



# Nurses' Performance Regarding Prophylaxis of Venous Thromboembolism in Critical Care Units

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## Abstract

Venous thromboembolism, a collective term that includes deep vein thrombosis and pulmonary embolism, is a preventable health problem that might result in long hospital stays, pain, edema, loss of function, and sudden mortality if proper prophylaxis is not taken. Nurses play a critical role in improving the quality of healthcare through prevention. assess nurses' performance regarding venous thromboembolism prophylaxis in critical care units. A descriptive exploratory research design was used. The study will be carried out at medical intensive care units at Cairo University Hospitals. A Convenience sample of all available nurses (80) who accept to participate in this study. Three tools were used to collect study data: Tool I: Nurses' self-administrated questionnaire regarding venous thromboembolism prophylaxis; Tool II: Nurses' observational checklist regarding venous thromboembolism prophylaxis and Tool III Nurses Attitude towards Thromboembolism Prophylaxis Questionnaire. The present study showed that 67.5% of the studied nurses had an unsatisfactory level of knowledge, and 95% of the studied nurses had an incompetent level of practice, and 95% had a negative level of attitude regarding VTE prophylaxis. The study reveals that the majority of the studied nurses had unsatisfactory knowledge, incompetent practice, and a negative attitude regarding VTE prophylaxis. The study shows a significant positive relationship between a nurse's demographics (experience, training, and education) and knowledge, practice, and attitude. Finally, there was a significant positive correlation between knowledge and practice and between practice and attitude. Continuous education and training of nurses regarding VTE prophylaxis is required. Provide updated VTE prophylaxis guidelines and policies in critical care units as a reference for nurses. Finally, continue to monitor nurses' performance and provide adequate guidance and practice improvement sessions.

**Keywords:** Critical Care Units, Nurses Performance, Prophylaxis, Venous Thromboembolism

## Full-length article

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## 1. Introduction

Venous thromboembolism (VTE) is a collective term that includes deep vein thrombosis (DVT) and pulmonary embolism (PE). The VTE term is usually used to describe the formation of thrombus in a vein or veins of the systematic venous system, which favors the lower limbs, abdomen, and pelvis. Consequently, thrombus embolization travels through the pulmonary arterial system via the inferior vena cava and then to the right heart side chambers [2]. Cerebral Vein Thrombosis is another type of VTE resulting from clots moving from the cardiovascular system, causing a cerebral clot (stroke), which is manifested as neurocritical symptoms such as paralysis, loss of function, and aphasia [32]. Venous thromboembolism is a preventable health problem that might result in long hospital stays and sudden mortality if not discovered and treated properly. It is estimated that VTE incidence is 1-2 cases per one thousand patients yearly worldwide. However, other studies suggest that the incidence is much higher, at 4 per one thousand

patients yearly[32].This adds burden to medical and non-medical healthcare system costs, which are, for example, estimated in the United States at \$13.5 and \$69.5 billion for direct medical care in hospitals. This also includes indirect medical expenses such as lifestyle modifications, lifelong treatments, caregiver expenses, and the cost of life lost[8].

Venous thromboembolism is not easily diagnosed due to its silent progression. It is estimated that 30% of patients with thromboembolic complications are discovered after discharge, not in hospital settings. The exact cause of VTE remains unknown; however, three main risk factors carry possible explanations for the VTE and are termed Virchow's Triad. The three risk factors are endothelial damage, venous stasis, and altered coagulation[18]. Nurses practice should be based on reducing the incidence of VTE through periodic risk assessments using standardized tools and offering them the proper anticoagulant. Indeed, provide non-medical relief measures such as changing positions, range of motion, proper nutrition, and hydration. However,

thromboprophylaxis is divided into two categories: pharmacological and mechanical measures. Mechanical methods include graduated compression stockings, venous foot pump devices, and intermittent pneumatic compression devices [18].

### 1.1. Study Significance

According to Centers for Disease Control and Prevention (CDC) estimates, about 900,000 individuals are affected by either PE or DVT, with an estimated death rate of 60,000–100,000 yearly due to VTE complications. Sudden death is one of the symptoms occurring in 25% of individuals with PE, whereas it is expected that 10%–30% will die within one month of diagnosis. Among people who have had a DVT, one third to half will have long-term complications (post-thrombotic syndrome) such as swelling, pain, discoloration, and scaling in the affected limb[9]. In a study conducted at Ain Shams University, medical risk factors in ICU and inpatient units accounted for 88.9% of the studied sample, while surgical risk factors accounted for only 3%. The most frequent risk factors were acute infection, obesity, central venous catheters, and chronic pulmonary disease. long-term immobility, CHF, and acute respiratory failure[35]. Overall, Egypt's mortality rate due to cardiovascular causes is estimated at 46.2%[36]. Recently, COVID-19 pandemic has increased the risk of VTE, especially rates of PE incidence. The overall incidence of VTE in patients admitted to the ICU with COVID-19 is estimated at 28% for both DVT (15%) and PE (3%) with a mortality rate of 6%[8].

