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**COLLEGE OF HEALTH SCIENCE, SCHOOL OF MEDICINE
DEPARTMENT OF EMERGENCY MEDICINE AND CRITICAL CARE**

**ASSESSMENT OF KNOWLEDGE, PRACTICE AND ASSOCIATED
FACTORS TOWARDS VENOUS THROMBO-EMBOLISM AMONG
ADULT INTENSIVE CARE UNIT NURSES AT GOVERNMENTAL
HOSPITALS, ADDIS ABABA, ETHIOPIA” MARCH TO APRIL 2019.**



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STATEMENT OF DECLARATION

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Abbreviations and acronyms

- ❖ AOR: Adjusted Odd Ratio
- ❖ CT-SCAN: Computerized Tomography Scan
- ❖ CVC: Central Venous Catheter
- ❖ DVT: Deep Venous Thrombosis.
- ❖ ICU: Intensive Care Unit
- ❖ KP: knowledge and practice
- ❖ NICE: National Institute for Health Care Excellence
- ❖ PE: Pulmonary Embolism
- ❖ PICC: Peripherally Inserted Central Catheter
- ❖ VTE: Venous Thrombi-Embolism
- ❖ DALY: Disability Adjusted Life Year
- ❖ SPSS: Statistical Package for Social Science

ABSTRACT

Background: Venous thrombi-embolism (VTE) is the third leading non-communicable vascular disease following heart attack and stroke worldwide. It is a significant and challenging problem in critically ill patient. Nurses' knowledge and skill to assess and prevent complications like VTE for admitted patients in ICU is limited in developing nations including Ethiopia which needs insight for possible solution and recommendations.

Objective: The aim of this study is to assess knowledge, practice and associated factors towards venous thrombi-embolism among adult intensive care unit nurses at governmental hospitals in Addis Ababa, Ethiopia March to April 2019.

Methods: Institution based cross-sectional study was conducted from March to April 2019 on 195 nurses working in selected governmental hospitals in Addis Ababa. Respondents were employed with non probability survey sampling technique. The data were collected by using self evaluative structured and pretested questionnaires. The collected data was coded and entered in to Epic data 4.4.2.1 and transferred to SPSS version 21 for further analysis. Vicariate and multi-variety logistic regression model was used for association between independent versus out-come variables.

Results; A total of 177 nurses with a response rate of 90.77% were participated in this study from which (55.4%) of the respondents had good knowledge about risk factors of VTE and (42.37%) had good practice towards VTE risk assessment and prevention practice. There was a significant relationship between nurses' knowledge level and lack of resource ($P= 0.027$) and experience ($p=0.022$). Nursing rotation ($p=0.038$), educational level ($p=0.012$) and coworker pressure ($p= 0.023$) were significantly associated with nurse's practice towards VTE in adult ICU. The statistical significance level was declared at $p\text{-value} < 0.05$.

Conclusion & Recommendation: The results from this study showed that nurses had poor knowledge of VTE risk factors and poor practice towards VTE risk assessment and prevention in patients admitted to intensive care unit. Lack of guide line, assessment protocol, and resources are contributing factors. Therefore, the hospital's administrative and supportive organizations would better to provide training regarding VTE risk factors and its management to staff nurses, avail guideline and protocols.

Key words: venous thrombi-embolism, knowledge, risk assessment practice, Addis Ababa, Ethiopia

1 INTRODUCTION

1.1 Background

Venous thrombi-embolism (VTE) is a non communicable disease in which a blood clot (a thrombus) forms in a vein and then dislodges and travels in the blood (an embolus). A venous thrombus commonly occurs in the deep veins of the legs or pelvis or travels to the lungs, to the pulmonary arteries, and cause a deep vein thrombosis (DVT) and pulmonary embolism (PE), respectively. VTE as a term includes both DVT and PE(1).

Venous thrombi-embolism (VTE) is the third leading vascular diagnosis after heart attack and stroke(2). Hospital associated VTE accounts for 60% of the disease burden. The reported DALYs were 2.4 times greater in low- and middle- income countries compared to high-income countries(3). VTE contributes significantly for morbidity and mortality in the critically ill patients. Majorities of patients admitted to a critical care unit have a major risk factor for VTE, and most them have greater than one risk factors(4). Hospital-acquired venous thrombi-embolism (VTE) is a common and potentially preventable problem(5). Almost all hospitalized patients have at least one risk factor for VTE. It is a common complication and contributes to excess length of stay, excess charges, and mortality(6). On the other hand, prevalence of DVT is 88.5% of critically ill patients belonged to high risk group according to the risk assessment model(7). In Africa the prevalence of DVT in ICUs was reported in only one study, which shows a prevalence of 8% in an Eritrean hospital (in sub-Saharan Africa). In ICUs(8). In our country Ethiopia the study conducted in black lion hospital to assess Risk Factors of Deep Venous Thrombosis in Duplex and Colour Doppler Ultrasound indicate that a peak incidence of thrombi-embolism is high in adult age group who has a disease such as malignancy, prolonged immobilization(9).

Having knowledge and well developed assessment skills can help in the recognition of a change in a patient's health status or to identify a risk factor for VTE that could protect the patient from an avoidable adverse event(10). It is necessary that a risk assessment tool that would reduce inconsistency among nurses be utilized, thereby enabling them to use an effective prophylactic measure (11). Nurses have inadequate knowledge on deep vein thrombosis risks, preventive measures, and poor practices with respect to the prevention of deep vein thrombosis(12)

1.2 Statement of the problem

Hospitalization for acute medical illness is related with an eightfold increased risk of VTE(13). Previous studies conducted across the globe had identified various risk factors leading of VTE in critically ill patients such as immobilization, sedation or neuromuscular blockade, Central Venous Catheters, surgery, sepsis, mechanical ventilation, vasopressin administration, heart failure, stroke, malignant neoplasm's, previous VTE, and renal dialysis are the most common risk factors for venous thrombi-embolism(14). Peripherally Inserted Central Catheter /PICCs/ were associated with higher risk of DVT than central venous catheter /CVCs/ in critically ill patients and patients with cancer(15). VTE in the critically ill patient is a significant problem and remains a challenge as they have the highest risk of both bleeding and thrombi-embolism. The implementation of the NICE guidelines, and the use of pharmacological and non-pharmacological devices will all drive the reduction in ICU mortality and morbidity from VTE(16). It is well known that VTE is the number one preventable cause of in-hospital morbidity and mortality by setting assessment priorities for nurses(17).

Nurses are at the center of a national strategy to reduce deaths from Venous Thrombi-embolism (VTE) evidence suggests that receiving a VTE risk assessment on admission to hospital, followed by appropriate prophylaxis, and has the potential to significantly reduce death from VTE because in many hospitals they are the ones carrying out initial risk assessments(18). Clinical risk identification tools are necessary for all patients with suspected PE to decrease the burden of both diagnostic failure and unnecessary testing(19). According 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(20). Similarly study done in South Korea indicates that only 16.2% nurses have good knowledge and 15% of nurses complete VTE risk assessment on all of their patients, (21).

As far as my knowledge reading of literatures, no study has been conducted related with nurse's knowledge and practice about venous thrombi-embolism to date. Therefore this was study given insight to assess the level of VTE knowledge and practice among ICU nurses at governmental hospitals in Addis Ababa. It also showed some factors affecting the knowledge and practice of nurses to the implementation their knowledge and skill for critically ill patients about venous thrombi-embolism.

1.3 Significance of the study

Intensive care unit is the treatment area where bedridden and unconscious patients stay for a long or short period. Different machines, medications and instruments are used for these patients in treatment processes. The disease conditions, treatment procedures and lack of mobility predisposes these patients for the development of venous thrombi-embolism through time. Nurses are the only health care providers who give care for the critically ill patients through twenty four hours in hospitals. They take care for patients every hour and can assess the occurrence of any complications in intensive care units. It needs continues risk assessments and prevention practice in daily patient care. During basic patient care in intensive care unit nurses do full assessment and identify any sign and symptoms of complications.

- ✓ This study identified level of knowledge of risk factors and implementation of preventive practice of VTE among intensive care nurses. It also assessed the use of tools for risk assessment of VTE for all patients and preventing occurrence the complication.
- ✓ The study also investigated factors affecting the knowledge of intensive care unit nurses about venous thrombi-embolism and recommended for solutions.
- ✓ This study investigated factors affecting the risk assessment and prevention practice of nurses towards venous thrombi-embolism in intensive care unit and presented possible solution and recommended for solutions.
- ✓ On the other hand the result of the study can be used as base line assessment for recommendation to avail the risk assessment tools (protocol) and preventative practice evaluation check lists for intensive care nurses.
- ✓ As far as coverage of reading literatures, there is no study related with venous thrombi-embolism specially nurses effort and participation in patient care to assess and prevent VTE in Ethiopia. Therefore, this study was assessed the level of knowledge, risk identification as well as preventive practice of nurses towards VTE among patients admitted to adult intensive care unit of governmental hospitals in Addis Ababa as a base line assessment.

1.4 Literature review

I. Introduction

According to the meta-analysis conducted on how nursing care provided for the prevention of venous thrombi-embolism (VTE) in hospitalized patients, use of mechanical and physical interventions and educating patients on VTE are identified as an important measures(22). 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 (23). Different conditions and situations can affect the quality of nursing care and treatment in intensive care unit especially on venous thrombi-embolism. These factors may include socio-demographic factors, knowledge and practice of nurses. Similarly knowledge and practice of nurses can be affected by different factors.

