recommend that to improve the quality of care, it requires a continuous education program and routine supervision.

Keywords: Deep vein thrombosis, Prevention practice, Factors, Barriers.

1. INTRODUCTION

1.1. Background

Deep vein thrombosis (DVT) is a blood clot that occurs in one of the body's deep veins, most commonly the deep vein of the leg, although it can form in the deep vein of the arms, mesenteric veins, and cerebral veins. It can result in serious problems like pulmonary embolism (Badireddy and Mudipalli, 2022).

Over 4 million patients suffer from the condition worldwide each year. According to the Center for Disease Control (CDC), the exact number of people affected by DVT ranges from 300,000 to 600,000 (1-10 per 1000) (Laffont et al., 2016).

In postoperative patients, deep vein thrombosis (DVT) prevalence ranges from 2.4% to 9.6% in different African nations, whereas the study conducted in Zambia shows that the prevalence of DVT of the lower limbs was 11.1% and proximal upper limb DVT was 9.1% (Mwandama et al., 2016).

Prevention of DVT is important to avoid negative consequence and requires both identifying patients at risk and choosing an appropriate method of prophylaxis. The National Institute for health and Care Excellence (NICE-UK) recommends assessing a patients' risk of DVT within 24hrs of hospital admission and whenever the clinical situation changes. Nurses can play a major role in DVT/VTE prevention if they are well educated and empowered to improve patient's outcome. Early ambulation, range of motion, assessment of DVT risks, and appropriate nursing intervention leads to reduce DVT in hospitalized patients and improve DVT prophylaxis(Lim and Davies, 2014).

There are different kinds of risk factors that can contribute to the occurrence of DVT, which are categorized as: Acquired risk factors include age over 60 years, pregnancy, puerperium, surgery, immobilization, cancer, chemotherapy, hormone therapy, previous DVT, heavy smoking, obesity, air travel, the lupus anticoagulant, and trauma (Wendelboe and Raskob, 2016).

Genetic risk factors include gender, ethnicity, blood group, and many genetic abnormalities affecting the control of hemostasis that lead to excess thrombin generation or decreased fibrinolysis. Acquired ICU risk factors include sepsis, respiratory and heart failure, sedation,

mechanical ventilation, central venous catheterization, and end-stage renal failure (Minet et al., 2015). A recent report from Addis Ababa also shows that DVT is associated with malignancy, prolonged immobilization, pregnancy-related problems, and major trauma (Haile et al., 2013).

The pathophysiology of DVT involves three interrelated factors, commonly referred to as "Virchow's triad" and described by Rudolf Virchow in 1856, consisting of damage to the vessel wall (endothelial damage), slowing down of the blood flow (stasis), and an increase in blood coagulability (Islam, 2017). Venous stasis is the most consequential of the three factors, but stasis alone appears to be insufficient to cause thrombus formation (Kumari et al., 2014). However, the concurrent presence of venous stasis and vascular injury, or hypercoagulability, greatly increases the risk for clot formation (Stone et al., 2017).

DVT prevention practice is an important part of nursing care to improve patients' safety and positive outcomes by providing appropriate care. Nurses play a key role in risk assessment, prevention care, and educating the patient or carer about risk and prevention. But different studies show that there is poor prevention practice and a number of barriers that affect DVT prevention practice: lack of knowledge and skill, lack of training, lack of standard tools, time constraints, inadequate equipment/devices, a small number of staff, and a very high work load are some of the barriers (McFarland et al., 2014, Wang et al., 2020).

1.2. Statement of the problem

Globally, deep vein thrombosis is a major health problem with a high morbidity and mortality rate worldwide (Gader et al., 2009), and it is also a silent killer that kills more people than AIDS, breast cancer, prostate cancer, and car accidents combined (Elkattan and Elderiny, 2017).

DVT is the third most preventable cardiovascular illness in the United States. According to the Agency for Health Care Research and Quality (AHRQ) (U.S. 2015), 60,000--100,000 Americans die from DVT annually, and 10--30% of those who have DVT die within a month of their diagnosis. Additionally, 33% will experience a recurrence within ten years (Di Nisio et al., 2016).

The overall confirmed DVT incidence in India was found to be 17.46 per 100,000 patients, with non-surgical, non-traumatic patients accounting for 64% of cases (Kumari et al., 2014). Another study conducted in Saudi Arabia showed a high incidence of DVT (15.7%) and that females were affected more than males (Elkhadir et al., 2018). In Africa, the mortality rate for individuals with pulmonary embolism (PE) ranges from 40% to 69.5% (Danwang et al., 2017).

Nurses are responsible for the prevention and management of DVT as well as the provision of the best quality care to the patient. Nurses are facing critically ill patients in the ward who are vulnerable to DVT risk. To reduce the occurrence, nurses must have good DVT prevention practice, but it is still one of the patient problems related to nurses' poor DVT prevention practice (Yesuf et al., 2021).

DVT prevention practice is more crucial and cost-effective than DVT therapy because, if a DVT occurs, it must be treated with great price. While increasing the burden of medical expenses, the outcomes also have a substantial impact on the psychosocial and physical health, well-being, and daily functioning of patients and threaten the lives of patients following VTE (Klok et al., 2014). The prevention of DVT is important because the diagnosis is challenging and the therapy is not always successful. The most practical and successful way to lower morbidity and mortality is through DVT prevention (Ho, 2010). But due to poor DVT prevention practice, it increases the amount of time spent in the hospital, has an influence on patients' quality of life, and has significant financial costs for society (Grosse et al., 2016). The yearly economic burden in the

USA is estimated to cost between $5 and $8 billion annually, or on average $20,000 per treated patient per year.

The most serious complication of DVT is pulmonary embolism, which is potentially life-threatening. Another consequence that progresses to long-term complications is the post-thrombotic syndrome, which affects up to one-third of people with DVT and results in chronic pain, chronic inflammation, cellulitis, and ulceration of the affected limb and, in severe cases, may lead to amputation (Lee et al., 2014, Shaaban, 2021).

It is a fact that nurses are the largest professional group involved in direct clinical care within a health care system, influencing and implementing changes to health care practices. They play a key role in the detection, treatment, and prevention of DVT. Including the DVT risk assessment as a routine practice is critical to preventing hospital-acquired DVT (Collins et al., 2010).

Nurses perform risk assessment, apply timely preventive methods, and educate patients regarding the importance of physical therapy, early ambulation, leg elevation, active and passive range of motion, and psychological support for patients with DVT. So skilled nursing intervention is lifesaving and also has positive outcomes in mechanical or physical prophylaxis (Khodier et al., 2022b).

On the other hand, studies have shown that having a poor level of DVT prevention practice could increase hospitalization and ultimately lead to poor health care outcomes (Al-Mugheed and Bayraktar, 2018, Antony et al., 2016).There are also a number of barriers that affect DVT prevention practice (Lee et al., 2014, Wang et al., 2020).

In prospective cohort research from Ethiopia that was carried out at Jimma University (Mulatu et al., 2020), the incidence density of DVT was almost 2.99 per day, but there have been few studies on nurses' DVT prevention practices in Ethiopia that have revealed a low level of DVT prevention practice (Yesuf et al., 2021, Yohannes et al., 2022). But still, they couldn't find perceived barriers that affect the use of DVT prevention strategies.

The study conducted on US military combat casualties shows that DVT and PE occur six times more frequently in combat casualties than in civilian trauma populations. The prevalence of DVT in amputee patients was 7.5%, with combined pelvic fractures, lower extremity fractures, and closed head injuries occurring at a rate of 5.4%. The study recommends that providers have a

more intense awareness of the need for prevention, detection, and treatment of DVT and PE in this population (Hutchison et al., 2014).

The majority of soldiers who are admitted to Ethiopian armed forces hospitals suffer from injuries that expose them to fracture, amputation, head injury, surgery, and immobilization which are risk factors for DVT. Nurses must perform the DVT prevention practice on a regular basis to avoid its occurrence. On the other hand, there was no study conducted in an Ethiopian armed force hospitals concerning DVT prevention practices.

So, this study aimed to assess the level of DVT prevention practice and explore perceived barriers that affect DVT prevention practice that are not addressed quantitatively.

1.3. Significant of the study

This study examines nurses' level of practice and perceived barriers to DVT prevention using quantitative and qualitative data. It aims to improve care quality, patient quality of life, and identify practice gaps. It also helps nurses' managers ensure strict guidelines are followed, identify educational gaps, and revise the nursing curriculum. In nursing administration, it helps identify practice gaps, schedule training, and establish baselines for researchers.

2. LITERATURE REVIEW

2.1. Practice of DVT prevention among nurses

In an exploratory descriptive study in California, 221 nurses were confident in their ability to inform patients and their families about the signs and symptoms of DVT/VTE, the use of mechanical devices for prevention (mean: 4.21 0.89), and the use of oral anticoagulants for treatment (mean: 3.88 1.0). The nurses that took part (mean, 3.5/1.0) were the least confident in their ability to conduct an exhaustive DVT/VTE risk assessment. While 84% (185/220) of participating nurses were confident in their ability to use mechanical devices for DVT/ VTE prevention most of the time and 70% (154/220) indicated that they could educate patients on oral anticoagulant medications most of the time, only 57% (126/221) indicated the same for conducting a thorough DVT/VTE risk assessment (Lee et al., 2014).

