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RESEARCH ARTICLE

VENOUS THROMBOEMBOLISM: RISK FACTORS AND PROPHYLAXIS ASSESSMENTS IN AL SULAIMANIYAH VERSUS LONDON HOSPITALS

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ABSTRACT

Background: Venous thromboembolism (VTE) that includes deep vein thrombosis (DVT) and pulmonary Embolism(PE) is the major cause of mortality and morbidity in hospitalized patients, and It is often under diagnosed due to lack of information on VTE risk and prophylaxis. International recommendations suggested that active monitoring of VTE prophylaxis can improve the quality of it is practice in Hospitals and prevent death (Bottaro and Emery, 2012; Dorfman and Chan, 2006). ***Aim of the study:*** Study aimed to: 1) Assess the prevalence of VTE risk in acute hospital care setting in AL-Sulaimaniyah, 2) Determine proportion of at-risk patients receiving prophylaxis, 3) Assess the type of prophylaxis measures used and compare it with London Hospitals, 4) Implement an Internal prophylaxis Guideline in Kurdistan to put a positive impact on patients safety and lower the incidence of VTE occurrence in hospitals. Hoping to be depended by Iraqi health system. ***Patients and Methods:*** The current cross sectional study was carried out in two parts on 350 patients; 1st part conducted in AL-Sulaimaniyah Hospitals including Medical, General Surgery, and Orthopedic Teaching Hospitals on 250 patients from December 2012 to March 2013, and 2nd part was conducted in London Hospitals including Medical, General Surgery, Cardiovascular, Plastic and Orthopedic on 100 patients, from April to May 2013. Risk factors profile and total risk score determined are stratified in four risk groups based on Caprini Scoring Risk Assessment Model. Low risk (from 0-1point), Moderate risk (2 point), Higher risk (from 3-4 point), Highest risk (from 5 point and more). Descriptive statistics (numbers and percentage) were calculated for all variables, as well as analytical statistics was done to find the relations between variables by using fisher exact and Chi square test. A p-value < 0.05 was considered as significant. ***Results:*** Patients in AL-Sulaimaniyah Hospitals revealed that most of the patients were at highest risk score > 5, and only small percentage of them receiving prophylaxis (31%) The differences between prophylaxis measures used in two cities regarding most types of measurements in two specialty medical and surgical were highly significant (P value of all <0.001). ***Conclusion:*** Because lack of prophylaxis measures and non-implementing a Unique National Guideline like that done in London, the results of the study showed that the risks for DVT and PE were high in patients of AL-Sulaimaniyah Hospitals.

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INTRODUCTION

Historical background: A Chinese physician named Huan-Ti described how blood clots could affect blood circulation 2600 years B.C. (Shapiro, 2003). Aristotle, in Meteorology, and Hippocrates, in De *Carnibus* both postulated that the phenomenon was due to the cooling of blood (Büller *et al.,* 2009). Modern understanding of the pathophysiology of venous thrombosis is usually attributed to Rudolf Virchow in the mid-19th century (Shapiro, 2003). "Virchow`s triad" illustrates the three most important categories contributing to venous thrombosis which are changes in the:

1. Vessel wall
2. Blood flow
3. Constitution of the blood itself.

Overview: Venous thromboembolism (VTE) that include both deep venous thrombosis (DVT) and pulmonary embolism (PE) is a major health problem with substantial morbidity and mortality. It is often under diagnosed due to lack of information on VTE risk and prophylaxis (Agnihotri *et al.,* 2012). DVT also consider as precursor of potentially fatal PE and about 70-80% of PE cases in the hospital occur in medical (non-surgical) patients (Wessels and Riback, 2012; Autar, 1996). Other long term complications include post thrombotic syndrome in nearly one third to half of DVT patients (Tick *et al.,* 2008) and to lesser extend pulmonary hypertension, which has been reported to occur in nearly 4% of patients within the first two years after the first PE (Pengo *et al.,* 2004).

Incidence: DVT is a silent killer (Autar, 1996). It is a serious threat to recovery from surgery and the third most common vascular disease, after ischemic heart disease and stroke. The incidence of hospital-acquired DVT based on objective diagnostic screening is 10–40% among medical or general surgical patients (Dorfman and Chan, 2006), and 40–60% among patients who have undergone major orthopedic surgery such as total knee replacement (TKR), total hip replacement (THR), and hip fracture surgery (Anderson *et al.,* 1991) and 52% among Patients in acute hospital care globally (Wessels *et al.,* 2012). One of the dominant characteristics of this disease is that for every symptomatic pulmonary embolism diagnosed, there are 2.5 cases of VTE that we are not able to identify. Moreover, 40 to 60% of the deaths from VTE occurs in patients whom lacked a previous diagnosis of deep vein thrombosis (DVT), and 20% of the patients have a sudden death secondary to massive embolism as their first and only symptom (Tapson *et al.,* 2005; Geerts *et al.,* 2008).

