School of Nursing

KNOWLEDGE, PRACTICE TOWARDS VENOUS THROMBOEMBOLISM PREVENTION AND ASSOCIATED FACTORS AMONG NURSES WORKING AT PUBLIC SPECIALIZED HOSPITALS IN CENTRAL ETHIOPIAN REGION, 2024

By: -Abdi Aman

A Research Paper Submitted To Saint Paul's Hospital Millennium Medical College School Of Nursing Presented In Partial Fulfillment Of The Requirements For The Degree Of MSc In Cardiothoracic Nurse Practitioner

August, 2024

Addis Ababa, Ethiopia

Knowledge, Practice towards Venous Thromboembolism Prevention and Associated Factors among Nurses Working at Public Specialized Hospitals, Central Ethiopia Region, 2024

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Academic Research Proposal

Name of investigator	Abdi Aman
The full title of the research project	Knowledge, Practice towards Venous Thromboembolism Prevention And Associated Factors In Public Specialized Hospitals Central Ethiopia Region, 2024
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Abstract

Background: - A venous thromboembolism (VTE) is a blood clot that blocks the flow of blood through the vein. The problem is steadily increasing in low-income countries where resources are scarce. Moreover, in Sub-Saharan Africa, including Ethiopia found a high prevalence of venous thromboembolism (50.4%) among hospitalized patients. So Nurses are crucial in the prevention of venous thromboembolism.

Objectives: - to evaluate knowledge, practice towards venous thrombi-embolism prevention and associated factors among nurses working at public specialized hospitals in central Ethiopia region, 2024

Methods: An institutional-based cross-sectional study design was conducted from May 1 / /2024 to July 1 / /2024 at Central Ethiopia Region of public specialized hospital. Systematic random sampling was deployed to select 422 respondents. Data was entered into Epi-data version7 and exported to Statistical Package for Social Science version 27 to be analyzed. To determine where there is significant relationship between the dependent and independent variable, bivariable and multivariable logistic regression was carried out

Results: - Overall, about 53.4% and 43.4% of nurses had good knowledge and practice towards VTE prevention, respectively. The odds of having knowledge of VTE prevention were two times higher among BSc holders compared with those with a diploma [(AOR = 2.1, 95% CI = 1.72–6.27)], and the odds of having knowledge of VTE prevention were six times higher among nurses who had received training [(AOR = 6.4, 95% CI = 4.27–9.74)]. The odds of practicing VTE prevention were two times higher among nurses who had received training compared with those who had not [(AOR = 2.1, 95% CI = 1.64–11)], and the odds of practicing VTE prevention were twelve times higher among nurses with a good level of knowledge compared with those with poor knowledge [(AOR = 12.3, 95% CI = 7.6–15.85)].

Conclusion: - This study revealed that educational status and receiving targeted training were significantly associated with good knowledge of VTE prevention. Additionally, a good level of knowledge about VTE prevention and receiving targeted training were significantly associated with a high level of practice towards VTE prevention.

Keywords: - Knowledge, Practice, Venous Thromboembolism Prevention, Associated Factors, Nurse

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Acronyms and Abbreviations

CI	Confidence Interval
CT-SCAN:	Computerized Tomography Scan
CVC:	Central Venous Catheter
DVT:	Deep Venous Thrombosis.
HA-VTE	hospital-acquired venous thromboembolism
ICD	International Code of Disease
ICU:	Intensive Care Unit
Km	kilometer
NHMRC	National Health and Medical Research Council
NHMMSH	Nigist Helen Mohammed Memorial Specialized Hospital
NICE:	National Institute for Health Care Excellence
PE:	Pulmonary Embolism
PI	Principal Investigator
PICC:	Peripherally Inserted Central Catheter
PTS	Post Thrombotic Syndromes
SPHMMC	St. Paul's Hospital Millennium Medical College
SPSS:	Statistical Package for Social Science
VTE:	Venous Thrombi-Embolism
WSH	Worabe Specialized Hospital
WUSH	Welkite University specialized hospital

1. INTRODUCTION

1.1. Background

Venous thromboembolism (VTE) is the development of single or multiple blood clots in the deep veins. A blood clot (thrombus) that forms in the vein, sometimes breaks loose and enters the circulation as an embolus, and eventually lodges in and fully obstructs a blood vessel is known as venous thromboembolism(1). Deep vein thrombosis is the most prevalent kind of venous thromboembolism(2). An obstruction in a pulmonary blood artery could result from the embolism. Massive pulmonary emboli can result in fatal collapse. Because they both have the ability to impede blood flow in the veins, deep vein thrombosis and pulmonary embolism are grouped together under the general term of venous thromboembolic disorders(3,4). Venous thromboembolism is the most common preventable cause of death among hospitalized patients(5). It is considered the main problem among hospitalized patients(6). The problem is steadily increasing in low-income countries where resources are scarce. Moreover, a multinational study conducted in Sub-Saharan Africa found a high prevalence of VTE (50.4%) among hospitalized patients. Ethiopia with the second largest population in Africa shares the serious challenges of VTE-related complications(7,8).

It is stated that nurses' knowledge and practices in cardiovascular disease, particularly VTE prevention, are inconsistent, despite the expectation that they possess competent abilities and strong understanding in VTE risk assessment and prevention(9). The most frequent obstacles that clinical nurses had when doing VTE risk assessment and prevention were a lack of resources such as clinical practice guidelines, inadequate support from organizations, a lack of expertise, and a lack of training(10). Data from the published study revealed that (50-80%) of VTE cases are preventable. Anyone can get Venous thromboembolism, but certain factors put more at risk (11). People who develop Venous thromboembolism often have more than one risk factor contributing to the condition, the most natural cause of blood clotting is injury or infection(12). Occasionally, a medical procedure such as surgery, chemotherapy, IV placement, or catheter implantation causes the harm. Long-term hospital patients are more likely to clot because they may be recovering from an illness or wound, are undergoing invasive medical procedures, and are immobilized in a medical facility(13).

Moreover, tissue factor, also referred to as tissue thromboplastin, is released by injured vascular tissue and initiates the coagulation cascade's extrinsic pathway(14). After eventually invading the thrombus, fibroblasts damage valves and leave scars on vein walls. While valve damage is irreversible and affects directional flow, patency may be recovered(4,15).The cost of investigating symptomatic patients, the risk and cost of treatment (bleeding), Post Thrombotic Syndromes (PTS), and chronic thromboembolic pulmonary hypertension. The US Surgeon General issued a call to action to prevent DVT and PE. This statement outlines key research priorities to address knowledge and practice gaps in VTE(7,16).

According to the Centers for Disease Control and Prevention, venous thromboembolism ranks as the seventh most common reason for individuals to have unplanned hospital readmissions after surgery(17).Therefore, by implementing preventive measures, 70% of hospital-acquired venous thromboembolism episodes can be avoided. The fact that up to 50% of VTE cases lack a clear initiating trigger highlights a critical gap in our knowledge of the mechanisms underlying the formation of pathogenic venous thrombus. Even with the wealth of published information, there appears to be an increasing gap between instructions and the implementation of preventative strategies. Specifically, the engagement of medical professionals in preventive Nursing professionals educate patients and the public about risk-reduction techniques, such as monitoring patients' well-being while(9,18).

In the hospital care context, nurses play a critical role in identifying and assessing patients' deep vein thrombosis risk factors. When sufficient knowledge along with proper patient care including graduated compression stockings, administration of the correct dose of an anticoagulation agent with careful assessment and monitoring of risk factors by nurses help to minimize the burden of VTE and its complications(12,19). A patient may be protected from an unnecessary adverse event by having information and well-developed assessment abilities to recognize a change in their health state or to identify a risk factor for venous thromboembolism(20). In poor nations, the level of venous thromboembolism prevention practiced by nurses is still relatively new, despite their critical role in preventing problems associated to venous thromboembolism(21). Poor venous thromboembolism prevention knowledge and practice among nurses may result in more frequent hospital stays and worse healthcare outcomes overall(22).

1.2. Statement of the Problem

The risk of venous thromboembolism is rising, a threat to public health around the globe. Up to 600,000–900,000 individuals in the USA may be affected by the incidence of VTE; 60,000–100,000 of them pass away each year. With significant morbidity and mortality, this is a serious global health concern. In the USA, an estimated 2 million people get VTE every year; 600,000 of those cases result in hospitalization, and 60,000 cases involve venous thrombus formation(5,23). Venous thromboembolism is the third most frequent acute cardiovascular disease, following myocardial infarction and stroke, with an annual incidence rate of 39–115 per 100,000(24). Venous thromboembolism is a significant cause of morbidity and mortality in hospitalized medical and surgical patients around world and considered as a common leading cause to increase length stay and cost in hospitalized patients(25).

In Sub-Saharan Africa found a high prevalence of VTE (50.4%) among hospitalized patients, in developing nations like Ethiopia, venous thromboembolism is on the rise. Inadequate knowledge and poor practice of nurses towards VTE prevention increased patients' complications, so Nurses are crucial in the prevention of venous thromboembolism(2,26). Approximately 10 million cases of Venous thromboembolism occur every year across low, middle, and high-income countries(27). The European Union also experiences a substantial venous thromboembolism burden of nearly 684,019 deep venous thrombosis, 434,723 pulmonary embolisms, and 610,138 post-thrombotic syndrome events that occur annually and cost billions of dollars each year. Hospitalization for acute medical illness is related to an eightfold increased risk of Venous thromboembolism(11,28).

The Venous thromboembolism-related cost estimate for 2014 ranged from $7 billion to $10 billion based on 375,000–425,000 incident cases in the US On a per-patient basis, 2014 annual incident costs were estimated at $12,000–$15,000 The National Health and Medical Research Council (NHMRC) state that, 'The incidence of Venous thromboembolism as a complication of hospital admission is commonly underestimated(8,29). Between 40% and 60% of all VTE events occur during or in the 3 months after a hospitalization, and hospitalization increases the risk of VTE by approximately 100-fold. The implementation of the NICE guidelines and the use of pharmacological and non-pharmacological devices will all drive the reduction in hospital mortality and morbidity from venous thromboembolism(30).

