TURKISH REPUBLIC OF NORTH CYPRUS
NEAR EAST UNIVERSITY
HEALTH SCIENCES INSTITUTE

THE RATIONAL USE OF THROMBOPROPHYLAXISTHERAPHYIN HOSPITALIZED PATIENTS AND THE PERSPECTIVES OF HEALTH CARE PROVIDERS IN NORTHERN CYPRUS

SYED SIKANDAR SHAH

A THESIS SUBMITTED TO THE GRADUATE INSTITUTE OF
HEALTH SCIENCES NEAR EAST UNIVERSITY

CLINICAL PHARMACY

PROF. DR. BILGEN BASGUT

NICOSIA, 2020

Dedication

Specially dedicated to my late mother

NEAR EAST UNIVERSITY

THESIS APPROVAL

Directorate of Institute of Health Sciences

Thesis submitted to the Institute of Health Sciences of Near EastUniversity in partial fulfillment of the requirements for the degree ofDoctor of Philosophy in Clinical Pharmacy.

Thesis Committee:

Chair of the committee: Prof. Dr. NurettinAbacioglu
Near East University

Sig: ……

Advisor: Prof. Dr. BilgenBasgut
Near East University

Sig: ……

Co-advisor: Assoc. Prof. Dr. Abdikarim Abdi
Near East University

Sig: ……

Approved by: Prof. Dr. Hüsnü Can BAŞER

Director of Health Sciences Institute
Near East University

Sig: ……..

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Student's Name & Surname: SYED SIKANDAR SHAH

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ACKNOWLEDGEMENT

Millions of thanks to Almighty ALLAH- Who has blessed me with the knowledge and power to perform and complete not only this research, but also other tasks and Who has always guided me in difficult times of which I have never imagined in my life. The love and care that my parents and family have been endowing me throughout my life has been a major cause behind my success. I deeply acknowledge the valuable advices and the guidance provided by my supervisor Prof. Dr. BilgenBasgut regarding the research development. I am very grateful to my co-advisor Assoc. Prof. Dr. Abdikarim Abdi for his encouragement throughout my university Career. Special acknowledgment to Dr. Wahab ali shah, Dr. Nadeem Ullah and Dr. OnurGültekinfor his major contribution in the completion of this research. The authors would like to give special thanks to Dr. Louai M Saloumi and Sibel Severler to provide help and statements that greatly improved the manuscript preparation.

The authors have also gratefully acknowledged the Near East University hospital, for the supply and guidance on the subject, Department of Clinical Pharmacy, Faculty of Pharmacy, Near East University, Nicosia, North Cyprus, for providing necessary facilities.

Finally, I am very thankful to all my family members and friends for their encouragement and prayer without which nothing would have been possible.

Syed Sikandar Shah

Sikandarshah850@gmail.com

KPK, Pakistan

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LIST OFABBREVIATIONS:

DVT: Deep venous thrombosis

ACCP: American College ofchest physician

PE: Pulmonary embolism

VTE: Venous thromboembolism

ICU: Intensive care unit

VT: Venous thromboembolism

OCT: Oral contraceptives

RAT: Risk assessment tool

IPC: Intermittent pneumatic compression

UFH: Ultra fractionated heparin

LMWH: Low molecular weight heparin

USA: United States of America

SCD: Sequential compression devices

HCP: Health care providers

LE: Lower extremities

CABG: Coronary arteries bypass grafting

ESR: Erythrocyte sedimentation rate

WBC: White blood cell

CT: Computed tomography

CTPA: peek expiratory

MRI: Magnetic resonance image

VKA: Vitamin K Antagonist

GCS: Graduated compression stocking

SUP: Stress ulcer prophylaxis

UTI: Urinary tract infections

CI: Confidence interval

IRB: Institution review board

TRNC: Turkish republic of North Cyprus

IQR: Inter quartile range

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ÖZET

Arka plan: Derin ventrombozunun (DVT) önlenmesi için etkili stratejilerin ve standart kılavuzların varlığına rağmen, tromboembolizm gelişme riski taşıyan hastaların önemli bir kısmı hastanede yatarken profilaksi almamış, diğerleri ise irrasyonel olarak almış ve bu nedenlede istenmeyen yan etkilere yol açmıştır.

Amaçlar: Bu çalışma, sağlık hizmeti verenlerin (HCP'ler) bilgi ve DVT'yi önleme konusundaki tutumlarının değerlendirilmesi ile birlikte, DVT gelişme riski taşıyan yatan hastaların mevcut tromboprofilaksi uygulamalarını ve yönetimini değerlendirmeyi amaçlamıştır.

Yöntemler: Caprini risk değerlendirme aracı kullanılarak DVT profilaksisinin rasyonel kullanımını araştırmak için hastaların kaydedildiği birden fazla klinikten Kuzey Kıbrıs'ın önde gelen iki üniversite hastanesinin genel servislerinde gözlemsel bir çalışma yürütülmüştür. Hastalar ayrıca hastanede taburculuk sonrası olası komplikasyonlar açısından iki hafta takip edildi. HCP'lerin DVT riskleri ve profilaksisi konusundaki bilgi ve tutumlarını değerlendirmek için kesitsel bir çalışma takip edildi.

Bulgular: Kayıt olan 180 hastadan% 47,7'si irrasyonel olarak tedavi oldu,% 52,3'ü rasyonel olarak tedavi edildi ve% 77,8'i yüksek riskli olarak belirlendi. Özellikle, daha fazla tromboprofilaksi alan on üç hastadan dördü küçük komplikasyonlar geliştirdi. Ayrıca hemşirelerin% 73,3'ü DVT eğitimi almamıştır. Üstelik doktorların ve hemşirelerin% 50'sinden fazlası DVT riskleri ve profilaksisiaçısından düşük bir bilgi puanı elde etti.

Sonuçlar: Hastanede yatan hastalara tromboprofilaksi tedavisi uygulamasında yüksek derecede irrasyonelolarak gözlemlendi. Sağlık hizmeti verenlerin genel puanları, DVT risk değerlendirmeleri ve profilaksisikonusunda yetersiz bilgi sahibi olduğu gösterildi.

Anahtar Kelimeler: Tromboz, profilaksi, tromboprofilaksi, Caprini risk değerlendirme aracı, DVT riskleri.

Name of the student: Syed SIKANDAR SHAH
Mentor: Prof. Dr. Bilgen Basgut
Department: Clinical Pharmacy

ABSTRACT

Background: Despite the presence of effective strategies and standard guidelines for the prevention of deep vein thrombosis (DVT), a considerable proportion of patients at risk of developing thromboembolism did not receive prophylaxis during hospitalization, while others received it irrationally, thus led to unwanted side effects.

Aims: This study aimed to evaluate the current thromboprophylaxis practice and management of hospitalized patients at risk of developing DVT, along with the assessment of health care providers (HCPs) knowledge, and attitudes regarding DVT prevention.

Methods: An observational study was conducted in the general wards of two leading tertiary university hospitals in Northern Cyprus in which patients from multiple clinics were enrolled to investigate the rational use of DVT prophylaxis using the Caprini risk assessment tool. Patients were also followed for possible complications two weeks post-hospitalization. A cross-sectional study followed to assess the knowledge and attitude of HCPs regarding DVT risks and prophylaxis.

Results: Of the 180 patients enrolled, 47.7% were identified as irrationally managed, 52.3% were identified as rationally managed, and 77.8% of patients were identified as having a high level of risk. Notably, four of thirteen patients who received more thromboprophylaxisdeveloped minor complications. Additionally, 73.3% of nurses had not received DVT education. Furthermore, more than 50% of physicians and nurses achieved a low knowledge score for DVT risks and prophylaxis.

Conclusions: A high degree of irrationality in the administration of thromboprophylaxis therapy to hospitalized patients was observed. The overall scores for HCPs indicated insufficient knowledge of DVT risk assessments and prophylaxis.

Keywords: Thrombosis, prophylaxis, thromboprophylaxis, Caprini risk assessment tool, DVT risks.

1.INTRODUCTION

The word thrombosis refers to the abnormal mass formation of vascular components within the vascular system of living animal. Deep vein thrombosis (DVT) is the growth of blood clots within the deep veins of the pelvic region or lower limbs (1). It generally affects veins of the deep leg (such as femoral vein, calf vein or deep veins in the pelvis and about 0.1% of people annually (2).

DVT is one of the preventable causes of morbidity and mortality globally. Every year, nearly two million people suffer from deep venous thrombosis,and approximately 0.6 million of these patients experience a pulmonary embolism (PE). PE causes the death of approximately 0.2 million patients annually [3]. Venous thromboembolism is also common cause of death among hospitalized patients in surgical wards (4). Venous thromboembolism is predicted to occur (1) per 1,000 people annually, with DVT counting for nearly two-thirds of these events. This rate increases with age, affecting 1% of individuals over the age of 75. The incidence is much lower in youth and higher in the elderly (5).

Although many patients develop DVT in the presence of risks such as malignant tumors and immobility, DVT can also occur without apparent provocation (DVT idiopathic). Some patients with idiopathic DVT have inherited or acquired thrombophlebitis, while the rest have no identifiable chemical or genetic defect (6).The risk of venous thromboembolism is assessed by the characteristics of the patient and the type of surgery that is performed (7).

There are two general methods of risk assessment, individual risk assessment and group risk assessment.Patient post surgery, ICU residents, patients immobile, patients with morbidities such as cancer, heart failure, previous VT, elderly, those on OCT, obese, pregnant and patients blood clotting disorders are all at risk for developing DVT and should receive prophylaxis according to the extent of risk. Currentreviews have concluded that it may be suitable to use an individual risk assessment method to identify and consider all potential risk factors to reveal the true extent of a patient's risk and provide proper suggestions for preventive treatments based on risk level. Several individual Venous thromboembolism risk assessment tools have been suggested and clinically assessed, most notably those developed by Kucher,Caprini, Cohen etc. (8).

Caprini checklist is a validated and powerful tool for surveying the risk of DVT amongst hospitalized patients (6).The Caprini risk assessment tool(RAT) was derived more than a years ago, based on a combination of published data and medical experience. The revised versions of the assessment tool were authorized in the surgical and medical environment in the western population. Most importantly, the RAT gives proper recommendations for prevention based on the level of risk

and outcome, which is suitable, practical and beneficial for health care providers. This RAT has been accredited by numerous organizations and translated into 12 languages. (9)

An exact detection of DVT is significantlyessential to prevent the possiblesevere lethal complication of PE and long lasting complications of pulmonary hypertension and postphlebitic syndrome (10).Both mechanical and pharmacological strategies can be used to prevent blood clotting. Mechanical strategies counteract venous stasis in the lower extremities by increasing venous discharge, while pharmacological strategies work by reducing blood clotting.

Compression elastic socks and intermittent pneumatic compression (IPC)are the mechanical means used for prevention, while anticoagulant agents, such as warfarin, low molecular weight heparin (LMWH), or unfractionated heparin (UFH), or antiplatelet agents, commonly aspirin, are the pharmacological drugs used for this reason. (11). Current additions to this list consist of fondaparinux, which has been licensed for prevention of thrombosis in USA for orthopedic patients having high risk, and the most recent agents are direct thrombin inhibitors. (12).

Antithrombotic drugs, provides very effecient way of decreasing morbidity and mortality assosciated with these patients. Despite suggestion supporting prevention of thrombosis, it is still not used enough because physicians realize that the risk of DVT is insufficient to warrant hemorrhagic complications for the use of anticoagulants. (4)

The American College of Chest Physicians (ACCP) recommends thromboprophylaxis intervention for groups of patients whose benefits appear to outweigh the risks. It is better to make assumptions about recommending thromboprophylaxis to specific patient by combining knowledge of the literature and clinical finding, the former based on extensive knowledge about the risk factors for each patient in the treatment of VTE, the possibility of adverse consequences with the occurrence of thromboembolism, and the accessibility of different possibilities in one center. Since most studies onthromboprophylaxis omitted patients who were at risk of developing venous thromboembolismorundesirablereactions, their results may not apply to those patients having history of deep venous thrombosis or with an improved risk of significant bleeding. In these conditions, proper clinical opinion may require the use of antithrombotic agents that is differ from the endorsed approach 11. Globally, more than half of the high risk admitted patients are not receiving prophylaxis for thrombosis. Careful evaluation of the patient's risks of VTE is crucial in advancing this situation and enhancing adherence with prevention regulations. (14). Treatment for deep vein thrombosis ordinally begins with its prevention. Anticoagulant agents are the mainstay of DVT therapy, with the goal of counteracting

development to PE and relapse of coagulation. The thirty-day death rate increase 3% in patients with deep vein thrombosis who were not anticoagulated and the risk of death rises by 10 times in patients with PE (15).Prime use of anticoagulant drugs not only requires extensive knowledge of pharmacotherapy and pharmacokinetic characteristics, but also requires a wide-ranging approach to patient managing, an area, and scope for clinical pharmacy practice and services to assure rationaleanticoagulation medication use (13). It is also vital to avoid undue anticoagulant therapy because of high risk of bleeding in misdiagnosed patients (11).

After a risk assessment, pharmacological prophylaxis regimens should be prescribed for moderate to severe risk patients, while pharmacological prophylaxis may not be necessary for low risk patients after a risk-benefit evaluation (16). The famous treatment used for DVT prophylaxis as a part of late clinical practice is sequential compression devices (SCD), Heparin and Enoxaparin. Improper use of DVT prophylaxis may lead to enhanced antithrombotic, profibrinolytic, and vasodilatory effects (17).

Some patients are more likely to experience the adverse effects of unfavorable incidents and ımproper use of medication due to their change in the physiological, pharmacokinetic and pharmacodynamics frameworks with growing age. Irrational use of medications may lead to adverse drug reactions, waste of rare health resources, and increased treatment costs (18).

Although there are standard protocols and useful strategies for preventing DVT, yet many patients having thromboembolism risks do not receive prophylactic treatment during stay in hospital while others receive this irrationally despite not being nominated according to evidence-based suggestions. (19).

Clinical pharmacists have extensive knowledge of medication and are prime source ofgiving effective information and advices regarding secure, suitable, and economical use of medications using recommended protocols.

The determination of competence of health care providers in deep venous thrombosis risk assessments and preventive measures might be valuable in improving their education and awareness and attenuating this global health issue. Prescribing and practice patterns also need to be evaluated periodically to assure rational practices. Multidisciplinary teams including clinical pharmacists, nurses, and physicians are needed to ensure rational drug use and adherence to evidence-based guidelines (20). However, no study has assessed the rational use of DVT prophylaxis in tertiary care hospitals in North Cyprus.

This study intended to examine the current thromboprophylaxis practice and management of hospitalized patients having risks of developing DVT, along with the assessment of health care providers (HCPs) knowledge, practice and attitudes regarding DVT prophylaxis.

2. LITERATURE REVIEW

2.1. Overview of Thromboembolism

Deep Vein Thrombosis and Pulmonary Embolism (DVT / PE) are often underdiagnosed and serious, but are preventable medical conditions.DVT is a medical condition that occurs when a clotting of blood occur in deep vein. These clots usually develop in the lower leg, thigh, or pelvis, but can also occur in the arm (21).Information about deep venous thrombosis is important because it can happen to anyone and can cause serious illness, disability and, in some cases, death. The good news is that DVT can be prevented and treated if discovered early (22). About thirty thousandAustralian hospital admission may occur due to VTE, resulting in the loss of 5,000 lives per year (23).
This is the third usual vascular disorder after stroke and myocardial infarction (MI) in the Caucasus (24). VTE is an acute incident predictable to hold 2-3 admissions per 1,000 hospitals followed by a prime diagnosis (25).

Unluckily, the disease is clinically soundless, and the first indicator may be the abrupt death that results from the formation of a thrombus within a venous circulation that manifest as DVT and PE.Beside death from pulmonary embolism it can happen in minutes after warning sign appear, before even starting to treat, but also long-term manifestations could develop as having recurrent thromboembolic events that cause significant suffering and pain to patients. (22).
Venous thromboembolic embolism is clinically manifested as DVT and PE with a dangerous complication in both genders (23).

There are numerous approaches for investigatingvenous thromboembolism including clinical trials probability combined with/without D-dimer dimension, known as algorithm approaches, and imaging methods (26). DVT typically begins in calf region of the leg. Most of the blood clotsoccur in lower limbs (distal DVT) and mostly solve spontaneously without any symptoms (28,29). About 60–70% of patients who have symptoms ofvenous thromboembolism develop deep venous thrombosis (30).

Many patients show symptoms when distal DVT expand to the femoral veins, popliteal and distinctive proximal vein (27). DVT mightcauseserious problems such as post phlebitis syndrome, pulmonary embolism, and loss of life (26).

There is a fifty percent chance that patients with untreated proximal DVT will raise symptoms of pulmonary embolism within 3 months (28). Avital consequence of venous thrombosis is post-thrombotic syndrome that develops in twenty to fifty percent of patients and may lead to permanent pain in the limbs, redness, heaviness, and edema and leg ulcers (30).

Deep vein thrombosis returns to about ten percent of patients who might progress acute post-thrombotic syndrome in 5 years (28, 29). However, most of these complications and deaths can be prevented by appropriate management of cost-effective anticoagulant drugs and non-pharmaceutical interventions (31).Pulmonary Embolism (PE) symptoms, such as chest ache, problem in breathing or persistent hypotension without an alternate cause (32), occur in about thirty to forty percent of VTE patients (33).The survival rate for patients with pulmonary embolism is severer than DVT as the sudden loss of life is the preliminarymedical demonstration of twenty-five percent of those patients (34). When this condition is identified in patients, without additional remedydeath rate can reach twenty five percent (35).

However, the risk is reduced to 1.5% by management with antithromboticagents. (36). Meanwhile the serious sequel of VTE its therapeutic management is also not far from major risks, since anticoagulants require careful doses and control through systematized methods to administering drug treatment that can significantly diminish risk, else if undertaken could lead to serious complication, mainly bleeding (37).

For this, Prevention of VTE in patients at risk is critical to rising conclusions, while when there is suspicion of VTE, a rapid and precise diagnosis of the illness is important for decision of proper therapy. Prime use of anticoagulant drugs not only requires extensive knowledge of pharmacotherapy and pharmacokinetic characteristics, but also requires a wide-ranging approach to patient managing, an area, and scope for clinical pharmacy practice and services to assure rationale anticoagulation medication use (38).

2.2. Pathophysiology, Epidemiology and Risk Factors

Thrombosis can affect virtually any intravenous flow.Commonlythrombus occurs in lower limbs, although it may form in any part of the circulatory system. After formation, thrombolysis, remain asymptomatic, close a vein, and propagate into more proximal veins till becoming an emboli or act in any combination of mentioned consequences (39).

2.2.1. Pathophysiologic Basis of VTE

Blood flow inside the blood vessels is regulated by a delicate equilibrium between the proteins that circulate causing clotting and those that inhibit it. Under normal situation, proteins that endorse clotting are inoperative, but in response to vascular injury are activated.The subsequent formation of a thrombus performs a defensive job by stopping blood injury. However, not all blood clots are developed in response to injury to vessel. Three most common factors have been recognized as accountable for causing thrombosis:

1. Changes in flow of blood, more precisely, blood collecting after lengthy period of immobility.
2. Changes in walls of the vessels due to reliablesituation i.e. inflammation or trauma.
3. Changes in formation of blood so that there is an enhancement in blood clotting, for example in some hereditaryhemolytic disorder.

Venous thromboembolism (VTE) is a complicated disease that includes both ecological exposure (such as clinical hazard factors) as well as environmental and genetic interactions (40).DVTcommonlypresentasunilaterallegpainandswellingorwarmth, the patient's surface veins may expand and a "profound cord" can be felt in the disturbed leg while pulmonary embolism produces dyspnea, diaphoresis, tachypnea, chest tightness and tachycardia. Hemoptysis, although painful, occurs in some of the patients. When pulmonary embolism is bulky, the patient might complain of vertigo or dizziness and the collapse of the cardiovascular system, which is characterized by cyanosis, shock and lack of urine, is aworrying sign.

The exact incidence of venous thromboembolism in the overall populace is unidentified, a significant amount of people around fifty percent of VTE patients have a quiet disease, although in the United States it is predicted that more than half a million are hospitalized while 60 000 patients die yearly due VTEs.(41). The incidence of venous thromboembolism is greater in men than women, with almost doubling in each decade more than fifty years of age.

Estimated direct medical costs of handling VTEs annually are much morethan$1billion. Annual incidence of venous symptomatic thromboembolismis 2-3 per thousand people. The one-year death rate is twenty percent after first venous thromboembolism. Among the living patients, fifteen to twenty five percent will experience a recurring session of venous thromboembolismin three years after the first event. Raising awareness of VTE, as well as effective prevention, early diagnosis and optimal treatment; all lead to a slightly lowered incidence of PE in recent years.Extensive studies have been carried on the occurrence of VTE in high-risk patients. Patients undergoing orthopedic procedures involving lower extremities (LE) or those with multiple traumas are mainlyat high risk.

The occurrences of venous thromboembolism in these patient groups often exceed 50% when effective prevention is not provided. In major postoperative patients that do not include LE, the incidence of venous thromboembolic embolism is 20-40% according to the existence of other risk factors i.e. age <60 years. Other major factors of high incidence of VTE include post MI, CVE, spinal cord injuries, metastatic cancer, hypercoagul ability diseases and patients with previous VTE during their lifetime. (38, 40, 42, 43).

The average yearly occurrence of venous thromboembolic disease amongst people of European origin ranges from 104 to 183 per 100,000 people - year (44). The incidence is comparable or higher

among African Americans, and lowest among Asians, Asians and Native Americans.

Unlike atherosclerotic arterial disease, the low incidence of VTE among Asians does not appear to increase after emigration and adoption of a western civilization diet and lifestyle, underscoring the probable role of heritability in the etiology of VTE (45). Using age and gender occurrence speed for a five-year time period, 1991 to 1995, projected to the white United States population in 2000, at least 2.6 million new cases of venous thromboembolism among whites occur in the United States yearly. If the rates of incidence among African Americans are comparable, then twenty-seven thousand additional incidents occur among African Americans in the United States yearly (46).

VTE is mostly an aging disease. In the lack of venous catheter, venous thromboembolism is rare before late puberty. Occurrence rates enhance significantly with age for gender and for both deep venous thrombosis and pulmonary embolism (47). Age regulatedoccurrence rate is morein men than women (male to female sex ratio is 1.2:1). Occurrence rates are mostly higher in women during reproductiveages, while after the age of 45 yearsoccurrence rates are usually higher in men. Pulmonary embolism accounts for an enhancing proportion of VTEfor both genders with growing age (48).

