



Effectiveness of nursing prophylaxes interventions on venous thromboembolism risks among patients with orthopedic surgery

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Abstract

Venous thromboembolism is a most prevalent problem for orthopedic surgery patients. Nurses have been shown in the literature to play a significant role in reducing the incidence of venous thromboembolism practicing range of motion exercises increase blood flow to the lower extremities, and early mobilization has been shown to improve outcomes. To evaluate the effectiveness of nursing prophylaxis interventions on venous thromboembolism risks among the patients with orthopedic surgery A quasi-experimental (Study- Control) research study on (60) randomly selected patients with cancer undergoing surgery divided equally in to two groups (study and control). Orthopedic department at Assiut University Hospitals Venous Thromboembolism (VTE) risk factors assessment scale. There was no statistical significant difference between study and control groups regarding their demographic data. There was a statistical significant difference between study and control groups regarding the high risk especially Left limb VTE with p.value (0.027*) after application of the nursing prophylaxis interventions. There was a positive correlation between demographic data and risk factors of VTE regarding age by years. The implementation of the nursing prophylaxis interventions had a significant diminishing of venous thromboembolism risks among study than control group. Regularly updating and refreshing the nurses' knowledge and practice are recommended through workshops to minimize the risks of VTE among the patients with orthopedic surgery. applying elastic stocking, exercising and range of motion had a positive effect on reducing incidence of VET among orthopedic surgical patients.

Keywords: Prophylaxis interventions, Venous thromboembolism risks, Orthopedic surgery

Introduction

Patients having Major Orthopedic Surgery (MOS), such as Total Hip Replacement (THR), Total Knee Replacement (TKR), and Hip Fracture Surgery (HFS), are at an increased risk of Venous Thromboembolism (VTE) most commonly the wide veins of the legs or pelvis ¹.

VTE is more common in orthopedic patients than in

the general population, with DVT rates ranging from 40% to 60% in major orthopedic surgeries. In approximately 6% of DVT patients and approximately 12% of pulmonary embolism patients, death occurs within one month of diagnosis ².

Venous Thromboembolism (VTE), particularly Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE), is a leading cause of morbidity and mortality in the United States. Patients undergoing major

orthopedic surgery, especially hip and knee arthroplasty, are at the highest risk of VTE³.

The coagulation cascade is triggered by major surgery or damage to the lower extremities, and the physiologic balance between factors that promote and inhibit coagulation is disrupted, resulting in a hypercoagulability state. Reduced venous flow and compromised endothelial function raise the risk of deep-vein thrombosis and pulmonary embolism in these patients⁴.

The most common VTE symptoms occur at the clot's location. Swelling, hot, discomfort or tenderness, and skin redness are some of the symptoms. Deep vein thrombosis may also occur without warning⁵.

The techniques that nursing staff can use to prevent VTE in high-risk patients including mechanical approaches such as programmed ambulation, leg exercises, deep breathing exercise, application of compression stocking or intermittent calf muscle compression, and hydration maintenance and anticoagulant medications, such as warfarin, aspirin and heparin are used in pharmacologic techniques⁶. Venous Thromboembolism (VTE), also known as deep vein thrombosis, is the third leading cause of death worldwide due to cardiovascular disease. VTE acquired in hospitals poses a significant threat to patient safety. In the medical sector, Deep Vein Thrombosis (DVT) is a recurrent and growing issue. This is particularly true of orthopedics and the aftermath of orthopedic procedures⁷.

There are two types of prophylaxis methods: pharmacological and mechanical. Prophylaxis should be started as soon as possible after surgery and continued until the risk has passed. Since each patient's risk/benefit ratio for bleeding after pharmacologic prophylaxis is different. The type of thromboprophylaxis should, preferably, be tailored to the level of risk. Perioperative thromboprophylaxis for 28-35 days after discharge from the hospital will lower the risk of VTE and improve outcomes for these patients⁸.

To prevent venous thromboembolism, static methods like graduated compression stockings (or elastic stockings or anti-embolism stockings) and dynamical systems like intermittent pneumatic compression

and a Venous Foot Pump Are Utilized (VTE). The most significant advantage of these devices is that they do not result in bleeding⁹.