In Africa, studies show that one identified risk factor for venous thromboembolism development is prolonged immobility(31). The prevalence of DVT in ICU is 8% in an Eritrean Hospital and the prevalence of pulmonary embolism in medical patients ranges up to 61.5%, with a mortality rate between 40% and 69.5% and the case-fatality rate of pulmonary embolism after surgery was 60%(26). Kenyan and White revealed that African-American patients are the highest risk group for first-time VTE. In Nigeria, the prevalence of VTE is 2.9%, with increased risk in male patients older than 40 and those with cancer(31).

According to estimates from the National Institute for Clinical Studies, venous thromboembolism VTE causes 2,000 deaths and 30,000 hospital admissions in Ethiopia annually. Many of the 2,000 deaths could have been avoided with competent nursing care, appropriate risk assessment, and interventions(5,32). A study conducted in teaching hospitals in Ethiopia, 186 (93%) of the 200 medically hospitalized patients had at least two risk indicators for the development of VTE(33). A substantial 70% reduction in the incidence of VTE can be achieved through appropriate nursing knowledge and preventive measures, as venous thrombosis embolism accounts for nearly 10% of all hospital deaths and over half of VTE incidents are hospital-acquired(34). To my knowledge reading of literature, no study has been conducted related to nurse's knowledge and practice about venous thromboembolism in study area. Therefore, to know the level of knowledge and clinical practice of nurses towards venous thromboembolism prevention in hospitals selected region.

1.3. Significance of the study

Medical workers who care for patients in hospitals around-the-clock are called nurses. The importance of this study that hopefully the result will help health care practitioner, hospital administrator and policy maker to make adoption for specific measures to improve prevention of VTE in hospitalized patients that may lead to decrease morbidity and mortality. Apart from provided support for further researched in the study region and country, the study served as a foundational document for the development of policies and quality assurance protocols related to the prevention of VTE in government and healthcare settings. To support regular monitoring of VTE prevention practices, individualized feedback and opportunities for improvement are needed to reinforce the importance of adherence to evidence-based guidelines. Apart from providing support for the next generation of research in the study region and nationally, the study were act as a foundational document for the development of VTE prevention strategies and quality assurance protocols in government and healthcare settings. It also provides managers with the knowledge they need to plan, create, and carry out guidelines, and it acts as a reference for continuous quality improvement in the existing venous thromboembolism prevention.

2. Literature review

2.1. Overview

Globally, pulmonary embolism and deep vein thrombosis (DVT) are the main causes of illness and mortality. Worldwide, venous thromboembolism is a chronic condition that affects around 10 million people annually(35). In the United States alone, it affects up to 600,000 patients annually. Preventive health's practices not only assist minimize the burden on essential services and healthcare expenses, but they also help curtail disease(38). Europe and the USA have the most comprehensive data on the incidence of VTE. According to a 2021 American Heart Association research In South Korea, for example, the incidence of VTE was estimated to be 0.2 per 1,000 person-years; data for South America and Oceania are less complete (39).

Research conducted in Buenos Aires, Argentina, and Perth, Australia, revealed that the incidence of VTE was 0.7 and 0.8 per 1,000 person-years, respectively(40). The prevalence of VTE in Africa is mostly unknown, This projection, which depicted approximately 370,000 occurrences of pulmonary embolism and approximately 857,000 cases of DVT in 2016, was based on previously unreported data from the National Inpatient Sample. A high prevalence of thrombotic complications has been reported in critically ill patients(41). Majorities of patients admitted to a critical care unit have a major risk factor for VTE, and most of them have greater than one risk factor (42).

In-hospital VTE is an important indicator of overall health, with even asymptomatic VTE associated with a threefold increased risk of death among hospitalized, acutely ill patients(43). It is also associated with significant cardiac and pulmonary complications such as hypoxia, and increased pulmonary vascular resistance (pulmonary hypertension) leading to right heart failure and bleeding(44). Risk factors for DVT are multifactorial and can be classified as modifiable or non-modifiable. Modifiable risk factors include immobility, HIV infection, sepsis, malignancy, heart failure, renal failure, diabetes mellitus, obesity, long travel, trauma, and surgery. Non-modifiable risks include gender, age, race, and hereditary risk factors(45). Epidemiological studies have revealed that HIV-infected patients have a 2-10-fold risk of developing VTE compared to the general population. Heart failure is associated with a 2-3-fold risk of DVT and PE(46).

It is estimated that approximately one-third of individuals with VTE have an identifiable inherited thrombophilia(47). Thromboembolism has been noted to be common among individuals taking the combined oral contraceptives(48). Pregnancy is associated with up to 5-fold risk of VTE and 60-84-fold risk three months after delivery(49). Ethiopia with DVT being almost twice more common than PE, The exact incidence of VTE is not known due to the lack of a national registry. However, it is estimated that the annual incidence of VTE is around 300,000–600,000 cases(50).According to a descriptive study conducted in California approximately 44% of hospital nurses have good knowledge of VTE risk assessment and only 31% of them complete VTE risk assessment in their patients(51). Similarly, a study done in South Korea indicates that only 16.2% of nurses have good knowledge and 15% of nurses complete VTE risk assessment on all of their patients(52).

Studies had been done to implement VTE guidelines, but few studies had been done to evaluate knowledge, and practice among nurses. It has a high impact on patients' quality of life and imposes a great financial effect on society(53). Attentiveness and monitoring are important to decision making, that also required, knowledge, and responsiveness that are elements of situational awareness which clearly identified and supported by the nurse(54). Nurses are on the frontline of thrombosis prevention, they play a crucial role in diagnosis and risk assessment, applying timely preventive methods, and providing vital educational and psychological support for patients with venous thromboembolism, so skilled nursing intervention can be lifesaving, they have positively affected outcomes in mechanical or physical DVT prophylaxis(55).

They educate patients regarding the importance of physical therapy and early movement through early ambulation, leg elevation, and leg flexing, active and passive range of motion exercises(56). Prevention of DVT is a patient safety issue, Patients must be evaluated by nursing as a routine, guided by institutional protocols and preventive measures must be implemented(57). As for pharmacological measures, it is up to the nurse to double check and the non-pharmacological measures are competence of nurses, and must be implemented with initiative, based on evidence, supported by protocols, without waiting for the prescription of another professional. VTE knowledge and compliance exhibited a positive relationship, meaning that nurses with high knowledge also had high compliance(58).

Nurses play a key role in the detection, treatment, and prevention of VTE. Including the DVT risk assessment as a routine daily practice is critical to preventing hospital-acquired DVT. Direct care nurses are patients' advocacy and can help bridge gaps between patients' specific situations and physicians' knowledge(59). That a lack of knowledge was the main barrier to performing DVT risk assessment. There is evidence that prevention is the safest, most effective, and cost-effective strategy for reducing VTE morbidity and mortality(60). The mechanical methods were as follows: non-pharmacological measures recommended for the prevention of VTE in the hospitalized patient: mechanical compression stockings and intermittent pneumatic compression devices; Nursing care: early mobilization and ambulation(61). Different studies revealed that Knowledge of healthcare providers and availability of VTE risk assessment and prophylaxis guidelines in hospitals is less, which decreases standard practice for VTE prophylaxis(62).

According to the research conducted on how nursing care is provided for the prevention of venous thrombi-embolism (VTE) in hospitalized patients, the use of mechanical and physical interventions and educating patients on VTE are identified as important measures (63). Clinical risk identification tools are necessary for all patients with suspected PE to decrease the burden of both diagnostic failure and unnecessary testing. Different conditions and situations can affect the quality of nursing care and treatment in intensive care units especially on venous thrombi-embolism. These factors may include scope-demographic factors, knowledge, and practice of nurses. Similarly, the knowledge and practice of nurses can be affected by different factors(64).

2.2. Socio-demographic

The study evaluated the impact of nursing care standards on preventing deep vein thrombosis among patients undergoing hip surgery. The largest percentage (76.7%) of them had the highest educational attainment and nursing knowledge with over 10 years of expertise, more over half of them (56.7%) were experienced professionals(65). Moreover, none of the research subjects had ever taken a course on nursing care methods for preventing VTE before. In contrast, 96.2% of research participants were female nurses, with a mean age of 29.years(66). Nursing bachelor's degrees (55.1%) and master's degrees (6.9%) were held by almost 62% of the population. They had worked for 5.3 (±4.7) years on average, and for 3.7 (±3.2) years, they had worked in the unit. Of the respondents, less than 10% stated they had participated in an in-service on VTE care but had not taken any more VTE education

or refresher courses(67). According to similar situations in tertiary hospitals of Addis Ababa, Ethiopia conducted across-sectional study on knowledge and practice 51.6 %, and 45.4% respectively(64) .

2.3. Knowledge about venous thromboembolism prevention

(21). The majority of the participants (50%) appeared to have mediocre to poor knowledge of VTE, despite having sufficient exposure and experience in the relevant unit as registered nurses. Comparably, a South Korean study on nurses' awareness of VTE risk factors and preventive measures for hospitalized patients found that most nurses had just a moderate understanding of the disease, with only 16.2% having a high understanding (68). The majority of nurses are aware that a number of risk factors for VTE include family history of DVT/VTE (77.6%), prior history of DVT/VTE (70.9%), immobilization in hospitalized patients (69.1%), paralysis, paresis, or a recent plaster cast on lower extremities (67.3%), cardiac diseases (27.3%), infections and inflammations (29.7%), and trauma (33.9%)(69).

A study conducted in the University Hospital of Northern Cyprus shows venous thrombi-embolism (VTE) as a fatal complication of DVT (87.9%) and VTE is a major cause of sudden death in hospitalized patients (67.9%) respectively. In contrast, a study on nurses' knowledge of venous thromboembolism prevention in north China suggests that there is a high risk of VTE among ICU patients. The findings demonstrated that over 60% of the medical staff believed that higher risk factors for VTE in emergency, surgical, and intensive care unit patients included varicose veins in the lower extremities (75.9%), immobility (71.6%), postoperative status (68%), and a history of VTE (61%)(70).