A descriptive study conducted in Cyprus on 165 nurses showed unsatisfactory practice in the prevention of deep vein thrombosis. Use graduated compression stockings as directed. (79.5%), "teaching patients to avoid injury" (76.8%), "administering anticoagulants as a preventive measure in clinic" (75.3%), "monitoring the side effects of the anticoagulants" (71.8%), "teaching patients and/or relatives about the risks of and prevention of DVT" (68.9%), "teaching patients on anticoagulants" (64.9%), "teaching patients on sufficient fluid intake" (64.7%), and "encouraging" patients to perform foot and leg exercises on their own, or to ask family members to assist if they are unable to do so. The items on the questionnaire that rated lower on never choosing to carry out the practices about DVT prevention were "assessing the patients periodically for signs and symptoms of DVT/VTE" (63.3%), "teaching the patients about the use of graded compression stockings" (63.1%), whereas regularly assessing the DVT risks of patients' (47.1%) (Al-Mugheed and Bayraktar, 2018).

Another descriptive study conducted in Kochi (India) on 100 nurses using the convenience sampling technique and a self-reported practice checklist found that the majority had average practice (14%) (Antony et al., 2016). On the other hand, the same study with 610 participants conducted in China had good practice (81.6) (Zhou et al., 2023). In addition, in the study conducted in Korea on 452 participants using self-administered questionnaires, the level of DVT prevention practice was 60% (Oh et al., 2017).

In a cross-sectional study conducted in Cairo (Egypt) on 100 nurses using convenience sampling techniques and practical observational tools, the level of practice regarding DVT prevention was 21% (Khodier et al., 2022a).

In Ethiopia, a multicenter cross-sectional study conducted in the Amhara region on 423 nurses from April 1 to 30, 2021, discovered that 48.8% of nurses have good DVT prevention practice (Yohannes et al., 2022). A similar study conducted in Gondar Comprehensive Specialized Hospital on 400 nurses by using simple random sampling and a self- reported practice checklist revealed that 170 (42.5%) had good practice in the prevention of DVT among staff nurses. The questions about "encouraging patients to conduct foot and leg exercises by themselves or with aid if patients are unable to do so" (98%), and "encouraging patients to elevate their legs" (97%), had the most responses: "regularly assessing the patients' DVT risks."(95.8%) "Educating patients and/or family members on the dangers and prevention of DVT" (95.5%) (Yesuf et al., 2021).

2.2. Factors associated to DVT prevention practice

2.2.1. Socio demographic characteristics

A study conducted at Cairo University Hospital shows that age (x^2=0.381,p-value=0.014), education levels (x^2 =0.754, p-value=0.048) had a statistically significant correlation with overall level of practice (Khodier et al., 2022b). Similarly, a study conducted in Gonder Comprehensive Specialized Hospital showed that people aged >30 years were 80% (AOR 0.2, 90% CI: 0.059-0.629) less likely to have good practice for VTE prophylaxis as compared to those age less than 25 years. Also, the participants whose level of education is an MSc degree were 4.341 times (AOR 4.341, 95% CI: 1.087-17.344) more likely to have good practice than a diploma (Kiflie et al., 2022).

2.2.2. Work related factors

A descriptive study conducted in Cyprus on 165 nurses showed that a lack of clinical practice guidelines and inadequate training at the service level in the hospital were significantly associated with DVT prevention practice (Al-Mugheed and Bayraktar, 2018). A further study conducted in China on 610 ophthalmic nurses showed that nurses who received previous VTE prevention training had significantly higher practice scores than those without (B=3.46, P <0.001 (Zhou et al., 2023).

The study conducted in Gonder Comprehensive Specialized Hospital revealed that work experience of >10 years (AOR=2.080, 95% CI:1.080-4.004) has good practice for DVT/VTE prophylaxes and also a strong association between participant working unit/ward and practice, working in orthopedics (AOR=3.34 95% CI:1,27-8.78) and working in ICU (AOR=4 95% CI:1.13-14.14) (Kiflie et al., 2022). Whereas in a multicenter cross-sectional study conducted in the Amhara region on 423 nurses from April 1 to 30, 2021, nurses with working experience of >11 years (AOR 3.44; 95% CI (1.45, 8.13) were significantly associated with DVT prevention practice (Yohannes et al., 2022).

2.2.3. Nurses' knowledge towards DVT prevention

A cross-sectional study conducted in China among 610 ophthalmic nurses who had better knowledge on DVT prevention (B = 0.04, P = <0.001) was significantly and positively associated with a higher practice score in VTE prevention (Zhou et al., 2023).

A study conducted in Cairo University Hospital on 100 nurses who provide care for COVID-19 patients shows a significant positive correlation between nurses total level of practice and their total level of knowledge (R = 0.678, p-value = 0.042) (Khodier et al., 2022b).
In a multicenter cross-sectional study conducted in the Amhara region on 412 nurses from April 1 to 30, 2021, nurses with adequate knowledge of deep vein thrombosis prevention [AOR 1.75; 95% CI (1.15, 2.65)] were significantly associated with DVT prevention practice (Yohannes et al., 2022).

2.2.4. Nurses attitude towards DVT prevention

A study conducted in China on ophthalmic nurses showed that a positive attitude towards VTE prevention (B = 1.35, p<0.001) was significantly and positively associated with higher practice scores in VTE prevention.

In a cross-sectional study conducted in Gonder Comprehensive and Specialized Hospital, the attitudes level of health professionals towards DVT/VTE prophylaxis for hospitalized patients was 352(87.1% with a 95% CI of 83.85--90.41) and about 129 (84.86%) nurses had a positive attitude (Kiflie et al., 2022).

2.3. Barriers to nursing practice towards DVT prevention

The study was conducted in Saudi Arabia, and the perceived barriers to performing DVT prevention practice were lack of knowledge, lack of in-service training, work load, lack of appropriate protocols, unfavorable supervision, and refusal by the patients (Al-Mugheed et al., 2023).

In an exploratory descriptive study conducted in California, the perceived barriers to doing assessments for DVT/VTE risk and prevention care that the participating RNs responded to in the open-ended questions were a lack of time and lack of knowledge. Other barriers were lack of standardized tools or protocols to use and language barriers. Less frequently cited perceived barriers were physician-performed risk assessment, no physician order, patient refusal to wear embolic stockings or sequential devices, and mechanical devices that were not available to use (Lee et al., 2014).

According to the study conducted in Palestine on ICU nurses, there is a mean of 2.67 out of 4 for the number of available staff in the unit and the role and responsibility between nurses and doctors for prophylaxis guidelines. Lack of educational courses about VTE prophylaxis has a mean of 2.99 out of 4, which could be explained (Salman, 2020).

A cross-sectional study was conducted in China on ICU nurses; the most common difficulties relating to medical staff were a very high workload and poor training. Lack of defined norms or guidelines, potential work dangers, inadequate equipment and devices, and low staffing were the most commonly reported aspects of the healthcare system. The most frequent patient-related barrier, according to participants, was insufficient patient support (Wang et al., 2020).

2.4. CONCEPTUAL FRAMEWORK

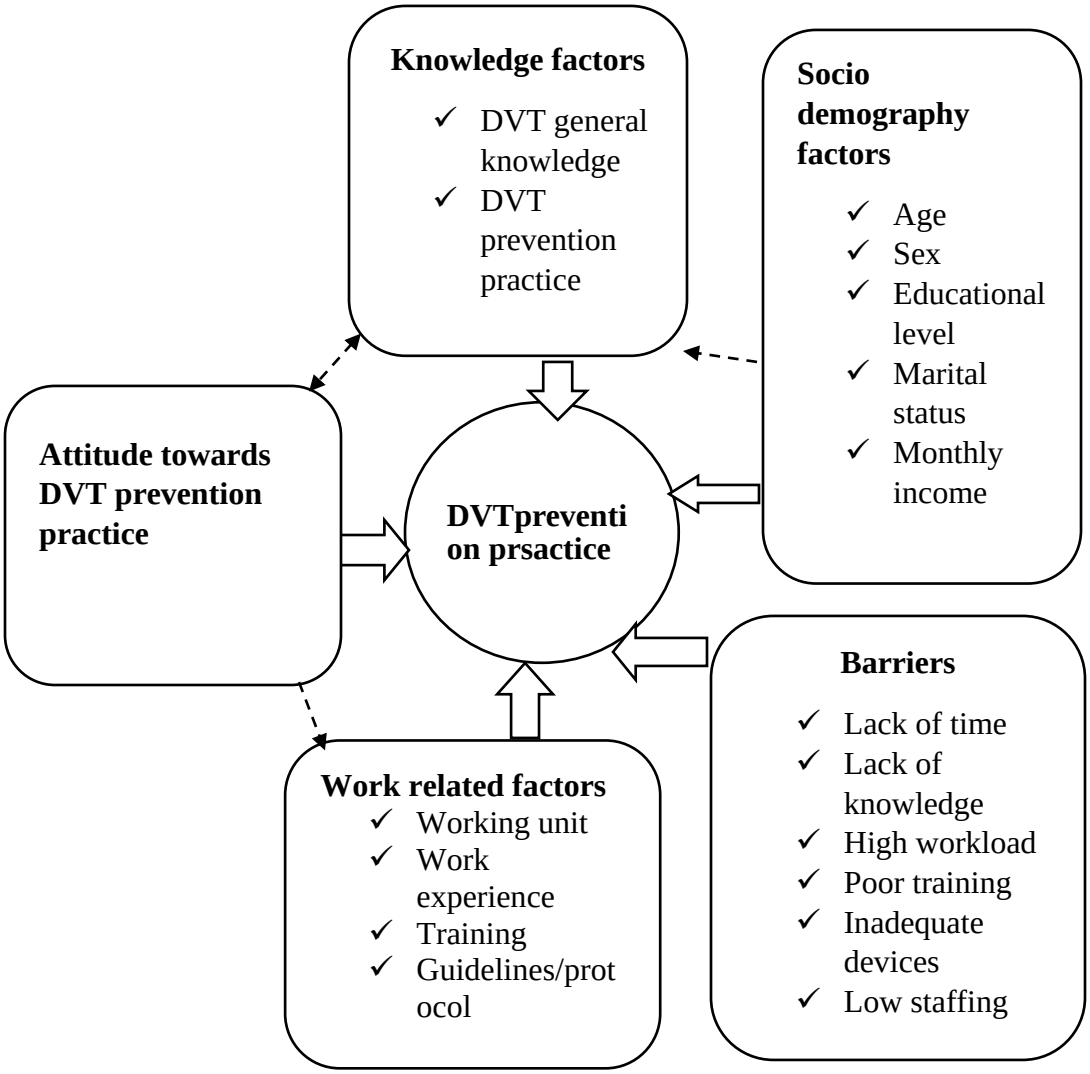

Figure 1: Conceptual frame work that shows the factors that affect DVT prevention practice, which developed after review different literatures ((Al-Mugheed and Bayraktar, 2018, Khodier et al., 2022b, Yohannes et al., 2022)

3. OBJECTIVES

3.1. General objective:

To assess Nurses practice and perceived barriers to deep vein thrombosis prevention in Ethiopian Armed Forces Hospitals from March 1 to May, 2023.