II. Socio demographic

The study conducted in Benda university hospital to assess effect of nursing care standards for preventing deep vein thrombosis among patients undergoing hip surgery demonstrated the distribution of nurses according to their demographic characteristics, (50.0%) of the study participants were in the age category (> 30 years old) with a mean age of (31.3667 ± 8.70784) years, the majority of them (93.3%) were female and married (90%). Their educational level is nursing diploma was the highest proportion (76.7%). Greater than half of them (56.7%) had an experience more than 10 years. and (all of the study participants were not attended any previous training courses about nursing care system for preventing DVT(24).

On the other hand according to study conducted in South Korea to assess nurses' level of perceived knowledge and practice of venous thrombi-embolism (VTE) risk assessment shows the demographic characteristics of the study participants showed (96.2%) was female nurses and the mean age was $29.0 (\pm 4.6)$ years. Approximately (62%) had a Bachelor's degree (55.1%) or a Master's degree in nursing (6.9%). The mean number of years their work experience was $5.3 (\pm 4.7)$, and the mean years working in the unit was $3.7 (\pm 3.2)$. Less than 10% of the respondents reported that they had attended an in-service on VTE care(21).

III. Knowledge about venous thrombi-embolism

The study done in California on evaluation of hospital nurses' perceived knowledge and practices of venous thrombi-embolism assessment and prevention nurses shows that slightly less than one half of respondents (44 %;) have good knowledge of VTE (20). On the other hand as the study conducted in Amrita Institute of Medical Sciences, Kochi shows the fact that not even a single staff nurse had good knowledge on prevention of VTE, even though the fact that 60% of them were graduates. (42%) of study participants had poor knowledge on prevention of DVT. Even though, majority of the subjects, (50%) had adequate experience and exposure in the respective unit as a registered nurse, knowledge on VTE seems to be average to poor. Similarly study done in south Korea indicates nurses knowledge of risk factor and preventive practice of VTE for admitted patients and the majority of nurses have moderate knowledge of VTE and only 16.2% nurses have good knowledge. (7,21)

According to a descriptive cross sectional study conducted on examination of knowledge of nurses on risk factors of DVT, majority of nurses knows that family history of DVT/VTE (77.6%), Previous DVT/VTE history (70.9%), immobilization in hospitalized patients (69.1%), Paralysis, paresis, or recent plaster cast on lower extremities (67.3%), Cardiac diseases (27.3%), Infections and inflammations (29.7%), Trauma (33.9% as risk factor for VTE(25). A study conducted in university hospital of Northern Cyprus which 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.(12)

On the other hand the study conducted in north China on nurses' objective knowledge regarding venous thrombi-embolism prophylaxis indicates that the risk of VTE among ICU patients is high. The results showed that more than 60% of the medical staff thought that a varicose vein in a lower extremity (75.9%), immobility (71.6%), post-operative status (68%), and VTE history (61%) were risk factors for VTE in ICU patients. Other risk factors noted were chronic illness (55.6%) and deep venous catheters (49%). Less than 40% of the medical staff considered sedation (37.7%), mechanical ventilation (35.8%), cancer (34.5%), vasopressin use (27.1%) and acute illness (25.8%) as risk factors for VTE in ICU patients. Finally, oral contraceptive use, hematological diseases, advanced age, pregnancy and continuous renal replacement therapy were considered VTE risk factors by 2.7% of the medical staff.(25)

The study results regarding nurses' knowledge on prevention of DVT showed that the majority of nurses had a low knowledge. Results further showed that from Bed rest is necessary after a major surgical intervention to prevent DVT (5%) early ambulation after surgery as prevention of DVT (13.3%), Intermittent pneumatic compression devices prevent DVT (18.2%), Foot and leg exercises prevent DVT (21.8 %) use elastic compression stockings (24.2%), as a prevention measures for VTE in hospitalized patients(12).

IV. practice of nurses on venous thrombi-embolism

According to descriptive study conducted on knowledge and self reported clinical practice on prevention of DVT among staff nurses in selected units in a tertiary care Amrita Institute of Medical Sciences, Kochi, there was no significant association between knowledge and practice of staff nurses on prevention of DVT among hospitalized patients. the study results which should even though 58% had average knowledge, when it comes to practice, it is hardly 20%, it may be probably because there are no strict protocols making it evident the practice of these nursing measures to prevent DVT(7) On the other hand a quasi-experimental study conducted Benda university hospital on effect of nursing care standards for preventing deep vein thrombosis among patients undergoing hip surgery on revealed that, (20%) of the studied nurses had satisfactory level of practice implementation. However, post its nursing care standards implementation, the majority of nurses (93.3%) had satisfactory level of practice on venous thrombi-embolism. (24).

According to study conducted in California on evaluation of hospital nurses' perceived knowledge and practices of venous thrombi-embolism assessment and prevention nurses educate patients and their families about VTE symptoms (mean, 3.89 ± 0.85), prevention with effective use of mechanical devices (mean, 4.21 ± 0.89), and treatments with oral anticoagulation (mean, 3.89 ± 0.85).The respondent nurses were least confident in their own ability to conduct a thorough VTE risk assessment (mean, 3.5 ± 1.0). Whereas 70% of participants says that they educate patients on oral anticoagulant medications most of the time and 84% were sure most or all of the time that they could effectively use mechanical devices for VTE prevention, only 57% conducting VTE risk assessment.(20)

The cross-sectional descriptive study conducted in Korea to nurses' level of perceived knowledge and practice of venous thrombi-embolism (VTE) risk assessment as well as prevention indicates that approximately 15% of participants reported completing a VTE risk assessment on all (6.0%) or nearly all (8.4%) of their patients, whereas 18.6% reported completing the assessment on no patients. Nurses working in ICUs most frequently assessed the VTE risk in their practice, with 44.2% completing VTE risk assessments on all or nearly all of their patients. (21) This descriptive study conducted with the registered nurses in a university hospital of Northern Cyprus shows that the practices of nurses on VTE prevention, they never use graduated compression stockings (80.6%), Educating the patients to avoid injury (73.9%), Administering anticoagulants as preventive in clinic (71.5%), Monitoring the side effects of the anti-coagulants (71.5%), Educate patients for sufficient fluid intake (66.1%), and elevate their legs (65.5%)(12)

V. Factors affecting knowledge and practice of nurses on venous thrombi-embolism

According to an exploratory descriptive web-based study conducted in California, the most common perceived barriers in performing assessment for VTE risk and prevention care that the participating nurses responded to the open-ended question with were lack of time (21%) and lack of knowledge (21%). Other barriers reposed by participating nurses were lack of a standardized tool or protocol to use (13%) and language barriers (5%). Sometimes effective communication between nurses and physicians and role compliant(20).

Survey of healthcare professionals on barriers and potential solutions toward optimal prophylaxis against deep vein thrombosis for hospitalized medical patients in china lack of clear indications and contra- indications to DVT prophylaxis lack of awareness about effectiveness of DVT prophylaxis and lack of time to consider DVT prophylaxis in every patient at $P=0.05$ and $CI=95\%$ (26). According to a Survey of the Knowledge of Venous Thrombi-embolism Prophylaxis among the Medical Staff of Intensive Care Units in North China, 12.1% of physicians expressed that they fear to use GCS, but only 3.6% nurses did not hesitate about this method ($p = 0.001$), Which can be showed by discrepancies in the following concerns: that GCS easily induce skin injury (34.1% VS 54.3%, $p = 0.000$), that GCS can be difficult to remove (49% VS 60.7%, $p = 0.000$), and that GCS cause patient discomfort (54% VS 59.4%, $p = 0.003$), by physicians and nurses respectively(27).

This descriptive study conducted with the registered nurses in a university hospital of Northern Cyprus shows that nurses having a bachelor's degree had higher rate (72.9%) knowledge than those graduated from the health-care vocational high school (46.9%). Nurses with 6–10 years of experience had higher knowledge than the other groups ($P < .05$). on the prevention practices of the nurses with their descriptive characteristics, the study found that nurses with bachelor's degree a higher rate (13.2%) than those graduated from the Healthcare vocational high school (3.7%) at ($P < .05$)(12). According to study conducted by Gaston S, White S. on systematic review of barriers and facilitators to venous thromboembolism clinical practice guideline compliance by healthcare professionals in acute care lack of completing risk assessment tools role conflict between doctors and nurses the major problem (28).

2 CONCEPTUAL FRAMEWORK

The knowledge and practice of nurses on venous thrombi-embolism can be affected by different factors. Some of the factors may be associated with their socio-demographic factors. Work experience, age, sex, and educational level can significantly affect nurses' knowledge and practice towards VTE. Similarly health system related factors such as material resource, human resource/nurse to patient ratio, in service and on job training, ward rotation etc. On the other inter professional/ social factors/ like pressure from colleagues, interdisciplinary factors can affect nurses' knowledge and practice in adult ICU(12, 24, 28, 29, and 30). On the other hand knowledge and practice can affect each other. This condition is going to be shown in the following diagram.