2.4. Practice of nurses on venous thrombi-embolism prevention

Using mechanical and physical interventions, as well as educating nurses about VTE, is one important measure in nursing care provided for the prevention of venous thromboembolism (VTE) in hospitalized patients. Another important measure is encouraging early ambulation surgical patients to use graduated compression stockings and clinical practice guidelines outline risk-specific interventions by patient demographic(71).

A descriptive study on staff nurses' knowledge and self-reported clinical practice on VTE prevention in a few units of the tertiary care Amrita Institute of Medical Sciences, Kochi, found no significant

correlation between their knowledge and practice in treating hospitalized patients for VTE. This could be because there are no tight protocols in place that clearly demonstrate the application of these nursing strategies to prevent domestic violence(73).

But in a quasi-experimental study, Benda University Hospital found that just 20% of the nurses under investigation implemented their practices to a satisfactory degree when it came to preventing deep vein thrombosis in patients after hip surgery. Following the establishment of nursing care guidelines, the majority of nurses (93.3%) possessed a satisfactory level of venous thromboembolism practice(56,73). The cross-sectional descriptive study on nurses' knowledge and practice of venous thromboembolism (VTE) risk assessment and prevention was carried out in Korea. The practices of nurses in preventing VTE are demonstrated by this descriptive study, which was carried out with registered nurses in a university hospital in Northern Cyprus. Specifically, nurses never use graduated compression stockings (80.6%), educate patients to prevent injury (73.9%), administer anticoagulants as a preventive measure in the clinic (71.5%), monitor the side effects of the anticoagulants (71.5%), advise patients to drink enough fluids (66.1%), and elevate their legs (65.5%) (22,71).

2.5. Factors affecting nurses on venous thromboembolism prevention

An exploratory descriptive web-based study carried out in California found that the participating nurses' most frequent excuses for not having enough time (21%) and knowledge (21%) for evaluating VTE risk and providing preventive therapy. These factors may include scope-demographic factors, knowledge, and practice of nurses. Similarly, the knowledge and practice of nurses can be affected by different factors(74).

According to this descriptive study, nurses with a bachelor's degree (72.9%) had a greater rate of knowledge than those who graduated from a healthcare vocational high school (46.9%), which was done with registered nurses in a university hospital in Northern Cyprus. The research revealed that nurses with bachelor's degrees had a higher rate of preventative practices (13.2%) compared to those who graduated from the Healthcare vocational high school (3.7%) at ($P < .05$). Healthcare practitioners in acute care settings are less likely to comply with clinical practice guidelines for venous thromboembolism due to a systematic review by Gaston S. and White(75).

2.6. Conceptual framework

Numerous factors can influence a nurse's knowledge and practice regarding the prevention of venous thromboembolism. They may have socio-demographic characteristics connected to some of the criteria. Nurses' knowledge and practice about VTE can be greatly impacted by their work environment, age, sex, work experience, and educational attainment. According to this, elements connected to the health system include supplies, the ratio of nurses to patients, in-service and on-the-job training, ward rotation, etc.

Knowledge and practice towards VTE prevention might be impacted by additional professional and social elements, including peer pressure and interdisciplinary considerations. (27, 33, 58, 59), On the other hand, knowledge and practice can affect each other. This condition is going to be shown in the following diagram.

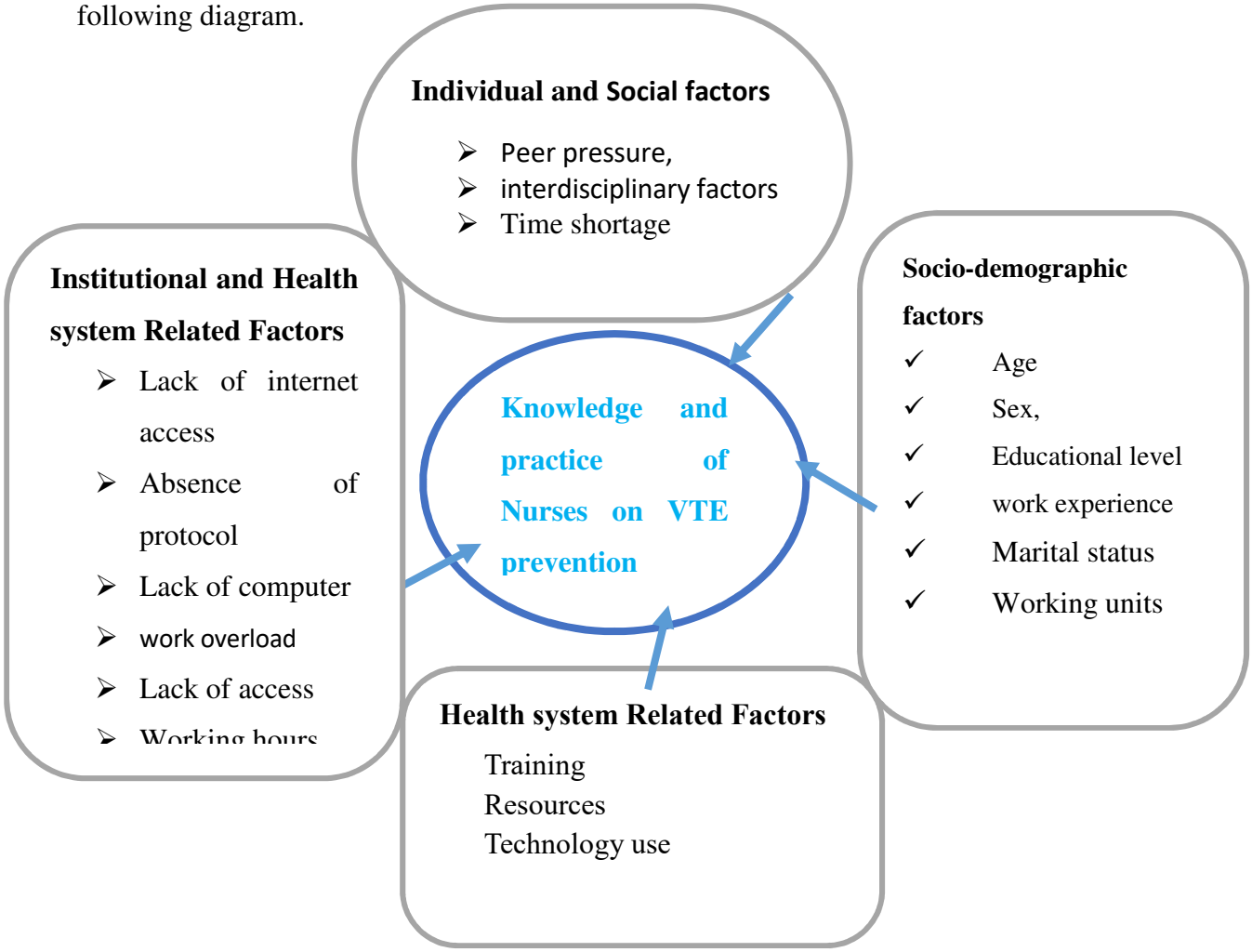

Figure 1 Conceptual framework that shows factors associated with VTE prevention (social-demographic, individual and institutional(26,32,59,60)

3. Objectives

3.1. General objective

To assess knowledge, practice towards venous thromboembolism prevention and associated factors among nurses working at public specialized hospitals in central Ethiopia Region, Ethiopia, 2024

3.2. Specific objectives

To identify knowledge level of nurses towards venous thromboembolism prevention among nurses working at Central Ethiopia Region public specialized hospitals from May 1 / 2024 to July 1 / 2024

To evaluate level of practice of nurses towards venous thromboembolism prevention among nurses working at Central Ethiopia Region public specialized hospitals from May 1 / 2024 to July 1/ 2024

To identify factors affecting knowledge of venous thromboembolism prevention among nurses working at Central Ethiopia Region public specialized hospitals from May 1 / 2024 to July 1 / /2024

To identify factors affecting practice of venous thromboembolism prevention among nurses working at Central Ethiopia Region public specialized hospitals from May 1 / /2024 to July 1 / /2024

4. Methods and Materials

4.1. Study setting and Study periods

The research was conducted at Central Ethiopia Region public specialized hospitals from May 1/ 2024 to July 1/ 2024. The Central Ethiopia region's capital city, Hossana, is situated 244 km south of Addis Ababa, 58 km from Worabe, and 124 km from Wolkite. It has 7 zones and 3 special woreda.

According to the Central Ethiopia Health Bureau's profile, the total population of the region is estimated to be 6,430235 in 2015E.C. with 3,182,966 (49.5%) males and 3,247,269 (50.5%) females. Additionally, the population projection shows that the Hadiya zone has a total population of approximately 1,838043, with male 911118 (49.5%) and female 926925 (50.5%), the Silte zone has a total population of approximately 1,191,141 with male 589615 (49.5%) and female 601,526 (50.5%), and the Gurage zone has a total population of approximately 1,539,325 with male 761,966 (49.5%) and female 777,359 (50.5%).

There are 228 health centers, 1,065 health posts, 314 private clinics, three general hospitals, three specialized hospitals, 18 basic hospitals, and three health centers in the region. Of the 2809 employees across the three hospitals, 1491 work in the medical field. Across the three hospitals, there are 579 nurses working: 235 at Hospital WSH, 190 at Hospital NHSH, and 174 at Hospital WSH. The study was focus on these three public specialized hospitals.

4.2. Study design

A hospital-based cross-sectional study design was employed among nurses at Central Ethiopia Region public specialized hospitals from May 1/ 2024 to June 1/ 2024

4.3. Study population

4.3.1. Source population

All nurses who work at the Central Ethiopia Region,

4.3.2. Study population

All Nurses working in WCSH, NHCSH, and WUCSH, and were available during data collection time between May 1/ 2024 to July 1/ 2024

4.3.3. Sampling unit

Individual nurses working in the public specialized hospital

4.4. Eligibility criteria

4.4.1. Inclusion criteria

All nurses working at the public specialized hospital of the Central Ethiopia Region, during the study period were included in the study.