Adding further that, epidemiological finding has revealed that between a quarter and a half of all clinically important venous thromboembolism happen in people who do not enter hospital and do not recover from a major disease. This increased apprehending of an at-risk population contests doctors to carefully inspect hazardous factors for venous thromboembolic disease to recognize patients at high risk patients who can benefit from prophylactic treatment (49).

2.2.2. Risk factors

DVT or PE commonly develops in patients with certain risk factors during or after hospitalization. Many patients, and possibly most of them, have asymptomatic disease but may also have long-lasting concerns, i.e. post-thrombotic syndrome and persistent venous thromboembolism. Many patients develop deep vein thrombosis before the onset of PE, while numerous do not. Patients may expire suddenly before starting effective therapy.

Factors enough in and of themselves to motivate clinicians to consider preventing venous thromboembolism include main surgery, multiple shock, hip rupture, or lower paralysis of the extremities due to injury to spinal cord. Further risk factors, such as history ofvenous thromboembolism, increased age, heart or breathing failure, immobility for lengthy period, the existence of central venous lines, estrogen, and an extensive range of hereditary and acquired blood conditions that contribute to an improved risk of developing venous thromboembolism.These influencing factors are rarely enough in themselves to rationalize the usage of prophylaxis. However, distinct risk factors, or groups thereof, can have important consequences for the sort and duration of proper prophylaxis and should be cautiously revised to assess the total risks of venous thromboembolism in each patient (50).

Table 1. represents the risk factors for VTE.

Category	**Risk Factors for venous thromboembolism**
Age	After the age of 50 risk duplicates with each span
Previous VTE	Strongest venous thromboembolismknown risk factor
Venous stasis	Major health illness major operation Obesity, Varicose veins paralysis polycythemia
Injury to vessels	Major orthopedics (such as knee and hip replacements) Trauma especially pelvic, hipor leg fractures venous catheter indwelling
Hypercoagulable States	Malignancy, diagnosed or occult Protein C deficiency Antiphospholipid antibodies Plasminogen activator inhibitor Inflammatory bowel disease Renal disease or syndrome Factor XI excess Pregnancy
Drug treatment	Estrogencomprising contraceptives, Selective estrogen receptor modulators (SERM) and Estrogen replacement therapy (ERT)

The hazard of developing DVT after main surgery has been widely recognized. Although the term "main surgery" is not accurate, most researchers apply this term to patients undergoing abdominal or chest surgery that need general anesthesia that lasts more than 30 minutes (51).Other kinds of surgery related with a high venous thromboembolism risk include CABG, surgical tumor surgeries (52) and major urology (53). The hazard after neurooperation is similar, (54) but intracranial operation is a relative contraindication to preventing thrombosis. Though, a study found that prophylactic use of enoxaparin is secure after elective neuro operation.

Table 2. represents classification of risk factors for venous thromboembolism.

Classification of Risk Factors for Venous thromboembolism
Strongest known risk factors
Rupture of leg or hip
Replacing knee or hip
Injury of spinal cord
Major shock
Main surgery
Moderate risk factors
Knee surgery
Central venous Catheter
Radiation therapy
Congestive heart failure or respiratory failure
(HRT) Hormonal replacement therapy

Tumors
(OCT) Oral contraception
Paralytic stroke
Pregnancy
History ofVTE
Thrombophilia
Weak risk factors
Bed rest more than 3 days
Immobilization due to sitting (i.e. prolonged travel in car or air travel)
advancing age
removal of gall bladder
Obese patients
Pregnancy

The recent massive increase in open surgery endoscopy alternatives has been attended by precise studies of the hazard of developing VTE, despite negative changes in hemostasis after laparoscopy. (56) In a recent review, Bergkvist and Lowe concluded that laparoscopic removal of gall bladders is a procedure of low risk so that usualvenous thromboembolism prevention cannot be justified (57). But the decision about preventing laparoscopy is likely to be made in the same way as conventional surgery, i.e. allocating it to specific risks for each patient, considering the period of the surgery, the amount of time period spent in bed, and common pathological situations. (58)

2.3. Consequences and Management

The clinical features of VTE are DVT and PE. Yearly occurrence of venous thromboembolism among Caucasians of European descent is one in thousand up to the age of forty; after this age, the occurrence degree doubles each decade. The ratio is prominent among those of African descent and lesser among Native and Asian Americans (59).

The death rate related tovenous thromboembolism is comparatively high, specifically in pulmonary embolismcases; the seven-day mortality rate is 3.7% in those with DVT and 40.9% in patients with PE. Though several treatment choices are available for the management and prevention of venous thromboembolism, they are associated with several disadvantages that greatly limit its practice. (60)

Microbiological results usually reveal higher serum concentrations of D-dimer, a byproduct of thrombin group. Also, elevated erythrocyte sedimentation rate (ESR) and WBC count are common in these patients. It is extremely difficult to ascertain the diagnosis or exclusion of VTE, as well as to distinguish it from other disorders and supplementary objective examinations are required (64).

2.3.1. Diagnosis

There are other situations having signs and symptoms like those of PE and DVT. For example, muscle injuries, bacterial infection, and inflammation of the veins below the skin can stimulate the signs and symptoms of deep vein thrombosis. It is also important to recognize that heart attack and pneumonia have similar signs and symptoms like that of PE. Therefore, special lab tests are needed that can detect blood clotting in veins or in lungs to diagnose deep venous thrombosis orpulmonary embolism. (65).

DVT

- Dual ultrasound is used to detect obstruction or blood clots in the legs. It is gold standard test use for thediagnosis of DVT.
- The D-dimer test deals with a substance in the blood that is discharged when blood clotting occurs. (66).
- Contrasting angiography is a special type of X-ray where contrast dye is inserted into the body so that physician can see the deep veins in the leg or hip. This is the most

precise test for the diagnosis of blood clots, but it is a surgical method, therefore, this test has been mostly replaced by dual ultrasound and is only used in some patients.

- Computerized tomography (CT) and magnetic resonance imaging (MRI) and tests can offer vein images and strokes but generally are not used for diagnosis of deep venous thrombosis (67).

PE

- Computed tomographic pulmonary angiography (CTPA) is an X-ray examination that includes injection of intravenous contrast dye. This test can offer images of the lungs blood vessels. It is the gold standard test for pulmonary embolism diagnosis. (68)
- Ventilation- perfusion is a test that uses radioactive material to show the parts of the lungs. This test is utilized when CTPA is unavailable or when the CPTA test should not be done because it may be destructive to a specific patient. (69)
- Pulmonary angiography is an X-ray examination in which large catheter is administered into a large vein or into the arteries of the lung, followed by insertion of dye through the catheter. It provides lung vascular imaginings and is the most precise test for PE diagnosis. However, it is a surgical examination, so used only in some patients. (65).
- Magnetic resonance imaging (MRI) use magnetic field and radio waves to present lung images, but this test is most commonly used for pregnant women or in patients where the use of dye can be harmful. (67)

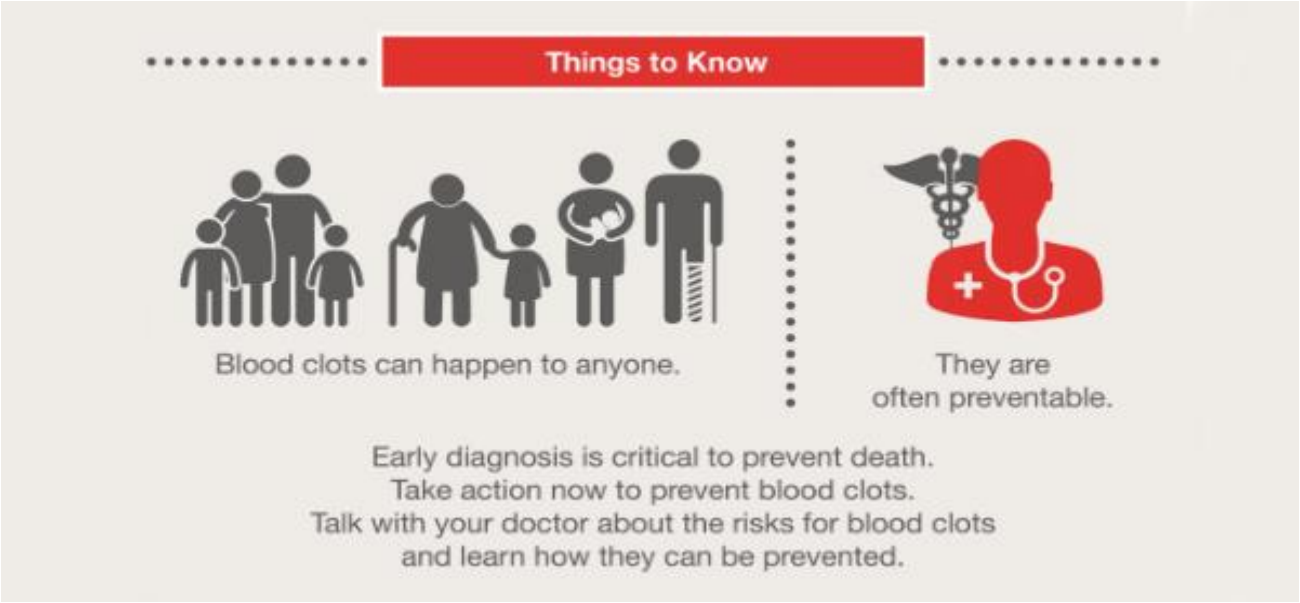

Figure 1. Things to know about blood clotting

2.4. Management:

VTE is the complexity of numerous situations. The effectiveness of prime prevention in orthopedics patients is well established. Without prophylactic treatment, up to eighty percent of orthopedic patients will obtain deep vein thrombosis (with asymptomatic thrombosis) and risk the development of PE. Frequently used protective factors for the LMWH operating system include warfarin. Acute venous thromboembolism treatment mostly contains unfractionated heparin (UFH) or LMWH for five to 10 days followed for several months by warfarin alone. Long treatment duration is essential as a subordinate precaution in case of repeated venous thromboembolism.(70)

According to AACP recommendations, patients with a first incident of secondary DVT for a reversible risk factor should receive treatmentwith VKA for 3 months. For patients with first episode of DVT with unknown risk factor, treatment should be sustained for at least 6 days to 12 months with VKA. For the previous fifty years, warfarin and heparins have been the foundation of antithrombotic therapy. Heparins, and the freshly developed fondaparinux, are injected on subcutaneous route.

Warfarin and other vitamin K antagonists (VKAs) areadministeredon oral route; however, their use is related with several limitations. Notably, they area narrow therapeutic window index drug, which means that there is a small difference in the dose that show effective protection against thrombosis and the dose that leads to harmful effects such as excessive bleeding. Therefore, these patient musts should be regularly monitored to guarantee that the

dose of warfarin is within the normal therapeutic and recommended range. VKAs also have some drug-drug and drug food interaction; this is of great implication in an elderly population that requires polytherapy. Other important disadvantages are slow onset of action. 72Due to the limitations of the factors presently available, many patients do not receive a satisfactory thrombosis treatment. For those receiving treatment, it is often inconvenient. There is a great need for a consistent dose of oral anticoagulants as efficient as VKAs, with minimum bleeding risk, rapid onset, less drug-drug and drug-food interactions and likely effects without the need for a monitoring of blood clotting (73).

Dabigatran etexilate, a novel oral antithrombotic agent in scientific area which is anticipated to meet all criteria and thus has the possibility to meet a large scientific need that has not been successfully met. The ongoing expanded clinical trial program for dabigatran etexilate is currently assessing its effectiveness and security in prime prevention, treatment, and secondary prevention of VTE. The effectiveness and security of dabigatran etexilate for stroke prevention are also assessed in atrial fibrillation patients.

Assumed that venous thromboembolism can be devastating or lethal, it is vital to treat it fast and strongly. Conversely, because significant bleeding caused by anticoagulants can be just as destructive, it is vital to avoid treatment when the analysis is not reasonably certain. The evaluation of the patient's condition should concernfor factors in the patient's clinical history.Deep Venous thrombosis is rare in the absence of hazards factors, and the effects of these risks are added. Even with mild symptoms that seem insignificant, the treatment of venous thromboembolism should be powerfully assumed in those who have numerous risk factors. (67).

2.5. Propylaxis Therapy: Rational Use in Thromboembolism Prevention

2.5.1. Definition of prophylaxistherapy

Prophylaxis is defined as a process to prevent the development of a specific disease by means of a treatment or procedure that affects disease. 75. Its primary meaning is prevention or protection from. Preventive treatment is an approach to prevent disease or condition before a patient is affected.The word prophylaxis comes from the Greek word prophylaktikós, which means pre-guard, also known as preventive treatment (76).

2.5.2.Thromboprophylaxistherapies and guidelines

Venous thromboembolism is the usual cause of fatality amongst hospitalized surgical patients. Mechanical strategies are used to enhance venous discharge from the legs and anticoagulant drugs, provides the most efficient way of lowering morbidity and death rate assosciated with these patients. Despite suggestion supporting prophylaxis for thrombosis, it is still not used enough because physicians realize that the risk of VTE is not enough to justify hemorrhagic complications for the use of anticoagulants.

The risk of VTE is regulated by the features of the patient and the type of operation performed. Because VTE is often asymptomatic in hospitalized patients, it is unsuitable to rely on primary diagnosis. Moreover, non-invasive examinations i.e. compressive ultrasound imaging, have inadequate sensitivity to the diagnosis of asymptomatic deep venous thrombosis. Thus, Thromboprophylaxis is the most active and well-established method in surgical patients for reducing morbidity and mortality from VTE. (4)

Both mechanical and pharmacological strategies can be used to prevent blood clotting. Mechanical strategies prevent venous stasis in the lesser extremities by increasing venous discharge, while pharmacological strategies work by reducing blood clotting. Intermittent pneumatic compression and compression elastic socksare non-pharmacological means used for prevention, while antithrombotic, such as low molecular weight heparin (LMWH), or unfractionated heparin (UFH), warfarin, and aspirin, are the pharmacological drugs used for this scenario (13).

Current additions to this list consist of fondaparinux, which has been licensed for thromboprophylaxis in USA in orthopedic patients of high risks, and the most recent agents are direct thrombin inhibitors. (12).

The American College of Chest Physicians recommends prophylaxis for thrombosis for some of patients for whom the advantages of this intervention seem to balance the risks.It is better to make conclusions about prescribing prophylaxis of thrombosis to a specific patient by combining knowledge of the literature and clinical finding, the final based on special knowledge about the risk factors for each patient in the management of VTE, the possibility of adverse consequences with the occurrence of thromboembolism, and the availability of different choices within one place. Since moststudies on thromboprophylaxis excluded patients who were at risk of developing VTE or opposing

reactions, their results may not suitable to those with previous deep venous thrombosis or with anenhanced risk of significant bleeding. In these situations, clinical finding appropriately may require the use of antithrombotic agents that is differ from the recommended method.11

2.6. Mechanical Methods of Thromboprophylaxis

One of the important principles of patient care is the primary and regular ambulation of hospitalized medical patients at risk of DVT. However, most patients can't be completely ambulatory early after operation or hospitalization. Furthermore, most of the symptomatic thromboembolic hospital relatedevents happen after patients have started to ambulate and mobilization lonely offer inadequate DVT prophylaxis for hospitalized patients. Precise mechanical methods of prophylaxis of thrombosis, include intermittent pneumatic compression (IPC) devices, venous foot pump (VFP), and graduated compression stockings(GCS),which endorse venous discharge and decrease stasisinside vein of leg.

In general, mechanical prophylaxis strategies have some vital benefits and disadvantages. The prime advantage of mechanical method is the nonexistence of bleeding possibility. Therefore, they are useful for patients having elevated risk of blood loss. However, the risk of DVT has been shown to reduce in several patient groups by all mechanical methods of thromboprophylaxis. But they are generally less efficient than antithrombotic prophylaxis because they have been fewer studied than antithrombotic-based approaches. (77,78,79,80).

Nomechanical methods have been studied to prevent thromboembolism in a large sample group which is enough to assess whether there is a reduced risk of loss of life or PE.Care must be taken when understanding reported risk decreases attributed to mechanical procedures of preventing thromboembolism for several purposes. Firstly, most trials were not blind, which increased the chance of bias for diagnostic doubt.Secondly, in previous examinations that used fibrous leg scan to detect deep vein thrombosis, mechanical methods reduced the false positive rate by 10 to 30% that was seen in the fibrinogen uptake test (FUT), while in control group; the rate remained unchanged (81).

Thirdly, a large diversity of mechanical policies is existing without any acceptable physiological criteria and with negligible comparative information. Internment pneumatic

compression devices vary with respect to its size. GCS are alsoheterogeneous regarding stocking distance, ankle pressure, pressure gradient, and proportion. The properties of the precise design structures of both mechanical devices on deep venous thrombosis prevention are unidentified. In detail, mechanical blood clotting prevention procedures should not even demonstrate to offer any defense against venous thromboembolism for approval and commercialization.

In any clinical trial, many of these devices have never beenevaluated; there is no baseless assumption that all of them are operative and comparable. Given the moderately poor compliance with optimum composition and usage of all mechanical choices, they are not likely to be as competent in daily base clinical practice asseen in examined studies where great energies are needed to improve its appropriate utilization.Finally, the usage of all mechanical methods of prophylaxis of thrombosis is related with significant costs interrelated to its procurement, storing, and maintenance, as well as its appropriate composition and the extensive tactics required ensuring ideal compliance. 82.

The ACCP recommends using mechanical methods to prevent blood clots mainly in patients at elevated risk of bleeding, or perhaps as an assistant to antithrombotic-based prophylaxis of thrombosis. For patients attaining mechanical procedures of thrombus prevention, ACCP recommends that attention be paid to ensuring appropriate use and adherence to these methods. In the following recommendations, the use of mechanical methods is the ideal choice for patients at elevated risk of bleeding.If the risk of elevated bleeding is transient, then attention must be given to start pharmacological prevention as soon as this risk is reduced. The use of mechanical methods may also be counted in conjunction with antithromboticagents to upgrade efficacy in some patients group for which this additional effect has been established. In all cases where mechanical procedures are utilized, health care providers must choose the precise length of the devices carefully, they must be applied correctly, and optimal compliance must be ensured (for example, they must be detached for a short time each day when the patient is on walk or taking bathing) . ACCP 82

Anticoagulants

Venous thromboembolism, which consists of DVT and PE, is a main clinical concern related with significant morbidity and fatality. The keystone of VTE treatment is anticoagulation, and old-fashioned anticoagulants include intravenous heparin and oral VKA. Freshly, new oral anticoagulant agents have been technologically advanced and licensed, including factor Xa

inhibitors i.e.rifaroxaban, apexaban and edoxaban and thrombin inhibitors i.e. dabigatran etexilate .84 LMWH and UFH work as anticoagulants by attachment to anti-thrombin and speeding up the rate at which coagulation factors are inhibited, especially thrombin and the stimulating factor Xa. The contact of LMWH and UFHwith antithrombin is initiated by an exclusive sequence of polysaccharide yeast located on a third or five LMWH and UFH chains, correspondingly. Fondaparinux, the synthetic analog of this sequence that occurs naturally in five polysaccharides, also work as an anticoagulant by means of binding anti-thrombin (85). LMWH is formed by removing the UFH polymerase to create heparin chains with an average molecular mass of one-third of the unfractionated heparin mass. Shorter low molecular weight heparin chains have well bioavailability after subcutaneous administration than longer unfractionated heparin chains, and UFH has a shorter half-life than LMWH. LMWH is related with a low incidence of thrombocytopenia caused by heparin. The anticoagulant appearance of UFH completely differs from that ofLMWH. To stimulate the inhibition of Xa factor by anti-thrombin, heparin only require attaching to the anti-thrombin through its penta-polysaccharide arrangement; A reaction that causes modulation variations in the loop of the anti-thrombin reactive center and rushes the rate ofinhibition ofXa factor. In distinction, to stimulate inhibition of thrombin with anti-thrombin, heparin must be associated with both anti-thrombin and thrombin, thereby blockingenzyme and the inhibitor together. 86. Individual heparin chains that contain pentasaccharide and at least thirteenextra polysaccharide units, match to the molecular weight of 5400D or more, are of enough length to offer this connecting function. Subsequently at least half of the low molecular weight heparin chains are very short to offer this connecting function, thrombin has a lesser inhibitory activity against the Xa factor than LMWH.

In distinction, all UFHchains are enough to bind anti-thrombin to thrombin;this gives it equivalent activity of inhibition against thrombin and factor Xa.With a low molecular weight, fondaparinux is too short to bind thrombin to antithrombin. As a result, fondaparinux stimulates factor Xa inhibition by antithrombin but has no effect on thrombin distraction proportion. Fondaparinux offers outstanding bioavailability after injecting subcutaneously and is recommended once a day. (22)

Fondaparinux, LMWH and UFH, usually begin after operation to decrease the risk of a hematoma in the spine, which is an infrequent but shocking consequence of the spinal

perforation for spinal or epidural anesthesia. 2 When these factors are given in preventive doses, proper monitoring of anticoagulation is not necessary. Warfarin is also used to prevent blood clots, but it must be carefully observed so that the dose can be changed to achieve an INR level of 2-3.ACCP recommends that, for every anticoagulant, physicians should follow the manufacturer's suggested dosage instructions.Also, for patients with renal impairment, renal elimination is the primary way to get rid of many anticoagulants, including fondaparinux and low molecular weight heparin. With decreased kidney function, these medications may gather in the body and enhance bleeding risk. There appears to be a great distinction in the association between renal insufficiency and drug gathering for different low molecular weight heparins, which may be associated to the chain length supply of different low molecular weight heparin preparations (87). Among 120 ICUpatients, all of whom had creatinine clearances - 30 mL / min, there was no sign of accumulation of diltiparine at five thousand units per minute used as a thrombolytic therapy based on factor Xa levels of anti-serial factors. (88)

ACCP recommends observing at renal function when making decisions about the use and proper dose offondaparinux, UFH and other anticoagulant medicines that are eliminated through kidney, especially in old age and diabetic patients and those at elevated risk of bleeding. Depending on the situations, ACCP recommends one of the following choices in this case: Avoid using bioaccumulative anticoagulants in the presence of disturbedkidney function, using a low dose of the drug, or monitoring the anticoagulant effect of drug or its level. (ACCP)

2.7. Antiplatelet Drugs

Platelets are the main cells that influence blood clotting, thrombosis, and thrombosis that are exclusive to mammals. It is a great part of the "hematopoietic components", which is a piece of blood platelets and proteins that stick to the site of vascular cuts. The excretion of von Willebrand factor by injured cells in the endothelium and other intermediaries for blood clotting from the granules inside the cells causes enlarged platelet aggregation. The future initiated activation event has been extensively studied because it is an essential part of physiological pathology for many diseases including DVT (89). Treatments that affect platelet functions may be another substitute treatment for deep vein thrombosis.