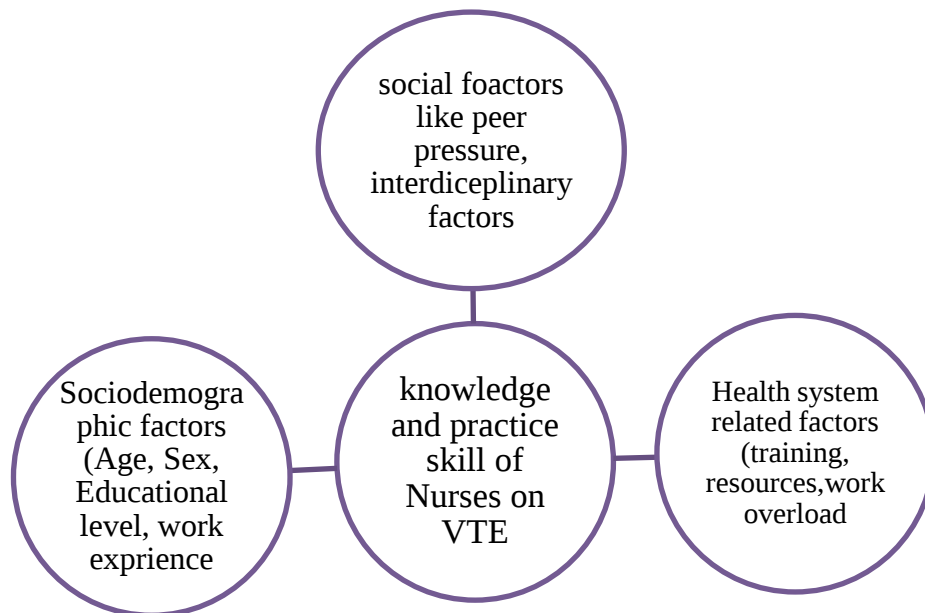


Figure 1. Conceptual frame work of the study

3 OBJECTIVE OF THE STUDY

3.1 General objective

The objective of this study is to assess knowledge, practice and associated factors towards venous thrombi-embolism among adult intensive care unit nurses at governmental hospitals in Addis Ababa, Ethiopia from March to April 2019.

3.2 Specific objectives

- ✓ To identify the knowledge level of nurses about venous thrombi-embolism among critical patients admitted to adult intensive care unit at Addis Ababa governmental hospitals, March to April 2019.
- ✓ To determine level of practice of nurses towards venous thrombi-embolism in adult ICU patients at Addis Ababa governmental hospitals, March to April 2019.
- ✓ To identify factors affecting nurses knowledge of venous thrombi-embolism in adult intensive care unit at Addis Ababa governmental hospitals, March to April 2019.
- ✓ To identify factors affecting nurses practice of venous thrombi-embolism in adult intensive care unit Addis Ababa governmental hospitals March to April 2019.

4 METHODS AND MATERIALS

4.1 Study area and period

The study was conducted at selected governmental hospital in Addis Ababa, the capital city of Ethiopia and Africa. Addis Ababa is the largest city of Ethiopia and the seat of African union, African economic commission, and hosts different diplomatic residencies with a population size of 3,475,952 according to the 2007 population census with annual growth rate of 2.7 %. Its area is estimated to be 530Km² with altitudes ranging from 2200 to 3000m above sea level, average temperature of 22.8C° and average rainfall of 1,180.4mm. (2018-10-11) from <http://worldpopulationreview.com/world-cities/addis-ababa/>

Addis Ababa has 41 hospitals (14 public and 28 NGO and private). From 14 public hospitals in AA, providing those ICU service were included in the study which are; Tikur-Anbessa Specialized hospital (TASH), St. Paul's hospital, Zewuditu memory hospital, Yekatit 12 Hospital, Addis Ababa Burn, Emergency and Trauma hospital, Ras-Desta hospital, Tirunesh Beijing hospital, St. Peters hospital and Alert specialized hospital were selected for this study since they are providing regular ICU service. On the other hand from the remaining four public hospitals in Addis Ababa, Federal Police referral hospital and Defensive force hospital are excluded due to ethical issues since they serve only for security and military force members where as Ghandhi memorial hospital and Amanuel specialized hospital provide specific service, Obstetrics and gynecology case and psychiatric cases respectively which are not related with regular ICU services. So this study was conducted in selected governmental hospitals in Addis Ababa from March to April 2019.

4.2 Study design and study period

Institutional based descriptive cross-sectional study design was employed and the study was conducted from March to April 2019.

4.3 Target and Study population

4.3.1 Target population

The target populations consists all nurses working at intensive care unit of governmental hospitals in Addis Ababa.-Ethiopia.

4.3.2 Study population

All nurses working at selected governmental hospital's intensive care unit in Addis Ababa.

4.4 Eligibility criteria

4.4.1 Inclusion criteria

All nurses who are working at ICU in selected hospitals and responsible for daily nursing care and evaluation of admitted critically ill patients in the units and on job during study period were included in this study.

4.4.2 Exclusion criteria

Coordinator and facilitators of the unit nurses and who cannot do daily patient care and evaluation in the unit as well as nurses on the annual leave and maternity leave during the data collection period were excluded from the study.

4.5 Sample size determination and sampling techniques

4.5.1 Sample size determination

There are fourteen governmental hospitals in Addis Ababa from which ten of them fulfill the criteria for this study. The nurses working in adult intensive care units in hospital with regular ICU of nine hospital including coordinators and facilitator nurses from nine hospitals in Addis Ababa are 225 and Minilik referral hospital were excluded since it was used for pretest. So that no need of calculating sample size rather I used use all nurses in the selected hospital who are eligible for this study

4.5.2 Sampling technique

The governmental hospitals in Addis Ababa with regular ICU were identified and the study participants were recruited from the nurses working in selected hospitals. There are fourteen governmental hospitals in Addis Ababa. From these hospitals eight of them are administered by federal government and six of them are administered by Addis Ababa health bureau. From these hospitals some of them were excluded by the selection criteria for the study. The number of study population from the selected hospitals by study selection criteria was not large to use probability sampling method. So nurses working in the ICU

of nine selected hospitals were included in the study with survey sampling according to the inclusion criteria. A total number of 225 nurses are working in ICU of those 9 hospitals. Accordingly; Black lion teaching and tertiary hospital (BLTTH), Yekatit 12 referral hospital, St. Paulo's referral and teaching hospital, Alert referral hospital, Zawditu hospital, AaBET hospital, Turunesh Beijing hospital, Ras Desta hospital, St. Peter specialized hospital were selected for this study.

On the other hand Amanuel specialized hospital and Gandhi memorial hospitals were excluded since they are not providing regular ICU service and police Hospital and defense force hospitals were excluded because of ethical issue since they serve only for security and military force members. Nurses working in Minilik referral hospital ICU were participated in pretest study and they were excluded from the study population during main study data collection. Accordingly the sampling looks as follows.

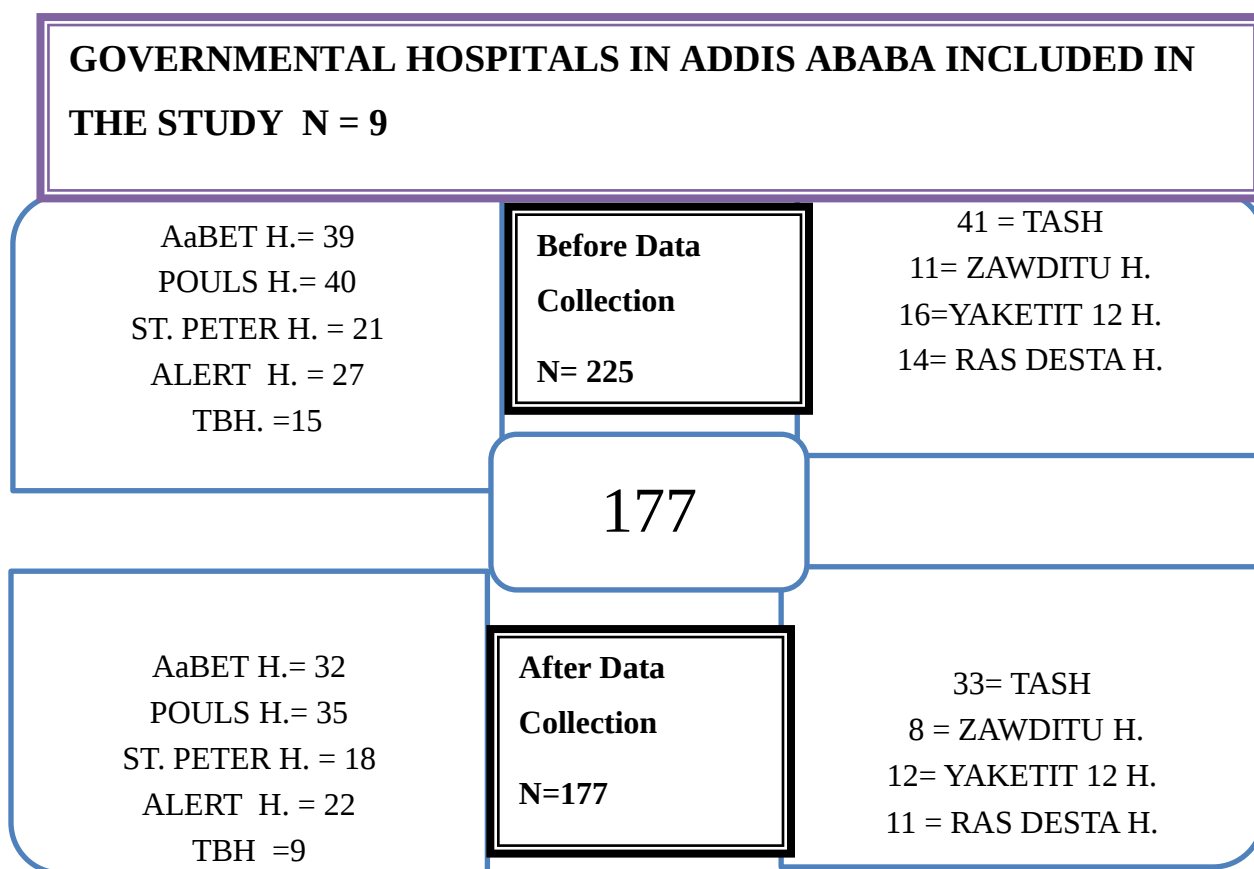


Figure 2: Distribution of study participants by their organizational allocation. Addis Ababa Ethiopia; 2019.