4.4.2. Exclusion criteria

Nurses who have level three diplomas and below educational level and maternity leave

4.5. Sample size determination and sampling technique

4.5.1. Sample size determination

The sample size was calculated using a single population proportion formula, proportion was knowledge and practice 51.6 %, and 45.4% respectively (since research conducted in Ethiopia was found) (64).

$$n = \frac{(Z\ \alpha/2)^2 \times p\ (1-p)}{d2}$$

P= Prevalence rate knowledge 51.6 %(it was taken from a cross-sectional study conducted in a similar situation in tertiary hospitals of Addis Ababa, Ethiopia)

D= (5%) is the maximum margin of error the researcher is willing to tolerate

Z=1.96 the standard normal deviation value responding to 95% CI

N = total nurse in each specialized hospital and the sampling procedure is explained explicitly in Figure 3.1.

$$n = \frac{(Z\ \alpha/2)^2 \times p\ (1-p)}{d2}$$

k= Prevalence rate knowledge 51.6 % (it was taken from a cross-sectional study conducted in similar situations in tertiary hospitals of Addis Ababa, Ethiopia) (64).

$$n = \frac{(1.96)^2 \times 0.516\ (1 - 0.516)}{(0.05)^2}$$

$n=\frac{3.8416 \times 0.516\ (0.484)}{(0.0025)} = \frac{0.9594}{0.0025} = 383.76 = 384$

P= Prevalence rate practice 45.6% (it was taken from a cross-sectional study conducted in similar situations in tertiary hospitals of Addis Ababa, Ethiopia)

D= (5%) is the maximum margin of error the researcher is willing to tolerate

Z=1.96 the standard normal deviation value responding to 95% CI

$n= \frac{(Z\ \alpha/2)^2 \times p\ (1-p)}{d2}$

$n = \frac{(1.96)^2 \times 0.454\ (1 - 0.454)}{(0.05)^2}$

$n=\frac{3.8416 \times 0.454\ (0.46)}{0.0025} = \frac{0.802279744}{0.0025} = 320.9118976 = 321$

Table 1: sample size calculation on associated factor(28).

Variables	Out com		Power	OR	Sample size	Reference
	exposed	Non expose				
Training	262	260	80	3.701	298	
Educational level	224	222	80	3.871	256	
Work environment	326	324	80	5.07	378	
Working department	156	154	80	4.802	182	

Sample size estimation using Epi- info version 7 for second objective

I took a greater sample size that is 384. Then by adding a 10%, nonresponse rate which is 38.4 ≈38, the final sample size were 422.

4.5.2. Sampling procedure

The overall sample was allocated based on the study population to each hospital and the sample was selected by using a systematic random sampling. All the nurses met on different shifts of all the ward units were selected as sample.

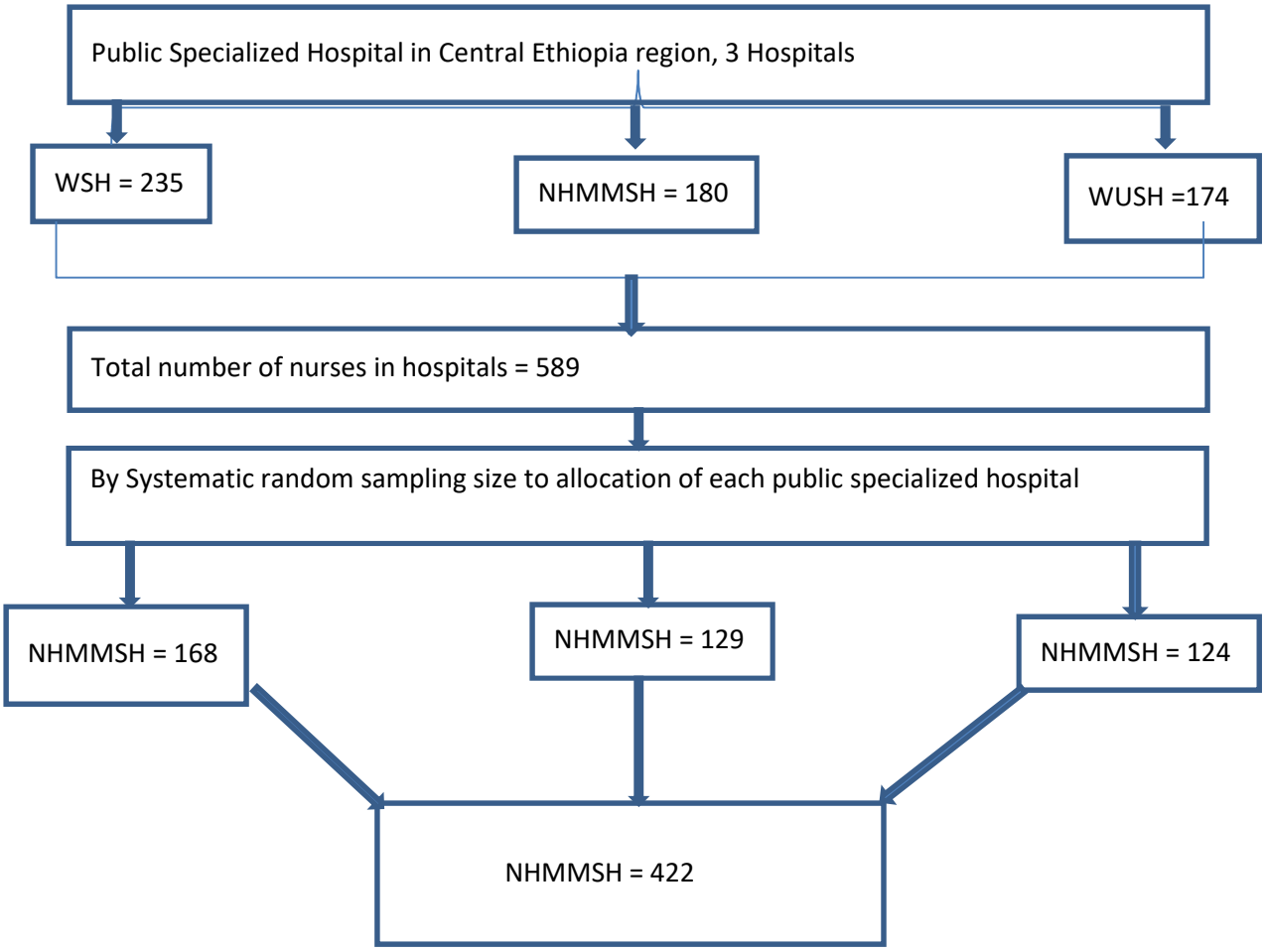

Figure 2 : Total number of population in the three hospitals and proportional allocation of study participants from each hospital by calculating k-value.

I assign a regular interval number they were used to select which members of the target population were included in the sample. The sample interval (k) is decided by dividing the population size (N) by the sample size (n). I have list of 589 customers (target population) and I wanted to survey 422 of them, my interval would be 1 this means that I have taken sample every 1th person in list of 589 customers.

589 / 422 = 1

To ensure systematic random sample, I use a random starting point within the range from 0-k. So if k = 1 randomly start with the 2nd name in the list and then sample every 1th person taken

WSH = 235 x 422/589 = 168

NHSH = 180 x 422/589 = 129

WUSH= 174 x 422/589 =125

4.6. Study variables

4.6.1. Dependent variables

Knowledge of Venous thromboembolism prevention

Practice Venous thromboembolism prevention

4.6.2. Independent variable

The independent (explanatory) variables of the study are:

Socio-demographic variables: Age, Sex, marital status, Educational level, religion, residence, Work experience, working units, and working hours).

Individual factors: - time shortage peer pressure, professional role conflict, unwillingness to new ideas, not being able to evaluate research, lack of ability to use a computer, lack of awareness of research articles, specific nursing care of venous thromboembolism

Institutional factors: - workload, lack of internet access, lack of computer, lack of access, training, resources, to reach library, administer support and lack of training, lack of protocol on venous thromboembolism prevention)

Health system factors:-training, resource, technology

4.7. Operational definitions

Venous thromboembolism - is a condition that occurs when a blood clot forms in a vein.

Deep vein thrombosis - It refers to developing a blood clot in a deep vein

Pulmonary embolism - is the obstruction of blood flow to one or more arteries of the lung by a Thrombus lodged in a pulmonary vessel

Good knowledge: respondents who answer correctly and those who scored equal or above the overall mean value from the total of knowledge-related questions(63)

Poor knowledge: respondents who answer below the overall mean value from the total of knowledge-related questions(63).

Good practice: respondents who answer correctly and those who scored equal to or above the overall mean value from the total of practice-related questions (61)

Poor practice: respondents who answer below the overall mean value from the total of practice-related questions (61)

Time shortage: as respondents said "I have a shortage of time to search current research VTE"

Factors: were obstacles to implementing venous thromboembolism prevention. These factors could be related to the nurses' experience, educational level, knowledge, and institutional related (50).

Always : if they perform every day and under never (7).

Some times : if you perform seldom (7)

Never : if you don`t do any time(7)

4.8. Data collections tools and Techniques

Data was collected using a pretested and structured self-administered questionnaire and In addition structured observational checklist was utilized to evaluate the nurse's practice, which is adapted from different literature(2,3,14,31,37,38,57,61,62). The questionnaires are prepared in English and organized into four main sections: socio-demographic, knowledge, practice, and associated factors of venous thromboembolism prevention. Six BSc nurses and Three MSc nurses were recruited as data collectors and one MSc nurse as supervisors to each hospital respectively. They received one-day

training on how to facilitate the data collection process, the aim of the study, confidentiality and consent.

The questionnaires were written in English and adapted from studies on knowledge and practice towards venous thromboembolism (VTE) prevention. The data collection tool used was as follows: Nurses Self-Administered Interview Questionnaire: This tool was constructed by the investigator after reviewing relevant literature. It assessed nurses' knowledge regarding the prevention of VTE among hospitalized patients. The tool contained 34 questions, with a total score of 68 points(16,19). Knowledge obtained from the studied nurses was checked against a model key answer. One point was given for correct answers, and two points were given for incorrect answers.

The total scores of knowledge were summed and converted into a mean score. The scores were classified into two categories: Good Knowledge: Total scores ≥ 50% and Poor Knowledge:

Total scores < 50% Practice Domain: This domain contained 16 questions scored on a 10-point scale using multinomial regression (always, sometimes, and never). Both "always" and "sometimes" were recoded as indicating practice, while "never" was coded as no practice. Nurses had a good level of practice when the total score was equal to or above 50%, and poor practice if the score was below 50%.