Acetyl salicylic acid prevents platelet accumulation by metabolizing arachidonic acid by

disrupting the cyclooxygenase enzyme, which is an unalterable disruption during the lifespan of platelets. Other antiplatelet agentssuch as clopidogrel work on different mechanisms of action. (90) ASA inhibits platelets by acetating permanently cyclooxygenase 1, the enzyme contained in the synthesis of thromboxane A2, which is an effective platelet agonist. Because they block platelets and cyclic oxidation cells of macroscopic cells 1, their outcomes continue throughout the life of the platelets. With platelet lifetime about ten days and substitution of ten percent of platelets circulating per day, 50% of the antiplatelet effect of ASA is changed within five to six days after stopping the drug (91).

Thienopyridines, thatcontain ticlopidine and clopidogrel, irreversibly block ADP platelets receptors. Both factors must experience hepatic alteration to create metabolites that discourage these receptors. Thus, its start is overdue unless loading doses are administered.

Clopidogrel substitutes ticlopidine due to security and suitability features. Like ticlopidine, neutropenia and thrombocytopenic purpura are not intermittent problems of clopidogrel therapy. Furthermore, clopidogrel may be given once a day, while ticlopidine should be given two times daily. Clopidogrel or ticlopidine is a rational substitute for patients who are allergic to ASA. (91)

Aspirin and additional other antiplatelet medications are valuable in lowering major thrombotic events in patients at risk or who have been diagnosed with atherosclerosis. Guidelines suggest that antiplatelet drugs also provide some safety against venous thromboembolism in admitted patients.

However, ACCP not recommend using aspirin alone as prevention against venous thromboembolism in the first place because the most effective methods of preventing blood clots are willingly accessible. Moreover, much of the suggestion indicating a benefit for using antiplatelet agents such as venous thromboembolism is based on systematically inadequate studies. For example, anti-platelet trials were collaborated. The data collected for the meta-analysis were generally small studies done thirty years ago and wereof adjustable quality.

Only one third of the examinations involved a group that received only aspirin. Among these methods, usually recognized methods of DVT screening were achieved in only thirty eight

percent. Several trials did not report a noteworthy advantage from preventing aspirin venous thromboembolism or found that aspirin was substandard to methods of preventing thromboembolism (92-93, 94, 95).

For instance, the relative risk reductions (RRR) for deep venous thrombosis and proximal deep venous thrombosis amongst patients who received prophylaxis for thrombosis with VFP plus aspirin more than that with aspirin lonely after total knee arthroplasty were thirty-two and ninety five percent respectively.

Among patients with hip rupture surgery randomly chosen to accept either aspirin or danaparoid, a low molecular weight compound, venous thromboembolism was detected in fort four percent and twenty eight percent of patients, respectively.Finally, aspirin usage is related with an enhanced risk ofsignificant bleeding, particularly if combined with other anticoagulant drugs. Therefore, ACCP guidelines recommend not using aspirinlonely as blood clots against venous thromboembolism for any group of patients.

2.8. Assessing Risk Factor in practice:

Risk assessment is a word used to designate a general method where:

• Categorize risks and its factors that can cause damage.

• Examine and assess the risks related with those risks.

• Determine proper ways to remove risks, or control risks when risks cannot be eradicated.

The standard "Occupational Health and Safety - Risk detection and Eradication, Risk analysis and Control" use the terms:

Risk assessment - the comprehensive procedure of risk detection, risk analysis and risk documentation.

Risk detection - the procedure for examining, including, and describing risks.

Risk Analysis - A procedure for understanding the nature of hazards and defining risk level.

(1) Risk analysis offers the foundation for risk assessment and decision making about hazard control.

(2) Evidence can comprise present and past information, hypothetical examination, informed sentiments, and stakeholder concerns.

(3) Risk analysis includes risk assessment.

Risk detection - the procedure of comparing estimated risks with specific risk criteria to regulate the importance of risk.

Risk control - procedures for implementing risk choices (96).

In epidemiology, the hazard factor is a variable related with an enhanced risk of illness or contamination. Sometimes, the delimiter is also utilized, being a variable related with either an increase or decrease in risk.

Risk factors are correlated and not necessarily contributing, because its relationshipdoes not establish causality. For example, being adult can't be said to instigate measles, but adults have anenhanced rate of measles because they are less possible to grow immunity during an earlier pandemic. Statistical approaches are frequently used to measure the strength of relation and offer causal suggestion (for example in studying the relationship between lungs and smoking).

Statistical examination, along with biological knowledge's, can demonstrate that risk factors are causal. Some favor the term risk factor to mean causal causes of elevated rates of disease, and for unstable links to be so-called potential hazards, associations, etc.

After risk factors are considerately identified and based on investigation, it can be a strategy for a medical examination. (97) Risk factors can be taken mainly from risk factors of breast cancer and can be designated in terms of relative risk i.e. "Women are more than hundred times more probable to grow breast cancer in their sixties than in their twenties. Part of accidents that occur in the group that possesses or is subjected to the risk factor, such as "ninety nine percent of breast cancer situations are detected in women". (98)

Increased incidence in the subjected group, such as " daily intake of alcohol enhance the occurrence of breast tumor by 11/1,000 cases in women"The risk ratio, such as "a rise in both total breast cancer and surgical intervention in women randomized to take progesterone and estrogen for an average of five years, with a risk ratio of 1.2 competed to controls" (99)

The possibility of the consequences typically depends on the interaction between numerous linked variables. When presenting an epidemiological evaluation of one or more specific outcomes, other causes may act as confusing factors and must be controlled, for example by classification.

The potential confounding causes vary according to the outcome studied, but the subsequent general confusion is common to largely epidemiological relations, and they are the most common determinants in epidemiological examinations:Age, gender orcast.

Less common types of potential disruption include:

Marital position / income, Genetic predisposition, Geographical place, gender distinctiveness,

Profession, sexual assimilation, chronic stress level, Diet, physical exercise level, Alcohol ingestion and cigarette smoking and additional social causes of health (100). A risk index is a variable that is related quantitativelyto a disease or other consequence, but the direct change of the risk mark does not essentially alter the risk of the consequences. For instance, the history of driving while intoxicated (DWI) is a risk sign for aviators as epidemiological examinations specify that aviators with a history of DWI are much more likely than their colleagues who do not have a history of DWI to participate in flying accidents (101). The term "risk factor" was coined for the first time in 1961 by former director of heart study in Framingham, Dr. William Kanel. (102).

2.9. Thromboembolism Risk Stratification

There are two common ways to makedecisions for prophylaxis for thrombosis. One method is the risk of VTE in every patient, based on individual influencing factors and the risks related with their present disease or technique.

Thromboprophylaxis is thenindividually prescribed based on a combined risk assessment. Formal risk assessment tool (RAT) have been planned to contribute in this procedure.

The individual physicians' approach to preventing blood clots based on official RAT is not routinely used by many physicians because it is not sufficiently verified and cumbersome.

Moreover, there is tiny proper understanding of how different hazard factors cooperate in a quantitative means to determine the place of each patient along with a continuous range of thromboembolism risk. Lastly, individual RAT may not value the effort because there are a inadequate number of thromboprophylaxis choices, and one of the method of efficient blood clot prevention is to decrease the difficulty of making decision.One of the simplifications of the risk assessment procedure for hospitalized surgical patients includes giving them to one of 4 levels of riskdepending on the type of surgery (major, minor), age (less than 40 years, 40 to 60 years, and more than 60 years), and the existence of supplementary risk factors (such as cancer or former venous thromboembolism).

Although this stratification chart is used in some settings, its disadvantages contain risk assessment based on 25-year-old examinations, uncertainties about the influence of each feature on the overall risk, lack of explanations of minor and main operation, and random cutoff to the age and length of surgical procedure (13).

Another method of making decisions for prophylaxis of thrombosis involves routinely implementing prevention of thrombosisto all assembled patients belongs to each of the major target groups, for example patients undertaking major general or major orthopedic operation.Presently, we support this method for numerous purposes.

First, although an elevated number of patient-specific risk factors for thrombosis contribute to the large variation in venous thromboembolism rates, the key factor is the patient's main cause for hospitalization, be it a surgical process or an acute disease.Moreover, currently, we are unable to recognize with confidence a small number of patients in different groups who do not need prevention from thrombosis. 51 Secondly, individual approach did not undergo a demanding clinical assessment, whereas group risk assessment and prophylaxis for thrombosis were the foundation for most randomized thrombotic tests and guidelines for evidence-based experimental practices.Third, individualization of prophylaxis of thrombosis is complex and may be linked to sub-optimal compliance unless ongoing efforts are made across the organization to implement. The extra simplification of our previous categorization system allows physicians to easily recognize the range of general hazards to their patients and to make general suggestions for the prevention of blood clots (13).

2.10. Present tools for risk assessment in VTE

Globally, more than half of the admitted patients at elevated risk did not receive venous thromboembolism prophylaxis. Precise evaluation of patient venous Thromboembolism risk is critical to raising this condition and enhancing compliance with prophylaxis suggestions(14). There are two general methods of risk assessment, individual risk assessment and group risk assessment. Most fresh publications determined that it maybe more suitable to use the individual risk assessment method to recognize and assess all probable risk factors to assess the true degree of risk for a patient and offer proper suggestions for prophylactic treatments basedon risk level. Several individual venous thrombosis risk assessment models (RAMs) have been suggested and assessed clinically, the most not able being those developed by Caprini, Cohen, Kucher,etc.

The Caprini risk assessment tool(RAT) was derived more than a years ago, based on a combination of published data and medical experience.The revised versions of the assessment tool were authorized in the surgical and medical environment in the western population. Most importantly, the RAT gives proper recommendations for prevention based

on the level of risk and outcome, which is suitable, practical and beneficial for health care providers. This RAT has been accredited by numerous organizations and translated into 12 languages. (6)

The Padua calculation score was used to assessvenous thromboembolism risk in 1180 hospitalized patients, respectively. Experimentally created by combining the Kucher template with additional elements and slightly adjusting specific results to allow all these conditions to be strongly recommended by the latest international guidelines. Patients were monitored for up to ninety days after admission to assess the occurrence of venous thromboembolism symptoms, and the percentage of people who had developed venous thrombosis was as follows:

Patients with "low risk" (711): 0.3 percent, High-risk patients receiving adequate thrombus prevention in hospitals (186): 2.2 percent, High-risk patients who do not receive adequate thrombus prevention in hospitals (283): 11.0 per cent (103). The IMPROVE risk score was used to assessvenous thromboembolism risk in 15,156 hospitalized patients enrolled in International Medical prevention registry on Venous Thromboembolism (IMPROVE). The rate monitored for venous thromboembolism during three months of admission was 0.4 to 0.5 percent if none of these risks were present factors and was in the range of 8 to 11 percent in individuals with maximum risk scores. (104)

The GENEVA risk score was subject to a multicenter validation study that involved1478 hospitalized patients, 43 percent of whom did not take prophylaxis for thrombosis. Overthreepercentofhigh-riskscoresubjectsdevelopedsymptomaticvenous thromboembolismorDVT associated death at 90 days, compared to 0.6 percent of low-risk score patients. When only patients who did not receive prophylaxis were considered, these risks were 3.5 and 1.1 percent respectively. (105)

2.11. Trends in Practice of Thromboprophylax is Guidelines in Health Care Settings

2.11.1. Studies done on thromboprophylaxis in turkey and world widely

The Venous Thromboembolism Prevention Study (VTEPS) Network is anassociation of 5 tertiarycarehospitals created to assess VTE in plastic surgical patients. The mid-term observation study report analyzes the study group to evaluate the occurrence of venous

thromboembolism in patients not tacking chemotherapy, and to validate the Caprini Risk Assessment tool (RAT) in plastic surgical patients. (106). The study was designed in VTEPS centers for all eligible plastic surgical patients by considering a medical record review between 15thMarch 2006 and 15thJune 2009.

The inclusion criteria were Capriniscore more than 3, surgery under generalized anesthesia, and hospital admission after surgery. Patients who took chemoprophylaxis treatment were excluded. Dependent variables included DVTor PE within 2 months and time after surgery to deep venous thrombosis or PE.

The study resulted in the identification of 1126 historical patients. The total VTE incidence in Turkey was found to be 1.75%.Almost 1 in 9 (11.3%) of the patients who had a Caprini score of more than had a venous thromboembolism event. Patients with a Caprini score of more than 8 was importantly more possibly to develop venous thromboembolism when compared to patients with a Capriniscore from 3 to 4. Amongst patients who have 7 to 8 Caprini score or more than 8 Caprinigrade, the risk of ventricular hypertrophy was not restricted to the instant postoperative period 1 to 14. In these highrisked patients, over fifty percent of venous thromboembolic events were detected in the late postoperative period (2 weeks to 8 weeks).

The study concluded that Caprini RAT works efficiently to identify risks for patients of plastic and reconstructive plastic surgery for the risk of developing VTE. Amongpatients who had a Caprini score of more than 8, 11.3% had VTE after surgery when chemoprophylaxis was not delivered.In patients at elevated risk, there was no suggestion that the risk of venous thromboembolism was restricted to the instant postoperative period.A second study was conducted on SICU patients known to be at high risk of developing VTE. The Caprini Risk Assessment (RAT) tool predict patients at risk of developing VTE. However, the doctor's capability to precisely complete the RAT and the result that the imprecise RAT completion on the risk of developing a VTE remains unknown. (107)

A study designed in-between 2009 and 2012; doctors completed the Caprini grade for all admission to SICU in our institution. For comparison, they used a pre-verified degree, score generated bycomputer. Regression-based procedures inspected the effect of improper division of risk on the patient's venous thrombosis risk, when monitoring for further confounders. The study concluded 3333 consecutive admission cases to SICU,

55.2% had computer produced grades that were greater than the ones stated by the doctor, and 20.6% of the grades were equivalent. The results produced by the computer were greater than the results stated by the doctor for both the mean (6 verses 5) and the range between the quarter (5 to 8 verses 3 to 7).

The study concluded that clinicians classify SICU patientsat risk when using Caprini RAT 2005. Since health care settings include electronic medical archives in daily exercise, computer generated Caprini scores may lead to more precise classification of venous thromboembolism risks. Insufficient evaluation of the risks of VTE and delays in radiation therapy carries a significant and independent enhanced risk of venous injuries.

Also, another study considered that VTE to occur frequently in patients at risk in hospital, and VTE prevention was not used significantly. The researchers pursued to initially evaluate the legitimacy of the Caprini RAT, the eminent single venous thromboembolismRAT, in Chinese hospitalized VTE patients (108). The study was a retrospective follow-up study among 347 patients with events of venous thromboembolism from a Chinese hospital.They found a comparison with other risk assessment tools (RAT), the Caprini model could categorize more venous thromboembolism patients to a higher or higher level of risk than kucher and padua model and the differences were statistically significant. The Caprini model demonstrated a significantly greater effect in assessing VTE risk for patients among surgical than non-surgical patientsin favor of the estimation effect for RAT in hospitalized surgical patients). Kaplan Mayer's analysis presented that patients were categorized to low and high-risk levelbased on the Caprini model increased the risk of venous thromboembolism relapse when compared with patients having moderate and high level of risk, but the outcome was not significant statistically.In conclusion, the study initially indicates that the Caprini risk assessment tool is a practical and efficient tool for assessing the risks ofvenous thromboembolism among inpatients in Chinese hospital and may also be suitable in predicting the risk of VTE recurrence. However, prospective studies are required with the control group and future authentication of the tool is needed in hospitalized Chinese inpatients.Another objective of one study was to assess adherence to prophylaxisof DVT guidelines in a public health care setting as a quality control policy. In this, a random review of clinical plans was conducted in Mexico to determine the degree of compliance to prevention of DVT guidelines. Caprini checklist was used to assess the risk of thrombosis in adult hospitalized patients. The sample consisted of 300 patients, of which182 were surgical patients and 118 were medical patients. 46 patients

received appropriate deep venous thrombosis prophylaxis. 27.1%ofmedicalpatientsand 8.3%ofsurgical patientsreceivedDVT prophylaxis.

Study results demonstrated that hospital commitment to prevent DVT was very low. Only 15 percent of high-risk patients received treatment, and evenless than 25 percent of very high-risk patients received treatment. The study concluded that strategies are needed to increase compliance with clinical guidelines. The study also designed to test the legitimacy of the Caprini risk assessment tool in categorizing patients with elevated VTEamong hospitalizedpatients. (109)

A case-control retrospective study was conducted among hospitalized medical patients hospitalized toSichuan University hospital from 2010 to 2011. A total of 218 patients with a specific VTE were recruited during hospitalization. 394 control patients were selected randomly from patients without VTE in the same departments during the same period. The risk of both cases and controls was assessed retrospectively with the Caprini risk assessment model. The average risk score in Caprini was considerably higher in cases than controls. No statistically significant difference was seen in the risk of ventricular hypertrophy between patients at low risk based on Caprini model and those at moderate risk (OR = 1.26, 95% CI: 0.62-2.56). Compared to lower risks, those with higher risks were related with an elevated risk of venous thromboembolism by 2 times (95% CI: 1.10-3.61), higher risk associated with 5.76 times higher risk of VTE (95% CI: 3.24 -10.24) (both <0.05).

The study concluded that Caprini risk assessment tool can effectively and quantitatively assess the risk of venous thromboembolism among hospitalized medical patients according to their individual risk factors of VTE.A multicenter analysiswas also conducted in turkey in which information from the Turkish arm of the study were collected to assess the risk of VTE and the appropriate use of guidelinesfor thromboprophylaxis in acute care hospital (108). In a study, a total of 1,701 hospitalized medical patients for treatment of acute or worsening chronic medical diseases or elective major surgery were included in elevenhealth care settings across Turkey. Patients at risk were identified and the venous thromboembolism preventive treatment applied retroactively based on medical charts. According to ACCP, a total of thirty five percent patients were recognized at risk for developing VTE. The risk of venous thromboembolism is observed in sixty percent of surgical patients and 23 percent of medical patients.

Contraindications to anticoagulation were detected in eight percent of both medical and surgical patients. The study concluded that VTE is yet a risk factor amongst patients who

have been admitted throughout Turkey, as it becomes apparent that the identification and prevention of patients with VTE risk is neglected.In a second study that was based on an assessment of the risk of VTE amongst hospitalized patients in general surgery clinics across Turkey, venous thromboembolism (VTE) was still considered a global public health issue due to the gaps between suggestions and clinical practice in preventing venous thromboembolism. (110).

2.11.3. Knowledge, attitude and practice of health care providers on DVT prophylaxis

Nurses with a great knowledge of DVT/VTE prevention can play a key role to improve patient's consequence. Nurses need to educate the patients about DVT risks, venous thromboembolism prophylaxis and its serious consequences. Nurse's play a vital role in acting as a patient advocate by helping them access information about their condition.

Ensuring that the patient is fully informed will increase the confidence of the individual, and better prepare him for any action that may need to be taken in the near future (111).Within the healthcare system, nursing is the biggest professional group involved in direct medical care. Nurses with particular knowledge and strong management and guidance skills can have a protruding role in manipulating and applying changes in health care practices (112). There is a rising awareness of DVT/VTE that is a significant public health issue, as concluded by a combined effort of Centers for Disease Control and prevention (CDC) Public Health Leadership Conference in 2003, American Public Health Association (APHA) and the Surgeon General's Workshop on DVT in 2006 (113).

They have asked the query of whether a systematic method to surveillance of DVT must be assumed to offer more generalizable data on disease occurrence, improve the present understanding of risk factors and the effect of changes in clinical practice on disease incidence, and offer modernized evidence on the application in clinical practice of reputable preventive measures (114).

Study showed by Jung-Ah Lee et al assessing hospital nurses perceived knowledge and practices of venous thromboembolism assessment and prevention. They showed low general knowledge score of VTE risk assessment and recommended to revisit in-service continuous education about VTE risk assessment especially in ICU settings (115).

Fangfei et al done a study on thromboprophylaxis awareness among Health care providers that revealed 10% of nurses, physicians and pharmacists were unaware of current guidelines. Researchers suggested that improving health care staff knowledge and attitude towards thromboprophylaxis by strengthening educational programmers to arrange training and seminars regarding this issue (116). Jed et al observed no computable progresses in DVT prevention practices of nurses. There is a need to raise knowledge and awareness of nurses on DVT risks and prevention to avoid problems. Determination of knowledge and practices of nurses on DVT risks and prevention may be suitable in improving their awareness and preventing this important public health problem (117).Orthopedic nurses play a significant role in the recognition, management and prevention of DVT among patients undergoing hip surgery because those patients need nursing involvements for prevention of DVT as fundamental part of nursing care standards (NCSs). An awareness of all features of DVT is important in providing ideal nursing care for patients undergoing hip surgery in order to increase patients' outcome, decrease the incidence and possibly life threatening problems of DVT (118).

Previous studies by Kimmerly et al. and Bhatti et al. have revealed grossly inadequate knowledge and less than the ideal practice of DVT prophylaxis among surgeons and health care workers. (119,120) The American College of Chest Physicians guideline for VTE prophylaxis has remained the most widely followed protocol, while there are no documentation of any guideline in some countries, (121) others have adopted their own national guidelines. (122,123) Implementation of already existing protocols has suffered on account of lack of understanding of clear indications and contraindications for prophylaxis and perceived risk of bleeding (38).

To overcome this fear, various ways have been used to improve the awareness of VTE prophylaxis. Recently, a protocol involving a computer-based clinical decision support and program of training seminar,(124) electronic reminders(125) and even didactic lectures have been used.The mean knowledge score was 5.81 ± 1.16. About two-third of surgeons(66.7%) had a poor knowledge of VTE prophylaxis while only 35 surgeons (33.3%) had good knowledge which included 16 (24.5%) senior residents and 19 (32%) consultants. No statistical difference was found between the two different groups of surgeons ($P > 0.05$).

The mean practice score was 5.19±1.8. Only 20% of surgeons appeared to have a good practice of DVT prophylaxis.