4.6 Study variables.

4.6.1 Dependent variables

- ✓ Knowledge of nurses about venous thrombo-embolism.
- ✓ Practice of nurses towards venous thrombo-embolism.

4.6.2 Independent variables of the study

The independent (explanatory) variables of the study are:

- I. Socio-demographic variables: Age, Sex, Educational level, Work experience
- II. Social factors like peer pressure, professional role conflict
- III. Health system related variables: training, resources, work overload

4.7 Data collection tools and procedures

4.7.1 Data collection tool

Self administered questionnaire was used for data collection. The questionnaire was adapted from different literatures, WHO guidelines and models like Caprini score Padua score, wells score of the risk assessment profile and the revised Geneva score (29) and was contextualized with some modification. The tool contained socio-demographic related questions; knowledge related and practice related questions with English language version.

4.7.2 Quality control

To assure the quality of the data the tool for data collection was standardized. The tool was developed in English and checked for grammatical unclear words keep its consistency. Two days trainings was given for the data collectors and supervisors regarding the objectives, contents and data collection process as well as consent, confidentiality and right of the study participants. Pretest study was carried out on 5% of the studied subjects at Minilik referral hospital which was not included in the main study. The pretest study was done to ensure clarity, applicability and feasibility of the study tool and time needed for each tool to be filled in. Modifications after pretest study were the time duration for 15-20 minutes for the staff

nurses to provide the data, but they were struggling to finish their questionnaire within this stipulated time. So time for response for nurses was given 30 minutes for the data collection during main study. The reliability test of the study tool was done and it has a test result of 0.877(87.7%). Some questionnaire format, arrangement, content modification was done for the main data collection.

4.7.3 Data collection procedures

Data were collected using standardized, pretested and structured self-administered questionnaire and self evaluative preventive practice questionnaires. The data collectors were trained on the data collection procedure and rules as well as the contents of the data collection tool. They are also trained on how they can get the data from the nurses, time of data collection and the consent of the respondents and confidentiality. The principal investigator and supervisors were following the data collection process for each data for its completeness and errors.

4.8 Data management and Analysis

Each of the data was coded, cleaned and checked for completeness, consistency and clarity. The data were entered into epiinfo version 4.4.2.1 and exported into SPSS version 21.0 for further analysis. Descriptive statistics were done and the results are presented in the form of texts, tables, and figures, mean with standard deviation after testing normality.

Binary logistic regression was done to assess the association between each independent variable and the dependent variables. Those variables having p-value less than 0.25 and considered to be clinically important for clinical decision making in the vicariate analysis were entered into the multivariable logistic regression model. Multivariable logistic regression was done with 95% confidence interval and corresponding AOR to control the influence of potential confounding variables. The statistical significance level was declared at p-value <0.05.

4.9 Operational definitions

- **Good knowledge** – Thirty four true/false questions with total score ranging from 0-34 points was used to evaluate the Level of knowledge on venous thrombo-embolism of Nurses for ICU admitted patients and those who scored 70% and above have good knowledge.
- **Poor knowledge** - those who scored below 70 % to knowledge items (with total score ranging from 0-34 points).
- **Good practice** - Is the performance of nurses based on standard principles and guidelines related to assessment and prevention venous thrombo-embolism and who scored average or 50% and above from sixteen practice questions.
- **Poor practice** means nurses who answer less than average practice 50% of questions about the preventive practice for venous thrombo-embolism.
- **Risk factors:** - An environmental or genetic factor which makes the occurrence of a disease in an individual more likely.

4.10 Ethical consideration

Ethical clearance was obtained from Addis Ababa University, College of health science, Department of emergency medicine and critical care and ethical clearance review board committee of Addis Ababa University and approved by Addis Ababa health bureau then finally the hospitals at which data collected had authorized the ethical clearance. Informed consent was obtained both from the hospitals and nurses who were participated in the study. Confidentiality was maintained by omitting their personal identification and any personal identity information.

4.11 Dissemination of results

The results of this study will be submitted and presented to Addis Ababa University department of emergency medicine. The result of this study will also be disseminated to intensive care units of the study center hospitals, Addis Ababa university library, ministry of health, and local institutions. The paper will also be submitted to national and international peer reviewed scientific journals for possible publications.

5 RESULTS

5.1 Socio demographic characteristics

During this study one hundred ninety five nurses working in the adult intensive care units of the selected governmental hospitals in Addis Ababa were enrolled for this study from which 177 nurses' were participated with response rate of (90.77%). Of the total participants (54.2%) females, 118(66.7%) were single, their mean age was 28.42 years and (SD= +/- 4.635). Majority of them have Bachelor degree of Science in nursing 157 (88.7%), most of the respondents had a working experience of less than 5years (62.7%) followed 6-10 years 43(24.3%).

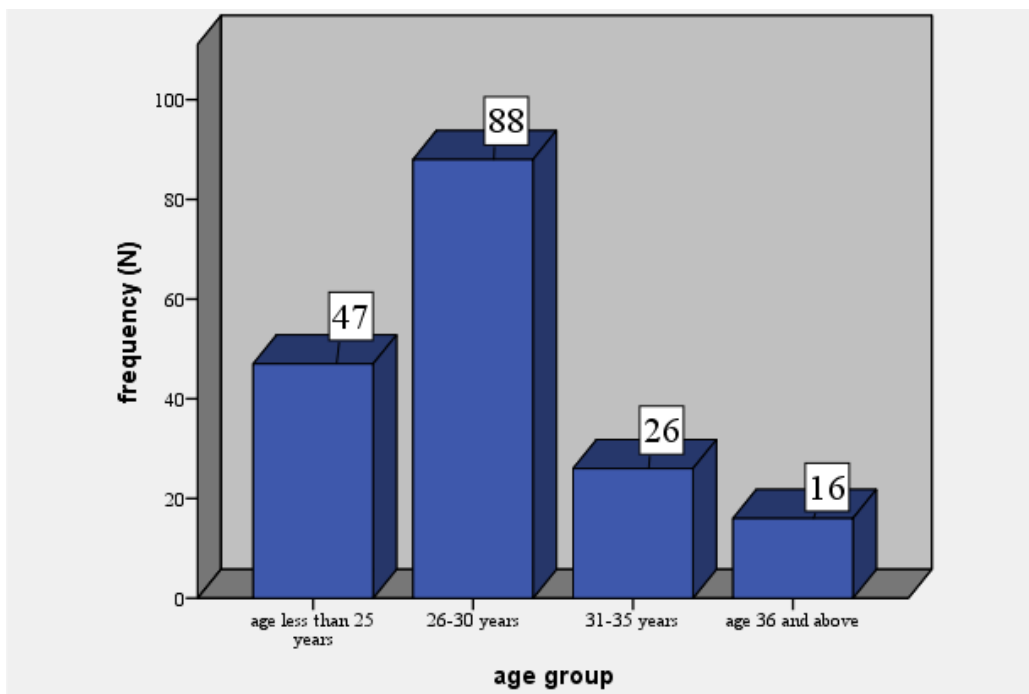


Figure 3: Distribution of study participants' by their age group , in governmental hospitals in Addis Ababa, Ethiopia, 2019.

Table 1: Socio-demographic characteristics of nurses in public referral hospitals of Addis Ababa, Ethiopia, 2019 (N= 177)

Variables	Responses	Frequency(N)	Percentage (%)
Sex	Male	81	45.8
	Female	96	54.2
marital status	Single	118	66.7
	Married	55	31.1
	Divorced	3	1.7
	Widowed	1	0.6
year of experience	less than one year	6	3.4
	1-5 years	111	62.7
	6-10 years	43	24.3
	greater than 10 years	17	9.6
Educational qualification.	clinical nurses/diploma	13	7.3
	BSC nurses degree	157	88.7
	MSC nurses degree	7	4.0

NB. VTE: venous thrombo-embolism, MSC= masters of Science BSC= Bachelor of Science, N= number.

5.2 Knowledge of nurses towards venous thrombo-embolism

In the present study, knowledge of nurses on venous thrombo-embolism was assessed for general knowledge on VTE, knowledge on risk factors of VTE, and knowledge of prevention practice techniques with self evaluative questionnaires. Majority of the nurses know DVT occurs as a result of stasis of blood or vessel wall injury, altered blood coagulation 168(94.9%) and venous thrombo-embolism (VTE) as a fatal complication of DVT (87%) as well as VTE as a major cause of sudden death in hospitalized patients 154(75.7%).