Content Validity**:** Content validity was ascertained by experts in nursing at Hawassa Specialized Hospital. Their opinions were elicited regarding the format, layout, consistency, accuracy, and relevancy of the tools(r=0.79). Reliability Analysis**:** The internal consistency of the tool was measured using Cronbach's Alpha test. The results were as follows: Interviewing Questionnaire: Cronbach's Alpha(r= 0.76) and Observational Checklist: Cronbach's Alpha = 0.812

A pilot study was conducted on 5% of the subjects (n=21 nurses) selected randomly from the previously mentioned settings. These nurses were later included in the sample. The pilot study tested the applicability, feasibility, practicability, and clarity of the constructed tools. It also helped estimate the time needed for each subject to complete the questionnaire. According to the results of the pilot study, no items were omitted, so the nurses were included in the study sample. Fieldwork: Fieldwork included the following steps:

The investigator met and introduced her to the nurses in the previously mentioned settings, explained the purpose of the study, and assessed each nurse individually using the previously mentioned tools.

The investigator observed the actual practice of every nurse using the observational checklist to ensure realistic practice. The observational checklist was filled out by the researcher within 20-30 minutes. The knowledge questionnaire tools were then distributed to all nurses and filled out in the presence of the investigator to ensure that the questions were answered completely. The completed tools were immediately delivered to the investigator to avoid any biases resulting from the interaction of nurses with each other. The time required to complete the knowledge questionnaire was around 15-20 minutes.

4.9. Data quality control and management

The quality of data was assured by applying properly designed and pre-tested data collection tools; the tools were pre-tested out of the three public specialized hospitals Validity and reliability was checked by using Cronbach's alpha test and 21individual were pretested in Hawassa specialized Hospital and with similar setup one week before the actual data collection to increase its reliability to elicit relevant information and to check completeness and consistency. Then corrective measures were taken before the actual time of data collection in addition, training was given to data collectors and supervisors, and proper categorization and coding of the questions were made. Finally, data collectors were closely followed by the supervisors and principal investigator.

Reliability and Validity

Reliability on a sample of 21 nurses test/retest reliability results using Cronbach Alpha revealed that all items are significantly different and have a correlation coefficient above the threshold of significance ($r = 0.79$). On the other hand, the alpha value for the performance checklist in the sample was ($r = 0.76$) which indicates the strong reliability of both tools.

4.10. Data analysis

Before data entry it was cleaned, coded, checked for outlier and missing values. Then it was entered using Epi-data version 4.6.0 (Epi-Data Entry was used for simple or programmed data entry and was documentation). The data was exported to SPSS (statistical package for social science) version 27

software for analysis. Univariate analysis computed by frequency, proportion and summary measures, such as mean and standard deviation, Bivariate and multivariate logestic regression was used to see significance of association between the outcome and independent variable. To determine the strength of association odd ratio with 95% confidence interval was used all variable having a p-value less than or equal to 0.2 were enter in to multivariable logistic regression analysis. Multicolineality was checked by variance inflation factors(VIF) and maximum number was 4.62 and model of fitness was checked by lesmer-lemshowp-value, which was > 0.05 variable with a p- value less than 0.05 in the multivariable logistic regression model were consider as statistically significant. The results are presented using texts, tables, and graphs

4.11. Ethical and legal considerations

To conduct the study, ethical clearance was obtained from the Institutional Review Board (IRB) (Reference no.pm23/1168, CER/682305/16, RN001/2024) respectively of St. Paul's Hospital Millennium Medical College. A letter was then sent from the school to the Central Ethiopia Region Health Bureau and the relevant public hospital authorities. Permission was obtained from the medical directors at each hospital before the actual data collection period. This permission letter was provided to the respective responsible bodies, and the study participants were informed about the purpose and procedures of the study. Confidentiality was maintained by using codes instead of stating their names. Participants were also informed of their right to withdraw from the study at any time during the data collection process."

4.12. Dissemination plan

The study findings will be presented to St Paul's Millennium Medical College School of Nursing with defense & present to those who need it and accordingly will advocate for those who can implement mainly, hospitals and regional health bureau. The findings will be also disseminated to the Ministry of Health for policy-making and will be used as a baseline for further research and will be published in national journals.

5. Result

From 422 initially sampled participants, 414 have participated giving a response rate of 98.1%; the mean age (standard deviation) the respondent was 31.27 (± 9.26) years. About 64.5 % of the study

participants are female, and about 20.3 % had work experience of 6-10 years. Among the respondents, 62.6% were married. The majority of participants had a bachelor's degree in nursing 93%. Regarding the working unit, 22% of participants were from the surgical unit and 5.7% were from the medical unit. 88.4% of participants not taken previous training in venous thromboembolism

(Table 1)

Table 2: Socio-demographic characteristics of nurses working at Public Specialized Hospitals Central Ethiopia Region, 2024

Variables	Category	Frequency	Percent
Sex	Male	147	35.5
	Female	267	64.5
Age in years	<= 25	201	48.6
	26-33	173	41.8
	34-41	35	8.5
	>42	5	1.2
Marital status	Single	140	33.8
	Married	259	62.6
	Divorced	12	02.9
	Widowed	3	0.7
Work experience (IN YR)	< 1 years	49	11.8
	1-5 years	261	63
	6-10 years	84	20.3
	>11 years	20	4.8
Educational level	Diploma Nurse	12	2.9
	BSC degree	385	93
	MSc nurses	17	4.1
Previous training in Venous Thromboembolism	Yes	48	11.6
	No	366	88.4
Department	Emergency	61	14.7
	medical	65	15.7

	departments		
	surgical departments	91	22
	OBY/GYN	26	6.3
	Operating theaters	43	10.4
	ICU	27	6.5
	Orthopedics	43	10.4
	Outpatient dept.	18	4.3
	Pediatrics	40	9.7
How long working hours per day	8 hrs.	285	68.8
	16 hrs. every other day	129	31.2

Knowledge and preventive practice on VTE

About 68.6% of the study participants agreed to "Yes" that, the absence of venous thromboembolism guidelines affects nurses' VTE prevention Practice in public specialized hospitals.in addition 70.5% of the study participants agreed that doctors' attitude towards nurses' role in VTE preventive practice impairs

Nurses' VTE prevention in the public specialized hospitals (Figure 4)

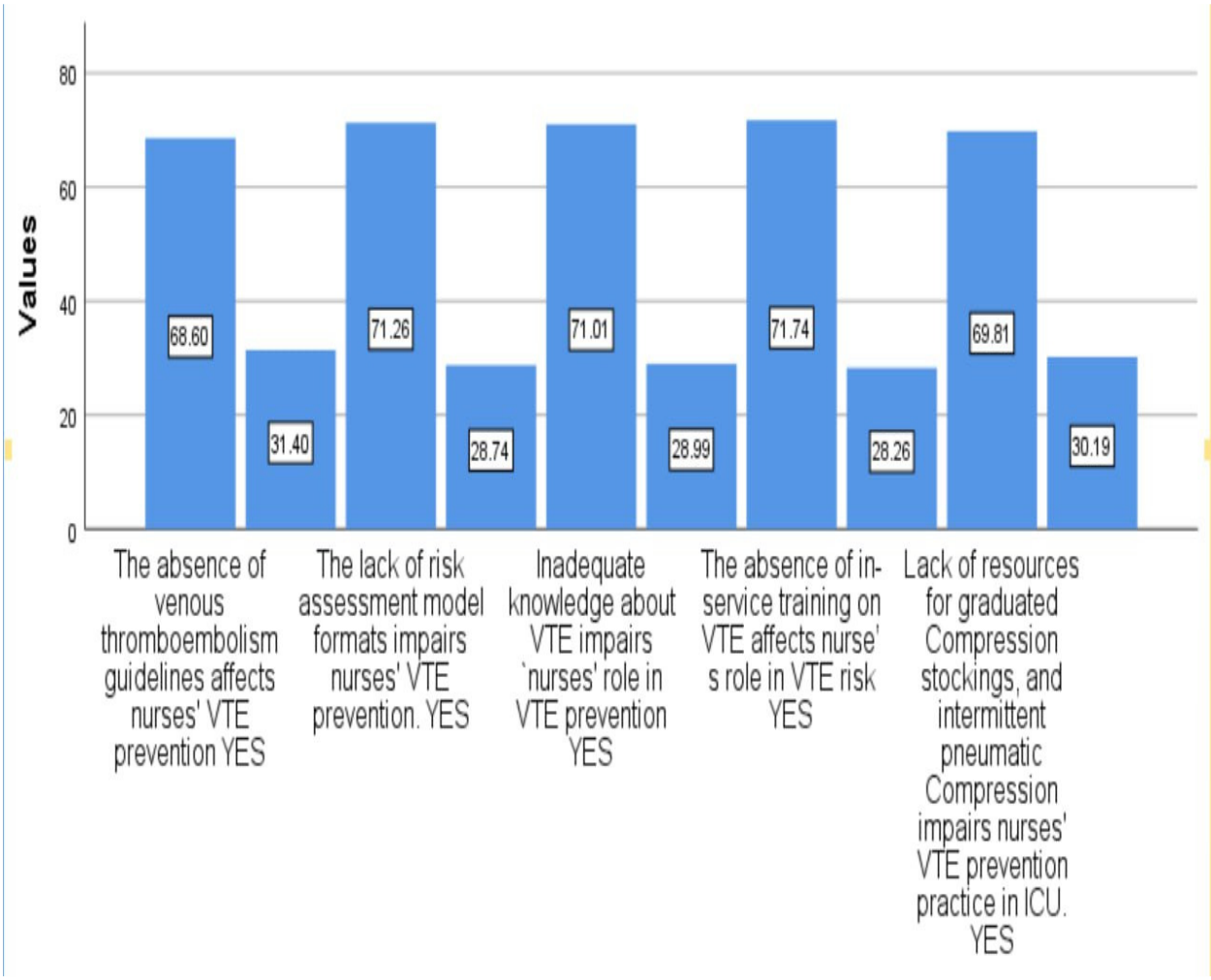

Figure 3: Knowledge and preventive practice on VTE of nurses working at Public Specialized Hospitals Central Ethiopia, 2024

Knowledge towards Venous Thromboembolism Prevention

Majority 53.4% (221) of the study participants had good Knowledge towards Venous Thromboembolism Prevention.