Nurses caring for patients at risk for VTE must consider their medical background, family history, current condition, current medications, and physical examination data when treating them. Nurses must evaluate the patient's risk factors and detect and immediately disclose irregular physical examination results in order to adequately advocate for patients and avoid DVT¹⁰.

Thromboprophylactic approaches, such as health education, correctly applied basic preventive measures, physical prevention strategies, and adequate antithrombotic medications, should be provided to patients undergoing major orthopedic surgery. In order to promote patient involvement and adherence, these treatments should ideally be patient-centered¹¹.

Significance of the study

1. Orthopedic surgeries, such as complete hip replacement, THA (total knee arthroplasty) and whole knee joint surgery are both conducive to the establishment and progression of DVT¹². VTE incidence rates without prophylaxis have been observed to range from 40% to 60%¹³.

Long-term complications (post thrombotic syndrome) affect 50% of people who have had a VTE, including extremity pain, venous dilation, edema, pigmentation, and venous ulcers¹⁴

The most common cause of Pulmonary Embolism (PE) is Deep Venous Thrombosis (DVT) Pulmonary Embolism (PE) is a potentially fatal illness or complication that is one of most surgeons' worst fears. The embolus that causes the obstruction normally comes from a faraway location and passes through the venous system. Dyspnea, chest pain, and collapse are all signs of PE. Furthermore, the clinical severity of PE varies, ranging from asymptomatic to fatal¹⁵

From the researcher's review of literatures, found that that majority of orthopedic patients return with deep venous thrombosis which can be reduced

through mechanical methods such as range of motion, exercises, and elastic stocking wearing. So, this study will be conducted to reduce venous thromboembolism among orthopedic patients.

Aim of the study

The current study aimed to assess the effectiveness of nursing prophylaxis interventions on venous thromboembolism risks among the patients with orthopedic surgery

Specific objectives

- Assess the level of venous thromboembolism risks among the patients with orthopedic surgery post the nursing prophylaxis interventions application.

Study hypotheses

- The level of venous thromboembolism risks among the study group patients with cancer undergoing surgery will be minimizing than control group post the nursing prophylaxis interventions.

Subject and methods

Research design

A quasi experimental (Study control) research design used in the study

Setting

This study was conducted in the Orthopedic department at Assiut University hospitals.

Subject:

A randomly selected (60) patients admitted to the orthopedic surgery department, at Assiut University Hospital.

Who divided equally into two groups study and control.

Inclusion criteria

- In general, all patients with Orthopedic surgery (i.e., major and minor).
- The randomization to aside of the study sample to avoid bias:
- The study group patients who admitted in the single ever numbered rooms (1, 3 and 5) in the surgical sectors.
- The control group patients who admitted in the double ever numbered rooms (2, 4 and 6) in the surgical sectors.

Study duration

- The whole data was collected during 10-month period, beginning in May 2021 and ending in February 2022.

Tools of data collection

Three tools were used for data collection of current study:

Tool I: VTE patient's assessment scale

This tool, which comprised of three sections, was designed to assess patients' risk factors for VTE development.

- **Part 1:** Demographic data of the patient: Such as age, sex, educational level, marital Status.
- **Part 2:** Patient medical sheet: This part was developed to assess patient BMI and type of surgery.
- **Part 3:** the VTE risk assessment scale¹⁶. It was developed to proactively identify patients at risk for VTE, it comprised seven subscales (Age specific group, Mobility, Trauma, Build/Body mass index, Special risk factor, High risk disease, Surgical intervention)