Almost all of nurses have good knowledge about the general understanding of VTE and preventive practice techniques. But only 55.4% (95% CI 48.9, 62.2) had good knowledge about risk factors for venous thrombo-embolism.

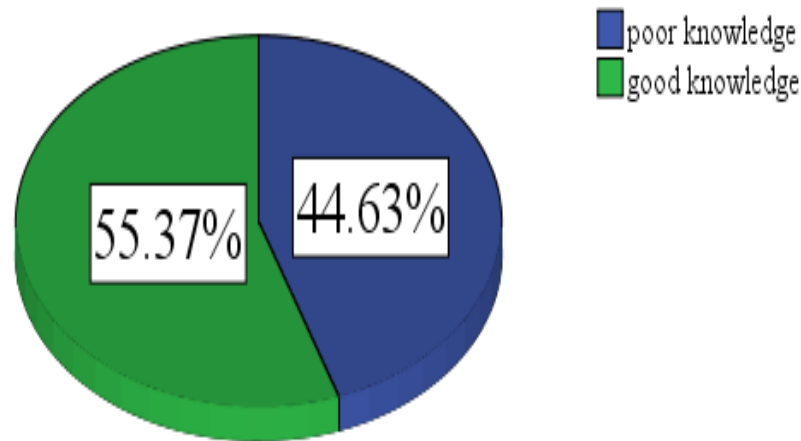


Figure 4. Percentage Distribution of ICU Nurses Knowledge Level on VTE risk factors In Governmental Hospitals in Addis Ababa, Ethiopia, 2019.

In this study regarding their knowledge related to prevention techniques of VTE, majority of nurses knows that Elastic compression stockings 126(71.2%), Heparin or low-molecular-weight heparin (LMWH) 125(70.6%), Early ambulation after surgery 126(71.2%), Use of VTE risk assessment model 129(72.9%) can prevent venous thrombo-embolism in patients admitted to intensive care unit.

Table 2. Distribution of participants by their knowledge on venous thrombo-embolism risk factor concepts (N = 177)

Variables	<i>Correctly answered Frequency& Percent %</i>	<i>Wrongly answered Frequency& Percent %</i>
Prolonged immobilization predisposes to DVT in hospitalized patients.	149(84.2%)	28(15.8%)
Indwelling intravenous devices such as central venous catheters and peripherally inserted central catheter may predispose to VTE.	125(70.6%)	52(29.4%)
Paralysis, paresis, or recent plaster cast on lower extremities may predispose to VTE.	136(76.8%)	41(23.2%)
Obesity may predispose to VTE.	133(75.1%)	44(24.9%)
Sedation or neuromuscular blockage is risk factor for VTE.	121(68.4%)	56(31.6%)
Advancing age may predispose to VTE.	130(73.4%)	47(26.6%)
Previous DVT/VTE history may predispose to DVT.	128(72.3%)	49(27.7%)
No relationship exists between cancer or cancer treatment and DVT/VTE.	73(41.2%)	104(58.8%)
Major surgery may predispose to VTE	144(81.4%)	33(18.6%)
Varicose veins may expose to VTE.	131(74.0%)	46(26.0%)
Acute myocardial infarction expose patient for VTE.	142(80.2%)	35(19.8%)
Trauma may predispose to VTE.	136(76.8%)	41(23.2%)
Renal dialysis may expose ICU patient to VTE.	117(66.1%)	60(33.9%)
Sepsis may predispose to VTE.	111(62.7%)	66(37.3%)
Cardiac diseases may predispose to VTE.	120(67.8%)	57(32.2%)
No relationship exists between respiratory diseases and VTE.	89(50.3%)	88(49.7%)
Infections or inflammations may predispose to DVT.	106(59.9%)	71(40.1%)
Vasopressin administration may expose ICU patient for VTE.	113(63.8%)	64(36.2%)
Pregnancy or postpartum may predispose to DVT.	125(70.6%)	52(29.4%)
Oral contraceptives or hormone replacement therapy may predispose to VTE.	102(57.6%)	75(42.4%)
Mechanical ventilation may predispose ICU patient to VTE.	104(58.8%)	73(41.2%)
There is no relationship between family history of DVT/VTE and DVT.	99(55.9%)	78(44.1%)

5.3 Factors related to knowledge of nurses on venous thrombo-embolism.

Binary logistic regression was used among different variables to determine the set of predictor variables which predicted knowledge of venous thrombo-embolism among nurses. All variables tested for an association with the outcome variables in vicariate logistic regression analyses at ($p < 0.25$) was included in the multiple logistic regression models. By controlling the effects of potentially confounding variables using multiple logistic regression; only Age, lack of resources and year of experience were significantly associated with nurses' knowledge towards venous thrombo-embolism risk assessment and prevention ($p < 0.05$).

Accordingly nurses with experience of 10 years and above are 18.18 times more likely knowledgeable about venous thrombo-embolism than nurses whose have less than three years of work experience ($p=0.022$) [AOR 18.181, 95% CI (1.512, 218.610)]. Additionally nurses with adequate resources are 2.153 times more likely knowledgeable than nurses with scarce resource ($p= 0.027$) [AOR 2.153 CI (1.092, 4.243)]. On the other hand the nurses' with age group 26 years and above 96% less likely knowledgeable towards venous thrombo- embolism than nurses age less than 25 years with [AOR (0.037- 0.046 , 95% CI (0.002, 0.727)]. ($p=0.016, 0.028, 0.029$ (see table 3 below).

Table 3- Vicariate and multi-variants predictors of VTE related to knowledge of respondents

Character		Knowledge level		Odds ratio(95% CI)		
				COR (p<0.25)	AOR (P<0.05)	p-value
		Good knowledge freq & %	Poor knowledge freq & %			
Sex	Male	47(59.5%)	49(50%)	1	1	
	female	32(40.5%)	49(50%)	1.469(0.807,2.673)	1.542(0.796, 2.986)	0.199*
Age group	<=25yrs	21(44.7%)	38(43.2%)	1	1	
	26-30 yrs	50(56.8%)	26(55.3%)	0.286(0.047, 0.741)	0.040(0.002,0.705)	0.028**
	31-35 years	14(53.8%)	12(46.2%)	0.474(0.081, 1.142)	0.046(.003,0.727)	0.029**
	36 yrs & above	13(81.3%)	3(18.8%)	0.127(0.062,1.175)	0.037(.003,0.545)	0.016**
Lack of in-service training	Yes	58(73.4%)	80(81.6%)	0.624(0.365,1.238)	0.833(0.379,2.061)	0.774*
	No	21(26.6%)	18(18.4%)	1	1	
Yrs of experience	1-3 years	31(47.7%)	34(52.3%)	1	1	
	10 yrs & above	10(58.8%)	7(41.2%)	0.638(0.54,5.177)	18.181(1.512,218.61)	0.022**
Lack of resource models	Yes	39(47.6%)	35(37.3%)	1.528(1.063, 3.543)	2.153(1.092,4.243)	0.027**
	No	43(52.4%)	59(62.7%)	1	1	

- ✓ p ≤ 0.25, CI- 95 %(Confidence Interval), COR- crude odds ratio, AOR-adjusted odds ratio
- ✓ “***” Remained statistically significant (p < 0.05) in adjusted odds ratio
- ✓ “**” not Remained statistically significant (p < 0.05) in adjusted odds ratio

5.4 Practice related to nurses` VTE assessment and prevention.

Regarding practice of nurses in intensive care unit towards-venous thrombo-embolism risk assessment and prevention 101 (57.1%) of the participants responded that they *always* administer anticoagulants as preventive measure and 92(52.0%) encourage early ambulation for major surgery patients. On the other hand the study participants responded that they *sometimes* monitor the side effects of the anticoagulants for patients taking anti-coagulant 93(52.5%) and assesses regularly their patients for risk of VTE 66(37.3%). Most of them responded that they *never* use risk assessment score models /protocol/ 98(55.4%) and guide line 70(39.5%) for patients admitted to ICU.

Generally according to this study the overall level of good practice of nurses was [75(42.37%) 95%, CI (35.3, 50.9) towards venous thrombo-embolism risk assessment and prevention practice in adult intense care units.

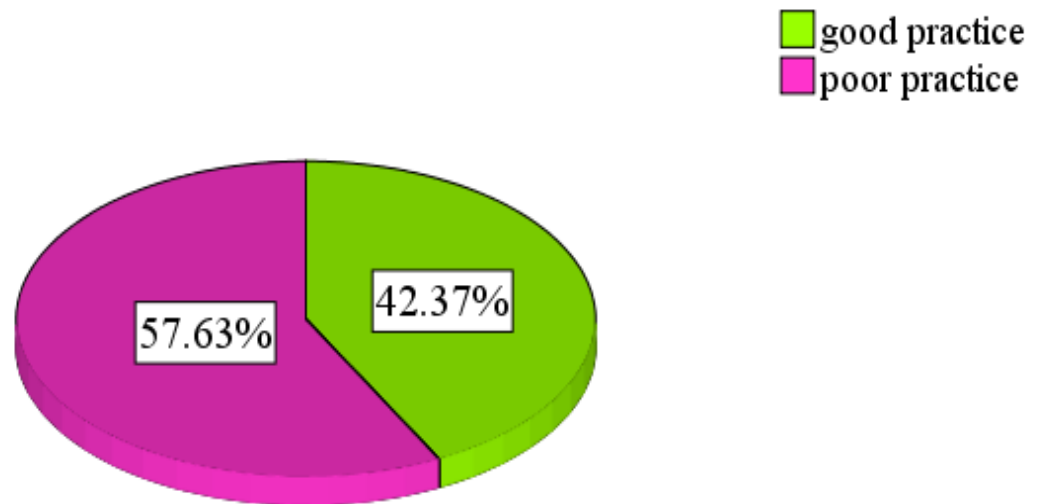


Figure 5. Percentage distribution of ICU nurses practice level on VTE in governmental hospitals in Addis Ababa, Ethiopia, 2019.