3.2. Specific objectives

To determine nurses practice to deep vein thrombosis prevention in selected Ethiopia Armed Force Hospitals in 2023.

To identify factors associated with nurses practice to deep vein thrombosis prevention in selected Ethiopia Armed Force Hospitals in 2023.

To explore nurses perceived barriers to deep vein thrombosis prevention practice in selected Ethiopia Armed Force Hospitals in 2023.

3.3. Research question

What is the level of nurses practice to deep vein thrombosis prevention in selected Ethiopia armed force hospitals? 2023

What are the factors that lead to poor nurses practice to deep vein thrombosis prevention in selected Ethiopia a Armed Forces Hospitals? 2023

What are the nurses' perceived barriers to deep vein thrombosis prevention practice in selected Ethiopia Armed Force Hospitals? 2023

4. MATERIAL AND METHOD

4.1. Study area and period

The study was conducted in Ethiopia Armed Forces Hospitals. There are three hospitals namely Torhailoch Comprehensive Specialized Hospital. It is 1.5 kilometers away from the Lideta Federal Court and situated in the western portion of Lideta Sub City Kebeles 2. The hospital offers medical, surgical, pediatric, obstetrics and gynecology and psychiatric care services. There are a total of 250 nurses working in this hospital.

Air Force Hospital is located in Bishoftu town, which is found in east Shewa zone, add'a liban district, Oromia region, 47km south east of Addis Ababa. This hospital was founded in 1952 EC as a health center, then transformed into a well-organized from of hospital in 1969 EC where 50 nurses are found. Bahirdar Hospital, in the north-western command, is found 485 km north-west of Addis Ababa, which was stablished 1992EC, and 150 nurses are found there.

Diredawa Hospital in the eastern command, Diredawa is found 500 km east of Addis Ababa which is stablished in 1996 EC and have 88 nurses. Hawassa Hospital in the southern command and Northern command, Hawassa is found 270 km south of Addis Ababa which is stablished in 2010 EC and 87 nurses are found

Konbolcha North command hospital, konbolcha is found 376 km north of Addis Ababa which stablished 1996 EC, and have 86 nurses. All hospitals serve over 100,000 military and civilian residents in outpatient and inpatient settings. Currently, those hospitals have 711 nurses working in medical, surgical, ICU, Ortho, and emergency wards (Information obtained from the Ethiopia defense health main department). The study was conducted between March 1 to May 2, 2023.

4.2. Study Design

An institutional-based mixed study designs was conducted from March 1 to May 2, 2023.

4.3. Population

4.3.1. Source of Population

Source of population were all nurses who working at armed force hospitals in Ethiopia

4.3.2. Study population

The study population consisted of all nurses who worked at selected armed force hospitals and were available during the study period.

4.4. Inclusion and exclusion criteria

4.4.1. Inclusion criteria

All nurses with work experience of at least six months.

4.4.2. Exclusion criteria

Nurses who took personal leave or not found during the time frame of data collection.

4.5. Sample size determination.

For quantitative

4.5.1. Sample size for objective one

The sample size was determined using a single population proportion formula. The proportion of DVT prevention practices taken from a prior study that was conducted in the Amhara region(Yohannes et al., 2022), which is 48.8%**,** CI= 95%, d=0.05 with 10% none respondent rate. $n = \frac{(z\alpha/2)^2 \times p(1-p)}{d^2}$

Whereas n = the minimum sample size for statistically significant study.

P = the prevalence of DVT prevention practice.

Zα/2 = normal deviant at the portion of 95% confidence interval two tailed test =1.96

D = marginal error taken as 5% = 0.05

$n = \frac{(1.96)^2 \times 0.488(1-0.488)}{(0.05)^2}$ = 384+10% none respondent rate (38)

total sample size = 422

4.5.2. Sample size for objective two

4.6. Sampling technique and procedure

Quantitative: Among 6 hospitals, 3 were selected by simple random sampling technique using the lottery method.

The sample size proportion was allocated for the three selected hospitals by the formula:

$$n_i = \frac{Ni}{NT} \times n_p$$

Where n_i = the sample size allocated for each hospital

Ni = the number of nurses found in each hospital

n_p = the previous sample size

N_T = the total number of nurses found in the three hospitals

Finally, the study unit were selected from each hospital using a simple random sampling technique. A computer-generated method was used to select 245 participants

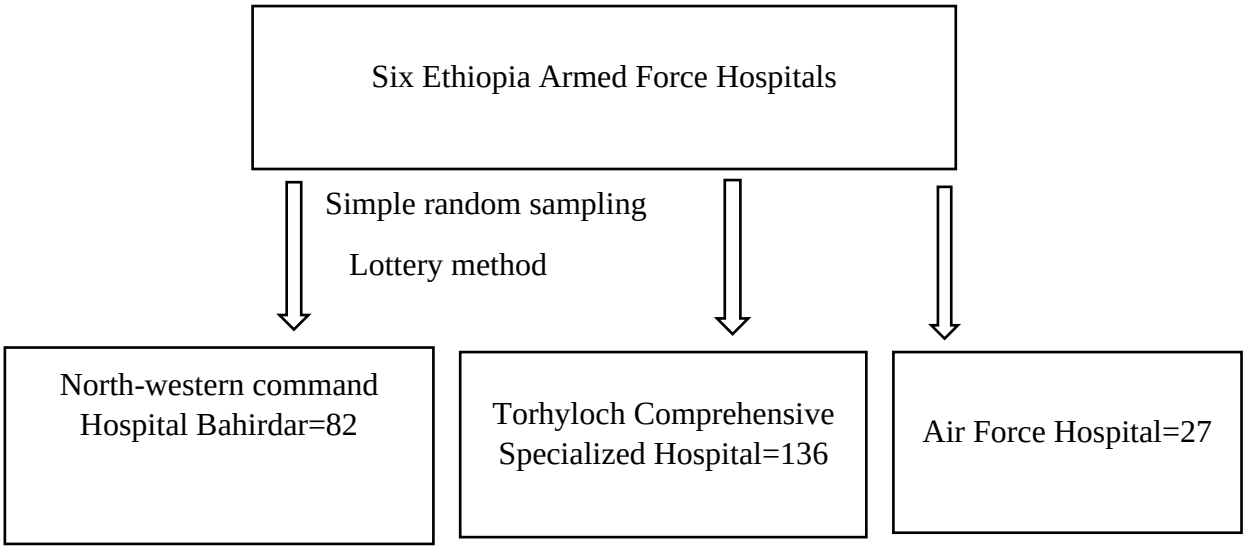

Figure 2: A schematic representation of sample size proportional allocation

Qualitative: A purposive sampling method was used; participants were selected based on their willingness and work experience for at least six months. Interviews were conducted until saturation occurred. The study used in-depth interviews with eight participants.

4.7. Variables

4.7.1. Dependent variables

Practice on DVT prevention

4.7.2. Independent variables

Socio-demographic variables (age sex, educational status, marital status, monthly income)
Work related factors (work experience, training, guideline/protocol, working unit)
Knowledge factors
Attitude

4.8. Data collection tools and procedure

Quantitative: Three BSC nurses used 41 self-administered questionnaires to collect data on sociodemographic variables, work-related features, knowledge, and attitude towards DVT prevention. An observational checklist with 16 lists was used to evaluate the nurse's level of practice through observation, which was adapted from the Venous Thromboembolism National Institute for Health and Care Excellence guideline 2020 (Khaild et al., 2022), were pre-tested on 5% of nurses in Hawassa south command hospitals in order to ensure the quality of the data. Reliability was checked. One MSc supervisor controlled the overall activities of data collection. Good DVT prevention practice was defined as scoring equal to or higher than the mean on the observational checklist activities, while poor DVT prevention practice was defined as scoring less than the mean on the observational checklist activities.