## 2. Subject and Methods

### 2.1. Research Design

A descriptive exploratory design was utilized in this study to satisfy the aim of the study and answer research questions.

### 2.2. Research Setting

The study was carried out at medical intensive care units at Cairo University Hospitals. The study took place at medical ICU and CCU units with a total of twenty-five beds.

### 2.3. Subject

A convenient sample of (80) nurses including all available nurses who provide direct bedside patient care at the previously mentioned setting. Nurses are 55 nurses working CCU and 25 in ICU.

### 2.4. Aim of the Study

This study aims to assess the nurses' performance regarding Venous Thromboembolism prophylaxis in Critical care units through the following objectives:

- Assess nurses' level of knowledge regarding Venous Thromboembolism prophylaxis.
- Assess nurses' level of practice regarding Venous Thromboembolism prophylaxis.
- Assess nurses' attitude regarding Venous Thromboembolism prophylaxis.

### 2.5. Research Questions

- What is the level of nurses' knowledge regarding venous thromboembolism Prophylaxis?
- What is the level of nurses' practice regarding venous thromboembolism Prophylaxis?

- What is the nurses' attitude regarding venous thromboembolism prophylaxis?

## 2.6. Tools of Data Collection

There are three tools used for data collection on this study

### 2.6.1. Tool I

Self- Administered Interview Questionnaire composed of two parts. Part I: Nurses' Demographic Characteristics: It included data such as nurses age, gender, educational level, years of experience in the field of nursing, years of dealing with ICU patients, attendance at training courses, hospital policies, and the availability of manuals and guidelines on VTE prevention. Part II: Nurses' Knowledge assessment Questionnaire regarding venous thromboembolism and its prophylaxis: It is developed by the investigator to assess nurses' knowledge regarding venous thromboembolism and prophylaxis in the form of multiple-choice questions composed of two sections composed of 53 multiple-choice questions. Questions cover knowledge related to venous thromboembolism and its prophylaxis.

#### • Scoring system of Knowledge part

Regarding the scoring system: the self-administered questionnaire nurses total score was ninety-six points. The scoring system was distributed according to the following:- Each correct answer had a score of (one) point, and the incorrect answer had a score of (zero) point. The score was summed up and was converted into a percentage score: It was categorized as:

- Satisfactory knowledge if the total score is >80%.
- Unsatisfactory knowledge if the total score is <80% [10].

### 2.6.2. Nurses' Observational Checklist regarding venous thromboembolism prophylaxis [12, 15, 27, 30, 31 & 33]

The tool is an adopted observational psychomotor checklist aiming to prevent the incidence of venous thromboembolism, consisting of seven observational checklists. It includes risk assessment of VTE (16 steps), subcutaneous injection anticoagulants (17 steps), early swelling detection via leg measurements (10 steps), elastic compression stockings (21 steps), early ambulation (16 steps), assisting patient with deep breathing exercises (13 steps) and active/passive range of motion (25 steps).

#### • Scoring system of Practice part:

Regarding the scoring system: the nurses practice checklist, the total score was 95 degrees. Each step that had been done had 1 score and not done step had a score of zero. Total practice scores ranged from 0 to 95 degrees and were categorized as:

- Competent if the total score is >80%.
- Incompetent if the total score is <80% [10].

### 2.6.3. Nurses Attitude towards Thromboembolism prophylaxis [28]

The tool is adopted to assess nurses' attitudes regarding venous thromboembolism prophylaxis. It is composed of 10 statements, five of which were positive and five of which were negative domain. The statements related to the importance of venous thromboembolism for medical

care, nursing attitudes towards the VTE, the importance of venous thromboembolism for patients in intensive care, the willingness of nurses to participate in venous thromboembolism prevention, and the burden or exhaustion that prevention of venous thromboembolism causes for nurses.

#### • **Scoring System for Attitude**

The tool consists of positively and negatively worded statements, items were scored on 5-point Likert scale from (0= strongly disagree), (1= Disagree), (2= maybe), (3= agree) and (4= strongly agree). Total scores ranged from 0 to 40 degrees and were categorized as:

- Positive attitude if the total score is 30 or more.
- Negative attitude if the total scores less than 30[28].