The majority of surgeons (90.5%) had encountered DVT in their practice. Almost half of them (50.5%) had encountered DVT in 1–5% of cases, while 39% and 3.8% of them have seen DVT in <1% and more than 5%, respectively. A large majority of respondents (82.9%) had encounteredpulmonary embolism (PE) in their practice, and 76.2% have lost patients from suspected PE. Most surgeons (93.3%) do not have any departmental or institutional guideline to follow in recommending the appropriate prophylactic measure for VTE; however 99% of them believed that it is necessary to have an institutional guideline. The most commonly encountered risk factors for DVT were advanced age, prolonged immobilization, and pelvic surgery. (126). While some studies suggest "no intervention" regarding DVT prophylaxis in hospitalized patients, review studies are in favor of conducting interventions (127). Studies have been conducted to figure out the reason for this discrepancy between the actual rate of patients in need of DVT prophylaxis and the actual rate of DVT prophylaxis prescription in practice. A study by Vardi et al showed that three main reasons have been associated with this problem, including underestimation of VTE risk, lack of formal prophylaxis programs and lack of interest. (128)

2.11.4. Role of the clinical pharmacist:

Clinical pharmacists are an essential source of logically effective information and advice regarding secure, proper and economic use of large-scale drugs in managing and improving drug therapy using evidence-based tools and recommendations. Over the past forty years, major variations have happened in the field of anticoagulation therapy. New approaches for old anticoagulants were established, old views were challenged, new anticoagulants were announced, and new indicators for existing anticoagulants were identified. The pharmacist's role in the management of anticoagulation has been defined, and doctors have realized more about the great consequences of drug safety. Progress has crossed from outpatient preparation to ICU setting. (129)

Although newer anticoagulants provide advantages, their complete lack of reflection can present challenges in the aspect of over anticoagulation. Other anticoagulants that are developed include indirect acting idraparinux once a week and direct acting penta-apixaban and rivaroxaban and tissue pathway inhibitor. Numerous other major progresses have occurred in the field of anticoagulation therapy. Hyper coagulants have been recognized, along with an understanding of their active participation in instigating

thrombosis.

Ideal use of antiplatelet drugs (with or without combination therapy of anticoagulant) was determined in atherosclerotic disease. Efforts to educate the public about the signs of stroke have flagged the way for the appropriate use of hemolytic treatment for acute stroke. The administration of long term subcutaneously administered anticoagulants changed the treatment VTE to an outpatient setting. The administration of self-monitoring of warfarin has allowed greater empowerment for some patients.

The introduction of the recombinant VIIA factor for hemophilia patients with factor VIII or IX inhibitors was an innovation. Despite the price and coagulation risks related with this factor, its off-label use continues to rise in most clinical settings, consisting of painful and uncontrollable bleeding. To understand the relationship between activation of inflammation and thrombosis led to the progress and adoption of drotrecoginalfa, the stimulant for acute septicemia. (130)

Over the previous two decades, the value of drug security with anticoagulants has become a serious matter for health organizations. In the 1980s, the occurrence of spine hematomas increased in patients getting low molecular weight heparin and nervous anesthesia enlarged responsiveness of important potential risks with anticoagulant management. The pharmacist's job in supervision of anticoagulant therapy in hospital setting was also defined. An evaluation of more than 7 hundred thousand patients in medical care from nearly 1,000 hospitals found that those without warfarin and heparin therapy in the pharmacy had higher rate of mortality, period of stay, medical care fees, bleeding rates, and blood transfusion necessities. Clinical pharmacist managed anticoagulant therapy improves the excellence and security of this treatment in both hospitalized and outpatient settings. (131)

In US, annually venous thromboembolism cause more deaths than AIDS,breast cancer and road accidents. Responsibility of clinical pharmacists which are suggested by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the National Quality Forum include:

- VTE prevention one day of hospitalization;
- VTE / Prevention risk assessment within one day of transfer to the ICU.
- Document the inferior vena cava filter index.
- Venous thromboembolic patient with interfering treatment;
- Venous thromboembolism patients getting UFH while monitoring WBC

count.

- Venous thromboembolic patients who receive indivisible heparin administration through a graph / protocol;
- VTE discharge instructions.
- Venous thromboembolic embolism, which can be prevented in hospital. (132)

Over the previous two decades, the advantage of an anticoagulant therapy managed by pharmacist has been proven. In 1985,Clinical Pharmacy and Drug Intelligence published an article on supporting the charge of a clinical pharmacistmanaged anticoagulation therapy. The administration of treatment by pharmacists resulted in an upgrading in the proportion of prothrombin times and INRs ratio in normal therapeutic range and a reduction rate in hospitalization due to DVT or bleeding events. Interest rate: An anticoagulant therapy was found at a satisfactory cost: benefit ratio. Several articles in well reputed journals have since confirmed these benefits (133).

With current developments in the area of anticoagulation management, the upcoming time will see an enhanced attention on patient security and disease protection. Quality treatment in relation to anticoagulants will be linked to hospital certification and compensation. New groups of anticoagulants will be presented, which will raise the need for reflex factors.Clinical pharmacists will continue to play animportant role in treating and evaluating the results of future anticoagulant management. (131).

Pharmacist-led anticoagulation theraphy reduce the occurrence of venous thromboembolism, increase anticoagulation safety, reduce hospital overload, and reduce healthcare costs. Pharmacists, either individually or as a member of pharmacy and therapeutic committee are ideally positioned to achieve national performance measures related to venous thromboembolism and thus can contribute significantly to the required improvement in the current prevention and care of venous thromboembolism.Similarly, Pharmacist presence can improve the quality of DVT care as well as the general safety of anticoagulants by providing anticoagulation therapy related to all basic VTE measures. Pharmacists can adequately improve the rate of appropriate preventions and treatment rates for VTE in a number of ways, such as helping to develop and implement local VTE quality improvement guidelines, policies and initiatives, Educating patients and other healthcare providers. Taking drug history, providing risk assessments, management of drug and food interactions show an overall improvement in the continuity of care. (134)

3. MATERIALS and METHODS

3.1. Objectives, Aims and Rationality:

Globally, more than half of the high risk admitted patients are not receiving prophylaxis for thrombosis.

Careful evaluation of the patient's risks of VTE is crucial inadvancing this situation and enhancingadherence with prevention regulations. There are two general methods of risk assessment, individual risk assessment and group risk assessment.

Most fresh publications determined that it may be more suitable to use the individual risk assessment method to recognize and assess all probable risk factors to assess the true degree of risk for a patient and offer proper suggestions for prophylactic treatments based on risk level.

There are over eleven different guidelines including local and international guidelines for the prevention of thromboprophylaxis such as ACCP, the Cardiovascular Disease Educational and Research Trust (ICS), the Scottish Intercollegiate Guidelines Network (SIGN), and the Australia and New Zealand working party on the prevention and treatment of VTE.The importance of hospital evaluation of patients for the risk of venous thromboembolism has received much consideration and will remain to be a major area of attention for the health care settings in the upcoming periods.

Despite growing suggestion that a huge proportion of patients admitted to the wards of internal medicine demonstrate a significant risk of venous thromboembolism complications, the use prophylaxis of thrombosis in these patients remains mainly underused.There are two common ways to makedecisions for prophylaxis for thrombosis. One method is the risk of VTE in every patient, based on individual influencing factors and the risks related with their present disease or technique.In order to categorize the risk of venous thromboembolism in admitted patients, formal risk assessments tools (RAT) have been advised for DVT for assistance in this process. Several individual Venous thromboembolism risk assessment tools have been suggested and clinically assessed, most notably those developed by Kucher,Caprini, Cohen etc.The Caprini risk assessment tool is utilized for the occurrence of venous thromboembolism amongst hospitalized surgical patients first and later validated for other settings.The grading system consists of a comprehensive list of risk factors proven by evidence-based publications linked to the development of deep vein thrombosis (DVT). Each risk factor is also classified according to the relative probability

of causing deep vein thrombosis compared to each other. Factors with one score are the least powerful reasons for DVT compared to other factors that got higher points. This correct intuitive approach to risk assessment has now been validated by comparing patient scores with the incidence of DVT in these individuals within 30 days of surgery. It is very important to identify all factors in a patient because losing one or more factors may not determine the appropriate level of risk for the patient.This tool and other interventions help to rationalize drug use and can be introduced by clinical pharmacists to promote optimal health and care.Clinical pharmacist's job in managing anticoagulant therapy is well established as new approaches for old anticoagulants were established, old views were challenged, new anticoagulants were announced, and new indicators for existing anticoagulants were identified. The pharmacist's role in the management of anticoagulation has been defined, and doctors have realized more about the great consequences of drug safety.

However, clinical pharmacist having antithrombotic specialty is not in practice in hospitals in both Turkey and Turkish Republic of North Cyprus (TRNC) though currently pharmacy regulations andeducation in turkey and North Cyprus are shifting in favor of more clinical care-based practice and education.

To our knowledge, the clinical pharmacy services introduced by both master and PhD students at Near East University Hospital, was the only established clinical pharmacy practice all over North Cyprus. This study evaluate current thromboprophylaxis practice at two tertiary care hospital investigating management of patients in general ward having low risk, medium, and high risk of developing DVT and determine the adherence to thromboprophylaxis guidelines and to assess rational prescribing of DVT prophylaxis and perspectives of health care providers in Northern Cyprusthusto optimize care and assure rational practices. The significance is to assess gaps incurrent management and patient care using assessment tools used by clinical pharmacists and compares that to current practice at hospitals in TRNC.

Study Setting and Subjects: The study was conducted in the general wards of two tertiary university hospitals, NEU hospital in Nicosia and KUH in Kyrenia of Northern Cyprus. NEUH is one of the largest and leading health care facilities in North Cyprus. The hospital consists of 208 private patient rooms, 8 operation theatres, a 17-bed Neonatal Intensive Care

Unit (NICU), 33-bed Intensive Care Unit, and more than 30 different clinics and departments. Dr.Suat Günsel Kyrenia University Hospital has a capacity of 150 beds and comprises three operation theatres equipped with modern instrumentation that are specifically designed to perform cardiac surgeries, four intensive care units with 17 beds that are specifically designed for general intensive care purposes and paediatric and cardiology intensive care. The hospital employs qualified health care providers, including academicians and specialists in different fields.In the first phase, an observational prospective study was performed. All (n=310) patients admitted between 01 April 2018 and 01 July 2018 who assembled the inclusion criteria were requested to participate in the analysis. The inclusion criteria were acute and chronically ill hospitalized patients for whom complete medical records were available and who were hospitalized for at least 7 days in a certain ward.Patients having age <18 years, superficial vein thrombosis, or any contraindications for DVT prophylaxis and patients who had deep venous thrombosis prophylaxis within the last month were excluded from the analysis.Information was collected from eligible patients, who were assessed for risk factors and the rational use of DVT prophylaxis using evidence based DVT risk assessment tool.

Demographic information of patients willing to participate in the study were recorded including age, sex, height, weight, primary diagnosis, chief complaints. Also the presence of risk factors of DVT, a drug used for DVT, sign, and symptoms of DVT, laboratory results, other co morbidities, any prophylaxis treatment administered for VTE, and a history of signs and symptoms of PE or DVT or anticoagulant complications documented in the patient files during hospitalization were collected. Patients were also assessed for possible complications by the research team during their follow-up visit two weeks after hospitalization to record any deep venous thrombosis signs and symptoms, pulmonary embolism, or adverse effects of medications.

In the second phase performed between 5th September 2018 and 5th November 2018, a cross-sectional questionnaire was distributed to health care providers at the two health care settings in a face to face meeting to assess the knowledge, practices, and attitudes of health care providers towards DVT risks and prophylaxis.

In the third phase, an interventional program both education and a daily individual assessment of DVT risk factors were incorporatedin both Near East University Hospital and Dr.Suat Gunsel Kyrenia University Hospital with an enclosed prophylaxis policy. The questionnaire already designed for nurses were distributed pre-training and post-training to nurses. Then an

observational prospective study was carried out for one month between 7th January and 7th February 2020 and patients who assembled the inclusion criteria were requested to participate in the analysis. Patients were then followed for possible complications two weeks post-hospitalization.

3.3. Study tools:

Risk assessment tool: The Caprini tool is a validated DVT risk assessment tool (135) that has been used in many healthcare settings worldwide to analyse hospitalized patients (136) and includes 20 variables (137).The Caprini risk score for the assessment of thrombosis risk in adult hospitalized patients was used to categorize patient risk and accordingly identify the required thromboprophylaxis mode. Patients' risk factors are classified into four categories: "very low risk" (0 points), "low risk" (1-2 points), "moderate risk" (3-4 points), and "highest risk" (≥5 points).

Health Care Providers questionnaire: Two different questionnaires were used to assess the knowledge, practice, and attitudes towards DVT. Questionnaires comprising 53 items for nurses (138) and 21 items for physicians (139) were adapted based on a literature review. The adapted questionnaire was reviewed by a committee of experts comprising a clinical pharmacist, pharmacologist, and cardiologist practicing in Northern Cyprus.

The first part of the questionnaire designed for nurses collects information about demographic characteristics using 12 questions. The second part comprises 20 questions assessing the nurses' knowledge of deep venous thrombosis risks with 3 choices (false, true and do not know), and the third part examines knowledge of the prevention of deep venous thrombosis using 8 questions with 3 choices (false, true and do not know). Both false and do not know responses were considered negative in the analysis. The fourth section examining the practices of nurses in deep venous thrombosis prevention consisted of 13 questions with a 3-point Likert scale (always, sometimes, and never).

A short questionnaire lacking demographic characteristics was distributed to physicians to increase the response rate. The adopted questionnaire consisted of two sections. The first section contained 15 questions, of which 11 questions assessed knowledge of DVT with 4 multiple choice responses while the other 4 questions had 2 choices (true and false). The second section examining the attitudes of physicians towards DVT prevention consisted of 6 questions with 5 choices (Strongly disagree, Disagree, Neutral, Agree, and Strongly Agree).Physicians' knowledge and attitudes were assessed using a questionnaire that included 15 knowledge-related questions scored from 0-15 points and 6 attitude-related questions scored from 6-30 points with a Likert scale. For the present study, favourable knowledge and

attitudes were defined as a score greater than 70% (140). Two native Turkish speakers with experience in translating health questionnaires independently translated the questionnaire. The two translators then compared their translations and a third questionnaire was produced jointly.

Pilot Study: A pilot study was done that targeted 10 to 15% of the study population, i.e. patients (n=35), nurses (n=40) and physicians (n= 15) (141). The internal consistency was measured for different scales using Cronbach's alpha and Kuder-Richardson (KR-21), which reflect good internal consistency (0.8) for both nurses' and physicians' knowledge and (0.7) for the attitudes of physicians.

3.4. Data Collection:

In the first phase, Patients' data regarding the presence of thrombosis risk factors were collected, recorded and entered in a worksheet prepared by the expert committee along with the concerned patient information and current medical status. The worksheet also consists of information regarding patient age; gender, patient complaints, medical history, history of family, drug use history, presence of different levels of risk factors, labs taken, and drugs given before and during their stay in hospital. In the second phase, the adapted questionnaires were distributed to health care providers in NEUH and SGKUH, and the sample comprises of 232 nurses and 103 physicians who took part in the examination.

3.5. Ethical Consideration:

The study protocol was approved on 29th March 2018 by the Institutional Review Board (IRB) of Near East University (YDU/2018/56-530) and assigned as an observational study. A written consent form was signed by healthcare providers upon their participation in the study. Verbal consent was obtained from patients and recorded on data collection form upon their follow-up interview.

3.6.Statistical Analysis:

Statistical Package for Social Sciences (SPSS) software, version 22.0, IBM corp., New York, USA was used to analyse the data. Descriptive statistics for qualitative and quantitative variables were used to analyse the results of the study. Categorical data are reported as frequencies and percentages (%), while continuous data are reported as the means (± standard deviations) or medians (ranges).

Raosoft software version 2.3 (Raosoft. Inc., Seattle, USA) was used to calculate the minimum sample size required for the study. Assuming a 95% confidence level, a 5% margin of error, and a 50% response distribution, at least 172 patients were needed to participate in the study out of 310 admitted to the hospital during the study duration. While 98 physicians and 169 nurses were required as a minimum required sample out of 130 physicians and 300 nurses

providing care at the two hospitals involved in the study.

Following the testing of normality, non-parametric hypothesis tests were performed throughout the whole data analysis phase. The Mann-Whitney U test and the Kruskal-Wallis test were performed to compare data between multiple groups. The associations between categorical variables were analysed using Fisher's exact test and Pearson's Chi-square test. The level of significance was set to $P < 0.05$.

4. OBSERVATIONAL RESULTS

4.1. Patient Demographics and Characteristics:

One hundred eighty patients with multiple pathologies from the general wards were enrolled to investigate their risk of thrombosis. The mean age ± SD of the patients was 65.47± 16.39 years, and 59.4% were male and 40.6% were females. The median length of hospitalization stay was 15 with 29.75-7.00 IQR. The minimum number of risk factors for patients was 0 and the maximum number of risk factors was 14 (median of 6/patient). The most common drug used for thromboprophylaxis in patients was enoxaparin (58.8%). Notably, 4.4% of patients died during follow-up but the cause of death was not related to DVT. Table 3 presents the main demographic and clinical characteristics of the patients included in the present study.

Table 3. Main demographic and clinical characteristics of the 180 Patients N (%)

Clinics	**Cardiology**	**Pulmonary**	**GIT**
Number	83 (46.1%)	11 (6.1%)	18 (10%)
	DM	**Orthopaedics**	**Neurology**
	3 (1.7%)	16(8.9%)	22(12.2%)
	Respiratory	**Allergy and chest disease**	**Infectious disease**
	5 (2.8%)	2(1.1%)	5 (2.8%)
	Geriatrics	**Oncology**	**Surgery**
	7 (3.9%)	7(3.9%)	1 (6%)
Average age		65.47 ± 16.39 (mean ± SD)	
The average number of drugs		9.41 ± 4.7 (mean ± SD)	
Males		107 (59.4%)	
Females		73 (40.6%)	
High level of risk		140 (77.8%)	
Moderate level of risk		27 (15%)	

Low level of risk	10 (5.6%)
Very low level of risk	3 (1.7%)
Rationally managed cases	94 (52.3%)
Irrationally managed cases	86 (47.7%)
Patients with no need for prophylaxis (total)	3 (1.7%)

The most common risk factors identified in the sampled patients included age of 41-60 years (26.1%), obesity (BMI>25) (21.1%), patients who were confined to bed for more than 3 days (100%), an age of 61-74 years (37.8%), and an age ≥75 years (28.3%). The distribution of risk assessment items and risk factors among sampled patients is shown in Table 4.

Table 4. Distribution of the most common risk factors among sampled patients

Risk factor	**N (%)**
Age of 41-60 years	47 (26.1%)
Swollen legs	16 (8.9%)
Obesity (BMI >25)	38 (21.1%)
Serious lung disease, including pneumonia	12 (6.7%)
Acute myocardial infarction	8 (4.4%)
Congestive heart failure	8 (4.4%)
Abnormal pulmonary functions (COPD)	11 (6.1%)
Age of 61-74 years	68 (37.8%)
Patient confined to bed for > 72 hours	180 (100%)
Major surgery > 45 minutes	11 (6.1%)
Minor surgery	13 (7.2%)
Aged 75 or older	51 (28.3%)

4.2. Thromboprophylaxis and Rationality

Of the 180 patients, thromboprophylaxis was appropriately provided to only 94 patients who received rational thromboprophylaxis. Of the 86 irrationally managed patients, 65 patientsdidnot take any form of thromboprophylaxis and 3 patients received inadequate prophylaxis (e.g., insufficient doses of enoxaparin or compression stockings alone). Thirteen patients received more thromboprophylaxis than was indicated (either taking an increased dose or taking medicine when only compression stockings were indicated).

The only four of these 13 patients developed minor complications while anticoagulation therapy was stopped in 2 patients. The most usual minor complications were wound haematoma, injection site bruising and haematuria. These minor complications developed mostly in elderly patients (>70).

However, a statistically significant difference in complications was not observed between genders. No major complications (e.g.gastrointestinal or retroperitoneal bleeding, thrombocytopenia, or fatal pulmonary emboli) were recorded during hospitalization and post-hospitalization follow-up visits.Fifty-eight patients out of 140 high-risk patients (41.4%) were not treated with thromboprophylaxis requiring both compression devices and an antithrombotic agent. Eight of these patients developed signs and symptoms of DVT (e.g. Warm feelings of legs in 4 patients, Leg swelling in 3 patients, etc.) as shown in table 5.

Table 5. Sign and Symptoms of DVT in high-risk group without prophylaxis

Table 5: Sign and Symptoms of DVT (n=8)

Sign and Symptoms	N (%)
Leg swelling	3 (23.07%)
Pain or tenderness in the leg	2 (15.38%)
Discoloration of skin	1 (7.69%)
Redness	1 (7.69%)
Itching of legs	2 (15.38%)
Warm feelings of leg	4 (30.76%)

Based on the data, 80.7% (n=113) of the female patients and 75.7% (n=106) of the male patients had high-risk factors, but no statistically significant associations were observed between gender and the categories of risk factors. Of the 104 patients aged greater than 65

years, 2.8% (n=3) displayed a low level of risk, 7.6% (n=8) of these patients belonged to the moderate risk group, and the other 89.4% (n=93) were assigned the high-risk group. Fig 2 shows the proposed management of the sampled patients based on the Caprini score.

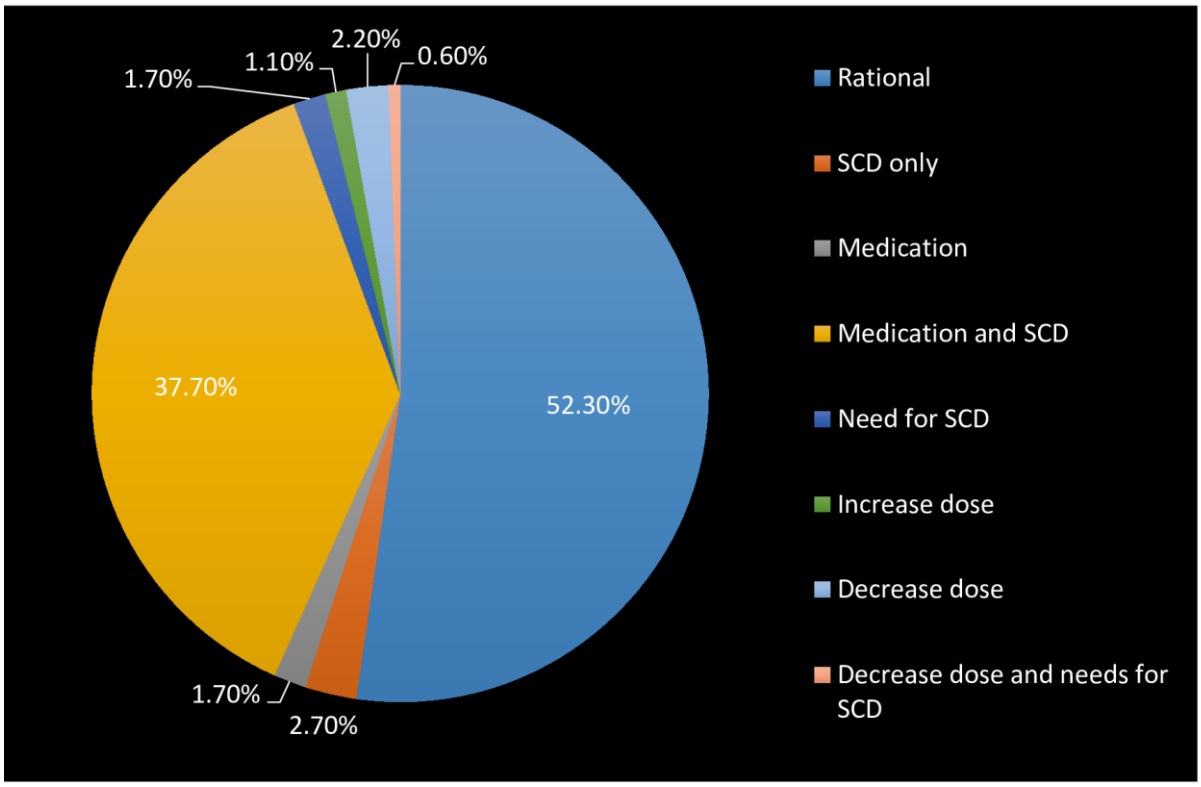

Figure 2. Proposed management of the sampled patients based on the Caprini score.