Table-4 Distribution of participants by their practice level on venous thrombo-embolism assessment concepts. Addis Ababa, Ethiopia. (N = 177)

Variables of practice assessment	<i>always</i> <i>Frequency</i> <i>&percent%</i>	<i>some times</i> <i>Freq(N)&</i> <i>percent%</i>	<i>never</i> <i>Freq(N)&</i> <i>percent %</i>
Providing information to patients and/or relatives about risks and prevention of DVT.	68(38.4%)	68(38.4%)	41(23.2%)
Using VTE assessment and prevention guide line during patient care.	55(31.1%)	52(29.4%)	70(39.5%)
Encouraging patients to do foot and leg exercises by themselves or relatives to help if patients are unable to do so.	90(50.8%)	55(31.1%)	32(18.1%)
Encouraging early ambulation surgery of patient.	92(52.0%)	51(28.8%)	34(19.2%)
Assessing the DVT risks of patients regularly.	65(36.7%)	66(37.3%)	46(26.0%)
Using risk assessment score models	26(14.7%)	53(29.9%)	98(55.4%)
Recommending VTE prophylaxis if the patient is at risk for VTE during assessment.	78(44.1%)	54(30.5%)	45(25.4%)
Administering anticoagulants as preventive measure in ICU.	101(57.1%)	41(23.2%)	35(19.8%)
Monitoring the side effects of the anticoagulants.	93(52.5%)	56(31.6%)	28(15.8%)
Educating the patients on anticoagulants.	79(44.6%)	57(32.2%)	41(23.2%)
Educating the patients to avoid injury.	84(47.5%)	59(33.3%)	34(19.2%)
Encouraging patients to elevate their legs.	91(51.4%)	48(27.1%)	38(21.5%)
Educating the patients on sufficient fluid intake.	73(41.2%)	54(30.5%)	50(28.2%)
Use of the graduated compression stockings.	24(13.6%)	65(36.7%)	88(49.7%)
Teaching the patients about proper use of graduated compression stockings.	29(16.4%)	58(32.8%)	90(50.8%)
Assessing the patients regularly for signs and symptoms of VTE.	65(36.7%)	64(36.2%)	48(27.1%)

NB: VTE: venous thrombo-embolism, DVT: Deep Venous thrombo-embolism, ICU: intensive care unit.

5.5 Associated factors related to VTE prevention practice practices.

Each of independent variables entered into vicariate logistic regression with dependent variable and tested for significance association at ($p \leq 0.05$) educational level, rotation in service units and peer pressures were remained significant in both vicariate and multi logistic regressions models after controlling for the effects of potentially confounding variables ($p \leq 0.05$).

Accordingly those respondents with masters degree in nursing are 3.569 times more likely have good practice on venous thrombo-embolism risk assessment and prevention than those who had diploma nurses qualification ($p = 0.012$) [AOR 3.569, 95% CI (1.325, 9.616)]. On the other hand nurses who works in the same units of service constantly had 2.327 times good practice than those nurses rotating among service units ($p = 0.038$) [AOR 2.327 95% CI (1.049, 5.160)]. Similarly those nurses free from pressures from colleagues/coworkers had 2.297 times good practice towards venous thrombo-embolism in intensive care units than those nurses under co-workers pressure ($p = 0.023$) [AOR 2.297, 95% CI (1.124, 4.693)] (See table 4 below)

Table 5- Bivariate and multivariate predictors with practice of respondents

Character		Practice of nurses		Linear regression (95% CI)		
		Poor practice freq& %	Good practice freq & %	COR($p<0.25$)	AOR($P<0.05$)	p- value
Educational level	Diploma nurses	7(55.8%)	6(44.2%)	1	1	
	MSC degree	2(85.7%)	5(71.4%)	2.916(1.316,8.066)	3.569(1.325,9.616)	0.012
Lack of risk assessment model	YES	24(13.6 %)	22(12.4%)	1.752(0.886,3.464)		
	No	86(48.6%)	45(25.4%)	1		
Absence of VTE guideline	YES	22(12.4%)	22(12.4%)	1.956(0.979, 3.906)		
	NO	88(49.7%)	45(25.4%)	1		
Due to rotation among units	Yes	91(66.9%)	21(51.2%)	1.926(0.952, 3.504)	2.327(1.049, 5.160)	.038
	No	45(33.1%)	20(48.8%)	1	1	
pressure from colleagues	Yes	44(47.3%)	49(52.7%)	1.036(1.086,3.727)	2.297(1.124, 4.693)	0. 023
	No	39(46.4%)	45(53.6%)	1	1	
Knowledge of nurses on VTE	Yes	45(25.4%)	34(19.26%)	0.672(0.365, 1.238)		
	No	65(36.7%)	33(18.64%)			

✓ $p \leq 0.25$, CI- 95 % (Confidence Interval), COR- crude odds ratio, AOR-adjusted odds ratio

✓ Remained statistically significant ($p < 0.05$) in odd rate

6 DISCUSSION

Nurses are the first line health care providers who stay at patient side for long period of time, assess and investigate any complication for their patients. Primarily assessing the knowledge and practice of nurses towards venous thrombo-embolism (risk factors and prevention mechanisms) precisely helps to identify the gaps and continue to deal with accordingly. Therefore, this study aims at describing the knowledge, practices and factors associated to knowledge and practice of VTE for patients admitted to adult intensive care unit among nurses working at public hospitals in Addis Ababa.

In this study, the overall level of good knowledge was [55.4% (95% CI 48.9, 62.2)] about risk factors for venous thrombo-embolism which shows that the gaps need considerations. The result is relatively consistent with study done in California which indicates less than half of respondents (44 %;) had good knowledge of VTE. But it is not consistent with the study done in South Korea which indicates nurses' knowledge of risk factor and preventive practice of VTE for admitted patients and the only 16.2% nurses have good knowledge. The possible reason is that most of respondents in this study were bachelor degree and masters degree nurses whereas the study conducted in south Korea around 38% vocational and qualification level nurses (7,21).

Majority of the nurses knows venous thrombo-embolism (VTE) as a fatal complication of DVT (87%); VTE is a major cause of sudden death in hospitalized patients 154(75.7%). This is relatively similar with the study conducted in university hospital of Northern Cyprus which shows Venous thrombo-embolism (VTE) as a fatal complication of DVT (87.9%) and VTE as a major cause of sudden death in hospitalized patients (67.9%)(12). Most of respondents knows that Sedation or neuromuscular blockage as risk factor for VTE (68.4%), renal dialysis (66.1%), Vasopressors administration 113(63.8%), Sepsis as risk factor for VTE 106(62.7%), Mechanical ventilation 104(58.8%), cancer or cancer treatment 73(41.2%) as risk factors for venous thrombo-embolism. Which is relatively congruent with the cross sectional study in north china which showed that (49%) knows venous catheters; 40% sedation (37.7%), mechanical ventilation (35.8%), cancer (34.5%), vasopressor use (27.1%) (25).

In this study regarding nurses' knowledge related to prevention mechanism of VTE, majority of nurses knows that Elastic compression stockings 126(71.2%), Early ambulation after surgery 126(71.2%), as preventive measure. This finding is relatively not congruent with the study conducted in university hospital of Northern Cyprus indicates that early ambulation after surgery as prevention for DVT development (13.3%), Elastic compression stockings (24.2%) as prevention mechanism of venous thrombo-embolism(12).The possible reason for the discrepancy is that the study conducted in Northern Cyprus includes nurse working in all service units where as this study includes only ICU nurses who stay with high risk group patients their exposure status with patients with high risk group.

Regarding factors that affects nurses knowledge of VTE; nurses with experience of 10 years and above are more likely knowledgeable about VTE than nurses who have less than three years of experience ($p=0.022$). This result is relatively related with the a study conducted in North China that a more experienced (>5 years), and lead nurses more knowledge than others ($P<.000$, $P<.000$, and $P=.001$). It is also similar with the study done in university hospital of Northern Cyprus that shows nurses with 6–10 years of experience had higher knowledge than the other groups $P < .05$) (12,25). Additionally nurses with adequate resources are more likely knowledgeable than nurses nurse with scarce resource ($p= 0.027$). This is in agreement with the study conducted in china which shows that lack of clear indications guideline and protocol decreases nurse knowledge about venous thrombo-embolism ($P=0.05$ (26).

Even though they had good knowledge about VTE prevention techniques with self evaluative questionnaires, only [75(42.37% 95%, CI 35.3, 50.9] had good practice towards venous thrombo-embolism risk assessment and prevention practice in adult intense care units. This is consistent with the finding of study done in Amrita Institute of Medical Sciences, Kochi which indicates that around 58% had good knowledge, when it comes to practice; only 20% had a good practice(6).