Qualitative

The descriptive information section included age, sex, work experience, education related to DVT, and source of education. A semi-structured interview guide was developed in English and then translated into Amharic. The guides were developed based on the existing literature (Wang et al., 2020, Lee et al., 2014, Al-Mugheed et al., 2023), and consisted of open-ended questions and probes that explored information regarding perceived barriers that affect DVT prevention practice. Data was collected via a face-to-face, in-depth interview with a purposefully selected participant. The study participants are those nurses who have work experience of at least six

months and are willing to participate. First, the researcher collected the participants contact information and scheduled interview dates based on the participants' desires. At the scheduled time, the nurse was invited to join the study, and a face-to-face, in-depth interview was conducted in a private and quiet room. The principal investigator was in charge of conducting the in-depth interview, making tape recordings, and taking notes. The interview took 20-30 minutes. Information saturation was achieved after 8 interviews.

4.9. Operational definition

Good knowledge: Nurses who scored equal to or above the mean score of the knowledge questions were considered to have good knowledge of DVT(Yohannes et al., 2008).

Poor knowledge: Nurses who scored below the mean score of the knowledge questions were considered to have good knowledge of DVT (Yohannes et al., 2022)

Good practice: Nurses were assessed to have good practice in deep vein thrombosis prevention if their scores on the practice questions were equal to or higher than the practice question mean (Yesuf et al., 2021).

Poor practice: Nurses were assessed as having poor practice in the prevention of deep vein thrombosis if their answers to the practice questions were less than the mean score (Yesuf et al., 2021).

Positive attitude: From the 8 items with a 5 Likert scale, if participant scored equal to or above the mean score of the attitude questions were considered to have positive attitude(Zhou et al., 2023).

Negative attitude: From the 8 items with a 5 Likert scale, if participant scored below the mean score of the attitude questions were considered to have negative attitude(Zhou et al., 2023).

4.10. Data quality and management

Quantitative: Standardized tools were utilized. Three BSc nurses' data collectors and one MSc supervisor were chosen based on their data collection experience, and training was given on the study's goals, method, and data collection technique. Before the actual data collection, the questionnaire and observational checklist were pre-tested on 5% of nurses in Hawassa south command hospitals in order to ensure the quality of the data. Reliability was checked, Cronbach's alpha was 0.71, 0.89, and 0.72 for knowledge, attitude and practice respectively. With data collectors and supervisor there were daily discussions and checks for data completeness. Data was entered into epi-data and exported to SPSS version 26.0 Double entry was performed. After checking outliers and handling missed values, the data were coded and cleaned by SPSS software.

Qualitative: The interview was conducted in the local Amharic language in a quiet place. The interview was taped, transcribed, the transcribed data reviewed and cross-checked with the recorded data, and then simultaneously translated into English.

4.11. Data process and analysis

Quantitative: Following completion of data collection and verification of data quality, the data collection instruments were coded, the data checked, and entered using Epi-Data version 3.1 software. It was cleaned and edited accordingly, exported to SPSS version **26**.0 for analysis, and checked for missing values before analysis. A descriptive analysis such as mean, standard deviation, frequency, and percentage was used to see the overall distribution of the study subject with the variables under the study.

Binary logistic regression analysis was used to measure the association between the dependent variable and independent variables. The first bivariable analysis was carried out to select eligible variables for a multivariable model. Variables that have a p-value of <0.25 were entered into multivariable regression for further analysis. A multivariable logistic regression analysis was carried out to identify the associated factors that affect DVT prevention practice, with a p-value of 0.05 taken as the cutoff point to label the significance of the variables. The strength of the association was measured by a 95% confidence interval (crude /adjusted odd ratio).

The presence of multicollinearity was checked by VIF which was less than 10 for all variables. The goodness of fit of the final model was checked using the Hosmer-Lemeshow goodness of fit test, and a p-value =0.962 which was a good fit for the logistic regressions. Finally, results were presented in the form of narration, tables, graphs, and charts according to the nature of the data**.**

Qualitative: Audio recordings were transcribed verbatim in Amharic. The transcribed data was reviewed and cross-checked with the recorded data to ensure the accuracy of the data and then the transcribed data was translated into English. The transcription and translation of the qualitative data were done by the investigator. Data was coded to identify a theme and data was sorted into themes, thematic analysis was aided by the qualitative software Atlas's version-7 to find the core meaning and interpret the finding, and finally, the result was triangulated with the quantitative result, interpreted, and then reported.

4.12. Ethical consideration

The study was conducted after receiving approval from the institution review board (IRB) of Hawassa University College of Medicine and Health Science School of Nursing. The permission letter obtained from the School of Nursing was sent to the Defense Main Department, and after getting permission, the nurse was given a copy of the written instructions and objectives of the study. Written informed consent was obtained from all participants. The participant was assured of the confidentiality of the information provided and had the right to refuse participation.

4.13. Result dissemination plan

The final report of the study will be presented and submitted to Hawassa University College of Medicine and Health Science School of Nursing. Finally, the results of the study will be disseminated to the nursing department, the selected three-armed force hospitals, and the Defense Health Main Department. Additionally, manuscript will be prepared and efforts made for publication.

5. RESULTS

5.1. Quantitative result

Among the sampled 245 participants, all of them participated in the study yielding a response rate of 100%.

5.1.1. Socio-demographic characteristics

Among the respondents 127 (51.8%) were males and 118 (48.2%) were females. The mean age of the respondent was 29.9 years ±5.6 standard deviation, and 137 (55.9%) were within the age group between 26-30 years. The majority of the participants (87.8%) had a bachelor's degree, and the participant had a mean of 6881.59 ±SD 1159.3 monthly income, as indicated in table 2.

Table 2: sociodemographic characteristics of nurses working at armed force hospitals, Ethiopia 2023 (n=245)

Variables	Categories	Frequency	Percent
Sex	Male	127	51.8
	Female	118	48.2
Age	26-30 years	82	33.5
	31-35 years	102	41.6
	≥ 36 years	61	24.9
Educational level	Diploma	15	6.1
	Degree and above	230	93.9
Marital status	Single	117	47.8
	Married	128	52.2
Monthly income	Mean, ±SD (6881.6, ±1159.3)		

5.1.2. Work related characteristics.

Most of the respondents (68.8%) had ≤5 years of work experience. Out of 245 nurses who participated in the study, 78 (31.8) nurses were working in surgical unit and only 36(14.7%) of the nurses responded that they had received formal training on the prevention of DVT, as shown in table 3.

Table 3: Work related characteristics about study participants in armed force hospitals, Ethiopia 2023 (n=245)

Variables	**Categories**	**Frequency**	**Percent**
Working unit/ Ward:	Surgical	78	31.8
	Medical	74	30.2
	Ortho	50	20.4
	ICU	43	17.6
Work experience:	≤ 5 years	92	37.6
	6-10 years	93	38.0
	≥ 11 years	60	24.5
Training on DVT prevention practice	Yes	144	58.8
	No	101	41.2
Guidelines/protocol for DVT prevention practice	Available	117	47.8
	Not available	128	52.2
Mechanical devises	Available	142	58.0
	Not available	103	42.0

5.1.3. Knowledge related to DVT

From all 245 study participants, 145 (52.2%) were found to have good knowledge, while 100 (40.8%) of the respondents were found to have poor knowledge of DVT prevention.

Participants were asked 23 questions to assess their knowledge of the prevention of deep vein thrombosis. Among all questions, DVT occurs as a result of stasis of blood, vessel wall injury, and altered blood coagulation was the most frequently answered question (98.4%), while oral contraceptives or hormonal replacement therapy may predispose to DVT was the least frequently answered question (57.6%), as indicated in table 4.

Table 4: knowledge regarding to DVT prevention among nurses working in armed force hospitals Ethiopia 2023 (n=245)

Statement on general knowledge, risk factors and prevention of DVT	**Categories**	**Correctly answered**		**Incorrect answered**	
	Yes/No	**N**	**%**	**N**	**%**
Item-1	Yes	241	98.4	4	1.6
Item-2	Yes	231	94.3	14	5.7
Item-3	Yes	226	92.2	19	7.8
Item-4	Yes	225	91.8	20	8.2
Item-5	Yes	190	77.6	55	22.4
Item-6	Yes	191	78.0	54	22.0
Item-7	Yes	214	87.3	31	12.7
Item-8	Yes	208	84.9	37	15.1
Item-9	Yes	220	89.8	25	10.2
Item-10	Yes	167	68.2	78	31.8
Item-11	Yes	211	86.1	34	13.9
Item-12	Yes	210	85.7	35	14.3
Item-13	Yes	220	89.8	25	10.2
Item-14	Yes	177	72.2	68	27.8
Item-15	Yes	168	68.8	77	31.4
Item-16	Yes	170	69.4	75	30.6
Item-17	Yes	210	85.7	35	14.3
Item-18	Yes	141	57.6	104	42.4
Item-19	Yes	220	89.8	25	10.2
Item-20	Yes	215	87.8	30	12.2
Item-21	Yes	218	89	27	11
Item-22	Yes	201	82	44	18
Item-23	Yes	207	84.5	38	15.5

5.1.4. Attitude related to DVT prevention practice

In response to 8 attitude questions, 145(59.2%) respondents stated that using DVT prevention measures among hospitalized patients is beneficial. On the other hand, 133 (50.3) disagree that using graduated compression stockings and intermittent pneumatic devices can prevent the occurrence of DVT. The total positive and negative response rates for the attitude-related items were 51.4% and 48.6%, respectively, as indicated in table 5.