The presence of stroke, multiple trauma or acute spinal cord injury less than one month prior to DVT, hip or leg fracture, a family or personal history of VTE, hospitalization or treatment for cancer in the last year, and current immobility were among the minor risk factors and were the strongest independent predictors of VTE among sampled patients.

4.3. Responses and Characteristics of The Nurses:

Two hundred sixty-five questionnaires were dispensed to nurses, and 237 were returned, corresponding to a response rate of approximately 89.4%. 232 questionnaires were evaluated, while 5 were improperly filled and discarded. Most of the respondents had a bachelor's degree (58.6%), were females (69%) and (53.4%) had <5 years of experience. Most of the

respondents were working in internal medicine (16.8%), and emergency units (15.9%). The most common age group was <25 years (53.4%). Nurses' responses to the question "Did you receive previous education on deep venous thrombosis?" indicated that 73.3% of the respondents had not received DVT training.

Those nurses (n=62) who received DVT training reported 5 resources. Most of the nurses (n= 42) and (n=9) had received this training at their congress/conferences and vocational high school, respectively. Other training resources were internet resources (n=4), courses (n=2) and workplace training (n=5).Approximately (n=206) of the nurses expressed that they needed education on DVT. Participants rated the quality of previous deep venous thrombosis education as excellent (n=4), very good (n=15), good (n=31) and poor (n=12).

4.4. Nurses' knowledge of and practice in thromboprophylaxis:

Most of the respondents recorded correct answers for most of the questions (6 of 6 questions) examining their general knowledge of DVT. They recorded correct answers for the statements "DVT occurs as a result of injury to a vessel wall, altered blood coagulation, and stasis of blood" (84.5%), and "DVT typically occurs in the lower extremities (deep leg veins)" (53.4%).

Most of the nurses had a low percentage of correct answers to most of the questions (5 of 8 items) examining their general knowledge of the prevention of deep venous thrombosis. They also recorded correct answers for the question "Exercise of the leg and foot (lower extremities) may prevent deep venous thrombosis" (77.2%). Furthermore, most of the nurses had a high percentage of incorrect answers to the question "Development of deep venous thrombosis may be prevented by elastic compression stockings."

The analysis of respondents' knowledge of deep venous thrombosis risk factors revealed a low percentage of correct answers to most of the questions (12 of 20 questions). The most common correct answers were recorded for the question "Prolonged immobilization may cause deep venous thrombosis in hospitalized patients" (78.4%), and the most common incorrect answers were recorded for the question "Inflammation or infections may predispose a patient to deep venous thrombosis" (71.6%).

Regarding the practice of nurses in preventing DVT, the investigation revealed that most of the participants responded with the option "always" to all questions compared with the choices "sometimes" and "never". The most common answers receiving a rating of "always" were recorded for the question "Educating the patients to avoid injury" (72.8%). The nurses

more frequently responded with the choice “sometimes” to the question “Educating the patients about the appropriate utilization of graduated compression stockings” (29.3%) and frequently responded, “never” to the question “Educating the patients about adequate or sufficient fluid intake” (23.3%).

Table 6.Nurses Knowledge of DVT in groups stratified by demographic characteristics

		Nurses practice on prevention score		Nurses general knowledge score		Nurses knowledge of risk factor score		Nurses knowledge of prevention score	
	N (%)	Median (IQR)	P	Median (IQR)	p	Median (IQR)	P	Median (IQR)	p
Gender									
Males	72 (31)	18 (9.75)	>0.05	4 (2)	>0.05	12 (3)	>0.05	5 (2)	>0.05
Females	160 (69)	19 (10)		4 (2)		12 (4)		5 (2)	
Age									
<25	124 (53.4)	21 (10)		4 (2)		12 (4)		5 (2)	
26-30	73 (31.5)	18 (10)	**<0.05**	4 (2)	**<0.05**	12 (4)	**<0.05**	5 (2)	**<0.05**
> 31*	35 (15.1)	17 (6)		5 (2)		15 (5)		6 (2)	
Experience									
1-5	153 (65.9)	18 (11)		4 (2)		12 (4)		5 (2)	
6-10	50 (21.6)	19 (9.5)	**<0.05**	4 (1.2)	**<0.05**	11 (4)	>0.05	5 (2)	>0.05
> 11	29 (12.5)	17 (7.5)		5 (3)		14 (5.5)		6 (2.5)	
Education									
Diploma	65 (28)	18 (9.5)		4 (2)		12 (3)		5 (2)	
Bachelor	136 (58.6)	19 (10.7)	>0.05	4 (2)	>0.05	12 (4.7)	>0.05	5 (2)	>0.05
Master	31 (13.4)	18 (11)		4 (2)		14 (4)		5 (2)	
Working Unit									
Emerg	37 (15.9)	18 (6)		4 (2)		13(3.5)		6 (2.5)	
ICU	36 (15.5)	22 (11)		3 (1.7)		11 (3)		5 (2.7)	
Internal	39 (16.8)	18 (11)		4 (2)		13 (5)		5 (4)	
Gynae	21 (9.1)	16 (5.5)		5 (2.5)		14 (6)		6 (2)	
Onco	16 (6.9)	27 (6.7)	**<0.05**	3 (1.7)	**<0.05**	12 (3)	**<0.05**	5 (1.7)	>0.05
Sugery	29 (12.5)	18 (11.5)		4 (2)		12 (4.5)		5 (2)	
Polycli	15 (6.5)	15 (7)		4 (3)		14 (5)		5 (2)	
Orthopaed	29 (12.5)	20 (8.5)		6 (2)		11 (3)		6 (2)	

^ Kruskal-Wallis test and Mann-Whitney U tests were used for the statistical analyses, when applicable. IQR (Interquartile range).

No statistically significant differences were observed in the four different scores between genders ($p>0.05$), as shown in Table 6. The median for practice on DVT prevention for nurses >31 years old was significantly lower than the median of nurses aged from 26-30 years and <25 years, (17), (18) and (21) ($p<0.05$), respectively. Meanwhile, the median for the general knowledge of DVT attained by nurses >31 years old was significantly higher than the median of nurses aged from 26-30 years and < 25 years old, (5), (4) and (4) ($p<0.05$), respectively. The median for knowledge of risk factors for DVT attained by nurses >31 years old was significantly higher than the median of nurses aged 26-30 years and <25 years old, (15), (12) and (12) ($p<0.05$), respectively. The median for knowledge of the prevention of DVT attained by nurses >31 years old was significantly higher than the median of nurses <25 years old, (6) and (5) ($p<0.05$), respectively.

Regarding the number of years of experience, nurses with >11 years of experience had a median for general practice that was significantly lower than the median of the nurses with 6-10 years of experience (17) and (19*****) ($p<0.05$), respectively. Also, no statistically significant differences were observed in the four different scores between education subgroups ($p>0.05$).

Regarding the work units, nurses who worked in an ICU had a median for practice that was significantly higher than the median of the nurses who worked in gynaecology, (22) and (16) ($p<0.05$), respectively. The nurses who worked in gynaecologyunit attained a median for general knowledge that was significantly higher than the median of the nurses who worked in polyclinic and an oncology unit, (5) (4) and (3.5) ($p<0.05$), respectively. The nurses who worked in an ICU had median for risk factor knowledge that was significantly lower than the median of the nurses who worked in polyclinic units, (11) and (14) ($p<0.05$), respectively.

4.5. Physicians' Demographics, Knowledge, and Attitudes Towards Thromboprophylaxis:

One hundred seventeen questionnaires were dispersed to physicians, and 109 were returned, corresponding to a response rate of approximately 93%. One hundred three questionnaires were evaluated, while 6 that were improperly filled were discarded. Physicians who responded to questionnaires were professors (n=29), associate professors (n=15), assistant professors (n=18) and specialists (n=41) working in different clinics. Table 7 presents the descriptive statistics of knowledge and attitude scores for physicians. Regarding the knowledge of physicians who completely responded to the questionnaire, a high percentage of incorrect answers were observed for most of the questions (10 of 15 questions). More than 50% of physicians did not know that VTE is a fatal combination of DVT. Similarly, 77.7% of physicians did not know that the administration of general anaesthesia for <30 minutes does not increase the risk of deep venous

thrombosis. However, the most common correct knowledge answers were recorded for the question “Patients undergoing surgery are more susceptible to deep venous thrombosis/venous thromboembolism than medical patients” (76.7%).

Table 7. Descriptive statistics of knowledge and attitude scores of physicians

Variables	Mean	Standard deviation	Minimum	Maximum
Knowledge	6.58	2.37	0.00	11
Attitude	20.12	4.86	9.00	30

In response to attitude questions, the majority of the respondent (38.8%) stated that they “Strongly Agree” that prevention/prophylaxis of DVT is necessary prior to surgery, and only (16.5%) stated that they “Strongly Disagree” that educating patients regarding preventive measures of DVT is necessary. Furthermore, they indicated a requirement for routine ultrasound screening in asymptomatic patients at discharge or during outpatient follow-up, as shown in Table 8**.**

Table 8. Responses of physicians to questions examining attitudes towards DVT (N = 103)

Attitude statements	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Mean** ± SD	**Total attitude score**
1. I believe that Doppler sonography (sensitive and objective tests) is necessary to screen for post-surgical DVT in patients.	12 (11.7)	20 (19.4)	26 **(25.2)**	30 (29.1)	15 (14.6)	3.16 ± 1.2	20.12 ± 4.9
2.vI believe that an assessment of DVT risk factors is necessary prior to surgery.	13 (12.6)	14 (13.6)	17 (16.5)	26 (25.2)	33 **(32)**	3.50 ± 1.39	
3. I believe that the prevention/ prophylaxis of DVT is necessary prior to surgery.	7 (6.8)	19 (18.4)	17 (16.5)	20 (19.4)	40 **(38.8)**	3.65 ± 1.34	
4. I believe that educating patients regarding preventive measures of DVT is necessary.	17 (16.5)	16 (15.5)	22 (21.4)	34 **(33)**	14 (13.6)	3.12 ± 1.30	
5. I believe that nurses require training in methods to prevent DVT.	13 (2.6)	17 (16.5)	27 **(26.2)**	19 (18.4)	27 **(26.2)**	3.29 ± 1.33	
6. I believe that the prevention of DVT with low dose heparin is irrational before surgery.	15 (14.6)	8 (7.8)	26 (25.2)	28 **(27.2)**	26 (25.2)	3.41± 1.33	

4.6. Results of the intervention study:

Eighty-one questionnaires were dispensed to nurses before and after training, and 81 were returned, corresponding to a response rate of approximately 100%. 81 questionnaires were evaluated, while 11being improperly filled were discarded. Most of the respondents had a bachelor's degree (68.6%), were females (75.7%) and (68.6%) had <5 years of experience. Most of the respondents were working in intensive care unit, oncology unit, internal medicine unit(21.4%), and gynaecology units (20%). The most common age group was <25 years (60%). Nurses' responses to the question "Did you receive previous education on deep venous thrombosis?" indicated that 74.3% of the respondents had not received DVT training. Those nurses 25.7% who received DVT training reported 5 major resources. Most of the nurses12.8% and 5.7% had received this training at their congress/conferences and workplace, respectively. Other training resources were internet resources 2.8%, courses 2.8% and vocational high school 1.4%.Approximately 84.2% of the nurses expressed that they needed education on DVT. Participants rated the quality of previous deep venous thrombosis education as excellent 14.28%,

very good 5.7%, good 2.8% and poor 2.8%.The mean ± SDand median of general knowledge on DVT, knowledge on risk factors of DVT, knowledge on prevention of DVT and practice score on DVT was recorded before and after the training in both hospitals as shown in table 9.

Table 9.The comparison between the scores of the enrolled nurses before and after training

	Mean ± SD	**Med (min-Max)**	**p value**
General Knowledge score on DVT before course	4.32 ± 1.46	4.0 (2-12)	< 0.001
General Knowledge score on DVT after course	5.20 ± 0.71	5.0 (3-6)	
Knowledge score on risk factor of DVT before course	14.37 ±5.20	13.0 (9-40)	< 0.001
Knowledge score on risk factor of DVT after course	18.08 ± 1.24	18.0 (15-20)	
Knowledge score on prevention of DVT before course	5.77 ±1.92	5.0 (3-16)	< 0.001
Knowledge score on prevention of DVT aftercourse	7.58 ±0.94	8.0 (5-9)	
Practicescore on DVT before	14.4 ±1.20	14.0 (13-18)	< 0.001
Practice score on DVT after	20.4 ±6.01	20.5 (8-29)	

The above table showed that the mean ± SD of general knowledge score on DVT after the training was significantly higher than before the training (5.20 ± 0.71) (4.32 ± 1.46) ($p < 0.001$), respectively. In addition, the mean ± SD of knowledge score on risk factors of DVT after the training was significantly higher than before the training (14.37 ±5.20) (18.08 ± 1.24) ($p < 0.001$). Similarly, the mean ± SD of knowledge score on prevention of DVT and practice score on DVT after the training was significantly higher than before the training (5.77 ±1.92) (7.58 ±0.94) and (14.4 ±1.20) (20.4 ±6.01)($p < 0.001$). Overall an important difference was noted in the knowledge of nurses regarding DVT educations, risk factors, prevention, practice and understanding of Caprini risk assessment tool. Then after 3 months35 patients from the general wards with multiple

pathologies were registered to examine their risk of thrombosis. 5 patients being not willingly participated were removed from the analysis. The mean age ± SD of the patients was 59.87± 11.45 years, and 42.67% were male and 53.33% were females. The average length of hospitalization was 9.2 days. Table 10 show demographical charasteristics of patients.

Table 10. Demographical characteristics of the 30 Patients N (%)

Clinics	**Cardiology**	**Pulmonary**	**GIT**
Number	12 (40%)	3 (10%)	3 (10%)
	Surgery	**Orthopaedics**	**Neurology**
	2 (6.7%)	4 (13.3 %)	2 (6.7%)
	Respiratory	**Oncology**	**Geriatrics**
	1 (3.3%)	2 (6.7%)	1 (3.3%)
Average age		59.87 ± 11.45 (mean ± SD)	
The average number of drugs		7.3 per day	
High level of risk		10 (33.3%)	
Moderate level of risk		8 (26.7%)	
Low level of risk		11 (36.7%)	
Very low level of risk		1 (3.3%)	

The most common drug used for thromboprophylaxis in patients was enoxaparin (62.5%) and heparin (29.1%) and coumarin derivatives (8.3%). Notably, 3.3% of patients died during follow-up.Of the 30 assessed patients thromboprophylaxis was correctly provided to only 25 patients (83.3%). Of the 5 irrationally managed cases, 3 patients (10%) did not take thromboprophylaxis and 1 patient (3.3%) received inadequate prophylaxis (e.g., insufficient doses of enoxaparin or compression stockings alone). 1 patient (3.3%) received more thromboprophylaxis than was indicated (either taking an increased dose or taking medicine when only compression stockings were indicated). Only one of these patients developed haematuria as a minor complication. Also, no major complicationswere recorded during hospitalization and post-hospitalization follow-up visits.

5. DISCUSSION

Despite the presence of an effective risk assessment strategies for the prevention of thromboprophylaxis, yet a considerable proportion of hospitalized and surgical patients who are more prone to develop risks of VTE do not receive thromboprophylaxis while other receive it irrationally thus leading to unwanted side effects and bleeding. Prevention of DVT reduces the risk of deep venous thrombosis and PE, which in turn leads to decreases mortality and morbidity (142). In these patients, the risks of VTE were significantly reduced by the results of demonstrative interventions of various control and randomized clinical studies (143). However, only (50%) of patients receive DVT prophylaxis upon hospitalization and venous thromboembolism is still the major cause of their sudden death (144). Despite this, it remains underused because physicians perceive that the risk of venous thromboembolism is not high enough to justify the potential hemorrhagic complications of anticoagulant use (4). Appropriate selection of VTE prophylaxis for hospitalized medical patients is an important unresolved public health issue. The simple 40-point Caprini risk assessment tool adapted at our study clearly discriminated between hospitalized medical patients at high and low risk of VTE complications.

Indeed, after assessing 180 patients of our study through Caprini risk assessment tool, thromboprophylaxis regimens was provided appropriate to only about (52.22%) of patients which complies with the discussed in(145,146). Furthermore, 32.61% and (58.5%) of the subjects received the correct prophylaxis. In contrast, this stated that 20.3% received rational prophylaxis. The study results also match with Sharif-Kashani et al reported that rational prophylaxis was provided for less than half of the study patients (147). In our study, (3.48%) of patients receive inadequate prophylaxis which is opposite to the results and Nekoonam B et al where inadequate VTE prophylaxis was administered in (35%) and (17.39%) of the subjects group (148). In our study, (15.11%) of patients received a higher dose, but in contrast in the study of Nekoonam B et al (6.52%) of patients received higher doses for thromboprophylaxis.

According to the comparative analysis risk points of the study (73.08%) of all patients were had (high risk) with three risk points or more. The 11.54% had (moderate risk) with 2 risk points and (15.38%) had (low risk) with 1 risk point or less which is similar to our results where (77.8%) of patients were having a high level of risk, (15%) patients were having moderate level of risk, and only (5.6%) and (1.7%) with low and very low level of risk. Furthermore, also concluded that there is a need for implementing evidenced-based guidelines to improve overall patient therapy, safety, and quality of life (149).

A study carried out in London (150) showed that (16%) and (20%) [148] of enoxaparin required dose adjustments upon administration, while in our study only (13.92%) of administered enoxaparin require dose adjustment. In Reference (151), results demonstrated that improper dosing, administration, and prescription of enoxaparin were very frequent and they needed training programs and implementation of evidence-based protocols to control prescribing patterns. Our study result showed that enoxaparin prescription pattern was appropriate opposite to the study as discussed in (151, 148). A study by Ambarish Pandey et al (152) show that on follow up (16.2%) of patients died while in contrast in our study only (4.44%) of patients died. Regarding complications, In Reference (152), shows that wound hematoma was (7.3%) and major bleeding was (0.5%), while in contrast in our study wound hematoma was (16.66%) and no major bleeding was noted during and post-hospitalization.

Our results are fully consistent with other international reports and confirm that, despite present evidence-based protocols suggesting the strong advantage of thromboprophylaxis in high-risk hospitalized medical patients (153). This practice continues to be largely under-implemented that are discussed in (154, 155, 156, 157). The selection of electronic devices was observed to be successful in encouraging health care providers to utilize prophylaxis at least amongst subgroups of patients at high risk of deep venous thrombosis complications (158, 159) electronic alerting systems, however, require sophisticated technology infrastructure and considerable financial

resources, and are thus unlikely to find widespread acceptance. While clinical pharmacists at hospitals, being a primary source of updated knowledge and advice regarding appropriate and proper use of medications having wide scope in rational use of medication and optimization using evidence-based protocols can utilize risk assessment tool an easy, proper, self-explanatory, and effective risk assessment tool as shown in multiple kinds of literature (7). The clinical pharmacist can possibly help clinicians in managing their patients without the need for supplementary electronic tools and may result in the rational implementation of antithrombotic prophylaxis in health care settings.

Our study also investigates the competence of health care providers on DVT prophylaxis in two public hospitals in Northern Cyprus. Our study showed that (73.3%) of the respondents had not received DVT training which is similar to study in (138), where (58.8%) of nurses did not receive DVT education. Those nurses who took DVT training were educated at vocational high school. However, the competence of the nurses should be improved by means of courses, lectures, internet, working places, scientific congresses, etc. Respondents were rated as good, very good, and excellent in regards to the quality of the previous DVT training. Our study result showed that majority of respondents (88.8%) need DVT education and this issue should be taken into account to improve awareness and willingness among nurses to attend training programs, workshops and congresses on the prevention of DVT.

Regarding general knowledge on DVT, Result of the current study demonstrated that, the most of the respondents had correct answers for question including ‘‘Surgical patients are more prone than medical patients to DVT/VTE’’ and ‘‘VTE is the most common cause of sudden death in hospitalized patients’’ as similar to (160, 161). It has been concluded that ‘‘surgical patients had more risks than those who received non-surgical treatment’’ and ‘‘the most common cause of death among hospitalized patients is venous thromboembolism’’ were chosen correctly by the majority of nurses.

An assessment of the knowledge of the respondents on risk factors of DVT showed low level of knowledge and the most frequent incorrect answer to questions were ‘‘No relationship exists between family history of DVT/VTE and DVT ’’ and ‘‘Oral contraceptives (OCT) or hormone replacement therapy (HRT) may predispose to DVT’’. This is similar to the study and found that nurses had poor knowledge on risk assessment of venous thromboembolism and that they needed in-service training programs in a continual manner in this respect (162). Blood coagulation is altered in cardiac and chronically ill patients, and complex interaction occurs between inflammation and host immune response, which leads to the development of VTE (163). Furthermore, the most common correct answers were about the question ‘‘Prolonged immobilization may predispose to deep venous thrombosis among hospitalized patients’’. These factors were described as deep venous thrombosis risk factors in the relevant literature. For example, Major risk factor has been considered as immobilization for venous thromboembolism, especially in elderly patients aged ≥ 70 years (164).