Most of nurses participated in this study responded that they *never* use risk assessment score models (55.4%), VTE assessment and prevention guide line (39.5%), Use of the graduated compression stockings 88(49.7%) and Teaching the patients about proper use of graduated compression stockings 90(50.8%) during patient care practice. This is relatively congruent

with the study conducted in university hospital of Northern Cyprus Knowledge and practices of nurses on deep vein thrombosis risks and prophylaxis which shows that they never use graduated compression stockings (80.6%), Administering anticoagulants as preventive in clinic (71.5%), Monitoring the side effects of the anti- coagulants (71.5%),(12,20).

Regarding factors affecting nurses practice towards VTE risk assessment and prevention nurses' with masters degree in nursing are more likely had good practice on VTE risk assessment and prevention practice than those who had diploma nurses qualification ($p=0.012$). This is relatively congruent with the study conducted by (Al-Mugheed KA, Bayraktar N. 2018) shows that nurses with bachelor's degree and higher rate (13.2%) than those graduated from the Healthcare vocational high school (3.7%) at ($P < .05$)(12). Similarly those nurses free from pressures from colleagues/coworkers had good practice towards VTE in intensive care units than those nurses under pressure from co-workers ($p=0.023$) . This result is similar with conducted by (Gaston S, White S.2013)on systematic review of barriers and facilitators to venous thromboembolism clinical practice guideline compliance by healthcare professionals in acute care; role conflict between doctors and nurses the major problem in completing risk assessment tools (28). It is also congruent with the study done in California which shows that lack of effective communication between nurses and physicians and role compliant as a factors that affects nurses practice towards venous thrombo-embolism assessment and prevention (20).

7 STRENGTH AND LIMITATION OF THE STUDY

7.1 Strength of the study

The study tried to dig out information and gaps about level of knowledge, practice and factors that affects nurse knowledge and practice of venous thrombi-embolism among adult intensive care unit nurses. It also identified the research gaps related to venous thrombi-embolism and give recommendations for further investigations. It is a multi-centered study so that is has high chance of representation. This in return can offer clues and may forward important message for further researchers.

7.2. Limitation of the study

The study did not observe the actual practices of nurses' assessment and prevention of venous thrombo-embolism but believed the respondents' self- report by self-evaluative questionnaires. The other limitation this study is it was not included attitude of nurses towards VTE assessment and prevention since it can be affected by social and personal biases to test by self administered questionnaires but it is one of the condition that can affect nurses practice on venous thrombi-embolism.

Finally the study was cross-sectional study and can only reflect experience of nurses at the time of assessment only. Therefore, a causal relationship cannot be established between KP and its predictors.

8 CONCLUSION AND RECOMMENDATION

8.1 8.1. Conclusion

Based on the findings in the study the following points were concluded:

The overall results of this study showed that nurses had poor knowledge, and poor practice on venous thrombi-embolism.

This showed that there is discrepancy in the knowledge, assessment, and prevention practice of VTE than expected. The reason behind may be the issue of knowledge, lack of contents about VTE risk assessment protocol model and management in their basic nursing education and lack of trainings on VTE managements for critically ill patients.

The findings of this study also suggest that the participants need in-depth education regarding venous thrombi-embolism risk factors. It also identified that even though they had good knowledge about prevention techniques of VTE, they have poor practice which may be due to lack of assessment model, guideline mechanical venous thrombi-embolism preventive resources.

8.2 Recommendation

Based on the findings of this study, the following points are recommended;

- ✓ Complication of Venous thrombi-embolism is expected in all patients admitted to intensive care unit. VTE risk assessment model and protocol as well as prevention and management guideline is necessary. So it would better to prepare risk assessment protocol and guideline of venous thrombi-embolism for daily patient routine care implementation in ICU.
- ✓ As far as the results from this study nurses have low knowledge and practice towards venous thrombi-embolism in patients admitted to intensive care unit. Therefore, the **hospital's administrative bodies and supportive organizations** would better to provide convenient professional education, training program regarding VTE risk factors and its management to staff nurses.
- ✓ **The hospital's quality care teams with the medical director and nurse's director** are better to monitor and evaluate practicability of VTE risk assessment practice, model and protocol utilization; offering motivational education on use of assessment tools and prepares documenting charts for VTE assessment scores.
- ✓ **Matrons, head nurses, staff nurses and academic nursing staffs** in conjunction with federal health bureau and Addis Ababa city administration would better to work together in major factors and execute means to alleviate those major constraints that were found in these study like availing guideline and protocols and supporting materials like graduated compression stockings.
- ✓ **For researchers** Employing mixed methods of studies including attitudes of nurses' is recommended to gain more information on the knowledge, attitude and practices of nurses related to VTE management. This will help to elaborate findings including gaps between the scores and the current situations at hand. Methods of data collection like observation have to be used; that in return help appreciating the actual practices.

9 REFERENCES

1. Langford NJ, Stansby G, Avital L. The management of venous thromboembolic diseases and the role of thrombophilia testing: Summary of NICE Guideline CG144. *Acute Med.* 2012;11(3):138–42.
2. Wendelboe AM, Raskob GE. Global Burden of Thrombosis: Epidemiologic Aspects. *Circ Res.* 2016;118(9):1340–7.
3. Turpie AGG, Eriksson BI, Bauer KA, Lassen MR. New Pentasaccharides for the Prophylaxis of Venous Thromboembolism: Clinical Studies. *Chest* [Internet]. 2003;124(6 SUPPL.):371S-378S. Available from: http://dx.doi.org/10.1378/chest.124.6_suppl.357S
4. NICE. Venous thromboembolism in over 16s pt 2. NICE Guid. 2018;2(March).
5. Practice E, Evidence S. Venous thromboembolism prevention. 2010;2–5.
6. Antony AM, Ms KTM, Dharan DR. Assessment of Knowledge and Self Reported Clinical Practice on Prevention of Deep Vein Thrombosis (DVT) Among Staff Nurses. 2016;5(1):18–24.
7. Danwang C, Temgoua MN, Agbor VN, Tankeu AT, Noubiap JJ. Epidemiology of venous thromboembolism in Africa: a systematic review. *J Thromb Haemost.* 2017;15(9):1770–81.
8. Haile L, Hawaz Y, Assefa G. Risk Factors of Deep Venous Thrombosis in Duplex and Colour Doppler Ultrasound at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia. *East Cent African J Surg* [Internet]. 2013;18(2):61–9. Available from: <http://www.ajol.info/index.php/ecajs/article/view/97333>
9. Sue S. CD. Nurse survey on venous thromboembolism (VTE): Knowledge and perception Sue. 2016;5(8):4172.
10. Chendrasekhar A, Aleti S. Venous thromboembolism risk assessments on trauma patients has suboptimal interobserver reliability among inexperienced clinicians (fourth-year medical students). 2018;225–31.

11. Gruner-Zarnoch E, Gajewski P. Nurses' objective knowledge regarding venous thromboembolism prophylaxis A national survey study Yu-Fen. *Pediatr Pol*. 2018;54(11):1323–7.
12. Al-Mugheed KA, Bayraktar N. Knowledge and practices of nurses on deep vein thrombosis risks and prophylaxis: A descriptive cross sectional study. *J Vasc Nurs* [Internet]. 2018;36(2):71–80. Available from: <https://doi.org/10.1016/j.jvn.2018.02.001>
13. Association A college of heart. What Is Venous Thromboembolism ? <https://www.heart.org/en/health-topics/venous-thromboembolism/what-is-venous-thromboembolism-vte>.
14. Scheres LJJ, Lijfering WM, Cannegieter SC. Current and future burden of venous thrombosis : Not simply predictable. 2018;(March):199–208.
15. Kahn SR, Lim W, Dunn AS, Cushman M, Dentali F, Akl EA, et al. Prevention of VTE in nonsurgical patients. *Antithrombotic therapy and prevention of thrombosis*, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2012;141(2 SUPPL.).
16. Pandey A, Patni N, Singh M, Guleria R. Assessment of risk and prophylaxis for deep vein thrombosis and pulmonary embolism in medically ill patients during their early days of hospital stay at a tertiary care center in a developing country. *Vasc Health Risk Manag*. 2009;5:643–8.
17. Tocco, Susan; Martin, Beth; Stacy KM. AACN Practice Alert Preventing Venous Thromboembolism in Adults. *Crit Care Nurse*. 2016;36(5):20–4.
18. Kakkar AK. Prevention of venous thromboembolism in the cancer surgical patient. *J Clin Oncol*. 2009;27(29):4881–4.
19. Caprini JA. Identification of patient venous thromboembolism risk across the continuum of care. *Clin Appl Thromb*. 2011;17(6):590–9.
20. Gordon RJ. Venous Thromboembolism Prevention. *Anesthesiology* [Internet]. 2017;127(2):401. Available from: <http://insights.ovid.com/crossref?an=00000542-201708000-00039>