AGE SPECIFIC GROUP (years)	score	BUILD / BODY MASS INDEX (BMI)	
10-30	0	Wt(kg)/ Ht (m) ²	
31-40	1	Build	BMI
41-50	2	Underweight	16-18
51-60	3	Average/ Desirable	20-25
61+	4	Overweight	26-30
		Obese	31-40
		Very obese (morbid)	41+
MOBILITY	score	SPECIAL RISK CATEGORY	score
Ambulant	0	Oral Contraceptives:	
Limited (uses aids, self)	1	20-35 years	1
Very limited (needs helps)	2	35+ years	2
Chair bound	3	Pregnancy/ Puerperium	3
Complete bed rest	4		
TRAUMA RISK CATEGORY		SURGICAL INTERVENTION	<i>Score only one appropriate surgical intervention.</i>
<i>Score item(s) only preoperatively.</i>	score		score
Head injury	1	Minor surgery < 30 mins	1
Chest injury	1	Planned major surgery	2
Spinal injury	2	Emergency major surgery	3
Pelvic injury	3	Thoracic	3
Lower limb injury	4	Abdominal	3
		Urological	3
		Neurosurgical	3
		Orthopaedic (below waist)	4
HIGH RISK DISEASES: Score the appropriate item(s)	score	ASSESSMENT PROTOCOL	Risk Categories
Ulcerative colitis	1	Score range	
Anaemia: Sickle Cell	2	≤ 6	No risk
Haemolytic	2	7-10	Low risk
Polycythaemia	2	11-14	Moderate risk
Chronic heart disease	3	≥ 15	High risk
Myocardial infarction	4		
Malignancy	5	SCORING:	
Varicose veins	6	Identify appropriate items, add and record below:	
Cerebrovascular accident	6	Assessor	
Previous DVT	7	Date	
		Score	

Scoring system ¹⁶

Score range	Risk categories
≤6	No risk
7-10	Low risk
11-14	Moderate risk
≥15	High risk

The nursing prophylaxis interventions

The researchers prepared the nursing prophylaxis interventions after extensive reviewing recent literature. It was designed in a simplified Arabic language and was supported by photo illustrations and colored pictures.

The researcher handed out a handout (Photo brochure) to the study participants at the end of the session as educational information and training methods for post-orthopedic surgery discharge instructions, which was prepared by the researcher after researching related literature. It featured an overview of DVT, instructions for applying elastic stocking, four types of exercise, and four types of R.O.M for thigh and calf muscle building. In addition, guidelines for length and frequency are provided to ensure that patients practise these exercises correctly after being discharged from the hospital (4-6 weeks) and at home.

Validity and reliability

Content validity of the used tools was done by (5) jury

of specialists in the field of medical- surgical nursing and oncology field.

The reliability was tested for tools by using Cronbach's alpha coefficient 0.85.

Ethical considerations

The study was following the common ethical guidelines of clinical research according to the declaration principles of Helsinki, ¹⁷. for medical research. Confidentiality and anonymity were guaranteed. Nurses and patients had the freedom to participate and or withdraw from the study whenever they want. No names appeared on any results and a coding system known only to the researcher was developed and used.

Pilot study

A pilot study was conducted to test visibility and applicability of the used tools and to estimate the time required for data collection tools. Which applied on (10%) the study subjects (6 patients who were chosen randomly). Some minor modifications based on the result of the pilot study were made to have more applicable tools for data collection. Some statements were omitted, and then the final forms were developed, so the total subject did not include the pilot study to ensure the stability of the results.

Data collection methods

Official letters were issued to the director of the hospital and to the head of the Orthopedic department as well as the hospital nursing director.

The current study was carried out by creating several data collection tools as well as securing a formal paper agreement one month before to the start of the study. Data was collected on a daily basis (3 to 4 days a week) during the morning or evening shift.

Researchers briefed for males and female's patients who were scheduled for orthopaedic procedures about the study's objective and nature, and then got oral consent from those who agreed to participate. The researcher selected the studied patients randomly by selecting all the patients undergoing orthopedic surgery through small paper blinded

selected.

The study group (30) patients admitted in the single even numbered rooms (1, 3 and 5). The study group (30) patients admitted in the double even numbered rooms (2, 4 and 6). Then the aims and objectives of the study were explained to each patient individually and only those who gave their consent participated in the study. Using the first instrument (VTE Patient's Assessment Scale), the researcher began collecting data from the control group in four months After finishing the control group, data collection from the study group began using the same instrument was utilised to determine the existence of VTE. The researcher assessed both study and control patients' risk factors using same tool, from the patients' folders it took around 10 minutes to fill it. The study sample's data was collected in an inpatient orthopaedic department during their hospitalisation (which spanned from 1 to 5 days) and subsequently at an outpatient clinic for follow-up. For the study group, there were a total of 4-5 data collecting and training sessions. Each treatment lasts about 5–10 minutes, depending on the patient's tolerance. At the conclusion of each session, there will be a discussion and feedback. It lasted between 30 and 60 minutes for both study groups. The researcher handed out a handout (Photo brochure) to the study participants at the end of the session as prophylaxis and training methods for post-orthopedic surgery discharge interventions, which was prepared by the researcher after researching related literature.