Table 5:-Nurses attitude towards DVT prevention who are working in armed force hospitals Ethiopia 2023 (n=245)

Attitude statement	**Strongly disagree N (%)**	**Disagree N (%)**	**Neutral N (%)**	**Agree N (%)**	**Strongly agree N (%)**
I believed that using DVT prevention measures among hospitalized patient is beneficial	17(6.9)	27(11.0)	56(22.9)	98(40.0)	47(19.2)
I believed that assessment of DVT risk factors is necessary prior to surgery	13(5.3)	44(18.0)	68(27.8)	95(38.8)	25(10.2)
I believed that prophylaxis of DVT is necessary prior to surgery for patient at high risk	20(8.2)	29(11.8)	55(22.4)	96(39.2	45(18.4)
I believed that educating patients regarding preventive measures of DVT is necessary	23(9.4)	32(13.1)	72(29.4)	89(36.3)	29(11.8)
I believed that VTE risk must be assessed in hospital patient	15(6.1)	36(14.7)	64(26.1)	90(36.7)	40(16.3)
I believed that early ambulation can decrease the occurrence of DVT	19(7.8)	29(11.8)	81(33.1)	79(32.2)	27(15.1)
I believe that using graduated compression stocking and intermittent pneumatic device can prevent the occurrence of DVT.	12(4.9)	35(14.3)	86(31.1)	89(36.3)	23(9.4)
I believe that DVT prophylaxis can improve the quality of medical care	12(4.9)	26(10.6)	60(24.5)	107(43.7)	40(16.3)

5.1.5. Nurses practice on DVT prevention practice**.**

To measure the level of prevention practice, we used an observational checklist. The result of this study showed that only 40.8%, with a 95% CI (34.6, 47.3), had good practice about DVT prevention, but the majority of nurses had poor practice on the prevention of DVT. From all activities, the most frequently performed activities were "encouraging early ambulation (97.1%), encouraging patients to perform foot and leg exercise, encouraging patients to elevate their leg (96.7%), and assessing the patients about signs and symptoms, as shown in table 6 and figure 3.

Table 6:-prevention practice based on observational checklist among nurses working in armed force hospital, Ethiopia 2023 (n=245)

Variables	**Categories**	
	Yes N (%)	**No N (%)**
Encouraging patients to perform feet and leg exercise	237 (96.7)	8 (3.3)
Encouraging early ambulation	238 (97.1)	7 (2.9)
Regularly moving bedridden patient	159 (64.9)	86 (35.1)
Use of graduated compression stocking	146 (59.6)	99 (40.4)
Choosing the accurate measurement size of GCS	138 (56.3)	107 (43.7)
Assessment of the graduated compression stocking	101 (41.2)	144 (58.8)
Use the intermittent compression device 24 hours for bedridden patient	69 (28.2)	176 (71.8)
Check the fitting of pneumatic compression device regularly	61 (24.9)	184 (75.1)
Assessing the patient about sign and symptoms	214 (87.3)	31 (12.7)
Educate the patient or family members about the danger and prevention of DVT	124 (50.6)	121 (49.4)
Teaching the patient on sufficient fluid intake	95 (38.8)	150 (61.2)
Teaching the patients about the use of graduated compression device	133 (53.5)	112 (45.7)
Encourages patients to elevate their leg	237 (96.7)	8 (3.3)
DVT risk assessment	191 (78)	54 (22)
Advising at risk patients about life style changes	144 (58.8)	101 (41.2)
Administration of anticoagulant medication	196 (80)	49 (20)

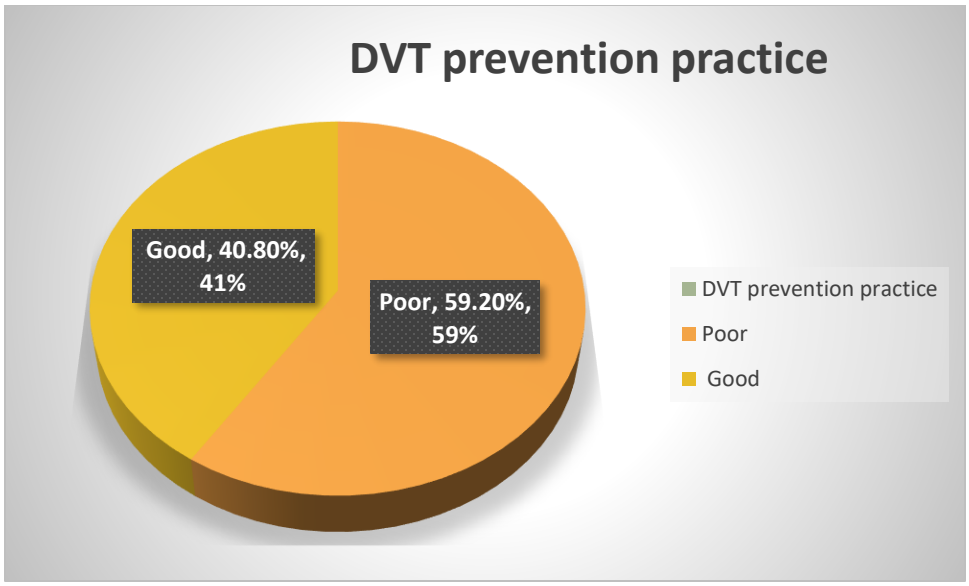

Figure 3:-Nurses level of DVT prevention practice

5.2.6. Factors associated with nurses' practice towards DVT prevention

From the total variables considered to be significantly associated in the bivariate analysis, age, educational status, marital status, monthly income, work experience, training on DVT prevention, knowledge, and attitude on DVT prevention were candidate variables for multivariate logistic regression analysis (p-value 0.25).

For the final model, multivariable logistic regression was applied to control the effect of potential confounding variables. After adjusting the confounders, age category (26-30) years, having work experience ≤ 5 years, having work experience 6-10 years, training, knowledge, and attitude towards DVT prevention were found to be independently associated with DVT prevention practice. The in- depth interview results agree with lack of professional competence, which was one of the central themes that contained lack of knowledge, lack of training, and negative attitude.

In this study, nurses whose age was between 26 and 30 years were 69% less likely to perform DVT prevention practice than those whose age was ≥36 years [AOR=0.31 (95% CI: 0.10, 0.99)]. However, this variable was not mentioned by participants through qualitative study.

Work experience ≤5 years were 84% less likely to perform DVT prevention practice than those who have work experience ≥11 years [AOR=0.16 (95% CI: 0.05, 0.51)]. Work experience 6-10 years was also 85% less likely to perform DVT prevention practice than those who had work experience ≥11 years [AOR=0.15 (95% CI: 0.05, 0.49)]. On the other hand, this was not found to be considered as important by participants through the qualitative arm.

Another important predictor was training. Nurses who were not trained about DVT prevention practice were 91% less likely to perform DVT prevention practice than those who trained on DVT prevention practice [AOR=0.09 (95% CI: 0.03, 0.33)], the qualitative arm also showed that lack of training affects DVT prevention care, as is exemplified by the statement "*Nurses, especially beginners, received orientation about DVT prevention activities once from the senior. I don't believe this kind of orientation is enough. "*

Nurses who had poor knowledge of DVT prevention practice were 70% less likely to perform DVT prevention practice than those who had good knowledge on DVT prevention practice

[AOR=0.30 (95% CI: 0.13, 0.70)]. In qualitative result, they stress that nurses lack of practice knowledge on DVT prevention completely hinders good patient care, as shown by the following statement: "*I saw some nurses did not do their tasks correctly; they removed graduated compression stockings at night and thought it may contribute to relaxation*."

In addition, attitude was significantly associated with DVT prevention practice. Nurses who had a negative attitude were 91% less likely to perform DVT prevention practice than those who had a positive attitude [AOR=0.09 (95% CI: 0.03, 0.28)]. In in-depth interview, nurses mentioned that negative attitudes towards DVT mechanical prophylaxis can reduce the continuity of prevention care, shown by the statement: *"I see some nurses who do not believe mobilization prevents DVT; only medication is the best choice"*.

Table 7:- Bivariate and Multi variate analysis of factors associated with nurses practice regarding to DVT prevention practice working in armed force hospital Ethiopia 2023.

Variables	**Category**	**DVT prevention practices**		**COR (95%) CI**	**AOR (95%) CI**	**P-value**
		Good	Poor			
Age	**26-30 years**	**23**	**59**	**0.24(0.12,0.48) ***	**0.31(0.10,0.99)**	**0.048***
	31-35 years	39	63	0.38(0.20, 072) *	0.55(0.19,1.65)	0.288
	≥36 year	38	23	1	1	
Education level	Diploma	1	14	0.10(0.01,0.73)	0.10(0.01,1.34)	0.081
	Degree above	99	131	1	1	
Marital status	Single	38	79	0.51(0.31,0.86)	2.35(0.88,6.27)	0.087
	Married	62	66	1	1	
Monthly income	Mean, SD (6881, ±1159.3)			1 (1,1.001)	1.00(0.99,1.00)	0.714
Work experience	**<=5 years**	**25**	**67**	**0.17(0.09,0.35)**	**0.16(0.05,0.51)**	**0.002***
	6-10 years	**34**	**59**	**0.27(0.13,0.53)**	**0.15(0.05,0.49)**	**0.002***
	=>11 years	41	19	1	1	
Training on DVT prevention	Yes	94	50	1	1	
	No	**6**	**95**	**0.03(0.01, 0.08)**	**0.09(0.03,0.33)**	**0.001***
Knowledge on DVT	Yes	69	76	1	1	
	No	**31**	**69**	**0.49(0.30, 0.85)**	**0.30(0.13,0.70)**	**0.005***
Attitude	Positive	91	35	1		
	Negative	**9**	**110**	**0.03(0.01,0.07)**	**0.09(0.03,0.28)**	**0.001***

Note: Multicollinearity (VIF range 1.055-2.822), Hosmer and Lemeshow=0.96

5.2. Qualitative result

The majority of the participants were female (62.5%) and the mean age was 33.8 ±2.9. The mean work experience was 6.25 ±1.67 years. All of them were educated about DVT. Following data analysis, the response revealed three main themes related to DVT prevention practice barriers. These include lack of professional competence, work-related challenges, and patient resistance, as shown in table 8.