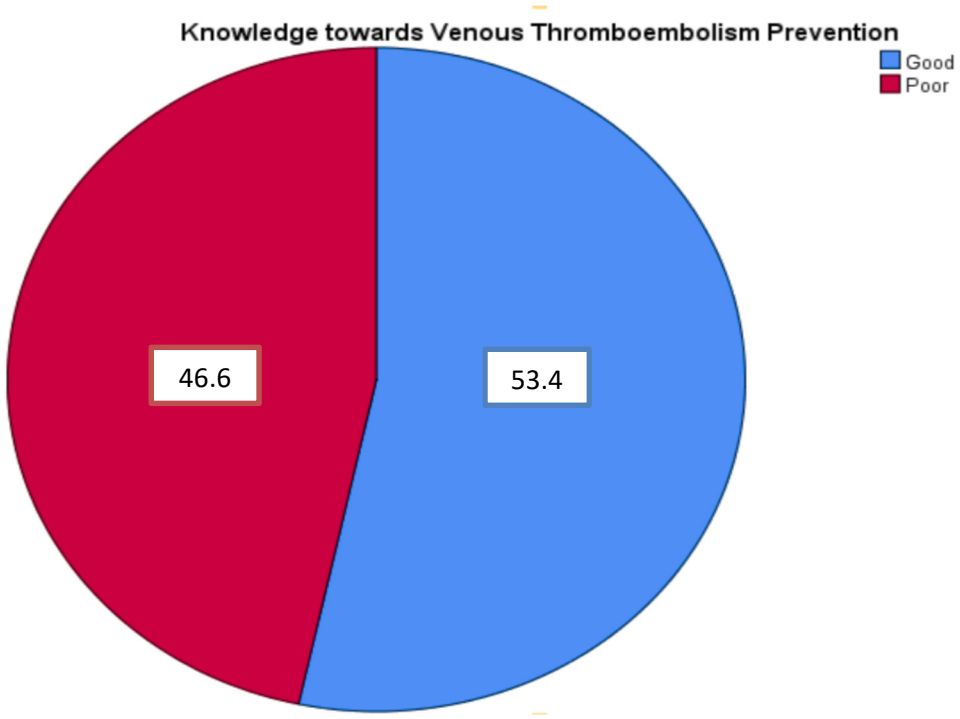

Figure 3: knowledge towards Venous Thromboembolism Prevention among Nurses Working at Public Specialized Hospitals, Central Ethiopia, 2024

Practices of VTE prevention

About 48.07 % of the study participants reported that they always provide information to patients and/or relatives about prevention of VTE; furthermore 19.08 % of the study participants reported that they always encourage patients to do foot and leg exercises by themselves or relatives to help if patients are unable to do so (Figure 5)

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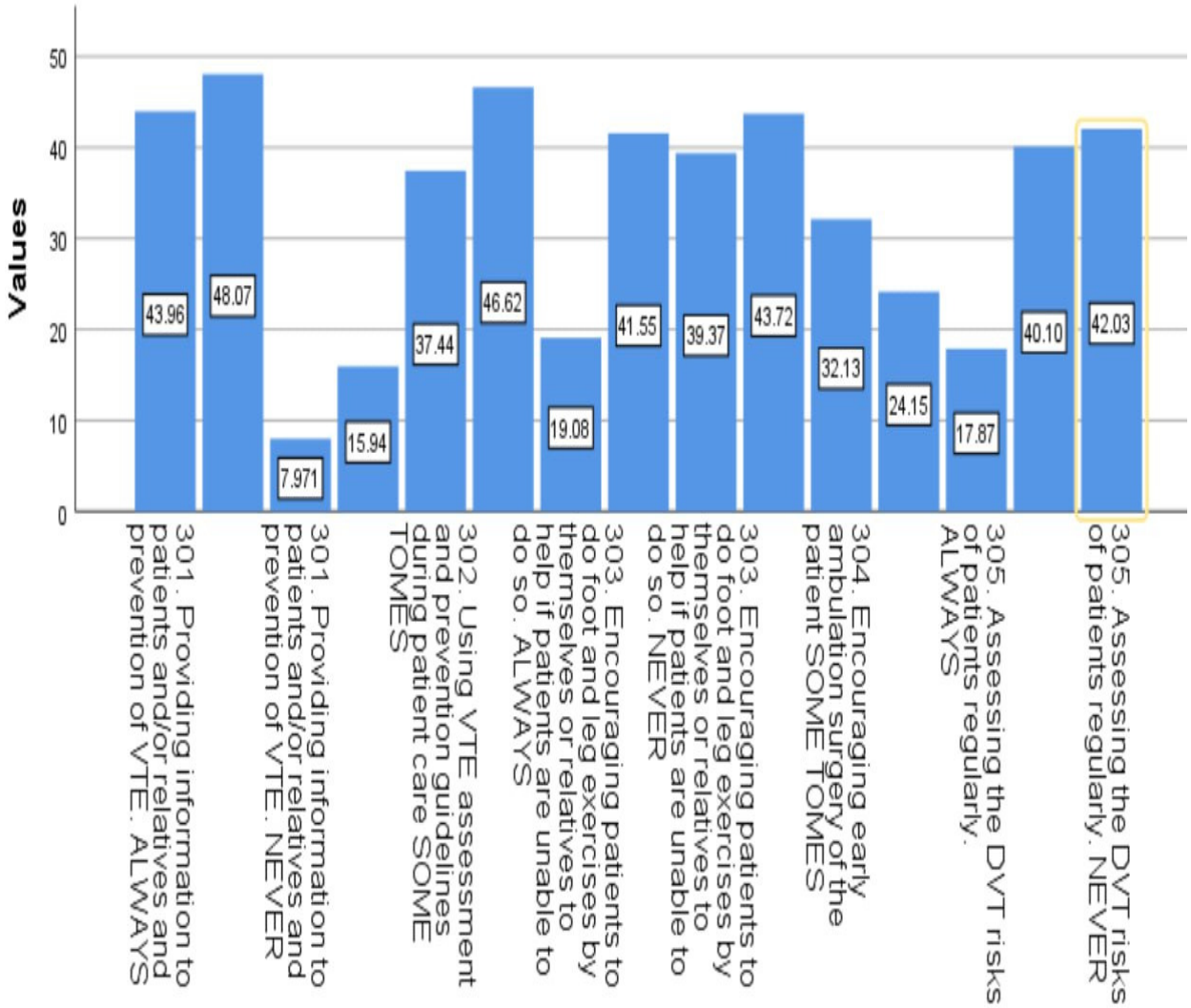

Figure 4: Practices of VTE prevention Among Nurses Working at Public Specialized Hospitals

Practices of VTE prevention

Majority (56.3%) of the participant had poor practice towards VTE prevention (Figure 7).

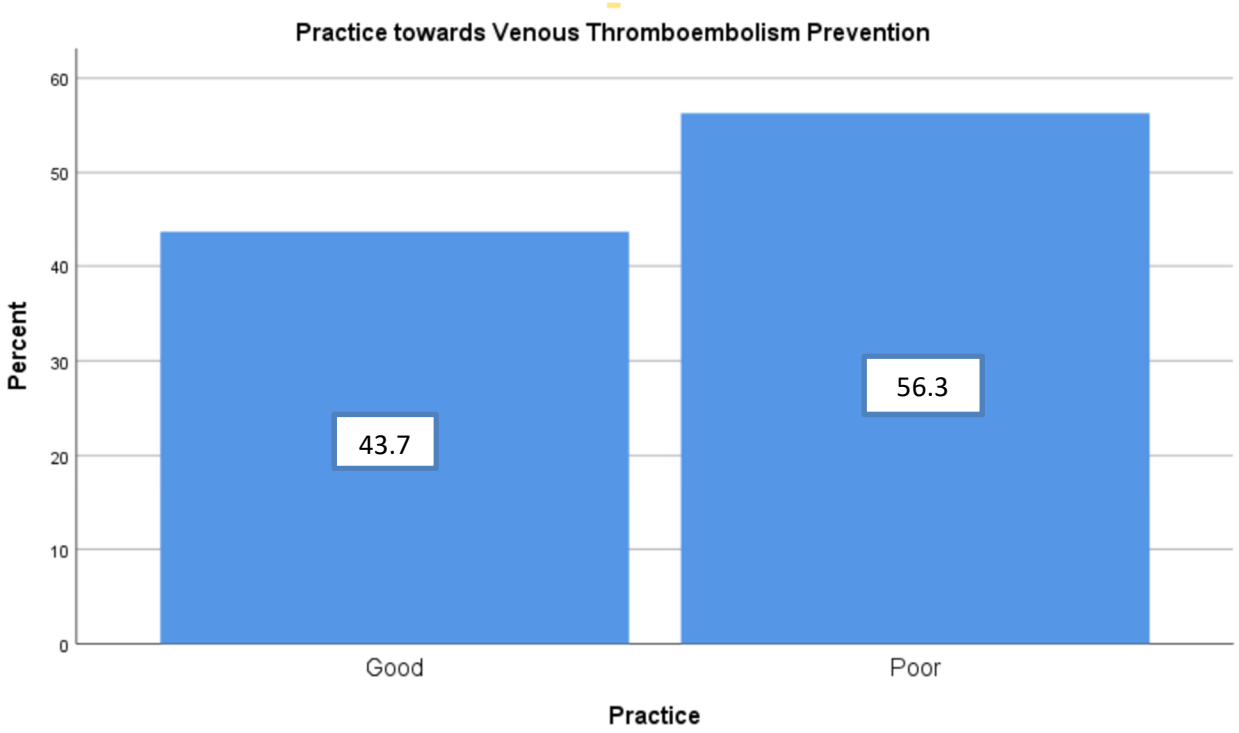

Figure 4: Practices of VTE prevention among Nurses Working at Public Specialized Hospitals Central Ethiopia, 2024