Nursing prophylaxis interventions regarding post orthopedic surgery discharge was prepared in Arabic language brochure include

Knowledge of the meaning, causes, risk factors, signs and symptoms, prevention, and treatment of VTE, as well as post-operative home care.

Practice included technique for applying elastic stockings, muscular leg and knee exercises, and range of motion. The researcher spoke to the patient and patient's family about the usage of elastic stockings, compliance with muscular leg and knee strengthening exercises, range of motion, and VTE manifestation after orthopedic surgery.

Educational information and training practices about prevention of VTE among orthopedic patients

including application of elastic stocking, muscular leg and knee strengthening exercise, and range of motion. Application of elastic stocking were applied by the study group at a day of surgery and the researcher was evaluated and ensure their competence in this practice immediately on the same day according to practice checklist. It was started on the second day of surgery muscular leg and knee strengthening exercise, and range of motion.

Application of elastic stockings: nurse will start apply of elastic stocking to patient during first day of operation¹³

Leg and knee exercise: patient start exercise during second day of operation. Strength training can be done up to three times per week, but always leave at least one day between sessions to allow the muscles to rest and rebuild. It aids in the development of muscle while preventing injury.

a. Straight leg raises exercise

Keep your affected leg straight and bend your other leg so that your foot is flat on the floor as you lie on the floor with your arms at your sides. Tighten your affected leg's thigh muscle and steadily raise it 6 to 10 inches off the floor¹⁹

b. Foot and ankle pump exercise

This helps to reduce swelling and risk of blood clots. Pump your whole foot up and down . Repeat 10 times, every hour²⁰

c. Knee straightening exercise:

Place a large folded pillow under your knee while you recline in bed. Activate your core muscles. Straighten your knee by raising your foot. Lower your leg gradually. 6–8 times a day, 3 times a day (20).

d. Lower buttock squeeze exercise

Lie down flat on your back with your legs straight. Gently squeeze your buttocks together, as if holding a pencil between them. Hold the position for 6 seconds. 6–8 times a day, 3 times a day (20).

4.Range of motion exercises: patient will start R.O.M during second day of operation.

Hip ABD/Adduction

Lie down flat on your back. Maintain a straight knee and toes pointing to the ceiling. Return your surgical leg to the middle after sliding it out to the side. Allowing your surgical leg to cross the midline is not a good idea. Repeat for a total of 10 times (1 set). Perform two sets per day ²¹

Follow-up for all patients (study & control) started at the day (15th, 30th, and 45th) postoperatively through face to face interview to evaluate occurrence of VTE. Also, the researcher encouraged patients of the study group to attend follow-up. If the patients not come at pre appointment follow up, researcher will be used his /her telephone number for calling with them to determine his/her compliance with the given instructions.

Finally, the researchers anticipate data regarding thromboprophylaxis in high-risk patients which could be another application of the score.

The total risks score of the study group compared with control groups, to assess the effect of the nursing prophylaxis interventions on the VTE risks among the

studied patients.

Statistical analysis

Data was presented using SPSS program (version 20) in numbers, percentages, mean and standard deviation (SD), Paired T-test, chi square analysis were used for assessment of the inter-relationships among quantitative variables. The level of significant was adopted at $p < 0.05$

Results

Table (1): showed that, there was no statistically significant difference between study and control groups regarding their demographic characteristics, in addition that the highest percentage among the studied patients for both study and control groups were aged from 41 to 49 years old, near half of them (53.3 and 50% respectively) were females, vast majority of them (86.6 and 83.3% respectively) were married, and most of them (73.4 and 76.7% respectively) were illiterate. Concerning occupation and residence majority of them (90.0 and 83.3% respectively) were not working, and (90.0 and 83.3% respectively) of them were living in rural area.