Table 8. Overview of the study themes.

Participant description	Sub-themes	Themes
Socks not measure correctly Problems in identified at high-risk patient Lack of understanding about the severity of DVT	Lack of knowledge	Lack of professional competence
Beginners received only orientation about prevention. We performed based on previous knowledge. Problem on how to apply prevention device	Lack of training	
Poor caring Lack of sense of duty/obligation	Lack of attitude	
Anable to follow the way of prevention No guiding material	Absence of guideline	Work related challenge
Inadequate nurse patient ratio Turnover of nurses Job dissatisfaction	Work load	
Lack of team work No one directs and monitor	Absence of supervision	
No enough GCS and IPCD Shortage of blood thinner medication	Shortage prophylaxis	
Not willing to wear GCS Patient needs staying in the bed rather than ambulation	Patient refuse to wear GCS	Patient resistance

5.2.1. Lack of professional competence

Lack of professional competence was one of the central themes that nurses mentioned in this study. This included a lack of knowledge, a lack of attitude, and a lack of training.

Lack of knowledge

The majority of participants said that having comprehensive knowledge was an important part of preventing DVT. They stress that nurses lack of practice knowledge on DVT prevention completely hinders good patient care.

I saw some nurses did not do their tasks correctly; they removed graduate compression stocking at night, thinking it may contribute to relaxation.

Lack of training

Nurses training concerning DVT prevention increases the nurse's knowledge and skill and makes the quality of care better. Though most nurses stated that there is inadequate in-service training.

We performed prevention activities based on the previous knowledge, no one give emphasis to DVT prevention.

Nurses, especially beginners, received orientation about DVT prevention activities once from the senior. I don't believe this kind of orientation is enough.

Lack of attitude

A positive attitude in the health care profession can also impact our actual performance, like caring, effective communication, responsibility and accountability, a sense of duty or obligation, and collaboration with the patient. Poor attitudes among nurses towards DVT mechanical prophylaxis can reduce the continuity of prevention practice

I see some nurses who do not believe mobilization can prevent DVT; only medication is the best choice.

5.2.2. Work related challenge

Nurses' professionals take part in different daily activities and challenges. This sub-theme included work load, absence of supervision, absence of guidelines and shortage of prophylaxis.

Work load

Nurses usually have a significant work load and must establish their priorities to manage different care challenges.

Inadequate nurse-patient ratios, turnover of nurses, work load, job dissatisfaction and administrative tasks contribute to a non-manageable work load.

The proportion of nurses to patients is not fair... I provide care for many patients. So, I work fast, hard and sometimes lose my concentration, and due to this, patient safety is endangered.

Absence of supervision

Supervision is a basis for performance improvement. Helps ensure tasks are performed accurately. Prevention activities need supervision because the supervisor must be able to instruct, correct, establish appropriate communication, and motivate the nurse.

Participants noted that there is no supervision that helps eliminate challenges related to work conditions.

No one comes and sees what we are doing, in what way we performed, or the communication between team members.

Absence of guideline/protocol

Nurses showed that the availability of a current guideline helps guide nurses to establish the best practice care for the patient.

Although training is beneficial having a current guideline is necessary for the unit, guideline will guide all health care profession.

Shortage of prophylaxis

Nurses indicated graduated compression stocking, an intermittent pneumatic compression device and blood thinner medication are important for patients who are at high risk of DVT. There is a shortage of mechanical prophylaxis and blood thinner medication.

5.2.3. Resistance from patients

The patients refused to use a DVT prophylaxis device. “I don’t want to apply the device.” We cannot obligate the patient to apply the device if they don’t like it. Lack of strong communication with the patient creates an obstacle in terms of applying DVT precautions.

When we say to some of our patients, let’s mobilize, they say no problem; I try to move by myself. After that, when we leave the room and go back to them, we find them either sitting on the bed or sleeping.

6. DISCUSSION

The overall DVT prevention practice in this study was 40.8%. Age, work experience, knowledge, attitude, and training were significantly associated with DVT prevention practice. From the qualitative analysis, three themes have merged, lack of professional competence, work related challenge and patient resistance.

The result showed that, the total of 245 participants, 40.8% had good practices in DVT prevention. This result is in line with studies conducted in Gondar Comprehensive Specialized Hospital (42.5%) (Yesuf et al., 2021).

The finding was lower as compared with studies conducted in the Amhara region (48,8%) (Yohannes et al., 2022). The discrepancy might be due to the study setting, sampling techniques or data collection tools, and sample size. In this study, from one comprehensive specialized hospital and two general Hospitals, 245 nurses working in surgical, medical, ICU, and orthopedics wards were included, selected by SRS techniques, and their practice level was evaluated by an observational checklist. In a study conducted in the Amhara region, five comprehensive specialized hospitals were incorporated, 423 nurses were involved, and data was collected by self- administered tools.

The age of the nurses was significantly associated with DVT prevention practice. Those whose age was 26-30 years were 69% less likely to perform prevention practice compared with those whose age was ≥ 36 years. The possible explanation for this result could be that as age increases, experience and exposure to DVT prevention practices also increase. In contrast, a study conducted at Gondar Comprehensive Specialized Hospital revealed that nurses whose age was > 30 years were 80% less likely to have good practice as compared to nurses whose age was less than 25 years (Yesuf et al., 2021).

Work experience was also an important variable associated with DVT prevention practices. Nurses who had work experience of ≤ five years were 84% less likely to perform DVT prevention practice as compared to nurses who had work experience of 11 years. Similarly, nurses who had work experience from six to ten years were 85% less likely to perform prevention practice as compared to nurses who had work experience ≥ eleven years. This was in line with studies conducted in the Amhara region (Yohannes et al., 2022) and in the Gondar

Comprehensive Specialized Hospital (Yesuf et al., 2021). The possible explanation for this could be that more experience gives a chance to develop prevention skills by sharing experience with coworkers, training, increasing their professional profile, and rotating in different departments.

The merging of the data allowed us to identify areas of agreement between the quantitative and qualitative results. The two measures agreed in terms of factors and perceived barriers: lack of training, lack of knowledge and a negative attitude affect DVT prevention.

According to the finding of knowledge, nurses who had poor knowledge of DVT prevention practice were 97 less likely to perform prevention practice as compared to those nurses who had good knowledge. Also in the qualitative finding, the participant stated that a lack of practice knowledge on DVT prevention completely hinders good patient care. This study is consistent with those conducted in China (Zhou et al., 2023), Saudi Arabia (Al-Mugheed et al., 2023), Cairo (Khodier et al., 2022a), and the Amhara region (Yohannes et al., 2022). This might be due to having background knowledge before requesting to perform the practice. In qualitative finding also, the participant stated that a lack of practice knowledge on DVT prevention completely hinders good patient care. In some nurses there is a knowledge gap in doing prevention activities.

The finding of training was that nurses who had not received training on DVT prevention practice were 91% less likely to perform DVT prevention practice as compared to those nurses who had taken training. This study was in line with the studies conducted in Cyprus (Al-Mugheed and Bayraktar, 2018) and China (Zhou et al., 2023). The possible justification could be that training can increase the theoretical understanding and skill of the nurses about prevention practice, enabling them to perform the practice. In an in-depth interview, the participants stated that training concerning DVT prevention increases knowledge and skill and makes the quality of care better, because of inadequate in-service training, we face challenge on how mechanical device applied for patient who are at high risk of DVT. This study was similar to those conducted in Saudi Arabia (Al-Mugheed et al., 2023) and China (Wang et al., 2020).

The other finding was that nurses who had negative attitudes towards DVT prevention practice were 91% less likely to perform DVT prevention practice than those nurses who had positive attitudes. In the qualitative study, respondents stated that positive attitudes in the health care profession can also impact our actual performance, like caring, effective communication, responsibility and accountability, a sense of duty or obligation, and collaboration with the

patient. This study was similar to the study conducted in China (Zhou et al., 2023). The possible explanation could be that those nurses who had a positive attitude had a chance to increase self-efficacy and take responsibility for performing the practice.

The qualitative data supplement the quantitative data with the absence of guidelines or protocols that didn't appear in the logistic regression model in the quantitative analysis. This was in line with studies conducted in California (Lee et al., 2014), China (Zhou et al., 2023) and Saudi Arabia (Al-Mugheed et al., 2023). That nurses also stated that the availability of a current guideline helps nurse establish the best practice care for the patient.

The shortage of graduated compression stockings, intermittent pneumatic compression devices, and anticoagulant medication also supplement the quantitative, which are important for patients at high risk of DVT. This study was similar to those conducted in China (Wang et al., 2020) and California (Lee et al., 2014).

The other qualitative data supplemented the quantitative data with the findings: were work load. Nurses stated that inadequate nurse-patient ratios, turnover of nurses, job dissatisfaction, and administrative tasks contribute to a non-manageable work load. The other was the absence of supervision. In the absence of supervision, nurses stated that prevention activities need supervision because a supervisor is able to instruct, correct, establish appropriate communication, and motivate the nurses.

Also, the patients refused to use a DVT-preventive mechanical prophylaxis. Some patients say wearing a compression stocking is not comfortable to move, even during sleeping time; others are not collaborative to ambulate the need to stay in bed. This study was consistent with studies conducted in Saudi Arabia (Al-Mugheed et al., 2023), and China (Wang et al., 2020).