Validity: It was ascertained by a jury of six experts in the field of critical care nursing to test its content validity by reviewing the tools for clarity, relevance, comprehensiveness, simplicity, and needed minor modifications were done according to the jury.

#### **2.7. Reliability**

The results of reliability of the tools based on the Cronbach alpha test reliable for the study; knowledge by Cronbach alpha is 0.82, practice is 0.93, and attitude is 0.86.

#### **2.8. Ethical considerations**

Prior to study conduct, approval was obtained from the scientific research ethical committee in the faculty of nursing at Helwan University, in addition to approval from the nursing director of Cairo University Hospitals and charge nurses in the respective unit. Participation in the study is voluntary. They were assured that anonymity and confidentiality of their information would be guaranteed and were informed about their role before joining the study. The ethical considerations included explaining the purpose the study, stating the possibility to withdraw at any time, and maintaining the confidentiality of the information so that it wouldn't be accessed by any other party without the permission of the participants. Ethics, values, culture, and beliefs were respected.

#### **2.9. Pilot Study**

After reviewing the tools, a pilot study was carried out on 10% of the sample, i.e., 8 nurses under study, to test the applicability, clarity, and efficiency of the tools. Additionally, any explanations and clarifications were provided to the nurses. Then the tools were modified according to the results of the pilot study. There were minor modifications in the visibility and readability of the tool related to font size and the arrangement of questions. Nurses involved in the pilot study were included in the sample, as there were no major modifications to the tool.

#### **2.10. Statistical Analysis**

Upon completion of data collection, collected data were organized, tabulated, and analyzed using Statistical Package for Social Science (SPSS), version 24 for analysis. For quantitative data, numbers, percentage, mean, and standard deviation (SD) were used to describe results. For qualitative data which describe a categorical set of data, frequency and percentage of each category were calculated. Appropriate significance was adopted at  $P < 0.05$  for interpretation of results. The observed associated differences were considered

as not significant if  $p > 0.05$  and significant if  $p < 0.05$ . Appropriate inferential statistics such as chi square, Pearson correlation "r" test was used as well.

### **3. Results**

Table (1) shows that 58.7% of the studied nurses aged from eighteen to less than 30 years old and 56.3% of them were females. Regarding qualifications, 46.2% of the nurses were holding technical institute as the highest qualification. Concerning job characteristics, 68.7% of the nurses were working at cardiac care unit, 70% and 78.7% of them had experience of less than 10 years in nursing profession and at critical care setting with a mean duration of  $(7.68 \pm 5.94)$  and  $(6.28 \pm 4.75)$  respectively. 82.5% of the studied nurses did not have training about VTE prophylaxis and 62.5% of them did not have unit policy/guidelines regarding VTE prophylaxis. Figure (1) illustrates that 67.5% of the studied nurses had unsatisfactory knowledge regarding prevention methods of venous thromboembolism, while 32.5% of them had satisfactory knowledge.

Figure (2) illustrates that 95% of the studied nurses had incompetent practices regarding prevention methods of venous thromboembolism, while 5% of them had competent practices. Table (2) shows that 77.5% and 65.0% of the studied nurses strongly agreed that prevention of venous thromboembolism is important and important for patients in intensive care units, respectively. Whereas 40% and 32.5% of them strongly disagreed that prevention of venous thromboembolism wastes time and that venous thromboembolism prevention practices are less practiced than other elements of care. Figure (3) illustrates that 95% of the studied nurses had negative attitude towards prevention methods of venous thromboembolism, while 5% of them had negative attitude.

Table (3) shows that there was a high statistically significant relation between total satisfactory knowledge scores of the studied nurses and their training about VTE prophylaxis with ( $p$  value= 0.000). There were statistically significant relations between total satisfactory knowledge scores of the studied nurses and their demographic and job characteristics as qualification with ( $p$  value= 0.053), years of experience in critical care setting with ( $p$  value= 0.016) and unit policy /guidelines about VTE with ( $p$  value= 0.036). Table (4): shows that there were statistically significant positive correlations between total knowledge scores of the studied nurses and their practices with ( $P$  value = 0.041) and between their practices and attitude scores with ( $P$  value = 0.02). While there were no statistically significant correlations between total knowledge and attitude scores of the studied nurses

### **4. Discussion**

- In relation to the demographic characteristics of the studied nurses, the current study reveals that more than half of the studied nurses age ranged between  $18 < 30$  years old with a mean age of  $30.03 \pm 7.07$ . According to the investigator's belief, the most suitable age for consolidating knowledge, psychomotor skills and attitude is early or young adulthood. During this period, the individual is physically and mentally capable of engaging in the learning process due to maturation and physical and psychological readiness. This study is in line with the Mokadem & El-Sayed [12], in their study

to assess the effectiveness of educational programs to reduce VTE found that more than half of the studied nurses were young and aged between 19-30.