Table (1): Relationship between study and control groups regarding their demographic data (N. =60)

Demographic data	Study		Control		P. value
	N.=30	%	N.=30	%	
1. Age in years:					
18- 29	2	6.6	1	3.3	0.500 ^{ns}
30-40	9	30	8	6.72	
41 - 49	11	36.7	12	40	
50 - 65	8	26.7	10	33.3	
2. Sex:					
Male	14	46.7	15	50	0.67 ^{ns}
Female	16	53.3	15	50	
3. Marital status:					
Single	2	6.6	3	10	0.219 ^{ns}
Married	26	86.6	25	83.3	
Divorced	0	0	1	3.3	
Widowed	2	6.6	1	3.3	
4. Education level:					
Illiterate	22	73.4	23	76.7	.289 ^{ns}
Primary	2	6.6	3	10	
Preparatory	1	3.3	1	3.3	
Secondary	5	16.7	3	10	
5. Occupation:					
House wife	27	90	25	83.3	.287 ^{ns}

Worker	3	10	5	16.7	
6. Residence:					
Urban	3	10	5	16.7	.837 ^{ns}
Rural	27	90	25	83.3	

Chi square test, ** statistically significant difference p. value < 0.05
^{Ns} non statistically significant difference p. value > 0.05

Table (2), demonstrated that; less than half of patients (40.0 and 43.3% respectively) were in standers level of weight (20 < 26 kg) as body mass index.

Table (2): Relationship between study and control groups regarding their (BMI) (N. =60)

Medical data	Study		Control		P. value
	N.=30	%	N.=30	%	
1. Body mass index					.215 ^{ns}
Low weight < 20	4	13.3	3	10	
Standard level of weight (20 < 26 kg)	12	40	13	43.3	
Over weight (26 < 30kg)	8	26.8	9	30	
Obese (30 < 40kg)	4	13.3	4	13.3	
Morbid obesity (> 40)	2	6.6	1	3.3	

Chi square test, ^{ns} non statistically significant difference p. value > 0.05.

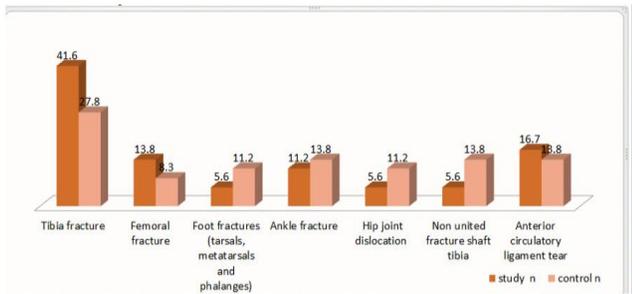


Figure (1): Distribution of study and control groups regarding medical data (type of surgery) n= 60

Figure (1): Shows that the highest percentage in both control and study group of patients had diagnosed with tibia fracture.

Figure (2): shows that there was a statistical significant difference between study and control groups regarding the high risk of VTE especially Left limb VTE p.value (0.027*) after application of the nursing prophylaxis interventions.

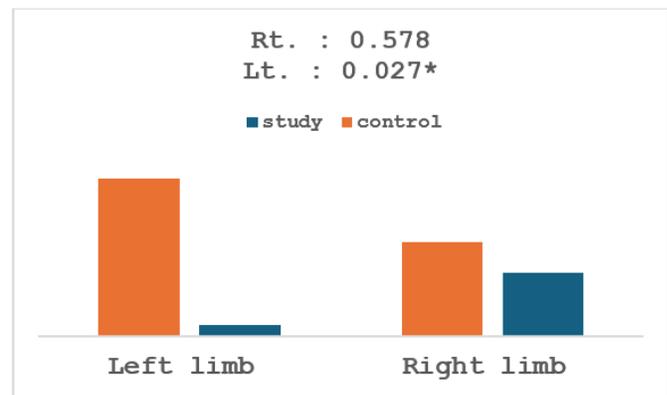


Figure (2): Distribution of study and control groups regarding Doppler findings of high risk of VTE after implementing the nursing prophylaxis interventions. n= (60)

Table (3): demonstrates that there was a positive correlation between demographic data and risk factors of VTE regarding age by years with p .value (0.0001). Most common indicators factor (age by years).