6.1. Strength and limitation of the study

The study integrated two data bases, the quantitative and qualitative to increase understanding towards DVT prevention practice. It is a multicentered, in which participants were drown from three defense hospitals and four units included from each hospital. The level of practice was assessed by an observational checklist, while other assessed by using self-reported checklist. Graduated compression and intermittent compression device were not available in some units, so the items related to this procedure were not applicable. More over the study might be introduce social desirability bias because the study outcome based on self-reports.

7. CONCLUSION AND RECOMMENDATION

The study reveals that more than half of the participants had poor practice in DVT prevention. Work experience, not having training, a nurse who had poor knowledge, and a negative attitude were factors that were associated with DVT prevention practice and work load, absence of supervision, lack of knowledge, lack of training, absence of guidelines, and patient resistance were perceived barriers that affect DVT prevention practice.

On the basis of the present study, we recommended to the Ethiopian Defense Health Main Department strengthening the prevention practice by providing the necessary supply, fulfilling the shortage of manpower, and proposing training programmes.

For defense hospitals, nursing administrators should make clinical guidelines on DVT prevention easily available and accessible in the unit, and nurse managers should ensure that clear DVT prevention guidelines are established and followed by the nurses working in different units. Monitoring critically ill patients for DVT is a day-to-day practice to create the right attitude among the nurses who are caring for the patients.

Nursing education on DVT prevention is important for those nurses who are practicing in different units through health education, demonstration, clinical teaching, role play, and making the patient have the right attitude about DVT prevention. Training programs should be conducted continuously to improve nurses' knowledge and skills in DVT prevention. The supervisors make it a practice to check on a daily basis for DVT prevention. Nursing researcher assess how well staff nurses who are involved in nursing care respond to training on DVT prevention

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ANNEX I**: INFORMATION SHEET**

Hawassa University, Faculty of health science, School of Nursing

Study on Assessment of practice and perceived barriers towards DVT prevention practice among nurses in Ethiopian Armed hospital, Ethiopia, 2023: Using mixed study design.

Good morning/afternoon! My name is.....and I am going to conduct an interview with you on behalf of Mr. Andualem Teshome a postgraduate student at Hawassa University, institute of health faculty school of nursing. I would like to ask questions related to practice and barriers towards DVT prevention

This study is designed to investigate nurses DVT prevention practice and perceived barriers that affect DVT prevention. The study will summarize your thoughts on the issues raised and by using the data to come up with a better plan of how to improve DVT prevention practice service. Honesty is needed to make this information useful in identifying strength/weakness of the current system and addressing them.

The questionnaire may take between 15-20 minutes you are requested to answer the question as honestly as you can. I assure you that whatever information you provide will only be used for the purpose of this research and will not be made available to anyone and your name is not mentioned in the form.

I appreciate you too much for your willingness and support to respond. I also assure that the answer you give will not bring any harm to you and your family. Your participation is voluntary. If you choose not to answer a particular question, that is your right. You are also permitted to withdraw any time from the study when you feel uncomfortable with it.

Therefore, to participate in this study you:

Agree ———————

Not agree ———————

Address of the principal investigator: Andualem Teshome Cell phone: +251 986875661, E-mail andualemteshe22@gmail.com

ANNEX II. **CONSENT FORM OF THE PARTICIPANT**

In signing this document, I am giving my consent to participate in the study titled "practice and perceived barriers towards DVT prevention among nurses in Ethiopian Armed Force Hospital, 2023: By mixed study design".

I have been informed about the purpose of the study. I have understood that participation in this study is entirely voluntary. I have been told that my answers to the questions will not be given to anyone else, and no reports of this study will ever identify me in any way. I have also been informed that my participation or non-participation or my refusal to answer questions will have no effect on me. I understood that participation in this study does not involve any risks.

I understood that Andualem Teshome is the person to contact, if I have questions about the study or about my rights as a study participant.

Respondent's signature_____

If no, skip to the next participant

Date of interview: _____ Time started: _____ Time finished: _____

Interviewer Name _____Signature _____ Date_____

Supervisor's name _____ Signature _

Results of interview questionnaire

1. Completed
2. Refused
3. Partially completed

ANNEX III: **QUESTIONNAIRE; ENGLISH VERSION**

This questionnaire designed to assess practice and perceived barriers towards DVT prevention among nurses in Ethiopian Armed Force Hospitals.

All questionnaires are completed anonymously.

I would like to appreciate, if you answer all the question and answer as honestly as possible

Please, if the question is choice, encircle the number that decided to be best answer, if the question is blank space fill the blank.

Code _____ Date of filling ____/____/_____ DD/MM/YY

Part I. Socio demographic characteristics

101. Sex: 1. Male 2. Female

102. Age in year _____

103. Educational level

1. Diploma

2. Degree

3. Master's degree

104. Marital status

1. Single 2. Married 3. Divorce 4. Widowed

105. Monthly income_____

Part II. Work related characteristics

201. Working unit/ Ward: 1. Medical 2. Surgical 3. ICU 4. Gyn-obs

202. Work experience: _____

203. Training on DVT prevention practice: 1. No 2. Yes

204. Guidelines/protocol for DVT prevention practice 1. Available 2. Not available

205. The availability of mechanical devise that are used for the prevention of DVT like graduated compression stocking, intermittent pneumatic compression device.

Available 2. Not available

Part III. Knowledge related to DVT prevention practice

No.	Questions	Yes	No
301	DVT occurs as a result of stasis of blood (venous stasis), vessel wall injury, and altered blood coagulation		
302	Venous thromboembolism (VTE) is a fatal complication of DVT.		
303	DVT occurs most frequently in the veins of the lower extremities		
304	Prolonged immobilization predisposes to DVT in hospitalized patients		
305	Surgical patients are more prone than medical patients to DVT/VTE		
306	Indwelling intravenous device such as a central venous catheter may predisposes to DVT.		
307	Paralysis, paresis or recent plaster cast on lower extremities may predispose to DVT		
308	Obesity may predispose to DVT		
309	Advancing age may predispose to DVT		
310	Previous DVT/VTE history may predispose to DVT		
311	Major surgery may predispose to DVT.		
312	Varicose vein may predispose to DVT		
313	Trauma may predispose to DVT.		
314	Smoking may predispose to DVT		
315	Alcohol may predispose to DVT		
316	Infection or inflammation may predispose to DVT.		
317	Pregnancy or postpartum may predispose to DVT		
318	Oral contraceptives or hormonal replacement therapy may predispose to DVT		
329	Foot and leg exercise may prevent DVT		
320	Elevating legs is necessary to prevent DVT/VTE		
321	Early ambulation after surgery may prevent DVT development		
322	Elastic compression stocking may prevent DVT development		
323	The use of intermittent pneumatic device may prevent DVT development		

Part IV Attitude related to DVT prevention practice

No.		Strongly Disagree	Disagree	Neutral	Agree	Strongly agree
401	I believe that using DVT prevention measures among hospitalized patient is beneficial					
402	I believed that assessment of DVT risk factors is necessary prior to surgery.					
403	I believe that the prevention/prophylaxis of DVT is necessary prior to surgery					
404	I believe that educating patents regarding preventive measures of DVT is necessary					
405	I believed that VTE risk must be assessed in hospital patient					
406	I believed that early ambulation can decrease the occurrence of DVT					
407	I believe that using graduated compression stocking and intermittent pneumatic device can prevent the occurrence of DVT.					
408	I believe that DVT prophylaxis can improve the quality of medical care					

Part IV: observational checklist

Table5. Observational checklist of DVT prevention practice adapted from the national institute for health and care excellence guideline 2020

No	Characteristics of DVT prevention practice	Yes	No
501	Encouraging patients to perform feet and leg exercise		
502	Encouraging early ambulation		
503	Regularly moving bedridden patient		
504	Use of graduated compression stocking		
505	Choosing the accurate measurement size of GCS		
506	Assessment of the graduated compression stocking		
507	Use the intermittent compression device 24 hours for bedridden patient		
508	Check the fitting of pneumatic compression device regularly		
509	Assessing the patient about sign and symptoms		
510	Educate the patient or family members about the danger and prevention of DVT		
511	Teaching the patient on sufficient fluid intake		
512	Teaching the patients about the use of graduated compression device		
513	Encourages patients to elevate their leg		
514	DVT risk assessment		
515	Advising at risk patients about life style changes		
516	Administration of anticoagulant medication		

Part V: Semi-structured interview question to explore perceived barriers that affect DVT prevention practice

Thank you for your participation in this research study that will be conducted in Ethiopia armed force hospitals. Through this interview, I hope learn how you think about DVT prevention in injured patients. When you answer the interview questions, please keep in mind that we are interested in your own thoughts and approaches. First, I have a consent form, I'd like you to read to make sure you understand, the reason for this study, and to see if you have any questions about becoming involved. Please take a few minutes to read it over.

INFORMATION SHEET

Hawassa University, Faculty of health science, School of Nursing

Study on practice and perceived barriers towards DVT prevention practice among nurses in Ethiopian Armed hospital, Ethiopia, 2023

Good morning/afternoon! My name is.....and I am going to conduct an interview with you on behalf of Mr. Andualem Teshome a postgraduate student at Hawassa University, institute of health faculty school of nursing. I would like to ask questions towards DVT prevention

This study is designed to investigate the perceived barriers that affect DVT prevention practice. The study will summarize your thoughts on the issues raised and by using the data to come up with a better plan of how to improve DVT prevention practice service.

Honesty is needed to make this information useful in identifying strength/weakness of the current system and addressing them.