- The current study reported that half of the studied nurses had technical institute degree as their qualifications. According to the investigator's observation, Cairo universities has its own technical institutes where newly graduated nurses need to spend at least two mandatory years at any associated hospital. This study is in line with Khodier et al. [22] in their study during the COVID-19 pandemic to assess nurses' practices to prevent DVT, found that more than half of the studied nurses hold a technical institute degree. The study is not in line with Abdel Nasser et al. [1] <sup>who</sup> found that two thirds of the studied nurses graduated from nursing schools with diploma degrees. MA et al. [26] in their study entitled "Nurses' objective knowledge regarding venous thromboembolism prophylaxis," found that more than two-thirds of the participants hold a bachelor's degree in nursing.
  - The current study showed that more than three quarters of the nurses did not receive any training or courses regarding VTE and its prophylaxis. According to investigators' opinion, this might be due to numerous factors, such as limited time, workload, lack of facilities, poor payment, and lack of motivation to learn or advance their practice. The university results are in line with Mohammed et al [28], finding that only one-third of the studied nurses at Zagazig University had training regarding VTE and its prophylaxis. Yesuf et al. [37] in their study to assess practice regarding DVT prevention, found that only one tenth of the nurses had training. In Egypt, multiple studies have highlighted that nurses do not receive in-service training regarding VTE and its prevention, which is evidenced by in many studies showing lower results in knowledge and practice [13].
  - Concerning nurses' total knowledge regarding venous thromboembolism and its prophylaxis, more than two thirds of the studied nurses have unsatisfactory knowledge. According to investigator's observation is related to the fact that most nurses have a technical institute degree, there is no training offered by hospitals, high workload, no adequate prevention resources, lack of desire for nurses to attend training sessions and courses and work according to task oriented approach. The current results are in line with Elkattan & Elderiny [13] in their training program for nurses on DVT prevention found that nearly all nurses had unsatisfactory knowledge regarding DVT prevention before starting the program.
  - The current results are in line with Mohamed et al. [28] who found that nurses did not perform the same skills, especially assessment skills. The results are further supported by Haza et al [17]. in their educational program, which found that nurses had unsatisfactory practice before implementing her program to prevent PE. The results could be justified by a lack of assessment tools, nurses not understanding how and when the assessment tool should be scored or obtained, and the hospital's design of patient charts [20]. On the contrary, higher practice scores were noted in nurses exposed to training and courses, as evidenced by their means of scoring post-implementation of similar programs.
  - Concerning the total nurses practice regarding VTE prophylaxis, the current study found that nine tenth of the studied nurses have incompetent level of practice. From an investigator's point of view, nurses lack medical supplies, training, adequate follow up and down payment compared to their assigned tasks. Additionally, most of the studied nurses are working at two hospitals which affect their productivity. Finally, most of the nurses consider non-pharmacological prophylaxis not their duty and should be performed by physiotherapist.
  - Our results are in line with Ahmed [3] who found that about nine tenth of the studied nurses had an incompetent level of performance among nurses working with cancer patients to reduce VTE incidence. The study findings are like another study that took place in Ethiopia by Yesuf et al. [37] who found that more than half of the nurses had incompetent practices regarding DVT prophylaxis.
  - According to the previous statement, our study revealed a major practice defect. Nearly all nurses who participated in the study showed incompetent practice regarding VTE prophylaxis. The causes might be correlated to many factors, such as lack of knowledge regarding the magnitude of VTE, workload, lack of supplies, level of education, years of experience, lack of training, nursing shortage, and leadership observation [26]. Job satisfaction is one of the main factors affecting nurses' practice, which is affected by the work environment. The nursing work environment may be defined as an organizational feature of the work environment that helps or restricts professional nursing practice. Consequently, nurses' practice is affected by nurses' involvement in hospital affairs, the support of nursing managers, adequate staffing, and the relationship between nurses and physicians. All of which will help reduce health complications and promote nursing care if addressed properly [24].
- Concerning the attitude of the studied nurses regarding VTE prophylaxis, it was found that more than nine tenth of them have a negative attitude. The study shows that three quarters and two thirds of the studied nurses strongly agreed that prevention of venous thromboembolism is important and important for patients in intensive care units respectively. Whereas two fifth and one third of them strongly disagreed that prevention of venous thromboembolism wastes time and that venous thromboembolism prevention practices are less practiced than other elements of care. From the author's perspective, nurses feel sympathy for patients from a religious perspective and inappropriate staff-patient ratios. Despite that, they believe VTE prevention measures are mostly related to physiotherapist, physicians, and pharmacists.