21. Bartlett M, Mauck KF, Bierle DM, Saadiq RA, Daniels PR. Updates in venous thromboembolism management: evidence published in 2016. *Hosp Pract* (1995) [Internet]. 2017;45(3):65–9. Available from: <https://doi.org/10.1080/21548331.2018.1486676>
22. Oh H, Boo S, Lee JA. Clinical nurses' knowledge and practice of venous thromboembolism risk assessment and prevention in South Korea: a cross-sectional survey. *J Clin Nurs*. 2017;26(3–4):427–35.
23. Barp M, Santos V, Carneiro M. Nursing care in the prevention of venous thromboembolism : an integrative review. 2018;1–13.
24. Lee JA, Grochow D, Drake D, Johnson L, Reed P, van Servellen G. Evaluation of hospital nurses' perceived knowledge and practices of venous thromboembolism assessment and prevention. *J Vasc Nurs* [Internet]. 2014;32(1):18–24. Available from: <http://dx.doi.org/10.1016/j.jvn.2013.06.001>
25. A.M. B, S. A, B. S, J. M. Knowledge, attitude and practices of healthcare providers towards deep vein thrombosis prophylaxis in five teaching hospitals of Rawalpindi. *J Ayub Med Coll Abbottabad* [Internet]. 2012;24(2):136–9. Available from: <http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed14&NEWS=N&AN=372447838>
26. Mohammed El-SayedEad D, KameliaFouadAbd-Allah P, Osama Hegazi M, Said Mohammed S. Effect of Nursing Care Standards for Preventing Deep Vein Thrombosis among Patients Undergoing Hip Surgery on Nurses' Performance and Patients' Outcome. 2016;5(4):1–12. Available from: www.iosrjournals.org
27. Elder S, Hobson DB, Rand CS, Streiff MB, Haut ER, Efird LE, et al. Hidden Barriers to Delivery of Pharmacological Venous Thromboembolism Prophylaxis : The Role of Nursing Beliefs and Practices. 2016;12(2):63–8.
28. Tang X, Sun B, Yang Y, Tong Z. A Survey of the Knowledge of Venous Thromboembolism Prophylaxis among the Medical Staff of Intensive Care Units in. 2015;1–11.

29. Lloyd NS, Douketis JD, Frnc C, Cheng J, Schu HJ, Cook DJ, et al. Barriers and Potential Solutions Toward Optimal Prophylaxis Against Deep Vein Thrombosis for Hospitalized Medical Patients : a Survey of Healthcare Professionals. 2012;7(1):1–7.
30. Gaston S, White S. Systematic Review of Barriers and Facilitators to Venous Thromboembolism Clinical Practice Guideline Compliance by Healthcare Professionals in Acute Care. Int J Cardiovasc Cerebrovasc Dis [Internet]. 2013;1(1):1–9. Available from: <http://www.hrpub.org>
31. Venous CJ. Caprini Risk Assessment Score L-TriP (cast) Score Based On The Clinical Risk Prediction Model.

10 ANNEXES

Annex A: Information sheet for participants.

Addis Ababa University

College of health science, school of medicine

Department of emergency medicine and critical care.

Dear Participant,

My name is Fikiru Yigezu a post graduate student pursuing a Master of Science in Emergency Medicine and Critical Care in Nursing, department of Emergency medicine and critical care at University of Addis Ababa. As one of the requirements for completion of this specialty, I am going to carry out this study in Addis Ababa governmental hospital's intensive care unit. The purpose of my study is to assess knowledge, practice and associated factors towards venous thrombo-embolism among adult intensive care unit nurses at governmental hospitals in Addis Ababa, Ethiopia from November 2018 to June 2019.

You are kindly requested to participate in this study. Your selection to participate in this study is because you are a frontline patient care provider and advocator throughout twenty four hours in this unit; assess and identify your patient progress and complication risk every time. I wish to ask you to kindly allow me to take some of your time to answer this questionnaire. If you agree to participate in the study, I shall issue you with structured questionnaire. The questions will address the socio-demography, knowledge and practice of nurses towards venous thrombo-embolism in adult intensive care unit in AA public hospital ICU. You have full right not to answer any question that you are not comfortable.

There are no risks to you in participating in this study. You are simply requested to answer the questions in the questionnaire as much detail as you can, and you are not obliged to answer a question if you don't want to participate in this study. On the other hand there may be no direct benefits to you from this study. However, it is expected that the findings of this study will be used to come up with better plans to ensure adequate knowledge, attitude and practice

skill training, guideline development and implementation for nurses' to prevent VTE among patients in ICU of AA public hospital. This will lead to making the necessary interventions, and therefore improve patient outcome.

The information you give in this study will be treated with most confidentiality during the study and thereafter. Your name will not be recorded anywhere. None of the information you give will be linked to you and it will only be used for the intended purpose.

Your participation in this study is voluntary. You are free to decline to participate in this study or can withdraw at any point. You are free not to answer any questions that you are not comfortable with. You have the right to refuse to participate or withdrawing from the study time any you want and there is no any punishment. Here is my personal contact in case of any complaints on any aspect of this study.

Yours sincerely

Name: Fikiru Yigezu:

Phone no: +251942451626,

Email address: ketoran2018@gmail.com

Annex B: Participant's consent

Addis Ababa university

College of health science, school of medicine

Department of emergency medicine and critical care.

Participant's consent

On behalf of Mr. Fikiru Yigezu, _____ has explained to me what is going to be done; the risks and benefits involved and will be available for questions at the Department of Emergency Medicine and critical care, Addis aAbaba University College of Health Sciences, on telephone number +251942451626 or e-mail address ketoran2018@gmail.com . I understand that my decision to participate or not to participate in this study will not have any reward or punishment. In the use of information generated from this study such as presentations and publications, my identity will remain anonymous. The records of the study must be available to only authorized study personnel. I am aware that I may withdraw from the study at any time.

I understand that by signing this consent form, I do not waive any of my legal rights but merely indicates that I have been informed about the study in which I am voluntarily agreeing to participate. A copy of this form will be provided to me.

Volunteer's signature----- Date -----

Annex C. English Version Questionnaire

Identification related information

Data collector's Name: _____ Signature: _____ Date _____

Supervisor's Name: _____ Signature: _____ date _____

Health facility's Name: _____ code of participant -----

NB: VTE: venous thrombo-embolism, DVT: deep venous thrombo-embolism, ICU: intensive care unit.

Part I: Now, I am going to ask you some questions about your Background (socio-demographic) information.

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	Religion	1. Orthodox 2. Muslim 3. Protestant 4. Other(specify)_____
106	Year of experience	1. < 1 years 2. 1-5 years 3. 6-10 years 4. >10 years
107	Educational level	1. Clinical nurse /Diploma 2. BSC degree 3. Msc nurses
108	Previous training on Venous Thrombo-Emboism	1. Yes 2. No

Part II. Now, I am going to ask you some questions about venous thrombo-embolism and its risk factors.

ID	Questions	Variable codes	
		True	False
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 DVT		
203.	VTE is a major cause of sudden death in hospitalized patients.		
204.	Prolonged immobilization predisposes to DVT in hospitalized patients.		
205.	Indwelling intravenous devices such as central venous catheters and peripherally inserted central catheter may predispose to VTE.		
206.	Paralysis, paresis, or recent plaster cast on lower extremities may predispose to VTE.		
207.	Obesity may predispose to VTE.		
208.	Sedation or neuromuscular blockage is risk factor for VTE.		
209.	Advancing age may predispose to VTE.		
210.	Previous DVT/VTE history may predispose to DVT.		
211.	No relationship exists between cancer or cancer treatment and DVT/VTE.		
212.	Major surgery may predispose to VTE		
213.	Varicose veins may expose to VTE.		
214.	Acute myocardial infarction expose patient for VTE.		
215.	Trauma may predispose to VTE.		
216.	Renal dialysis may expose ICU patient to VTE.		
217.	Sepsis 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 DVT.		
223.	Oral contraceptives or hormone replacement therapy may predispose to VTE.		
224.	Mechanical ventilation may predispose ICU patient to VTE.		
225.	There is no relationship between family history of DVT/VTE and DVT.		
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 DVT development.		
230.	Bed rest is necessary after major surgery to prevent DVT.		
231.	Heparin or low-molecular-weight heparin (LMWH) may prevent DVT development.		
232.	Fluid restriction is necessary to prevent VTE.		
233.	Elastic compression stockings may prevent VTE development in ICU.		
234.	The use of intermittent pneumatic compression devices may prevent DVT development.		

PART III. Now, I am going to ask you some questions about your practices of on VTE prevention.

For each of the following questions please write “X” under always if you perform every day and under some times if you perform seldom and under never if you don`t do any time.				
ID	Questions	Always	Some times	Never
301.	Providing information to patients and/or relatives about risks and prevention of DVT.			
302.	Using VTE assessment and prevention guide line 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 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 assessment.			
308.	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 the patients regularly for signs and symptoms of VTE.			

Section V. Now I ask you some question related factors affecting knowledge and risk assessment preventive practice on VTE.

ID	Question	Code of variable	
		Yes	No
401.	Absence of venous thrombo-embolism guideline affects nurses VTE prevention practice in ICU.		
402.	Lack of risk assessment model formats impairs nurses VTE prevention.		
403.	Inadequate knowledge about VTE impairs `nurses role in VTE prevention.		
404.	Absence of in service training on VTE affects nurse's role in VTE risk assessment.		
405.	Lack of resources graduated Compression stockings, intermittent pneumatic Compression impairs nurses VTE prevention practice in ICU.		
406.	High patient to nurse ratio in ICU impairs nurses from VTE prevention.		
407.	Due to rotation with nurses in other units at different time affects nurses VTE prevention.		
408.	Peer pressure from colleagues affects VTE prevention in ICU.		
409.	Doctors attitude towards nurses role in VTE preventive practice impairs nurses VTE prevention in ICU		
410.	Others specify -----		

Thank you for your participation!