Factors associated with Knowledge of Venous Thromboembolism Prevention

Educational status and receiving targeted training had significantly associated with Knowledge towards VTE Prevention; Knowledge towards Venous Thromboembolism Prevention were about two times higher compared with Diploma holder nurses [AOR=2.1, 95% - CI = (1.72-6.27]. In addition Knowledge towards Venous Thromboembolism Prevention among nurses who had previous trainings was 6.4 times higher compared with those who had not received trainings [(AOR=6.4, 95% CI = (4.27-9.74)]. (Table 2)

Table 3: Factors associated with Knowledge towards Venous Thromboembolism Prevention among Nurses Working at Public Specialized Hospitals, in Addis Ababa, 2024

Variables	**Category**	Knowledge		**COR**	**AOR**	**P value**
		Good	**Poor**	**(95% CI)**	**(95%CI)**	
Sex	Female	128	19	12.6(8.37- 15.7)	7.4(3.28-11.29)	0.27
	Male	93	174	1		
Educational level	MSC or above	10	7	1.42 (1.17-7.37)	1.3(1.08-4.73)	
	BSC	269	116	2.3(1.24-5.38)	2.1(1.72-6.27)**	0.001
	Diploma	6	6	1		
Work experience	< 1 year	8	41	1	1	
	1-5	102	159	3.28(1.72-6.27)	2.5(1.38-8.7)	0.37
	6-10	67	17	20.2(16.33-23.7)	9(6.33-11.28)	0.23
	>10 year	12	8	7.6(2.72-9.25)	3.3(1.29-7.49)	0.39
Previous Training	Yes	41	7	6.05(8.37-14.22)	6.4(4.27-9.74)**	0.001
	No	180	186	1		

* * Significant at P = ≤ 0.002, COR =odds ratio, AOR=Adjusted odds ratio, CI= Confidence interval

Factors associated with Practice of Venous Thromboembolism Prevention

Receiving targeted training had significantly associated with practice towards VTE Prevention; practice towards Venous Thromboembolism Prevention were about two point four times higher compared with nurses who did not receive trainings [AOR=2.1, 95% CI = (4.64-11]. In addition practice towards Venous Thromboembolism Prevention among nurses who had good level of knowledge was 12.3 times higher compared with those who had poor level of knowledge [(AOR=12.3, 95% CI = (7.6-15.85) (Table 3).

Table 4: Factors associated with Practice of Venous Thromboembolism Prevention among Nurses Working at Public Specialized Hospitals, in Central Ethiopia Region, 2024

Variables	**Categories**	**Practice**		**COR**	**AOR**	**P value**
		Good	**Poor**	**(95% CI)**	**(95%CI)**	
Educational level	MSC or above	11	6	1.3(0.47-4.73)	1.2(0.24-4,83)	0.72
	BSC	163	222	0.52(0.27-5.36)	0.2(0.09-3.72)	0.28
	Diploma	7	5	1	1	
Work experience	< 1 year	18	31	1	1	
	1-5	99	162	1.05(0.37-4.87)	0.9(0.53-3.72)	0.72
	6-10	53	31	2.94 (1.17-6.75)	2.3(1.86-4.7)	0.36
	>10 year	11	9	2.1(1.63-4.82)	1.7(1.2-7.34)	0.44
How long participants work	8 HR.	147	138	2.97(1.27-8.43)	2.4(1.85-5.37)	0.27
	16 hrs. every other day	34	95	1	1	
Previous Training	Yes	39	9	10.89(6.9-12.32)	7.6(4.64-11)*	0.03
	No	142	357	1	1	

Knowledge	Good Poor	163 18	58 175	27.3(24.7-31.74) 1	12.3(7.6-15.85)* 1	0.02

* Significant at P = <0.05, OR =Odd ratio, AOR=Adjusted odd ratio, CI= Confidence interval

6. Discussion

The finding from the current study indicates that about half of nurses employed at public specialized hospital in Central Ethiopia Region had good level of knowledge regarding to the prevention of venous thromboembolism. In contrast, around two-third of the nurse working at public hospital in Central Ethiopia Region had poor practice regarding venous thromboembolism prevention. Educational status and receiving targeted training had statistically significant association with knowledge and receiving targeted training with practice regarding venous thromboembolism prevention.

The level of good knowledge (53.4%)towards venous thromboembolism prevention of the current study is comparable with the study finding conducted in tertiary hospital of Addis Ababa reveal that only (51.6%) had adequate knowledge(64) and University-affiliated hospital in China correct response to knowledge items(60.1%) for clinician and 55.4% for nurses(65).

The magnitude of good practice level towards Venous Thromboembolism Prevention (VTE) (43.7%) is lower than findings from cross-sectional study conducted Addis Ababa (45.4%) had good practice towards venous thromboembolism prevention (64).; Institutional-based cross-sectional study was conducted among nurses working at Amhara region comprehensive specialized hospitals, Northwest, Ethiopia, which showed 48.8% magnitude of good practice towards VTE prevention practice (66).

There are several key reasons why nurses working in different hospitals in the different studies had varying levels of good practice when it comes to venous thromboembolism (VTE) prevention. Some of the main factors include; access to Training and Education; the availability and quality of VTE prevention training and educational opportunities provided to nurses can vary across different hospital settings, leading to disparities in knowledge and skills; Organizational Culture and Leadership; interdisciplinary Collaboration, the level of collaboration and communication between nurses, physicians, pharmacists, and other healthcare team members in developing and implementing VTE prevention strategies can impact the consistency of nurse practices; moreover resource availability is also key factor (67, 68).

The odds of Knowledge of Venous Thromboembolism Prevention among nurses was 2.1 times more among B.Sc. holder nurses compared with Diploma holder nurses; this finding is align with An

institutional-based cross-sectional study conducted among nurses in Addis Ababa(64).; and a cross sectional study among nurses working at Amhara region hospitals(66).; this might be, because, Nurses with higher levels of education, such as those with a Bachelor's degree or higher, tend to have more comprehensive and up-to-date knowledge about VTE prevention compared to nurses with only a diploma. Nursing programs with higher educational levels (e.g., BSN, MSN) typically devote more curricular time and resources to covering the pathophysiology, risk assessment, prophylaxis strategies, and evidence-based guidelines related to VTE prevention; moreover, higher levels of nursing education are associated with the development of stronger critical thinking and problem-solving abilities, which are essential for identifying and addressing VTE-related issues in clinical practice (69, 70).

The odds of Knowledge of Venous Thromboembolism Prevention among nurses who had related training was 6.4 times more compared with those who had not received related training, this finding is similar with; a cross sectional study done at a university-affiliated hospital in China (65). a national survey study done in Peking Union Medical College Hospital(71).; this might be due to, Nurses who have participated in dedicated training programs or educational sessions focused on VTE prevention demonstrate significantly higher levels of knowledge and adherence to VTE prevention guidelines compared to those without such training. Nurses who have received VTE prevention training are better equipped to accurately assess patient risk factors, identify appropriate prophylactic measures, and implement evidence-based interventions to reduce the incidence of VTE. Training programs expose nurses to the latest clinical practice guidelines, research evidence, and best practices in VTE prevention, enhancing their understanding and ability to translate this knowledge into clinical decision-making(72, 73).

The odds of Practice of VTE prevention among nurses was 2.4 times more among nurses who had received a training on it compared with those who did not received a training ; this finding is consistent with a study conducted at the Johns Hopkins Hospital, an academic medical center in Baltimore, Maryland(74).; and a study at University Of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia(75).; this is because nurses who have received targeted VTE prevention training are better equipped to translate their acquired knowledge into clinical practice, leading to improved implementation of evidence-based VTE prophylaxis interventions. Moreover, training programs not only enhance nurses' understanding of VTE prevention but also provide opportunities to develop

practical skills, such as proper use of mechanical devices, medication administration, and patient education, which are essential for effective VTE prevention practices(67).

Nurses who have undergone VTE prevention training often feel more confident and empowered to advocate for appropriate VTE prophylaxis measures, leading to better adherence to institutional policies and guidelines. Training programs often reinforce the importance of VTE prevention and make nurses more aware of their role in contributing to institutional quality metrics and patient outcomes, further motivating them to improve their practices (73).

The odds of good Practice of Venous Thromboembolism Prevention among nurses was 12.3 times more among nurses who had good level of knowledge compared with those who had poor knowledge of Venous Thromboembolism Prevention; this finding is consistent with Institutional-based cross-sectional study conducted among nurses working at Amhara region comprehensive specialized hospitals, Northwest, Ethiopia(66).; and a cross-sectional in Saudi Arabia(72).; this might be because; Nurses with a higher level of VTE prevention knowledge are better equipped to assess patient risk, select appropriate prophylactic measures, and make informed clinical decisions, leading to improved implementation of VTE prevention strategies (75).

Nurses with a deeper understanding of the significance of VTE and the potential consequences of its complications are more motivated to ensure that appropriate VTE prevention measures are consistently implemented. Nurses with a stronger grasp of VTE prevention are better equipped to communicate and collaborate with other healthcare professionals, such as physicians and pharmacists, to ensure a coordinated and comprehensive approach to VTE prevention; moreover, By prioritizing the development and maintenance of nurses' VTE prevention knowledge, healthcare organizations can empower their nursing staff to provide the highest quality of care and contribute to the reduction of VTE-related complications among patients(68, 75). Reducing hospital stays and recurrent VTE is best achieved through prevention(64). Furthermore, early detection, prevention, and control strategies of problems associated to VTE depend heavily on the knowledge and experience of nurses in VTE prevention(66, 67). Therefore, the purpose of this study was to evaluate the knowledge, practices, and related variables of nurses with relation to VTE prevention in public specialized hospital. The results of this investigation showed that nurses' practice were insufficient.

Strength and Limitation of the study

This study identified a tool applicable for assessing knowledge about venous thromboembolism (VTE) among nurses working at public specialized hospitals in the Central Ethiopia Region and Social desirability bias and recall bias are common in self-reported questionnaires used to assess nurses' knowledge and proficiency in VTE prevention. Not with standing these drawbacks, the knowledge, practice, and related variables of Central Ethiopian Region nurses working at comprehensive specialized hospitals about VTE prevention were amply demonstrated by this study. Therefore, future research should also consider examining attitudes to improve overall indicators of VTE prevention, this study demonstrated unequivocally the knowledge, practice, and related aspects of Central Ethiopia Region nurses working at public specialized hospitals with regard to VTE prevention.