**Table 1.** Frequency and percentage distribution of the studied nurses according to their demographic and job characteristics (n=80)

| Demographic Characteristics                          | N            | %           |
|--|--------------|-------------|
| <b>Age:</b>  |              |             |
| • 18> 30 years                                       | 47           | <b>58.7</b> |
| • 30>40 years  | 22           | 27.5        |
| • 40-60 years  | 11           | 13.8        |
| Mean ± SD  | 30.03 ± 7.07 |             |
| <b>Gender:</b>                                       |              |             |
| • Male   | 35           | 43.7        |
| • Female   | 45           | <b>56.3</b> |
| <b>Qualification:</b>                                |              |             |
| • Diploma  | 12           | 15          |
| • Technical institute                                | 37           | <b>46.2</b> |
| • Bachelor of specialized nursing                    | 10           | 12.5        |
| • Bachelor's degree                                  | 21           | 26.3        |
| • Postgraduate                                       | 0            | 0.0         |
| <b>Unit:</b>   |              |             |
| • Intensive care unit                                | 25           | 31.3        |
| • <b>Cardiac care unit</b>                           | 55           | <b>68.7</b> |
| <b>Total years of experience in nursing:</b>         |              |             |
| • 1 > 10 years                                       | 56           | <b>70</b>   |
| • 10 > 20 years                                      | 20           | 25          |
| • 20-40 years  | 4            | 5           |
| Mean ± SD  | 7.68 ± 5.94  |             |
| <b>Years of experience in critical care setting:</b> |              |             |
| • 1 > 10 years                                       | 63           | <b>78.7</b> |
| • 10 > 20 years                                      | 17           | 21.3        |
| • 20-40 years  | 0            | 0.0         |
| Mean ± SD  | 6.28 ± 4.75  |             |
| <b>Training about VTE Prophylaxis:</b>               |              |             |
| • No   | 66           | <b>82.5</b> |
| • Yes  | 14           | 17.5        |
| <b>Unit policy/guidelines about VTE:</b>             |              |             |
| • No   | 50           | <b>62.5</b> |
| • Yes  | 30           | 37.5        |

**Table 2.** Percentage distribution of the studied nurses according to their attitudes towards prevention methods of venous thromboembolism (n=80)

| Attitude Items   | Strongly Disagree     | Disagree | Maybe | Agree | Strongly Agree |
|--|-----------------------|----------|-------|-------|----------------|
| ▪ Prevention of venous thromboembolism is <b>important</b> .                                     | 1.3                   | 0.0      | 10.0  | 11.3  | <b>77.5</b>    |
| ▪ Prevention of venous thromboembolism is <b>important for patients</b> in intensive care units. | 1.3                   | 1.2      | 5.0   | 27.5  | <b>65.0</b>    |
| ▪ Venous thromboembolism is a life-threatening condition   | 1.3                   | 0.0      | 12.5  | 27.5  | 58.7           |
| ▪ Nurse is willing to participate in the prevention of venous thromboembolism                    | 3.8                   | 2.5      | 26.2  | 27.5  | 40.0           |
| ▪ All intensive care patients are susceptible to venous thromboembolism                          | 2.6                   | 3.8      | 36.3  | 23.8  | 33.8           |
| ▪ Prevention of venous thromboembolism is physically exhausting.                                 | 18.8                  | 18.7     | 30.0  | 22.5  | 10.0           |
| ▪ Prevention of venous thromboembolism wastes time   | <b>40.0</b>           | 21.2     | 32.5  | 3.8   | 2.5            |
| ▪ Prevention of venous thromboembolism is financially costly.                                    | 22.5                  | 35.0     | 38.8  | 3.7   | 0.0            |
| ▪ Preventing venous thromboembolism is a psychological burden                                    | 25.0                  | 42.5     | 25.0  | 7.5   | 0.0            |
| ▪ Venous thromboembolism prevention practices are less practiced than other elements of care.    | <b>32.5</b>           | 18.8     | 25.0  | 21.2  | 2.5            |
| <b>Mean ± SD</b>   | <b>23.100 ± 4.364</b> |          |       |       |                |