The interview may take between 20-30 minutes. I will record sounds, so I do not miss any of your response. I will take note. You are requested to answer the question as honestly as you can. I assure you that whatever information you provide will only be used for the purpose of this research and will not be made available to anyone and your name is not mentioned in the form.

I appreciate you too much for your willingness and support to respond the interview. I also assure that the interview process will not bring any harm to you and your family. Your participation is voluntary. If you choose not to answer a particular question, that is your right. You are also permitted to withdraw any time from the study when you feel uncomfortable with it.

Therefore, to participate in this study you:

Agree ———————

Not agree ———————

Address of the principal investigator: Andualem Teshome Cell phone: +251 986875661, E-mail andualemteshe22@gmail.com

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I understood that Andualem Teshome is the person to contact, if I have questions about the study or about my rights as a study participant.

Respondent's signature_____

Date of interview: _____ Time started: _____ Time finished: _____

Interviewer Name _____Signature _____ Date_____

Supervisor's name _____ Signature _

Results of interview questionnaire

1. Completed
2. Refused
3. Partially completed

Before we begin the interview, I would like to take a few minutes to complete this form, which consists of a few demographic questions

1. Sex 1. Male 2. Female
2. Age_____
3. Education related to DVT
    1. yes 2. No
4. source of education_____
5. work experience_____

Thank you. Now I will move on to some question about DVT prevention.

1. Can you tell me your awareness or knowledge concerning DVT? What are the contributing factors on the occurrence of DVT?
2. Is that possible to prevent DVT? How? Probe anything else to add? In your hospital which prevention method routinely performed? Why?
3. Is there an obstacle in DVT prevention practice? Can you tell me detail please? How these problems are solved?

Is there anything else you would like to tell me?

Future Recommendation

What do you recommend for future? What else?

How responsible body can handle such issue? What about you?

Is there anything else you would like to add?

Thank you very much for sharing your views. We really appreciate it.

Data collector Name_____ signature_____

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በኢትዮጵያ የጦር ሆስፒታል ውስጥ ባሉ ነርሶች መካከል የ DVT መከላከል ስራዎች ላይ ሊኖሩ የሚችሉ መሰናክሎች ጥናት ፣ እ.ኤ.አ. 2023

እንደምን አደርክ/አደርሽ / አረፈክ/አረፈድሽ! ስሜ ..... እናም በሀዋሳ ዩኒቨርሲቲ የድህረ ምረቃ የነርሲንግ ትምህርት ቤት የጤና ፋክልቲ ተቋም ተማሪ ሚስተር አንዱዐለም ተሾመ በመወከል ከእርስዎ ጋር ቃለ ምልልስ አደርጋለሁ,. ከ DVT መከላከል ጋር የተዛመዱ ጥያቄዎችን መጠየቅ እፈልጋለሁ

ይህ ጥናት በ DVT መከላከል ስራዎች ላይ ተጽዕኖ ያላቸውን መሰናክሎች ለመመርመር የተቀየሰ ነው. ጥናቱ በተነሱት ጉዳዮች ላይ ሀሳቦችዎን ያጠቃልላል እንዲሁም የ DVT መከላከል ስራዎች አገልግሎትን እንዴት ማሻሻል እንደሚቻል የተሻለ ዕቅድ ለማውጣት ይጥቅማል. የአሁኑን የመከላከል ስርዓት ጥንካሬ / ድክመት ለመለየት እና እነሱን ለመፍታት ይህንን መረጃ ጠቃሚ ለማድረግ ሐቀኝነት ያስፈልጋል. ቃለመጠይቁ ከ 30 እስከ 40 ደቂቃዎች ሊወስድ ይችላል. ድምፆችን እመዘግብለሁ ፣ ስለዚህ ማንኛውም ምላሽዎት አያመልጠኝም. ልብ በሉ. ጥያቄውን በሐቀኝነት እንዲመልሱ ይጠየቃሉ. እርስዎ የሚሰጡት መረጃ ሁሉ ለዚህ ምርምር ዓላማ ብቻ ጥቅም ላይ የሚውል እና ለማንም የማይገኝ እና ስምህ/ስምሽ በቅጹ ውስጥ እንደማይጠቀስ አረጋግጣለሁ. በቃለ መጠይቁ ምላሽ ለመስጠት ፈቃደኛነትዎ እና ድጋፍዎ በጣም አደንቃለሁ. የቃለ መጠይቁ ሂደት ለእርስዎ እና ለቤተሰብዎ ምንም ጉዳት እንደማያመጣ እርግጠኛ ነኝ. የእርስዎ ተሳትፎ በፈቃደኝነት ነው. ለአንድ የተወሰነ ጥያቄ ላለመመለስ ከመረጡ ያ የእርስዎ መብት ነው. እርስዎም ምኞት የማይሰማዎት ሆኖ ሲሰማዎት ከጥናቱ በማንኛውም ጊዜ እንዲወጡ ተፈቅዶልዎታል.

ስለዚህ በእነዚህ ጥናቶች ውስጥ ለመሳተፍ-:

ይስማማሉ — — — — — — — —

አይስማሙም — — — — — — —

የዋና መርማሪው አድራሻ-አንዱዐለም ተሾመ ሞባይል ስልክ: 251 986875661 ፣ ኢ-ሜል እናualemteshe22@gmail.com

የፀሐፍ የስምምነት ውል

ይህንን ሰነድ በመፈረም ፣ እ.ኤ.አ. በ 2023 በኢትዮጵያ የጦር ሀይሎች ሆስፒታል ውስጥ ባሉ ነርሶች መካከል የ DVT መከላከል ስራ ላይ ያሉ እንቅፋቶችን ለማወቅ በሚደረገዉ ቃለመጠይቅ ላይ ለመሳተፍ ፈቃደኛ ነኝ ። ስለ ጥናቱ ዓላማ ተነግሮኛል. በዚህ ጥናት ውስጥ መሳተፍ ሙሉ በሙሉ በፈቃደኝነት መሆኑን ተረድቻለሁ. ለጥያቄዎቹ የሰጠሁት መልስ ለሌላ ለማንም እንደማይሰጥ ተነግሮኛል ፣ እናም የዚህ ጥናት ዘገባዎች በምንም መንገድ አይለዩም. የእኔ ተሳትፎ ወይም ተሳትፎ-አልባነት ወይም ለጥያቄዎች መልስ ለመስጠት ፈቃደኛ አለመሆኔ በእኔ ላይ ምንም ተጽዕኖ እንደማይኖረው ተነግሮኛል. በዚህ ጥናት ውስጥ መሳተፍ ምንም ዓይነት አደጋዎችን እንደማያካትት ተረድቻለሁ.

ስለ ጥናቱ ወይም ስለ እኔ መብቶች እንደ ጥናት ተሳታፊ ጥያቄ ካለኝ አንዱዐለም ተሾመ የማነጋግረው ሰው መሆኑን ተረድቻለሁ.

የተሳታፊው ፊርማ_____

የቃለ መጠይቅ ቀን: _____ የተጀመረበ ሰዐት: _____ የተጠናቀበት ሰዐት: _____

ቃለ-መጠይቅ ያካሂደው ስም _____

ቀን_____ ፊርማ_____

የተቆጣጣሪው ስም _____ ፊርማ _

የቃለ መጠይቅ ውጤቶች

1.ተጠናቅቋል

2. በከፊል ተጠናቅቋል

3. ውድቅ ተደርጓል

ቃለመጠይቁን ከመጀመራችን በፊት ጥቂት የስነ ሕዝብ አወቃቀር ጥያቄዎችን ያቀፈውን ይህንን ቅጽ ለማጠናቀቅ ጥቂት ደቂቃዎችን መውሰድ እፈልጋለ

1. ጾታ 1. ወንድ 2. ሴት

2. ዕድሜ_____

3. ስለ DVT ትምህርት ወስደዋል?

1. አዎ 2. አልወሰድኩም

4. በምን አገኙ_____

5. የስራ ልምድ_____

አመሰግናለሁ. አሁን ጥቂት ስለ DVT መከላከል መሰናክል ጥያቄዎች እሸጋገራለሁ.

1. ስለ DVT ያሎትን ግንዛቤ ወይም እውቀት ቢያካፍሉኝ? በምን አይነት ሰዎች ላይ ይከሰታል ብለው ያምናሉ? ለምን?

2. DVTን መከላከል ይቻላል? በምን በምን መንገድ መከላከል ይቻላል? አንተ/አንቺ በምትሰሩበት ሆስፒታል የትኞቹ የመከላከያ መንገዶች አዘውትረው ይሰራሉ? ለምን? በአጠቃላይ DVT ን የመከላከል ስራው ምን ይመስላል?

3. DVT መከላከል ስራ እንዳይተገበር የሚያደርጉ ችግሮች አሉ? ካሉ ምን ምንድናቸው?

እንዴትስ ማስወገድ ይቻላል?

ሊነግሩኝ የሚፈልጉት ሌላ ነገር አለ?

የወደፊቱ የውሳኔ ሃሳብ

ለወደፊቱ ምን ይመክራሉ? ሌላስ?

እንዲህ ዓይነቱን ጉዳይ ምን ያህል ታላፊነት የሚሰማው አካል ሊቆጣጠር ይችላል? ስለ አንተስ?

ማከል የሚፈልጉት ሌላ ነገር አለ?

አመለካከቶችዎን ስላጋሩ በጣም እናመሰግናለን. እኛ በእውነት እናደንቃለን.

የመረጃ ሰብሳቢ ስም_____ ፊርማ_____