7. Conclusion

Educational status and receiving targeted training were significantly associated factors with good Knowledge of VTE Prevention; whereas good level of VTE Prevention knowledge and receiving targeted training were significantly associated factors with good practice level towards VTE prevention. By implementing a comprehensive, evidence-based, and multifaceted training program, healthcare organizations should empower their nursing staff to enhance their knowledge and practice of VTE prevention, ultimately improving patient safety and outcomes.

8. Recommendations

- Policymakers should implement an interactive, evidence-based short training program for nurses, focusing on practical skills up like mechanical comprehension, patient education, and regular monitoring of VTE prevention practices.
- Public specialized hospital should efficiently enhance nurses' knowledge and practice towards VTE prevention. Healthcare organizations need to implement a system for continuous education, skills assessment, and feedback to help nurses maintain and continuously improve their knowledge and practice of VTE prevention over time.
- Consequently, for better patient outcomes, it is essential to upgrade educational level of nurses give training and apply protocol about venous thromboembolism prevention, therefore, upgrading

nurses' educational level, providing continuous training, and availing the clinical practice guidelines in all working units were important measures to increase nurses 'practice

- Collaborate with healthcare professionals to establish standardized diagnostic criteria and assessment tools for the identification and monitoring of PTE prevention
- Translate research findings into clinical practice

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Appendix

Annex I: Information sheet

Introduction

Good Morning/Afternoon. My name is_____. I am a trained data collector. This questionnaire is prepared to be filled out by data collectors as designated by the student researcher to these data for these research projects required in partial fulfillment of MSC in perioperative cardiothoracic surgery nursing in SPHMMC, School of Nursing. The research title is Knowledge, Practice towards Venous Thromboembolism Prevention and Associated Factors among Nurses Working at Public Specialized Hospitals in Central Ethiopia Region, Ethiopia, 2024.

Confidentiality

All data collected during the research process will be handled with utmost confidentiality and safety in a manner only the researcher and most relevant persons linked to this research will haveresponsible access.

Risk and Benefits

You may encounter unpleasant situations while participating in data gathering, such as squandering time or interrupting your work. However, I am hoping you will agree to take part in this study. There is absolutely no risk to you because of participating in this study. Participation as a respondent in this research process shall not bring you any kind of direct or immediate benefit in terms of money or any other. The information you provide will rather help the hospital and concerned bodies to improve hospital services that can also benefit you and your community**.**

Address of PI: -

Name: Abdi Aman

Cell Phone: +251911760439

E-mail: abdiamaan2023@gmail.com

Annex II: consent

I have read and understood the information provided to me. Therefore, my signature below indicates that I have decided to participate in the study voluntarily.

Participant's Name (Optional) _____

Participant's Signature:_____Date: _____

Investigator's/data collector's Signature:_____Date: _____

If you have any questions, you can contact the principal investigator at any time using the following address:

Name of the Principal Investigator: - Abdi Aman

Mobile Phone number: +251911760439

E-mail:-abdiamaan2023@gmail.com

Thank you in advance for your cooperation

Annex III: Questioner

Part I. Self-administered Socio-demographic characteristics questionnaire format.

Part I: Socio-demographic characteristics of the respondents		
ID	Questions	Code of variables
101	Sex	1. Male 2. Female
102	Age	_____years
103	Marital status	1. Single 2. . married 3. Divorced 4. Widowed
105	Year of work experience	1. < 1 years 2. 1-5 years 3. 6-10 years 4. >10 years
106	Educational level	1. Clinical nurse /Diploma 2. BSC degree 3. MSc nurses
107	Previous training in Venous Thromboembolism	1. Yes 2. No
108	In what department do you work?	1. Emergency departments 2. medical departments 3. surgical departments 4. Oby/Gyn 5. Operating theaters 6. ICU 7. Orthopedics
109	How long do you work per day	In hours_____

Part II. Self-administered questionnaire formats related to knowledge about venous thromboembolism and its risk factors

Part III: questions related to knowledge about VTE			
ID	Questions	Variable codes	
		Yes	No
201.	DVT occurs as a result of stasis of blood (venous stasis), vessel wall injury, and altered blood coagulation.		
202.	Venous thromboembolism (VTE) is a fatal complication of VTE		
203.	VTE is a major cause of sudden death in hospitalized patients.		
204.	Prolonged immobilization predisposes to VTE in hospitalized patients.		
205.	Indwelling intravenous vices such as central venous catheters and Peripherally inserted central catheter may predispose to VTE.		
206.	Paralysis, paresis, or recent plaster cast on the lower extremities may Predispose to VTE.		
207.	Obesity may predispose to VTE.		
208.	Sedation or neuromuscular blockage as risk factor for VTE.		
209.	Advancing age may predispose to VTE.		
210.	Previous DVT/VTE history may predispose to VTE.		
211.	No relationship exists between cancer or cancer treatment and DVT/VTE.		
212.	Major surgery may predispose to VTE		
213.	Varicose veins may exposé to VTE.		
214.	Acute myocardial infarction exposes the patient to VTE.		
215.	Trauma may predispose to VTE.		

216.	Renal dialysis may expose ICU patient to VTE.		
217.	Infection May Predispose To VTE.		
218.	Cardiac diseases may predispose to VTE.		
219.	No relationship exists between respiratory diseases and VTE.		
220.	Infections or inflammations may predispose to DVT.		
221.	Vasopressor administration may exposé ICU patient for VTE.		
222.	Pregnancy or postpartum may predispose to VTE.		
223.	Oral contraceptives or hormone replacement therapy may predispose to VTE.		
224.	Mechanical ventilation may predispose ICU patients to VTE.		
225.	There is no relationship between family histories of DVT/VTE.		
226.	Foot and leg exercises may prevent VTE.		
227.	Elevating legs is necessary to prevent DVT/VTE.		
228.	Use of VTE risk assessment model decrease chance missing patient problem.		
229.	Early ambulation after surgery may prevent VTE development.		
230.	Bed rest is necessary after major surgery to prevent VTE.		
231.	Heparin or low-molecular-weight heparin (LMWH) may prevent VTE development.		
232.	Fluid restriction is necessary to prevent VTE.		
233.	Elastic compression stockings may prevent VTE development in the unit.		
234.	The use of intermittent pneumatic compression devices may prevent DVT development.		

Part III. Questioner formats about practices of VTE prevention.

For each of the following questions please write "under always if they perform every day under sometimes if you perform seldom and under never if you don`t do any time.				
ID	Questions	Always	Sometimes	Never
301.	Providing information to patients and/or relatives and prevention of VTE.			
302.	Using VTE assessment and prevention guidelines during patient care.			
303.	Encouraging patients to do foot and leg exercises by themselves or relatives to help if patients are unable to do so.			
304.	Encouraging early ambulation surgery of the patient.			
305.	Assessing the DVT risks of patients regularly.			
306.	Using risk assessment score models			
307.	Recommending VTE prophylaxis if the patient is at risk for VTE during the assessment.			
038.	Administering anticoagulants as preventive measure in ICU.			
309.	Monitoring the side effects of the anticoagulants.			
310.	Educating the patients on anticoagulants.			
311.	Educating the patients to avoid injury.			
312.	Encouraging patients to elevate their legs.			
313.	Educating the patients on sufficient fluid intake.			
314.	Use of the graduated compression stockings.			
315.	Teaching the patients about proper use of graduated compression stockings			
316.	Assessing patient questionnaire rely for signs and symptoms of VTE.			

Part IV. Self-administered questioner formats related to factors affecting knowledge and risk assessment preventive practice on VTE.

Part V. Factors affecting knowledge and risk assessment preventive practice on VTE.			
ID	Question	Code of variable	
		Yes	No
401.	The absence of venous thromboembolism guidelines affects nurses' VTE prevention Practice in selected units.		
402.	The lack of risk assessment model formats impairs nurses' VTE prevention.		
V43.	Inadequate knowledge about VTE impairs `nurses' role in VTE prevention.		
404.	The absence of in-service training on VTE affects nurse's role in VTE risk Assessment.		
405.	Lack of resources for graduated Compression stockings, and intermittent pneumatic Compression impairs nurses' VTE prevention practice in ICU.		
406.	The high patient-to-nurse ratio in the ICU impairs nurses from VTE prevention.		
407.	Rotation with nurses in other units at different times affects nurses' VTE prevention.		
408.	Peer pressure from colleagues affects VTE prevention in the ICU.		
409.	Doctors' attitude towards nurses' role in VTE preventive practice impairs nurses' VTE prevention in the selected unit		

Part V. observational checklist format(6) .

Venous thromboembolism observational guidelines items		Done right and complete		Done but no right and complete		Not done	
		n	%	n	%	n	%
501	Doing foot exercise regularly.						
502	Early ambulation 2 times per day.						
503	Regularly moving bedridden patients						
504	Remove the sleeve for about 30 min to check the skin (2 times a day).						
505	Daily assessment of the graduated compression stockings.						
506	Used intermittent pneumatic compression devices for 24 hours for bedridden patients.						
507	Graduated compression stockings should not be worn folded.						
508	The Use right way to roll the graduated compression stockings.						
509	Choosing the accurate measurement size of graduated compression stockings						
510	The check fitting of intermittent pneumatic compression devices regularly.						

Name of observer_____ signature_____

Thank you for your participation!

Declaration

I declare that this Research proposal entitled Knowledge, Practice Towards Venous Thromboembolism Prevention and Associated Factors Among Nurses Working at Public Specialized Hospitals in Central Ethiopia Region, Ethiopia, 2024, is my work that has not been addressed in the study area as far as my knowledge touched and all the sources I used have been indicated and acknowledged as a complete reference.

Name of investigator	Signature	Date
._____	_____	_____

Name of adviser/s

1. _____	_____	_____
2. _____	_____	_____

Name of invigilators

1._____	_____	_____
2._____	_____	_____