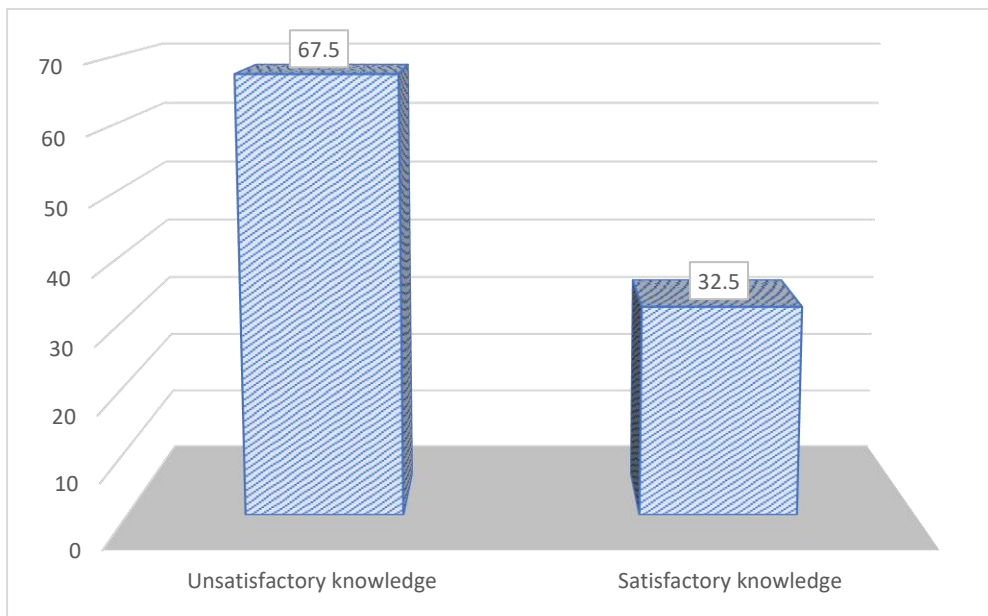
**Table (3):** Relations between total satisfactory knowledge scores of the studied nurses and their demographic and job characteristics (n=80)

| Patients' Characteristics                    |                                 | Total knowledge score             |                | Chi square | P value  |
|--|---------------------------------|-----------------------------------|----------------|------------|----------|
|  |                                 | Satisfactory                      | Unsatisfactory |            |          |
| Age ( in years)                              | 18 < 30                         | 16                                | 31             | 0.193      | 0.908    |
|  | 30 < 40                         | 7                                 | 15             |            |          |
|  | 40 years or more                | 3                                 | 8              |            |          |
| Gender                                       | Male                            | 11                                | 24             | 0.033      | 0.857    |
|  | Female                          | 15                                | 30             |            |          |
| Qualification                                | Diploma                         | 1                                 | 11             | 3.758      | 0.053 *  |
|  | Technical institute             | 4                                 | 33             |            |          |
|  | Bachelor of specialized nursing | 1                                 | 8              |            |          |
|  | Bachelor's degree               | 20                                | 1              |            |          |
|  | Postgraduate                    | 0                                 | 0              |            |          |
| Unit   | Intensive care unit             | 16                                | 39             | 0.624      | 0.430    |
|  | Cardiac care unit               | 10                                | 16             |            |          |
| Total years of experience in nursing         | 1 > 10 years                    | 18                                | 38             | 6.080      | 0.452    |
|  | 10 > 20 years                   | 7                                 | 13             |            |          |
|  | 20 years or more                | 1                                 | 3              |            |          |
| Years of experience in critical care setting | 1 > 10 years                    | 19                                | 44             | 10.47      | 0.016 *  |
|  | 10 > 20 years                   | 7                                 | 10             |            |          |
|  | 20 years or more                | 0                                 | 0.0            |            |          |
| Training about VTE Prophylaxis               | Yes                             | 12                                | 2              | 11.905     | 0.000 ** |
|  | No                              | 14                                | 52             |            |          |
| Unit policy /guidelines about VTE            | Yes                             | 12                                | 38             | 4.391      | 0.036 *  |
|  | No                              | 14                                | 16             |            |          |
| * Significant (S) p < 0.05                   |                                 | ** High Significant (HS) p < 0.05 |                |            |          |