Table (3): Correlation between demographic data and risk factors for VTE (Regression test).

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	11.245	1.849		6.083	0	7.553	14.937
Age By Years	0.12	0.02	0.601	5.885	0	0.079	0.161
Male And Female	0.337	0.402	0.074	0.837	0.406	-0.467	1.14

Discussion

Venous Thromboembolism (VTE) represents one of the most important causes of morbidity and mortality among patients with orthopedic surgeries. Most cases of venous thromboembolism are caused by it. Without proper prophylaxis, patients having high-risk orthopedic surgeries, such as total hip arthroplasty, total knee arthroplasty, and hip fracture repair surgery, are at a greatly elevated risk¹¹

The pathogenesis of VTE is multifactorial. A comprehensive understanding of the pathogenesis of VTE in cancer would allow identification of those at increased risk for VTE who could potentially benefit from the preventive measures²²

The present study aimed to assess the effectiveness of nursing educational interventions on venous thromboembolism risks among patients undergoing orthopedic surgery. In general, the current study found that the designed nursing educational interventions application had a statistically significant beneficial effects minimizing venous thromboembolism risks among the patients undergoing orthopedic surgery.

The present study revealed that there was no statistically a statistically significant difference between study and control groups and their demographic and medical data. This was important to ensure comparability of the two groups, and indicate successful randomization of the two groups. This confirmed by Boonchoo et al.,²³ who documented that it is of paramount importance to ensure equivalence of the groups at the beginning of the experiment to avoid bias basis of some variable known to influence outcomes, such as baseline reading ability or gender.

The present study revealed that the majority of the studied patients in the age range of 41 - 49 years. This result disagreed with Jarvandi et al.,²⁴ who mentioned in their study, that two thirds of all newly diagnosed patients with cancer were in the age 55 years older and this can be attributed to the beginning of generic period of life.

Anderson et al.,²⁵ were in agreement, revealing that "the current study findings demonstrated that the

risk of developing VTE had a substantial association with patient age, with the risk increasing with greater age." In line with this, a Turkish study found that patients' age was a significant factor in increasing the risk of VTE in orthopedic surgery patients."

The current study shows that the highest percentage in both control and study group of patients had diagnosed with tibia fracture. Hussein et al.,²⁶ were disagreeing with current study results as they revealed that "In terms of surgically treated joints, the right hip was the most common. Finally, about two-thirds of patients had osteoarthritis, which necessitated surgical replacement.

Regarding body mass index the present study revealed that more than one third in both study and control groups experience over weight and obesity respectively. Obesity is connected with inactivity, elevated intraabdominal pressure, and decreased blood velocity in the legs, as well as proinflammatory and prothrombotic states, according to the study findings. All of these factors are likely to increase the risk of venous thromboembolism, which is defined as Deep Venous Thrombosis (DVT) with or without pulmonary embolism as a consequence. Obesity is linked to a nearly twofold increase in the risk of main VTE."²⁷

Furthermore, Klovaite et al.,²⁸ Obesity as a causal risk factor for deep venous thrombosis" the researchers discovered. These findings show that efforts to reduce obesity and overweight across the board could have a significant impact on VTE prevention. The current study results revealed that there was a statistical significant difference between study and control group regarding signs and symptoms of DVT in calf muscle regarding redness, swelling and absence of signs while in thigh muscle presence of swelling show a statistical significant difference between the two groups.

Patel et al.,²⁹ were in the same line with the current study results as they reported that "VTE is known to cause pain and edema in the legs; however, symptoms might be present or absent, unilateral or bilateral, mild or severe in a specific patient. A thrombus that does not restrict the net venous outflow is frequently asymptomatic. The most particular symptom of DVT is edema and swelling."