Nurses play a vital role in the prevention of deep venous thrombosis, including patient education, administering anticoagulants and mechanical prophylaxis methods (151). Regarding the knowledge on prevention of DVT, our study showed that most of the nurses had poor knowledge which similar to a quantitative study conducted by Abin et al which concluded that (42%) of the nurses had a low level of knowledge on deep venous thrombosis prevention in hospitalized patients (165). After surgery and a prognostic factor, early mobilization, within 24 hours, is an important component of increased recovery (166). However, the rates of correct answers for the questions ‘‘Exercises of the leg and foot may prevent deep venous thrombosis’’ and ‘‘Elevating the legs is important to prevent DVT/ VTE’’ were very high. A study conducted by Lilly concluded that those patients who took pharmacological prophylaxis had a lower risk of death and anti-thrombotic medication was considered the primary prophylaxis of DVT (167). In our study, the rate of correct answers for the question ‘‘Heparin or Low molecular weight heparin

(LMWH) may prevent the development of deep venous thrombosis'' was observed to be very low. Overall, the results of our study demonstrated that knowledge of nurses in regards to the prevention of DVT was unsatisfactory. In another study, most of the nurses reported that the educational training and attending seminars supported them in the implementation of best practice of VTE (168). Furthermore, it was revealed that nurses who had more experienced had higher rates of correct knowledge than less experienced groups in regards to knowledge questions on some risk factors.

Regarding the evaluation of the knowledge and the attitude of physicians, our study showed that more than (50%) of physicians did not know that VTE is a fatal combination of deep venous thrombosis. Similarly, (77.7%) of physicians did not know that general anesthesia for <30 minutes does not increase deep venous thrombosis risk which matches with the result by Mehdi et al which shows that more than (50%) of study population did not know that general anesthesia for >30 minutes increases risk of deep venous thrombosis. In addition, more than half of them did not know that surgery in cancer patients had a higher risk for the development of deep venous thrombosis than obese or aged patients (169). The 6th American College of Chest Physicians (ACCP) conference on antithrombotic therapy suggested that patients must be classified as having very high, high, moderate, and low risks for the development of VTE and that according to this risk stratification scores prophylaxis method must be used (170). The recent guidelines from the 7th ACCP conference suggested that every health care setting must develop a formal and effective strategy for the prevention and complication of venous thromboembolism (171). Suggestions include incorporation of prophylactic measures for the prevention of deep venous thrombosis in all surgical patients and preoperative stratification of risk for the determination of prophylaxis measure as well as continuing anticoagulant therapy promptly and resuming them when indicated throughout the postoperative period by educating health care providers about venous screening program and venous thromboembolism (165).

Thromboprophylaxis was underutilized in tertiary care hospitals in Northern Cyprus which denote a gap between evidence-based guidelines and practice. A training program for nurses about DVT prevention and establishing a hospital-wide clinical Pharmacist based DVT prevention program was carried out which will decrease the morbidity and mortality associated with this disease process and will assure rational practices.

A study by mohamed et al tried to evaluate the effect of implementing nursing care guidelines on the occurrence of deep vein thrombosis among orthopedic patients (172). The study results indicate the success of the application of guidelines in clinical settings in reducing patients' risks of DVT, which match with our study results in which the proportion of rationality were increased and risks of DVT were decreased. In our study, the use of both mechanical and pharmacological prophylaxis were associated with decreased risks of DVT which is similar to the study done in China (173) in which combined pharmacological and mechanical prophylactic measures were responsible for decreasing the risk of DVT after orthopedic surgery. Thus, the better the nurse's performance, the lower is the patient's risk of DVT. A similar positive effect of a four-year quality improvement program to prevent inferior limb DVTs in intensive care unit in Italy was demonstrated, where the incidence of DVT dropped to 2.6% after training and involving nurses with direct application of DVT prophylaxis (174).

Nurses are ideally placed to identify barriers to effective VTE prevention strategies and develop actions to make a positive change in their particular clinical area. Considering the clinical care settings, nurses can identify where there might be a gap in practice, assess through consultation or audit the extent of the problem and formulate an improvement plan with the multidisciplinary team. Successful change could lead to safer care and improved health outcomes. In congruence with this, (175) also highlighted that an updated, clearly written guideline and an organization-wide procedure, with staff education, is sufficient to change practice and improve patient compliance. The knowledge and capacitation of the nursing team are factors that can avoid

complications in the postoperative period; the nursing team should know and be attentive to possible aggravations of the surgery, evaluating individually each patient to prevent the DVT (176).

Strength and limitations of the study:

The present study assesses the rational use of thromboprophylaxis therapy in hospitalized patients and perceptions of health care providers in two tertiary care hospitals in North Cyprus. However, this study also has some limitations that might decrease the generalizability of the results. As only 2 hospitals were chosen as study setting, we may not be able to generalize the study findings overall hospitals in North Cyprus. Both studied hospitals were teaching hospitals, in which healthcare professionals provide beside complex care; clinical education and training to current and future health professionals through educational and mentoring activities [177]. Teaching hospitals tend to be early adopters of new evidence and technologies which leads to better outcomes and less mortality compared to non-teaching hospitals [178]. Healthcare providers in teaching hospitals are more exposed to learning and teaching activities besides their preceptorship which encourages them to be theoretically and practically prepared for the role, adheres more closely to clinical policies, best practices and deliver high-quality care and services as role models [179]. This may further suggest inferior knowledge and practice of DVT prophylaxis in other settings with less teaching and mentorship, which necessitate further research and comparison to reach such a conclusion.

The demographic data of the physicians were not collected to increase the response rate. we were unable to document pulmonary embolism as the cause of death of the patients who died during hospitalization because it was not documented properly.

An interventional program that incorporates both education and a daily individual evaluation of risk factors of DVT is needed with aconfined prophylaxis strategy. The establishment of an effective deep venous thrombosis prophylaxis strategy in health care settings with evidence-based recommendations may be useful to improve patient safety, quality of life, and best practices. Clinical pharmacists can utilize the Caprini risk assessment tool and assist health care providers in the rational implementation of the rational use of medications and antithrombotic prophylaxis in hospitals. Investments in training health care providers about deep venous thrombosis prophylaxis are needed to achieve the proper utilization of antithrombotic

medications, this public health issue and regular medication errors related to inappropriate anticoagulant use deserve further consideration to decrease morbidity and mortality.

6. CONCLUSIONS

Based on the findings of the present study and international reports, adherence to VTE prophylaxis is still low in practice, a high level of irrationality in thromboprophylaxis therapy of hospitalized patients, and inappropriate administration of anticoagulants was observed. Furthermore, a low degree of knowledge of risk factors for deep venous thrombosis, preventive measures, bad practices in preventing deep venous thrombosis among nurses and, a lack of knowledge of health care providers and standard guidelines was also noted in assessed hospitals. After interventional program, giving proper training to nurses and utilization of Caprini risk assessment tool in both NEUH and SGKUH have significantly improved rational use of thromboprophylaxis therapy in hospitalized patients which will lead to decrease gastrointestinal bleeding and other serious complication related to DVT in future.

7. REFERENCES

1. Emeka Kesieme, ChinenyeKesieme, NzeJebbin, EshioboIrekpita, and Andrew Dongo, Deep vein thrombosis: a clinical review, J Blood Med. 2011; 2: 59–69.
2. Buesing KL, Mullapudi B, Flowers KA. Deep venous thrombosis and venous thromboembolism prophylaxis. Surg Clin North Am 2015; 95:285-300.
3. Trends in the incidence of deep vein thrombosis and pulmonary embolism: a 25-year population-based study. Silverstein MD, Heit JA, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ 3rd Arch Intern Med. 1998 Mar 23; 158(6):585-93.
4. O'Donnell M, Weitz JI. Thromboprophylaxis in surgical patients. Can J Surg. 2003; 46(2):129–135.
5. Oger, E. Incidence of venous thromboembolism: a community-based study in Western France. EPI-GETBP Study Group. Groupe d'Etude de la Thrombose de Bretagne Occidentale. Thromb. Haemost. 2000; 83: 657–660.
6. Caprini JA. Thrombosis risk assessment as a guide to quality patient care. Dis Mon. 2005; 51(2-3):70–78.
7. Caprini JA. Risk assessment as a guide for the prevention of the many faces of venousthromboembolism. Am J Surg 2010;199:S.
8. Kucher N, Spirk D, Baumgartner I, Mazzolai L, Korte W, Nobel D, Banyai M, Bounameaux H. Lack of prophylaxis before the onset of acute venous thromboembolismamong hospitalized cancer patients: the Swiss Venous Thromboembolism Registry. AnnOncol 2009; 21: 931–5.
9. Bahl, V., Hu, H.M., Henke, P.K., Wakefield, T.W., Campbell, D.A., and Caprini, J.A. A validation study of a retrospective venous thromboembolism risk scoring method. Ann Surg. 2010; 251: 244–350.
10. Jack Hirsh and Agnes Y. Y. Lee, How we diagnose and treat deep vein thrombosis, Blood 2002 99:3102-3110.
11. Management of deep vein thrombosis and pulmonary embolism. A statement for healthcare professionals. Council on Thrombosis (in consultation with the Council on Cardiovascular Radiology), American Heart Association. Hirsh J, Hoak J Circulation. 1996 Jun 15; 93(12):2212-45.
12. Arixtra prescribing information. GlaxoSmithKline.October 2005, http://us.gsk.com/products/assets/us_arixtra.pdf.

13. Geerts WH, Bergqvist D, Pineo GF, et al. Prevention of venous thromboembolism: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8thEdition). Chest 2008; 133:381S.

14. Anderson FA Jr, Zayaruzny M, Heit JA, et al. Estimated annual numbers of US acutecare hospital patients at risk for venous thromboembolism. Am J Hematol 2007; 82:777.
15. Søgaard KK, Schmidt M, Pedersen L, et al. 30-year mortality after venous thromboembolism: a population-based cohort study. Circulation 2014;130:829-36. 10.1161/CIRCULATIONAHA.114.009107
16. Motykie GD, Zebala LP, Caprini JA, Lee CE, Arcelus JI, Reyna JJ, et al. A guide to venous thromboembolism risk factor assessment. J Thromb Thrombolysis. 2000; 9(3):253-262.
17. Jonathan Laryea, MD, FACS, FASCRS[1] and Bradley Champagne, MD, FACS, FASCRs, Venous Thromboembolism Prophylaxis, Clin Colon Rectal Surg. 2013 Sep; 26(3): 153–159.
18. Ofori-Asenso R, Agyeman AA. Irrational use of medicines-a summary of key concepts. Pharmacy. 2016; 4(4):35.
19. Deng J, Thomas L, Li H, Varughesekutty E, Shi Q, Sambharia M, et al. Overuse of DVT Prophylaxis in Medical Inpatients. Am Soc Hematology. 2015.
20. Imberti D, Becattini C, Bernardi E, Camporese G, Cuccia C, Dentali F, et al. Multidisciplinary approach to the management of patients with pulmonary embolism and deep vein thrombosis: a consensus on diagnosis, traditional therapy and therapy with rivaroxaban. Intern Emerg Med. 2018; 13(7):1037-1049.
21. Stone J, Hangge P, Albadawi H, Wallace A, Shamoun F, Knuttien MG, et al. Deep vein thrombosis: pathogenesis, diagnosis, and medical management. Cardiovasc Diagn Ther. 2017; 3: S276-S284.
22. TurpieAGG,ChinBSP,LipGYH.Venousthromboembolism: Pathophysiology clinical features, and prevention. BMJ2002; 325:887–890.
23. I. A. Naess, S. C. Christiansen, P. Romundstad et al., “Inci-dence and mortality of venous thrombosis: a population-based study,”Journal of Thrombosis and Haemostasis, vol. 5,no. 4, pp. 692–699, 2007.

24. H. Gibbs, J. Fletcher, P. Blombery et al., “Venous thromboem-bolism prophylaxis guideline implementation is improved bynurse directed feedback and audit,”Thrombosis Journal, vol. 9,no. 1, p. 7, 2011.
25. D. Scarvelis and P. S. Wells, “Diagnosis and treatment of deep-vein thrombosis,”CMAJ, vol. 175, no. 9, pp. 1087–1092, 2006.
26. C. Kearon, “Natural history of venous thromboembolism,”Circulation, vol. 107, no. 23, supplement 1, pp. I22–I30, 2003.
27. W. K. Ho, “Deep vein thrombosis risks and diagnosis,”Australian Family Physician, vol. 39, no. 7, pp. 468–474, 2010.
28. R. H. White, “The epidemiology of venous thromboem-bolism,”Circulation, vol. 107, no. 23, supplement 1, pp. I4–I8, 2003.
29. V. Snow, A. Qaseem, P. Barry et al., “Management of venousthromboembolism: a clinical practice guideline from theAmerican College of Physicians and the American Academy ofFamily Physicians, “Annals of Internal Medicine, vol. 146, no. 3,pp. 204–210, 2007.
30. S. R. Kahn, “The post thrombotic syndrome,”ThrombosisResearch, vol. 127, supplement 3, pp. S89–S92, 2011.
31. National Health and Medical Research Council,Stop the Clot: Integrating VTE Prevention Guideline Recommendations intoRoutine Hospital Care, National Health and Medical ResearchCouncil, 3rd edition, 2011,http://www.nhmrc.gov.au/.
32. G. Agnelli and C. Becattini, “Acute pulmonary embolism,”TheNew England Journal of Medicine, vol. 363, no. 3, pp. 210–274,2010.
33. S. McRae, “Pulmonary embolism,”Australian Family Physi-cian, vol. 39, no. 6, pp. 462–466, 2011.
34. J. A. Heit, “Venous thromboembolism: disease burden, out-comes and risk factors, “Journal of Thrombosis and Haemostasis, vol. 3, no. 8, pp. 1611–1617, 2005.
35. D. W. Barritt and S. C. Jordan, “Anticoagulant drugs in thetreatment of pulmonary embolism. A controlled trial, “TheLancet, vol. 275, no. 7138, pp. 1309–1312, 1960.
36. J. D. Douketis, C. Kearon, S. Bates, E. K. Duku, and J. S.Ginsberg, “Risk of fatal pulmonary embolism in patients withtreated venous thromboembolism,”Journal of the AmericanMedical Association, vol. 279, no. 6, pp. 458–462, 1998
37. LevineMN,RaskobG,BeythRJ,KearonC,SchulmanS.Hemorrhagiccomplicationsof anticoagulant treatment: The Seventh ACCP Conference on Antithrombotic and

Thrombolytic Therapy. Chest 2004;126:287S–310S.

38. Geerts WH, Pineo GF, Heit JA, et al. Prevention of venous thromboembolism. The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004;126:338S–400S.u.
39. Kearon C, Ginsberg JS, Julian JA, et al. Comparison of fixed-dose weight-adjusted unfractionated heparin and low-molecular-weight heparin for acute treatment of venous thromboembolism. JAMA2006; 296:935–942.
40. Heit JA, Mohr DN, Silverstein MD, Petterson TM, O'Fallon WM, Melton LJ 3rd. Predictors of recurrence after deep vein thrombosis and pulmonary embolism. A population-based cohort study. Arch Intern Med2000;160:761–768.
41. Buller HR, Agnelli G, Hull RD, Hyers TM, Prins MH, Raskob GE. Antithrombotic therapy for venous thromboembolic disease: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004;126:401S–428S.
42. Levitan N, Dowlati A, Remick SC, et al. Rates of initial and recurrent thromboembolic disease among patients with malignancy versus those without malignancy. Risk analysis using Medicare claims data. Medicine (Baltimore) 1999;78:285–291.
43. ReitsmaPH.Geneticsinthrombophilia.Anupdate.Hamostaseologie.2015;35(1):47-51. doi:10.5482/HAMO-14-11-0062.Epub2014Dec3.PubMedPMID:25465384.
44. White, RH. The epidemiology of venous thromboembolism. Circulation 2003; 107: 14–8.
45. Heit, I , Cohen, A , Anderson, FJ. Estimated annual number of incident and recurrent, non-fatal and fatal venous thromboembolism (VTE) events in the US. Blood 2005; 106: 267A
46. Rosendaal, FR. Thrombosis in the young: epidemiology and risk factors. A focus on venous thrombosis. ThrombHaemost 1997; 78: 1–6.
47. Oger, E. Incidence of venous thromboembolism: a community-based study in Western France. EPI-GETBP Study Group. Groupe d'Etude de la Thrombose de Bretagne Occidentale. ThrombHaemost 2000; 83: 657–60.

48. Cushman, M. Epidemiology and risk factors for venous thrombosis. SeminHematol 2007;44: 62–9.
49. Anderson, Jr. FA, Wheeler HB. Physician practices in the management of venous thromboembolism: a community-wide survey. J Vasc Surg. 1992; 16: 707–714.
50. Anderson Jr FA, Spencer FA. Risk factors for venous thromboembolism. Circulation. 2003 Jun 17;107(23_suppl_1):I-9.
51. Clagett GP, Reisch JS. Prevention of venous thromboembolism in general surgical patients. Results of meta-analysis. Ann Surg. 1988; 208: 227–240.

52. Clarke-Pearson DL, DeLong ER, Synan IS, et al. Variables associated with postoperative deep venous thrombosis: a prospective study of 411 gynecology patients and creation of a prognostic model. Obstet Gynecol. 1987; 69: 146–150.
53. Skillman JJ, Collins RE, Coe NP, et al. Prevention of deep vein thrombosis in urological patients: a controlled, randomized trial of low-dose heparin and external pneumatic compression boots. Surgery. 1978; 83: 230–234.
54. Frim DM, Barker FG2nd, Poletti CE, et al. Postoperative low-dose heparin decreases thromboembolic complications in neurosurgical patients. Neurosurgery. 1992; 30: 830–833.
55. Agnelli G, Piovella F, Buoncristiani P, et al. Enoxaparn plus compression stockings compared with compression stockings alone in the prevention of venous thromboembolism after elective neurosurgery. N Engl J Med. 1998; 339: 80–85.
56. Lindberg F, Rasmussen I, Siegbahn A, et al. Coagulation activation after laparoscopic cholecystectomy in spite of thromboembolism prophylaxis. Surg Endosc. 2000; 14: 858–861.
57. Bergqvist D, Lowe G. Venous thromboembolism in patients undergoing laparoscopic and arthroscopic surgery and in leg casts. Arch Intern Med. 2002; 162: 2173–2176.
58. Catheline JM, Turner R, Gaillard JL, et al. Thromboembolism in laparoscopic surgery: risk factors and preventive measures. Surg LaparoscEndoscPercutan Tech. 1999; 9: 135–139.

59. Heit JA. J Thromb Thrombolysis 2006; 21: 23?9.
60. Heit,JA, et al. Arch Intern Med 2000; 160: 761?8.
61. Turpie AG, et al. BMJ 2002; 325: 887?90.
62. Prandoni P, et al. Ann Intern Med 1996; 125: 1?7.
63. American Academy of Orthopedic Surgeons information webpage http://orthoinfo.aaos.org/fact/printer_page.cfm?topcategory=Knee&Thread_ID=264.
64. Buller HR, et al. Chest 2004; 126:401S? 428S.
65. Wells PS, Anderson DR, Rodger M, et al. Evaluation of D-dimer in the diagnosis of suspected deep-vein thrombosis. N Engl J Med. 2003; 349: 120
66. A novel and rapid whole-blood assay for D-dimer in patients with clinically suspected deep vein thrombosis. Circulation. 1995; 91: 2184–2187.
67. Wells PS, Anderson DR, Rodger M, et al. Excluding pulmonary embolism at the bedside without diagnostic imaging: management of patients with suspected pulmonary embolism presenting to the emergency department by using a simple clinical model and D-dimer. Ann Intern Med. 2001; 135: 98–
68. Leclercq MG, Lutisan JG, Van MarwijkKooy M et al. Ruling our clinically suspected pulmonary embolism by assessment of clinical probability and D-dimer levels: a management study. ThrombHaemost. 2003; 89: 97-103.
69. Anderson DR, Kovacs MJ, Kovacs G, et al. Combined use of clinical assessment and D-dimer to improve the management of patients presenting to the emergency department with suspected deep vein thrombosis (the EDITED study). J ThrombHaemost. 2003; 1: 645–651.
70. Kearon C, Akl EA, Comerota AJ, Prandoni P, Bounameaux H, Goldhaber SZ, Nelson ME, Wells PS, Gould MK, Dentali F, Crowther M, Kahn SR: Antithrombotic therapy for VTE disease: antithrombotic therapy and prevention of thrombosis, 9th ed: American College of Chest Physicians evidence-based clinical practice guidelines. Chest 2012, 141: e419S-e494S. 10.1378/chest.

71. Torbicki A, Perrier A, Konstantinides S, Agnelli G, Galiè N, Pruszczyk P, Bengel F, Brady AJ, Ferreira D, Janssens U, Klepetko W, Mayer E, Remy-Jardin M, BassandJP: Guidelines on the diagnosis and management of acute pulmonary embolism: the Task Force for the Diagnosis and Management of Acute Pulmonary Embolism of the European Society of Cardiology (ESC). Eur Heart J 2008, 29: 2276-2315. 10.1093/eurheartj/ehn475

72. Erkens PM, Prins MH: Fixed dose subcutaneous low molecular weight heparins versus adjusted dose unfractionated heparin for venous thromboembolism. Cochrane Database Syst Rev 2010, 9: CD001100.

73. Nutescu E, Chuatrisorn I, Hellenbart E: Drug and dietary interactions of warfarin and novel oral anticoagulants: an update. J Thromb Thrombolysis 2011, 31: 326-343. 10.1007/s11239-011-0561-1

74. Schulman S, Kearon C, Kakkar AK, Mismetti P, Schellong S, Eriksson H, Baanstra D, Schnee J, Goldhaber SZ: Dabigatran versus warfarin in the treatment of acute venous thromboembolism. N Engl J Med 2009, 361: 2342-2352. 10.1056/NEJMoa0906598.

75. Handbook of Clinical Neurology, 2012

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76. TheAmericanHeritage®Stedman'sMedicalDictionary.Copyright©2002,2001,1995 byHoughtonMifflinCompany.PublishedbyHoughtonMifflinCompany.

77. CzajaCA,HootonTM.Updateonacuteuncomplicatedurinarytractinfectioninwomen. Postgrad Med2006;119:39–45.

78. StapletonA,StammWE.PreventionofurinarytractinfectionInfectDisClinNorthAm 1997;11:719–33.

---

79. Lansberg MG, O'Donnell MJ, Khatri P, Lang ES, Nguyen-Huynh MN, Schwartz NE,Sonnenberg FA, Schulman S, Vandvik PO, Spencer FA, Alonso-Coello P, GuyattGH,Akl EA; American College of Chest Physicians. Antithrombotic and thrombolytic therapy for ischemic stroke: Antithrombotic Therapy and Prevention of Thrombosis,9thed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012 Feb;141(2 Suppl):e601S-36S. doi:

10.1378/chest.112302.PubMedPMID:22315273;PubMedCentralPMCID:PMC3278065.

80. MazzoneC,ChiodoGrandiF,SandercockP,etal.Physicalmethodsforpreventingdeep vein thrombosis in stroke. Cochrane Database Syst Rev 2004; issue 4: article No. CD001922.

81. SchulzSL,StechemesserB,SeebergerU,etal.Graduatedcompressionstockingsforthe prevention of venous thromboembolism in surgical patients in the age of low molecular weight heparins. J ThrombHaemost 2005;3:2363–2365.