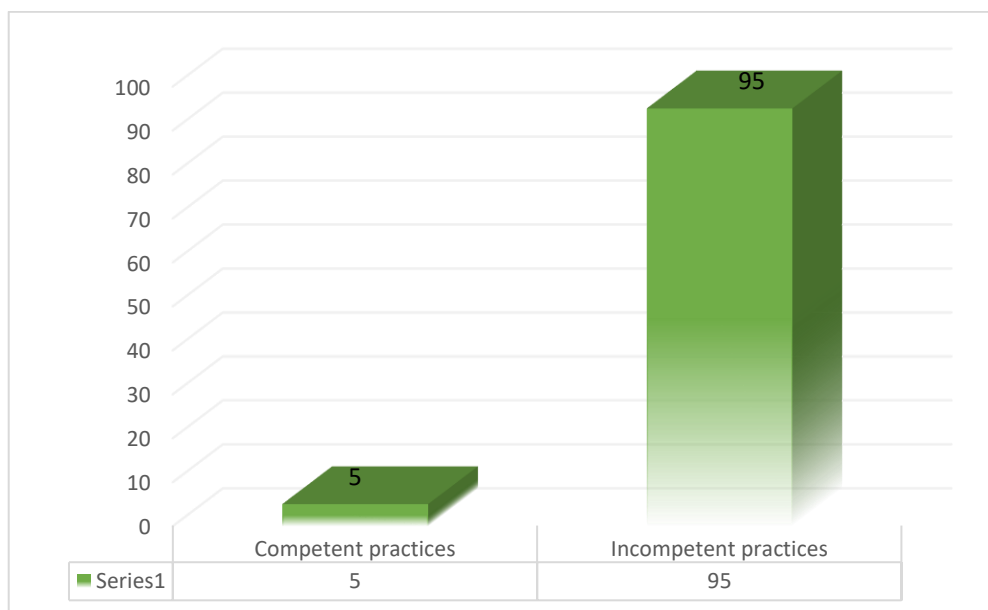
**Table 4.** Correlations between total knowledge scores of the studied nurses, their practices and attitude scores

| Items           |   | Total knowledge | Total practices |
|-----------------|---|-----------------|-----------------|
| Total practices | R | 0.716           | 1               |
|                 | P | 0.041 *         | 0               |
| Total attitude  | R | 0.074           | 0.864           |
|                 | P | 0.514           | 0.020 *         |

\* Significant (S)  $p \leq 0.05$

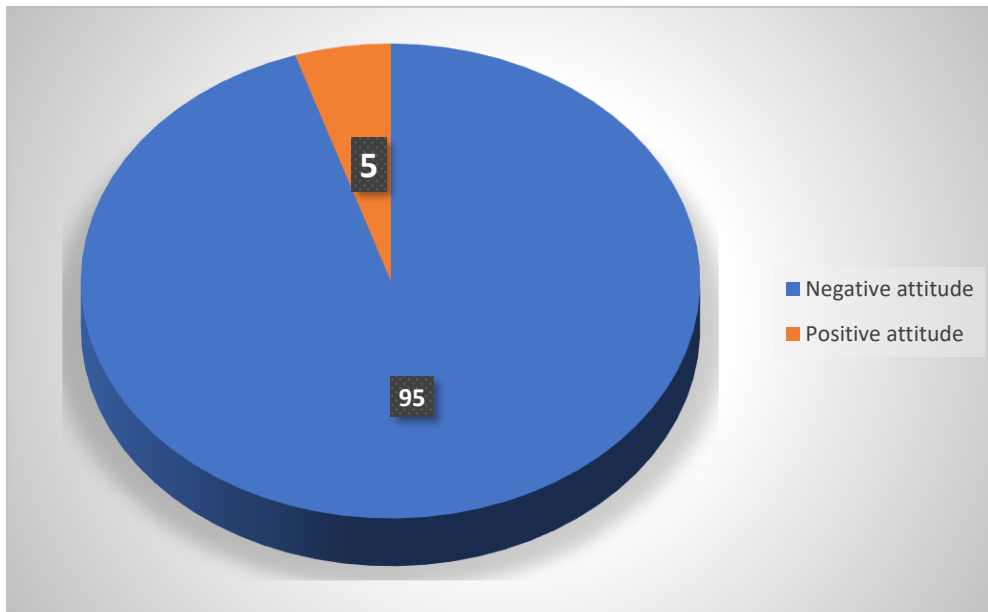


**Figure 1.** Percentage distribution of the studied nurses according to their total knowledge regarding prevention methods of venous thromboembolism (n=80)





**Figure 2.** Percentage distribution of the studied nurses according to their total practices regarding prevention methods of venous thromboembolism (n=80)



**Figure 3.** Percentage distribution of the studied nurses according to their total attitudes towards prevention methods of venous thromboembolism (n=80)