There was a statistical significant difference between study and control groups regarding the occurrence of VTE high risks after application of the nursing prophylaxis interventions. From the researcher point of view these results are accepted as the researchers provided a valuable nursing educational interventions to study group of patients which has the clear effect on reducing the number of patients who developed high risk of VTE than the control group. Also, Mohamed et al.,³⁰ were in agreement with the findings of the study, which stated, "The intervention is also advantageous in terms of patient outcomes, with considerably lower DVT risk grade and score compared to the control group patients." The researcher point of view that, this results may be due to the significance increase in the nurses' performance regarding VTE risks identification, prevention and management which help in early detection and decrease the level of risks among the patients with cancer undergoing orthopedic surgery. In this admiration, Hernández-Gea et al.,³¹ reported that; Egyptian patients enrolled in exhibit nearly the same features as compared to the global study. In both the global and Egyptian studies, orthopedic surgical patients make up a slightly higher percentage of high-risk patients than other types of surgeries. On both the international and Egypt-specific levels, there was substantial room for improvement to achieve a goal of 100% prophylaxis compliance, as only 30-50% of high-risk patients received any preventative care³² While, Danwang et al.,³³ mentioned that; VTE is a leading cause of hospital-related deaths worldwide. However, the proportion of patients at risk of VTE who receive appropriate prophylaxis in Egypt is unknown.

Additionally, Yin & Shan,³⁴ clarified that "There was a statistically significant difference in VTE incidence in the two groups, with the number of patients with VTE in the intervention group being lower due to the distinct risk levels and associated nursing intervention,".

The researchers opinion that, the importance of translational simulation in healthcare stating that the "training of individuals and teams in communication, technical skills and teamwork is necessary for improved patient safety and outcomes.

Finally, the present study shows that most common

indicators factors of developing VTE in orthopedic surgical patients were age and occupation. Also, there were positive correlations between risk factors for VET and age, marital status and occupation. Bui et al.,³⁵ were agreeing with the current study results as they reported that "VTE remains a common complication following orthopedic surgery. Older age, immobility status, and surgical time have been found to be risky factors for the development of postoperative lower-limb VTE in orthopedic patients".

Also, Zhang et al.,³⁶ were in the same line as they revealed that "Patients aged more than fifty years who were hospitalized for orthopedic surgery were having a great Risk factors associated with the development of deep vein thrombosis and VTE.

Additionally, Heit et al.,³⁷ agreeing with the present study results as they revealed that "Risk factors include age, congestive heart failure, immobility, major trauma, obesity, prior venous thromboembolism (VTE), recent surgery, and smoking". Finally, educational intervention in patients undergoing orthopedic surgery significantly improved patient outcomes and showed a reduction in VTE risks and reinforcing the simulation-based education provides a valuable adjunct in residency education.

Limitation of the study

Limitation of privacy during follow up with patients because no anymore places provided in the outpatient clinic for more explanation and evaluate their patients accurately.

The sample size was small and from the limited setting, leading to restrictive the value of the findings.

Conclusion

Results illustrated that that there was a statistical significant difference between study and control groups regarding the high risk of VTE especially Left limb VTE after application of the nursing educational interventions. Results illustrated that that there was a positive correlation between demographic data and risk factors of VTE regarding age by years .

Recommendations

Based on the finding of the present study the following recommendations are suggested:

1. Continuous in service training programs regarding the suggested nursing interventions for detection, prevention and management of VTE among the patients undergoing orthopedic surgery were highly recommended to raise the standards of nursing care given to such group of patients.
2. Nurses should monitor and assess the risk of VTE in orthopaedic surgery patients on a regular basis.
3. A continual educational and training programme for staff nurses, including post-orthopedic surgery discharge instructions and home care, is designed and delivered on a regular basis for patients following orthopaedic surgery.
4. Written Arabic booklets or brochures, as well as posters, with post-orthopedic surgery discharge instructions, should be provided in health-care settings and distributed to orthopaedic surgical patients and their caregivers.
5. The media should be used more effectively to raise public awareness of disease, treatment approaches, and prevention among the general public and their caregivers.
6. Orthopedic surgical patients must be followed for a long time to evaluate long-term outcomes.

Declaration of conflicting interests

The authors declare that there is no conflict of interest

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