82. Urbankova J, Quiroz R, Kucher N, et al. Intermittent pneumatic compression and deep vein thrombosis prevention: a meta-analysis in postoperative patients. ThrombHaemost 2005;94:1181–1185.

83. Agu O, Hamilton G, Baker D. Graduated compression stockings in the prevention of venous thromboembolism. Br J Surg 1999;86:992–1004.

84. Coe NP, Collins RE, Klein LA, et al. Prevention of deep vein thrombosis in urological patients: a controlled, randomized trial of low-dose heparin and external pneumatic compression boots. Surgery 1978;83:230–234

85. Gallus A, Raman K, Darby T. Venous thrombosis after elective hip replacement-the influence of preventive intermittentcalf compression and of surgical technique. Br JSurg 1983; 70:17–1900.HirshJ.Heparin.NEnglJMed1991;324:1565-74.

86. Franchini M, Mannucci PM. A new era for anticoagulants. Eur J Intern Med 2009; 20: 562–568.

87. Hirsh J, Raschke R. Heparin and low-molecular-weight heparin.The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004; 126:188S–203S.

88. Lim W, Dentali F, Eikelboom JW, et al. Meta-analysis: low-molecular-weight heparin and bleeding in patients with severe renal insufficiency. Ann Intern Med 2006; 144:673– 684

89. Grand'Maison A, Charest AF, Geerts WH. Anticoagulant use in patients with chronic renal impairment. Am J Cardiovascular Drugs 2005;5:291–305.

90. Douketis J, Cook D, Zytaruk N, et al. Dalteparin thromboprophylaxis in critically ill patients with severe renal insufficiency: the DIRECT study [abstract]. J ThrombHaemost 2007; 5(Suppl 2):PS-680.

91. Vieira-de-Abreu A, Campbell RA, Weyrich AS, Zimmerman GA. Platelets: versatile effector cells in hemostasis, inflammation, and the immune continuum. Seminars in Immunopathology 2012;34(1):5-30.

92. Lugo JJ, Hurtado EF, Calderón LI, Gómez G, Castro P, Estrada G, et al. Resistance to acetylsalicylic acid and to clopidogrel: an emergent clinical entity [Resistencia al ácidoacetilsalicílico y al clopidogrel: una entidadclínicaemergente]. RevistaColombiana de Cardiología 2008;15(4):172-83. [Google Scholar] [Ref list]

93. Antiplatelet TrialistsÍ Collaboration. Collaborative overview of randomized trials of antiplatelet therapy: III. Reduction in venous thrombosis and pulmonary embolism byantiplateletprophylaxisamongsurgicalandmedicalpatients.BMJ1994; 308:235-46.

94. Graor RA, Stewart JH, Lotke PA, et al. RD heparin (ardeparin sodium) vs aspirin to prevent deep venous thrombosis after hip or knee replacement surgery [abstract]. Chest 1992;102:118S.

95. Gent M, Hirsh J, Ginsberg JS, et al. Low-molecular-weight heparinoid orgaran is more effective than aspirin in the prevention of venous thromboembolism after surgery for hip fracture. Circulation 1996;93:80–84.

96. Lotke PA, Palevsky H, Keenan AM, et al. Aspirin and warfarin for thromboembolic disease after total joint arthroplasty. ClinOrthop 1996;324:251–258.

97. Pannucci CJ, Obi A, Alvarez R, Abdullah N, Nackashi A, Hu HM, Bahl V, Henke PK. Inadequate venous thromboembolism risk stratification predicts venousthromboembolic eventsinsurgicalintensivecareunitpatients.JamCollSurg.2014May;218(5):898-904.

98. Westrich GH, Sculco TP. Prophylaxis against deep venous thrombosis after total knee arthroplasty: pneumatic plantercompression and aspirin compared with aspirin alone. J Bone Joint Surg Am 1996;78:826–834.

99. Canadian centre for an ocupational health and safety.

100. Wald, N J; Hackshaw, A K; Frost, C D (1999). "When can a risk factor be used as a worthwhile screening test?". BMJ 319(7224):1562–1565

101. Giordano SH, Cohen DS, Buzdar AU, Perkins G, Hortobagyi GN (July 2004). "Breast carcinoma in men: a population-based study". Cancer 101 (1):51–7.

102. Heiss, G., Wallace, R., Anderson, G. L., Aragaki, A., Beresford, S. A., Brzyski, R., ... & Prentice, R. L. (2008). Health risks and benefits 3 years after stopping randomized treatment with estrogen and progestin. *Jama*, *299*(9), 1036-1045.

103. Case, S.P. and Haines, K.R. (2009) Understanding Youth Offending: Risk FactorResearch,PolicyandPractice.Cullompton: Willan% Husten,Larry(23August2011).

104. Husten, Larry (23 August2011). -Joint Commission. National Consensus Standards for Prevention and Care of Venous Thromboembolism (VTE).www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/National+Consensus+Standards+for+Prevention+and+Care+(VTE).htm (accessed 2015 Jun 05)

105. Barbar S1, Noventa F, Rossetto V, Ferrari A, Brandolin B, Perlati M, De Bon E, Tormene D, Pagnan A, Prandoni P.A risk assessment model for the identification of hospitalized medical patients at risk for venous thromboembolism: the Padua Prediction Score. J ThrombHaemost. 2010 Nov;8(11):2450-7. doi: 10.1111/j.1538- 7836.2010.04044.x.

106. Spyropoulos AC, Anderson FA Jr, Fitzgerald G, Decousus H, Pini M, Chong BH, Zotz RB, Bergmann JF, Tapson V, Froehlich JB, Monreal M, Merli GJ, Pavanello R, Turpie AG, Nakamura M, Piovella F, Kakkar AK, Spencer FA, IMPROVE Investigators. Predictive and associative models to identify hospitalized medical patients at risk for VTE;.Chest.2011;140(3):706.

107. NendazM,SpirkD,KucherN,etal.MulticentrevalidationoftheGenevaRiskSco

refor hospitalised medical patients at risk of venous thromboembolism. Explicit assessment of Thromboembolic RIsk and Prophylaxis for Medical patients in Switzerland (ESTIMATE).ThrombHaemost 2014;111:531.

108. PannucciCJ,BaileySH,DreszerG,FisherWachtmanC,ZumstegJW,JaberRM, Hamill JB, Hume KM, Rubin JP, Neligan PC, Kalliainen LK, Hoxworth RE, PusicAL,Wilkins EG. Validation of the Caprini risk assessment model in plastic and reconstructive surgery patients. J Am Coll Surg.2011.

109. Pannucci CJ, Obi A, Alvarez R, Abdullah N, Nackashi A, Hu HM, Bahl V, Henke PK. Inadequate venous thromboembolism risk stratification predicts venous thromboembolic eventsinsurgicalintensivecareunitpatients.JAmCollSurg.2014May;218(5):898-904.

110. ZhouHX, TangYJ,WangL,XiaoJ,WangB,YangJ,LuoD,LiJ,ChenXL,FengYL, Yi Q. [Validity of Caprini risk assessment model in identifying high venous thromboembolism risk patients among hospitalized medical patients]. 2013 Jun 25;93(24):1864-7.

111. Butterworth, T., Jones, K., & Jordan, S. (2011). Building capacity and capability in patient safety, innovation and service improvement: an English case study. Journal of Research in Nursing, 16(3), 243-251.

112. Collins, R., MacLellan, L., Gibbs, H., MacLellan, D., & Fletcher, J. (2010). Venous thromboembolism prophylaxis: The role of the nurse in changing practice and saving lives. Australian Journal of Advanced Nursing (Online), 27(3), 83.

113. Centers for Disease Control, & Prevention (US). (2003). A public health action plan to prevent heart disease and stroke. US Department of Health and Human Services, Centers for Disease Control and Prevention.

114. Goodman, E., Slap, G. B., & Huang, B. (2003). The public health impact of socioeconomic status on adolescent depression and obesity. American journal of public health, 93(11), 1844-1850.

115. Lee, J. A., Grochow, D., Drake, D., Johnson, L., Reed, P., & van Servellen, G. (2014). Evaluation of hospital nurses' perceived knowledge and practices of venous thromboembolism assessment and prevention. Journal of Vascular Nursing, 32(1), 18-24.

116. Gao, F., &Kause, J. (2010). Thromboprophylaxis awareness among hospital staff. British Journal of Nursing, 19(18), 1175-1178.

117. Serrone, J. C., Wash, E. M., Hartings, J. A., Andaluz, N., & Zuccarello, M. (2013). Venous thromboembolism in subarachnoid hemorrhage. World neurosurgery, 80(6), 859-863.

118. El-sayedead, D., Fouad Abdallah, K., Hegazi, M., & Mohammed, S. (2016). Effect of Nursing Care Standards for Preventing Deep Vein Thrombosis among Patients Undergoing Hip Surgery on Nurses Performance and Patients Outcome. Journal of Nursing and Health Science, 5(4), 1-12.

119. Prevention of fatal pulmonary embolism by low doses of heparin. The Lancet 1975;306:45–51.

120. Geerts WH, Heit JA, Clagett GP. Prevention of venous thromboembolism. Chest 2001;119:132S–175S.

121. Group Second Thromboembolic Risk Factors (THRiFT II) Consensus Risk of and prophylaxis for venous thromboembolism in hospital patients. Phlebology 1998;13:87–97.

122. Clagett GP, Anderson Jr FA, Levine MN, Salzman EW, Wheeler HB. Prevention of venous thromboembolism. Chest1992;102(4Suppl):391S–407S.

123. Yu HT, Dylan ML, Lin J, Dubois RW Hospital's compliance with prophylaxis guidelines for venous thromboembolism. Am J Health Sys Pharm 2007;64:69–76.

124. Cohen AT, Tapson VF, Bergmann JF, Goldhaber SZ, Kakkar AK, Deslandes B, et al. Venous Thromboembolism risk and thromboprophylaxis in acute hospital care setting (ENDORSE study): a multinational cross sectional study. Lancet 2008;371:387–94.

125. Akbar MN, Salahuddin O, Zafarullah O. A clinical audit on venous thromboembolism prophylaxis of medical patients in West Medical Ward, Mayo Hospital. Ann King Edward Med Uni 2006;12(2):328–30.

126. Kesieme, E. B., Arekhandia, B. J., Inuwa, I. M., Akpayak, I. C., Ekpe, E. E., Olawoye, O. A., ... & Ofoegbu, I. J. (2016). Knowledge and practice of prophylaxis of deep venous thrombosis: A survey among Nigerian surgeons. Nigerian journal of clinical practice, 19(2), 170-174.

127. Granziera S, Cohen AT. VTE primary prevention, including hospitalised medical and orthopaedic surgical patients. ThrombHaemost. 2015;113(6):1216–23.

doi: 10.1160/TH14-10-0823. [PubMed: 25809340].

128. Vardi M, Dagna L, Haran M, Duckit R. Attitudes towards and practice of venous thromboembolism prevention in general internal medicine wards: a multinational survey from member countries of the European Federation of Internal Medicine. Thromb Res. 2012;129(5):573–6.doi: 10.1016/j.thromres.2011.07.043. [PubMed: 21862111].

129. Ongen G, Yılmaz A, Cirak AK, Ersoy CY, Erden F, Altıntaş F, Yıldırım C, Güven H, Demir A, Kaynar L, Bastacı N, Demirtaş N. Venous thromboembolism risk and thromboprophylaxis among hospitalized patients: data from the Turkish arm of the ENDORSE study. ClinApplThrombHemost. 2011Oct;17(5):539-45.

130. Rosborough, T. K., & Shepherd, M. F. (2004). Unreliability of international normalized ratio for monitoring warfarin therapy in patients with lupus anticoagulant. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy, 24(7), 838-842.

131. KurtogluM;RAISEStudyGroup.Anobservationalstudyforvenousthromboembolism risk assessment among hospitalized patients in general surgeryclinics across Turkey. Phlebology. 2011Dec;26(8):344-52.

132. Dasta, J. F., Pilon, D., Mody, S. H., Lopatto, J.,Laliberté, F., Germain, G.,&Nutescu, E. A. (2015). Daily hospitalization costs in patients with deep vein thrombosis or pulmonary embolism treated with anticoagulant therapy. Thrombosis research, 135(2), 303-310.

133. Favaloro EJ, Bonar R, Sioufi J, et al. An international survey of current practice in the laboratoryassessmentofanticoagulationtherapywithheparin.Pathology2005;37:234-8.

134. Dobesh, P. P., Trujillo, T. C., & Finks, S. W. (2013). Role of the pharmacist in achieving performance measures to improve the prevention and treatment of venous thromboembolism. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy, 33(6), 650-664.

135. Obi AT, Pannucci CJ, Nackashi A, Abdullah N, Alvarez R, Bahl V, et al. Validation of the Caprini venous thromboembolism risk assessment model in critically ill surgical patients. JAMA surg. 2015; 150(10):941-948.

136. Liu X, Liu C, Chen X, Wu W, Lu G. Comparison between Caprini and Padua risk assessment models for hospitalized medical patients at risk for venous thromboembolism: a retrospective study. Interact Cardiovasc Thorac Surg. 2016; 23(4):538-543.

137. Caprini JA. Risk assessment as a guide for the prevention of the many faces of venous thromboembolism. Am J Surg. 2010; 199(1):S3-S10.

138. 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. 2018; 36(2):71-80.

139. Zobeiri M, Najafi F. Prophylaxis for deep venous thrombosis: Knowledge and practice of surgeons. 2011.

140. Mariam MG, Bedaso A, Ayano G, Ebrahim J. Knowledge, attitude and factors associated with mental illness among nurses working in public hospitals, Addis Ababa, Ethiopia. J Ment Disord Treat. 2016; 2(108):2.

141. Connelly LM. Pilot studies. Medsurg Nurs. 2008; 17(6):411.

142. Badireddy, M.,& Mudipalli, V. R. (2018). Deep Venous Thrombosis (DVT) Prophylaxis.

143. Heit JA, Silverstein MD, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ 3rd. Risk factors for deep vein thrombosis and pulmonary embolism: a population-based case-control study. Arch Intern Med. 2000;160:809-15.

144. White RH. The epidemiology of venous thromboembolism. Circulation. 2003; 107(23):I-4-I-8.

145. Kingue S, Bakilo L, Mvuala R, Minkande JZ, Fifen I, Gureja YP, et al. Epidemiological African day for evaluation of patients at risk of venous thrombosis in acute hospital care settings. Cardiovasc J Afr. 2014; 25(4):159.

146. Pereira CA, Brito SS, Martins AS, Almeida CM. Deep venous thrombosis prophylaxis: practical application and theoretical knowledge in a general hospital. J Vasc Bras, 2008; 7(1):18-27.

147. Sharif-Kashani B, Mohebi-Nejad A, Abooturabi SM. Estimated prevalence of venous thromboembolism in Iran: Prophylaxis still an unmet challenge. Tanaffos. 2015; 14(1):27.

148. Nekoonam B, Eshraghi A, Hajiesmaeili M, Sahraei Z. Deep vein thrombosis prophylaxis evaluation in intensive care unit. Arch Crit Care Med. 2016; 1(4): e8497.

149. Zeitoun AA, Dimassi HI, El Kary DY, Akel MG. An evaluation of practice pattern for venous thromboembolism prevention in Lebanese hospitals. J Thromb Thrombolysis. 2009; 28(2):192.

150. Jetha L. A drug usage review of therapeutic doses of enoxaparin at Barnet and Chase Farm Hospitals: London Pharmacy Education and Training Pzifer Project Awards. 2007.

151. Fahimi F, Bani AS, Behzad NN, Ghazi TL. Enoxaparin utilization evaluation: An observational prospective study in medical inpatients. 2008.

152. Pandey, A., et al., 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. Vascular health and risk management, 2009. **5**: p. 643.

153. Novo-Veleiro I, Alvela-Suárez L, Costa-Grille A, Suárez-Dono J, Ferrón-Vidan F, et al. Compliance with current VTE prophylaxis guidelines and risk factors linked to complications of VTE prophylaxis in medical inpatients: a prospective cohort study in a Spanish internal medicine department. BMJ open, 2018; 8(5): e021288.

154. Lansberg, M.G., et al., Antithrombotic and thrombolytic therapy for ischemic stroke: antithrombotic therapy and prevention of thrombosis: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest, 2012. 141(2): p. e601S-e636S.

155. Chopard, P., et al., Venous thromboembolism prophylaxis in acutely ill medical patients: definite need for improvement. Journal of internal medicine, 2005. 257(4): p. 352-357.

156. Goldhaber, S.Z., K. Dunn, and R.C. Mac Dougall, New onset of venous thromboembolism among hospitalized patients at Brigham and WomenвЂ™s Hospital is caused more often by prophylaxis failure than by withholding treatment. Chest, 2000. 118(6): p. 1680-1684.

157. Tapson, V.F., et al., Venous thromboembolism prophylaxis in acutely ill hospitalized medical patients: findings from the International Medical Prevention Registry on Venous Thromboembolism. Chest, 2007. 132(3): p. 936-945.

158. Kucher, N., et al., Lack of prophylaxis before the onset of acute venous thromboembolism among hospitalized cancer patients: the SWIss Venous ThromboEmbolism Registry (SWIVTER). Annals of oncology, 2009. 21(5): p. 931-935.

159. Lecumberri, R., et al., Maintained effectiveness of an electronic alert system to prevent venous thromboembolism among hospitalized patients. Thrombosis and haemostasis, 2008. 100(10): p. 699-704.

160. ВГў, S.A., et al., A cross-sectional evaluation of venous thromboembolism risk and use of venous thromboembolism prophylaxis in hospitalized patients in Senegal. Archives of cardiovascular diseases, 2011. 104(10): p. 493-501.

161. Buesing, K.L., B. Mullapudi, and K.A. Flowers, Deep venous thrombosis and venous thromboembolism prophylaxis. Surgical Clinics, 2015. 95(2): p. 285-300.

162. Lee, J.-A., et al., Evaluation of hospital nurses' perceived knowledge and practices of venous thromboembolism assessment and prevention. Journal of Vascular Nursing, 2014. 32(1): p. 18-24.

163. Levi, M., et al., Safety of recombinant activated factor VII in randomized clinical trials. New England Journal of Medicine, 2010. 363(19): p. 1791-1800.

164. Engbers, M.J., et al., Clinical features of venous insufficiency and the risk of venous thrombosis in older people. British journal of haematology, 2015. 171(3): p. 417-423.

165. Abin MA, Moly KT, Dhanya RD. Assessment of knowledge and self-reported clinical practice on prevention of deep vein thrombosis (DVT) among staff nurses. J Nurs Health Sci 2016;5:18-24.

166. Neville A, Lee L, Antonescu I, et al. Systematic review of out-comes used to evaluate enhanced recovery after surgery.Br J Surg 2014;101:159-70.

167. Lilly CM, Liu X, Badawi O, et al. Thrombosis prophylaxis and mortality risk among critically ill adults. Chest 2014;146:51-7.

168. Li F, Walker K, McInnes E, et al. Testing the effect of a targeted intervention on nurses' compliance with ''best practice'' mechanical venous thromboembolism prevention. J Vasc Nurs 2010;28:92-6.

169. World Health Organization . World Medicines Strategy 2008–2013. World Health Organization; Geneva, Switzerland: 2008.

170. Geerts WH, Heit JA, Clagett GP, Pineo GF, Colwell CW, Anderson FA, et al. Prevention of venous thromboembolism.Chest 2001;119(Suppl 1):132S–175S.

171. Geerts WH, Pineo GF, Heit JA, Bergqvist D, Lassen MR, Colwell CW, et al.

Prevention of venous thromboembolism: the Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. Chest 2004;126(3 Suppl):338S-400S.

172. Mohamed, A., Othman, W., El Alphy, B., & Sheble, A. (2017). Effect of Implementing Nursing Care Guidelines on the Occurrence of Deep Vein Thrombosis among Orthopedic Patients. IOSR Journal of Nursing and Health Science, 6(3), 28.

173. Zhang, H., Mao, P., Wang, C., Chen, D., Xu, Z., Shi, D., ... & Jiang, Q. (2017). Incidence and risk factors of deep vein thrombosis (DVT) after total hip or knee arthroplasty: a retrospective study with routinely applied venography. Blood Coagulation & Fibrinolysis, 28(2), 126-133.

174. Boddi, M., & Peris, A. (2016). Deep vein thrombosis in intensive care. In Thrombosis and Embolism: from Research to Clinical Practice (pp. 167-181). Springer, Cham.

175. Restrepo, P., Jameson, D., & Carroll, D. L. (2015). An evidence-based quality improvement project to improve deep vein thrombosis prophylaxis with mechanical modalities in the Surgical Intensive Care Unit. Journal of nursing care quality, 30(1), 31.

176. Fonseca, R. M. P., & Peniche, A. D. C. G. (2009). Enfermería en centro quirúrgico: treinta años después de la creación del Sistema de Asistencia de Enfermería Perioperatoria. Acta Paulista de Enfermagem, 22(4), 428-433.

177. Shahian DM, Nordberg P, Meyer GS, Blanchfield BB, Mort EA, Torchiana DF, et al. Contemporary performance of US teaching and nonteaching hospitals. Acad Med. 2012; 87 (6):701-708.

178. Burke LG, Frakt AB, Khullar D, Orav EJ, Jha AK. Association between teaching status and mortality in US hospitals. Jama. 2017; 317(20):2105-2113

179. Bukhari, Elham, and Margaret Rogers. Nature of preceptorship and its impact on clinical nursing care from the perspectives of relevant nursing staff. University of Manchester. 2012.

10. APPENDIX

Appendix 1 patient form

Annexure-A

Patient Case Documentation Form

Patient Name: _____ Room #:_____ Admission Date: / / Discharge date: _____

Age: _____ Gender: _____ Ht: _____ Wt: _____ Case: Cardio Pulmonary GI DM Other: _____

IBW:_____ kg: Crt. Cl ____ ml/min.