- The current results disagree with many studies nationally. Ahmed et al. [3] found that more than three-quarters of nurses identified VTE as a main concern as they discussed the importance of pharmacological prophylaxis needed to prevent its occurrence. Similarly, Mohammed et al. [28] showed that half of the studied nurses had a positive attitude towards VTE and viewed it as a main concern that needed to be addressed. In line with the current study by Li et al. [24] in their study to evaluate the immobility-related complications, they found that nurses' positive attitudes helped in reducing complications. However, from the author's perspective, the variation in the results is because the scoring system in our study is higher at 75% compared with other studies, which are between 50% and 60%.
- Regarding relation between nurses' demographics and knowledge, the current study shows highly statistically significant between nurses' demographics (training, years of experience, qualification, critical care setting experience and availability of guidelines) with total knowledge. The current study is in line with the findings of Alyousef et al [6] who found a statistically significant relationship between nurses' years of experience, previous DVT education, and total knowledge score regarding DVT prevention. Additionally, Al-Hameed et al [5] found that nurses with more than 5 years of experience demonstrated satisfactory knowledge.
- Concerning the relation between nurses' demographics and practice, the current study presents that there were no statistically significant relations between total competent practices scores of the studied nurses and their demographic characteristics. However,

there were statistically significant relations between training about VTE prophylaxis and availability of unit policy /guidelines about VTE. The current study is in line with Kiflie et al. [22] study entitled "Assessment of knowledge, attitude, practice, and associated factors of VTE prophylaxis among health professionals," which found no statistically significant relation. However, the same study highlighted that nurse who received training and clear guidelines and policies showed competent practice. Nationally, Mohammed et al.[28] reported no significance regarding nurses' demographics except for the nurses who went for training and police at their unit.

- In relation to the attitude with nurses' demographics, the current study presents no statistically significant relations between total attitude scores of the studied nurses and their demographic except for age and qualification. The current study is in the same line with Feng et al. [14] who found statistically significant relation with age of the studied nurses. They justified the relation to fear of financial penalty, better workload, and increased medical cost.
- Regarding the correlation between the study variables, it shows that there were statistically significant positive correlations between the total knowledge scores of the studied nurses and their practices and between their practices and attitude scores. While there were no statistically significant correlations between the total knowledge and attitude scores of the studied nurses.
- The results are in line with Khodier et al. [21] who found a highly statistically significant correlation between nurses' total level of practice and total level of knowledge in their study to assess nurses' knowledge and practice regarding the prevention of DVT among hospitalized patients. Additionally, Ahmed et al.[3] in



their study entitled "Assessment of Nurses' Knowledge and Practice Regarding Care for Patients with Spinal Cord Injury in the Critical Care Unit," found a significant correlation between total knowledge and practice. Similarly, Elkattan and Elderiny [13] discovered a highly statistically significant relationship between nurses' knowledge and their practices in their study, "Effect of Nursing Care Guidelines on Preventing DVT among Patients Undergoing Arthroplasty Surgery.

- Similarly, the study is in line with Ibrahim et al. [19] who found a positive correlation between total practice and attitude as more than half of nurses demonstrated quality of care regarding VTE prevention. Myaneh et al. [29] in their study entitled "Relationship Between Practice and Attitude Regarding Pressure Injury Among Intensive Care Nurses in Iran" found a statistically significant correlation between fair practice and attitude among the studied nurses. However, Roshdy et al. [34] found a statistically significant correlation between incompetent practice nurses and positive attitudes. This is justified as nurses had higher nurse-patient ratios.

## 5. Conclusion

Most of the studied nurses had unsatisfactory knowledge regarding VTE prophylaxis. Additionally, there was a statistically significant relationship between patient demographic characteristics, including years of experience, educational level, qualification, in-service training, and the presence of policies and guidelines regarding VTE prevention in their units. Statistically there was no correlation between knowledge and attitude, but a statistically significant correlation between knowledge and practice was established. Most nurses had an incompetent level of practice regarding VTE prevention. There was a significant relation between training and policies and a better practice outcome. Additionally, competent practice was associated with positive attitudes towards VTE prevention and quality of care. Finally, most of the nurses demonstrated a negative attitude towards VTE prophylaxis. There was no relation between attitude and demographic characteristics except for age and qualification, which should have a significant positive correlation.

## 6. Recommendations

### 6.1. Recommendation for future research

- Conduct the study on a larger probability sample in different types of hospitals, including those in the government and private sectors, for comparison and generalization.
- Conduct an educational research program to test its effectiveness on nurses' outcomes.

### 6.2. Recommendation for Practice

- Conduct training sessions and seminars periodically to enhance nurses' performance regarding VTE prevention.
- Provide updated and accessible policies, guidelines, and paperwork for VTE prophylaxis based on the most recent evidence-based practice.
- Provide ongoing feedback and evaluation of the key-based indicators of nurses with recommendations for improvement.

- Provide financial resources, supplies, and adequate staffing levels to enhance compliance.
- Announce the monthly unit outcome and praise the best performance.

### 6.3. Recommendations for Education

- Emphasis on VTE prophylaxis for undergraduate students.
- Enhance students search skills by focusing on developing their English language, research skills, and usage of nursing databases.
- Integrate ethical principles into the curriculum to improve student nurse's attitude.

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