CC:
_____
_____

HPI:_____
_____
_____
_____
_____
_____

PMH:_____
_____
_____
_____

FH:_____
_____
_____

SH: Smoking _____ EtOH:_____ Other: _____

Allergies:
_____
____

Home Rx:
_____
____
_____
_____
_____
_____

Hospital Course (include any pertinent labs):
_____

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_____

Each Risk Factor Represents 1 Point

- ❑ Age 41-60 years
- ❑ Swollen legs (current)
- ❑ Varicose veins
- ❑ Obesity (BMI >25)
- ❑ Minor surgery planned
- ❑ Sepsis (<1 month)
- ❑ Acute myocardial infarction
- ❑ Congestive heart failure (<1 month)
- ❑ Medical patient currently at bed rest
- ❑ History of inflammatory bowel disease
- ❑ History of prior major surgery (<1 month)
- ❑ Abnormal pulmonary function (COPD)
- ❑ Serious Lung disease including pneumonia (<1 month)
- ❑ Oral contraceptives or hormone replacement therapy
- ❑ Pregnancy or postpartum (<1 month)
- ❑ History of unexplained stillborn infant, recurrent spontaneous abortion (≥ 3), premature birth with toxemia or growth-restricted infant
- ❑ Other risk factors_____

Subtotal:

Each Risk Factor Represents 5 Points

- ❑ Stroke (<1 month)
- ❑ Multiple trauma (<1 month)
- ❑ Elective major lower extremity arthroplasty
- ❑ Hip, pelvis or leg fracture (<1 month)
- ❑ Acute spinal cord injury (paralysis) (<1 month)

Subtotal:

Each Risk Factor Represents 2 Points

- ❑ Age 61-74 years
- ❑ Arthroscopic surgery
- ❑ Malignancy (present or previous)
- ❑ Laparoscopic surgery (>45 minutes)
- ❑ Patient confined to bed (>72 hours)
- ❑ Immobilizing plaster cast (<1 month)
- ❑ Central venous access
- ❑ Major surgery (>45 minutes)

Subtotal:

Each Risk Factor Represents 3 Points

- ❑ Age 75 years or older
- ❑ History of DVT/PE
- ❑ Positive Factor V Leiden
- ❑ Elevated serum homocysteine
- ❑ Heparin-induced thrombocytopenia (HIT)
  (Do not use heparin or any low molecular weight heparin)
- ❑ Elevated anticardiolipin antibodies
- ❑ Other congenital or acquired thrombophilia

If yes: Type_____

- ❑ **Family History of thrombosis***
- ❑ Positive Prothrombin 20210A
- ❑ Positive Lupus anticoagulant

* **most frequently missed risk factor**

Subtotal:

TOTAL RISK FACTOR SCORE:

FACTORS ASSOCIATED WITH INCREASED BLEEDING

Patient may not be a candidate for anticoagulant therapy & SCDs should be considered.

Active Bleed, Ingestion of Oral Anticoagulants, Administration of glycoprotein IIb/IIIa inhibitors, History of heparin induced thrombocytopenia

CLINICAL CONSIDERATIONS FOR THE USE OF SEQUENTIAL COMPRESSION DEVICES (SCD)

Patient may not be a candidate for SCDs & alternative prophylactic measures should be considered.

Patients with Severe Peripheral Arterial Disease, CHF, Acute Superficial DVT

Total Risk Factor Score	Risk Level	Prophylaxis Regimen
0	VERY LOW	❑ Early ambulation
1-2	LOW	❑ Sequential Compression Device (SCD)
3-4	MODERATE	Choose **ONE** of the following medications +/- compression devices: ❑ Sequential Compression Device (SCD) - Optional ❑ Heparin 5000 units SQ TID ❑ Enoxaparin/Lovenox: ❑ 40mg SQ daily (WT < 150kg, CrCl > 30mL/min) ❑ 30mg SQ daily (WT < 150kg, CrCl = 10-29mL/min) ❑ 30mg SQ BID (WT > 150kg, CrCl > 30mL/min) (Please refer to Dosing Guidelines on the back of this form)
5 or more	HIGH	Choose **ONE** of the following medications **PLUS** compression devices: ❑ Sequential Compression Device (SCD) ❑ Heparin 5000 units SQ TID **(Preferred with Epidurals)** ❑ Enoxaparin/Lovenox **(Preferred)**: ❑ 40mg SQ daily (WT < 150kg, CrCl > 30mL/min) ❑ 30mg SQ daily (WT < 150kg, CrCl = 10-29mL/min) ❑ 30mg SQ BID (WT > 150kg, CrCl > 30mL/min) (Please refer to Dosing Guidelines on the back of this form)

Current meds: _____ other medications during hospitalization: _____

1. _____ 1. _____

2. _____ 2. _____

3. _____ 3. _____

4. _____ 4. _____

5. _____ 5. _____

6. _____ 6. _____

7. _____ 7. _____

8. _____ 8. _____

9. _____ 9. _____

10. _____ 10. _____

11. _____11. _____

12. _____ 12. _____

Overall assessment and Summary:

_____
_____
_____
_____
_____
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_____

Appendix eng 2 nurses

The rational use of thromboprophylaxis therapy in hospitalized patients and the perspectives of health care providers in Dr. Suat Gunsel Kyrenia University Hospital and Near East University Hospital in Northern Cyprus

Annexure B

1. Age

a. ≤ 25
b. 26–30
c. ≥ 31

2. Educational degree

a. Diploma
b. bachelor's degree
c. master's degree
d. PhD

3. Gender

a. Male
b. Female

4. Years of nursing experience

a. <5
b. 6–10
c. >11

5. Currently working unit

a. Emergency care
b. Intensive care unit (ICU)
c. Internal medicine unit
d. Obstetrics/gynecology unit

e. Oncology unit
f. Surgical unit
g. Rehabilitation unit
h. Others

6. Previous DVT education

a. Yes
b. No

7. Educational resource

a. School
b. Courses
c. Web resources
d. Congress/conferences
e. In-service education

8. Opinions on the quality of the DVT education

a. Excellent
b. Very good
c. Good
d. Fair/poor

9. Need for education on DVT

a. Yes
b. No

Annexure C

Nurses' General Knowledge on DVT

Statements on DVT	**True/ False**	**Correct answer**		**Wrong answer / I don't know**	
		N	**%**	**N**	**%**
DVT occur as a result of stasis of blood (venous stasis), vessel wall injury, and altered blood coagulation.					
Venous thromboembolism (VTE) is a fatal complication of DVT.					
VTE is a major cause of sudden death in hospitalized patients.					
Surgical patients are more prone than medical patients to DVT/VTE.					
DVT occurs most frequently in the veins of the lower extremities.					
Deep vein thrombosis also occurs frequently in the upper limbs.					

Nurses' Knowledge on Risk Factors of DVT

Statements on DVT Risk Factors	True/ False	Correct answer		Wrong answer / I don't know	
		N	%	N	%
Prolonged immobilization predisposes to DVT in hospitalized patients.					
Indwelling intravenous devices such as central venous catheters may predisposes to DVT.					
Paralysis, paresis, or recent plaster cast on lower extremities may predispose to DVT .					
Obesity may predisposes to DVT.					
Low body mass index may predisposes to DVT.					
Advancing age may predisposes to DVT.					
Previous DVT/VTE history may predisposes to DVT.					
There is no relationship between cancer or cancer treatment and DVT/VTE.					
Major surgery may predisposes to DVT.					
Varicose veins may predispose to DVT.					
Exercises may predisposes to DVT.					
Trauma may predisposes to DVT.					
Smoking may predisposes to DVT.					
Alcohol may predisposes to DVT.					
Cardiac diseases may predispose to DVT.					
There is no relationship between respiratory diseases and DVT.					
Infections or inflammations may predispose to DVT.					
Pregnancy or post-partum may predispose to DVT.					
Oral contraceptives or hormone replacement therapy may predispose to DVT.					
There is no relationship between family history of DVT/VTE and DVT.					

Nurses' Knowledge on Prevention of DVT

Statements on DVT Prevention	True/ False	Correct answer		Wrong answer / I don't know	
		N	%	N	%
Foot and leg exercises may prevent DVT.					
Elevating legs is necessary to prevent DVT/ VTE.					
Early ambulation after surgery may prevent DVT development.					
Bed rest is necessary after major surgery to prevent DVT.					
Heparin or low molecular weight heparin (LMWH) may prevent DVT development.					
Fluid restriction is necessary to prevent DVT.					
Elastic compression stockings may prevent DVT development.					
The use of intermittent pneumatic compression devices may prevent DVT development.					

Practices of Nurses on DVT Prevention

DVT PreventionPractices	Always		Sometimes		Never	
	N	%	N	%	N	%
Providing information to patients and/or relatives about risks and prevention of DVT.						
Encouraging patients to do foot and leg exercises by themselves or relatives help if patients are unable to do so.						
Encouraging early ambulation surgical of patients.						
Assessing the DVT risks of patients the regularly.						
Administering anticoagulants as preventive in clinic.						
Monitoring the side effects of the anticoagulants.						
Educating the patients on anticoagulants.						
Educating the patients to avoid injury.						
Encouraging patients to do elevate legs.						
Educating the patients on sufficient fluid intake.						
Using of the graduated compression stockings.						
Teaching the patients about proper use of graduated compression stockings.						
Assessing the patients regularly for signs and symptoms of DVT/VTE.						

Appendix turk 2 hemşire

Yakın Doğu üniversitesi Hastanesi*'de Ve Dr. Suat Günsel Girne Üniversitesi* **Hastanesi***'nde yatan hastalarda trombo- profilaksi tedavisinin akılcı kullanmı*

EK-B

1. **Yaş**

   a. 25 yaş ve altı
   b. 26 ve 30 yaş arası
   c. 31 yaş ve üzeri

2. **Eğitim durumu**

   a. Meslek Yüksekokulu
   b. Lisans
   c. Yüksek Lisans
   d. Doktora

3. **Cinsiyet**

   a. Erkek
   b. Kadın

4. **Yıllık Hemşirelik İş Deneyimi**

   a. 5 ve altı
   b. 6 ve 10
   c. 11 ve üzeri

5. **Şuanda Çalışılan Birim**

a. Acil Ünitesi
b. Yoğun Bakım Ünitesi
c. Dahiliye Birimi
d. Jinekoloji Birimi
e. Onkoloji Birimi
f. Cerrahi Birimi
g. Rehabilitasyon Birimi
h. Diğer

6. Önceki DVT (Derin ventrombozu) Eğitimi

a. Evet
b. Hayır

7. Eğitim Kaynağı

a. Okul
b. Kurslar
c. İnternet Kaynakları
d. Konferanslar
e. İşyeri Eğitimi

8. Bu eğitimler hakkındaki düşünceler

a. Mükemmel
b. Çok İyi
c. İyi
d. Kötü

9. DVT eğitimine ihtiyaç

a. Evet
b. Hayır

EK- C

Hemşirelerin DVT üzerine genel bilgisinin değerlendirilmesi;

DVT üzerine ifadeler	Doğru/ Yanlış	Doğru cevap	Yanlış cevap / Bilmiyorum

		N	**%**	**N**	**%**
DVT, damar duvarı hasarı ve değişmiş kan pıhtılaşması sonucu ortaya çıkar.					
VTE, DVT'nin ölümcül bir komplikasyonudur.					
VTE, hastanelerde yatan hastalarda ani ölümün ana nedenidir.					
Ameliyat olacak olan hastalar, medikal hastalara göre DVT ye daha yatkındır.					
DVT, sıklıkla alt ekstremitvenler de görülür.					
DVT, sıklıkla üst ekstremitevenler de görülür.					

Hemşirelerin DVT risk faktörleri üzerine bilgisi

Risk faktörleri üzerine ifadeler	**Doğru/ Yanlış**	**Doğru cevap**		**Yanlış cevap / Bilmiyorum**	
		N	**%**	**N**	**%**
Uzun süreli hareketsizlik hastanede yatan hastalarda DVT ye yatkınlaştırır.					

Santral Venözkateter gibi kalıcı intravenöz cihazlar DVT ye yatkınlaştırır.					
Felç, kısmi felç ve alt ekstremiteler üstündeki alçı DVT ye yatkınlaştırır.					
Şişmanlık, DVT ye yatkınlaştırır.					
Vücut kitle indeksi, DVT'ye yatkınlaştırır.					
Yaş ilerledikçe DVT'ye yatkınlaştırır.					
Önceki DVT/VTE öyküsü DVT'ye yatkınlaştırır.					
Kanser veya kanser tedavisi ve DVT/VTE arasında bağlantı yoktur.					
Büyük ameliyat, DVT'ye yatkınlaştırır. Varisli damar, DVT'ye yatkınlaştırır.					
Egzersizler, DVT'ye yatkınlaştırır.					
Travma, DVT'ye yatkınlaştırır.					
Sigara içmek, DVT'ye yatkınlaştırır.					
Alkol, DVT'ye yatkınlaştırır.					
Kalp hastalığı, DVT'ye yatkınlaştırır.					
Solunum hastalıkları ve DVT arasında bir bağlantı yoktur.					
Enfeksiyonlar veya iltihaplanmalar DVT'ye yatkınlaştırır.					
Gebelik veya doğum sonrası DVT'ye yatkınlaştırır.					
Oral kontraseptifler ve hormon replasman tedavisi DVT'ye yatkınlaştırır.					
DVT/VTE'nin aile öyküsü arasında bağlantısı yoktur.					

Hemşirelerin DVT önleme üzerine bilgisi

DVT önleme üzerine ifadeler	doğru/ yanlış	Doğru cevap		Yanlış cevap / bilmiyorum	
		N	%	N	%
Ayak ve bacak egzsersizleriDVT'yi önler.					
Ayakları kaldırmak DVT/VTE' yi önlemek için gereklidir.					
Ameliyat sonrası erken ambulasyon DVT gelişimini engeller.					
Büyük ameliyattan sonra yatak istirahati DVT'yi önlemek için gereklidir.					
Heparin veya düşük moleküler ağırlıklı ilaçlar DVT gelişimini önler.					
DVT 'yi önlemek için sıvı kısıtlaması gereklidir.					
Elastik kompresyon çorapları DVT gelişimini önler.					
Aralıklı pnömatik kompresyon cihazları kullanmak, DVT gelişimini önler.					

Hemşirelerin DVT önleme üzerine uygulamaları

DVT önleme uygulamaları	Genelde		Bazen		Asla	
	N	%	N	%	N	%

DVT ve DVT'nin risklerinden korunma ile ilgili hastalara ve yakınlarına bilgi verilmesi.						
Hastaları, kendi kendilerine veya yapamayacak durumda ise yakınlarının yardımıyla ayak ve bacak egzersizi yapmaya teşvik etmek.						
Hastaların erken ambulasyon cerrahisine teşvik etmek.						
Hastaların DVT risklerini düzenli olarak değerlendirmek.						
Klinikte koruyucu olarak antikoagülan ilaç uygulanması yapmak.						
Antikoagülan ilaçların yan etkilerini izlemek.						
Hastaları antikoagülan ilaçları üzerine eğitmek.						
Yaralanmaları önlemek için hastaları eğitmek.						
Hastaları, ayaklarını kaldırma konusunda teşvik etmek.						
Hastaları, yeterli sıvı alımı konusunda eğitmek.						
Kademeli kompresyon çorabı kullanımı sağlamak.						
Hastaları, kompresyon çorabının doğru kullanımı hakkında eğitmek.						
Hastaları düzenli olarak DVT/ VTE belirtileri ve semptomları hakkında değerlendirmek.						

Appendix eng 3 doctors

The rational use of thromboprophylaxis therapy in hospitalized patients and the perspectives of health care providers in Dr. Suat Gunsel Kyrenia University Hospital and Near East University Hospital in Northern Cyprus

Annexure-D
Questionnaire for evaluation of surgeon's and physician's knowledge:

1. Which one of the following variable had more probability of risk for DVT?

a. males

b. females

c. person less than 30 years old

d. person more than 40 years old

2. Which one is correct?

a. General anesthesia dose not increased DVT risk

b. Any duration for general anesthesia increased risk of DVT

c. General anesthesia only in abdominal or pelvic surgery raised risk of DVT

d. General anesthesia with more than 30 minute duration increased DVT risk

3. Which one had more incidence of DVT during surgery?

a. obese patient

b. surgery for malignancy

c. old age

d. pelvic surgery

4. What is the most important mechanism or mechanisms of DVT risk during surgery?

a. hypercoagulability

b. stasis

c. vascular injury

d. all of them.

5. Which one is correct?

a. DVT of thigh had 50% chance of pulmonary embolism.

b. Calf DVT had 40% probability of pulmonary embolism.

c. Proximal extenton of DVT decrease risk of pulmonary embolism.

d. DVT is a most common source of pulmonary embolism.

6. Which one is not risk factor of DVT?

a. Cardiac failure

b. peripartom state

c. OCP consumption

d. Surgery duration with less than 30 minute

7. Which one of the following statements reflects the outcome of DVT without treatment?

a. proximal extension

b. limitation by fibrinolysis or organization in calf DVT

c. embolisation risk increased

d. all of above

8. Which one has not applicable for DVT prophylaxies during surgery?

a. Intermittent pneumatic compression

b. low dose heparin

c. warfarin with INR of 2.5-3

d. elastic stocking

9. Selection of DVT preventive measures determined by

a. number of risk factors

b. type of surgery

c. kind of anesthetic drug

d. a and b

10. In pulmonary thromboembolism which one is not correct?

a. most common cause of preventable mortality in hospital

b. DVT is the most common source

c. most common cause of cyanosis in surgery

d. most of them have normal CXR

11. Diagnosis and beginning of therapy for pulmonary thromboembolism is based on

a. clinical criteria

b. simple hematologic tests

c. sophisticated imaging

d. clinical suspicious is enough

12. DVT ocur as a result of stasis of blood (venous stasis), vessel Wall injury, and altered blood coagulation.

a. True

b. False

13. Venous thromboembolism (VTE) is a fatal combination of DVT.

a. True

b. False

14. VTE is a major cause of sudden death in hospitalized patients.

a. True

b. False

15. Surgical patients are more prone than medical patients to DVT/VTE.

a. True

b. False

Annexure-E

Attitude questions for physicians/surgeons

Attitude statements	**Strongly Agree**	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**
1. I believe that Doppler sonography (sensitive and objective tests) is necessary to screen for post-surgical DVT in patients.					
2. I believe that an assessment of DVT risk factors is necessary prior to surgery.					
3. I believe that the prevention/prophylaxis of DVT is necessary prior to surgery.					
4. I believe that educating patients regarding preventive measures of DVT is necessary.					
5. I believe that nurses require training to in methods to prevent DVT.					
6. I believe that the prevention of DVT with low-dose heparin is irrational before surgery.					

Appendix 3 turk doctors

Yakın Doğu üniversitesi Hastanesi'de Ve Dr. Suat Günsel Girne

Üniversitesi Hastanesi'nde yatan hastalarda trombo- profolaksi tedavisinin akılcı kullanmı

EK-D

HEKİMLERİN BİLGİ DEĞERLENDİRMESİ İÇİN ANKET

1. Aşağıdakilerden hangisinin DVT (derin ven trombozu) için daha fazla risk olasılığı vardır?

a. Erkeklerde
b. Kadınlarda
c. 30 yaşından küçük kişilerde
d. 40 yaşından büyük kişilerde

2. Hangisi doğrudur?

a. Genel anestezi,DVT riskini arttırmaz.
b. Genel anestezi, DVT riskini arttırır.
c. Genel anestezi, sadece karın veya pelvise ait ameliyatlardaDVT riskini yükseltir.
d. 30 dk'dan fazla süren genel anestezi,DVT riskini arttırır.

3. Aşağıdakilerden hangisi ameliyat sırasında DVT olma sıklığı daha çoktur?

a. Kilolu hastaların
b. Malignite ameliyatlarında
c. Yaşlı hastalarda
d. Pelvise ait ameliyatlarda

4. Ameliyat sırasında DVT riski için en önemli mekanizma ya da mekanizmalar nelerdir?

a. Hiperkoagulabilite
b. Dolaşım sisteminin durması
c. Damarsal yaralanma
d. Hepsi

5. Hangisi doğrudur?

a. Uyluktavar olan DVT nun % 50 oranında pulmoner emboli olma olasılığı vardır.
b. Baldırdavar olan DVT nun % 40 oranında pulmoner emboli olasılığı vardır.
c. DVT'nin proksimal uzantısı pulmoner emboli riskini azaltır.
d. DVT, en yaygın pulmoner emboli kaynağıdır.

6. Hangisi DVT'nin risk faktörlerinden değildir?

a. Kalp yetmezliği
b. Paripertum evresi
c. OCP tüketimi (oral kontraseptif)
d. 30 dk dan az ameliyat süresi

7. Aşağıdaki ifadelerden hangisi tedavi edilmeden DVT sonucunu yansıtır?

a. Proksimal uzantı
b. Fibrinoliz ile sınırlama veyaDVT baldırı
c. Embolizasyon riski artması
d. Hepsi

8. Hangisi ameliyat sırasında DVThastalığından korunma için uygun değildir?

a. Aralıklı pnömatik sıkıştırma.
b. Düşük doz heparin
c. 2.5-3 INR ile varfarin (International normalized ratio)
d. Elastik çorap

9. DVT'nin önleyici tedbirlerin seçimi nasıl belirlenir?

a. Risk faktörlerinin sayısı
b. Ameliyat tipi
c. Anestezik ilaç türü
d. a ve b

10. Pulmoner Tromboembolizm için hangisi doğru değildir?

a. Hastanede önlenebilir ölümün en sık nedeni.
b. DVT en yaygın kaynak
c. Siyanozun ameliyatta en sık nedeni.
d. Çoğunun normal CXR (chest X-ray) si vardır.

11. Pulmoner tromboembolizm için tanı ve tedavi başlangıcı;

a. Klinik kriterler

b. Basit hematolijik testler
c. Sofistike görüntüleme
d. Klinik şüphe yeterlidir.

12. DVT, damar tıkanıklığı, damar duvarı hasarı ve değişmiş kan pıhtılaşması sonucu ortaya çıkar.

a. Doğru
b. Yanlış

13. Venöz Tromboembolizm DVT' nin ölümcül bir kombinasyonudur.

a. Doğru
b. Yanlış

14. VTE (Venöz Tromboembolizm) hastanede yatan hastalarda ani ölümlerin ana nedenidir.

a. Doğru
b. Yanlış

15. Ameliyat hastaları, DVT/VTE 'ye medikal hastalardan daha yatkındır.

a. Doğru
b. Yanlış

EK-E

Doktorlar için tutum sorular

Tutum sorular	**Kesinlikle Katılıyorum**	**Kesinlikle Katılmıyorum**	**Kararsizim**	**Katılıyorum**	**Katılmıyorum**

1. Inanıyorum ki Ameliyat sonrası hastalarda DVT taraması için hassas ve objektif testler (Doppler sonografi) gerekledir.					
2. Inanıyorum ki Ameliyattan önce DVT risk faktörlerinin belirlenmesi gereklidir.					
3. Inanıyorum ki Ameliyattan önce DVT profilaksi gereklidir.					
4. Inanıyorum ki eğitmek önleyici ile ilgili hastalar DVT ölçülerigereklidir.					
5. Inanıyorum ki DVT ‘nin önlenme hakkında hemşirelerin bilgi düzeyi ve Eğitimi istiyor.					
6. Inanıyorum ki Ameliyat öncesi düşük doz heparin uygulamasının tehliklidir.					