Pathology: DVT refers to the formation of one or more blood clots (a blood clot is also known as a "thrombus") in one of the body's large veins, most commonly in the lower limbs. The clot(s) can cause partial or complete blocking of circulation in the vein, which can lead to pain, swelling, tenderness, discoloration of the affected area, and the skin can be warm to touch with prominent superficial veins. VTE comprises DVT with or without symptomatic PE (Anands *et al.,* 1998). PE occurs when a portion of the blood clot breaks loose and travels in the bloodstream to the lungs. PE can be a life threatening complication with signs and symptoms that include: shortness of breath, chest pain, cough and, more rarely, fainting due to low systemic blood pressure caused by vascular obstruction in the lungs (Johan, 2010) Table (1). Another serious complication of DVT is non-hemorrhagic stroke that may occur in a patient with a patent foramen ovale (Bridges *et al.,* 1992), A clot in the deep venous system of the leg can break off and travel to the right atrium, dilating that heart chamber. If the patient is one of the 25 or 30% who have a nonfunctioning patent foramen ovale, this atrial dilatation can open the patent foramen and allow the clot to enter the left side of the heart and proceed to the brain, producing a stroke (Messe *et al.,* 2004). The diagnosis of this problem is difficult because once the right atrium returns to normal size, the patent foramen ovale may be difficult to detect. Often when the clot breaks off from the leg, it does so cleanly without residual damage that can be detected on subsequent duplex examination (Messe *et al.,* 2004).

Table 1. Signs and Symptoms of DVT and PE that were looked for in the subject Patients

Signs and symptoms of DVT
• Pain or tenderness in the leg
• Swelling of the leg or along a vein in the leg
• Red or discolored skin on the leg
• Increased warmth in the area of the leg that's swollen or is in pain
Signs and symptoms of PE
• Unexplained shortness of breath
• Pain with deep breathing
• Coughing up blood
• Rapid breathing and fast heart rate

Causes and Risk factors: The cause of thrombosis is usually unknown but is universally attributed to Virchow's triad: stasis, hypercoagulability, and intimal injury. Risk factor can be divided to Acquired risk factor and genetic risk factor, Acquired risk factors as in Patients with malignancy, spinal cord injuries, multiple trauma or after any major surgical, gynecological and orthopedic procedures are at high risk for developing DVT and eventually might develop the fatal PE (Wessels *et al.,* 2012). Other risk factors for thromboembolic disease include pregnancy, immobilization, congestive heart failure, cigarette smoking, and the use of oral contraceptive (Kouka *et al.,* 2013) Table (2). Genetic factors that increase the risk of VTE include deficiencies of three proteins that normally prevent blood from clotting protein C, protein S, and Antithrombin. Having a non-O blood type approximately doubles VTE risk, Non-O blood type is common in all races, making it an important risk factor, Individuals without O blood type have higher blood levels of von Willebrand factor and factor VIII than those with O blood type, increasing the likelihood of clotting. Some risk factors influence the location of DVT within the body, In isolated distal DVT the profile of risk factors appears distinct from proximal DVT. Transient factors, such as surgery and immobilization, appear to be dominate risk.

Diagnosis: Diagnostic tests include Ventilation-Perfusion lung scans, Compression Ultrasound of the proximal leg veins, Pulmonary Arteriogram, Computed Tomography (CT scan) and Magnetic Resonance Imaging (MRI). Unfortunately, the results from most of these high technology diagnostic tests are usually inconclusive. The most important factor in establishing the diagnosis is the patients' signs and symptoms (Kouka, 2013).

Risk Assessment: The single most important factor in preventing VTE is identification of patient risk factors (Table 1) and many patients have more than one risk factor such as old age, decrease mobility and acute medical or surgical illness. Caprini Risk score recommendations were be compatible with The seventh American College of Chest Physicians on antithrombotic therapy and prophylaxis recommendations that were recently published a thorough evaluation of the literature that has been translated into evidence-based guidelines for thrombosis prophylaxis and treatment (Geerts *et al.,* 2014; Joseph, 2005; Juan *et al.,* 2010). They recommend simplified process of assigning patients to one of four VTE risk levels based on type of operation, age, and the presence of additional risk factors (Joseph, 2005). Table (3). Taking in consideration factors that increase anticoagulant bleeding side effect and caution in using mechanical prophylaxis (Figure 1)

Prevention: The Federal Agency for Health Research and Quality (AHRQ) in the United States considers that the appropriate use of thromboprophylaxis (TP) is the most important procedure today for an institution to improve the quality of its practices (Geerts *et al.,* 2008). Physicians should be encouraged to strongly consider highly aggressive prophylactic measures if the best available diagnostic tests are inconclusive, because treatment is usually safe and successful.

General measures used to prevent VTE:

1. Early mobilization and leg exercise
2. Adequate hydration
3. Compression methods (e.g. stockings)
4. Pharmacological agents which may be used alone or in combination with compression methods (Alison Warren, 2006).

Table 2. Acquired Risk Factors

Acquired risk factors	Mechanism
Older age	alters blood composition to favor clotting.
Major surgery, orthopedic surgery & trauma	increase the risk because of tissue factor from outside vascular system entering the blood venous stasis may be temporarily provoked by a cessation of blood flow as part of the procedure [12].
Malignancy and chemotherapy	Genetic alteration can lead to DVT development and over 50%of malignant patients have altered marker of thrombophilia(2) VTE risk is 3- to 5-fold higher in cancer patients who are undergoing surgery and 6.5-fold higher in cancer patients receiving chemotherapy than in patients who do not have cancer.[19]
Pregnancy and postpartum	alters blood composition to favor clotting.
Oral contraceptives and hormonal replacement therapy	Increase the risk through a variety of mechanisms, including altered blood coagulation protein levels.
Obesity and immobilization, as in orthopedic casts sitting, travel, bed rest, and hospitalization	1- reduced blood flow in leg veins 2-injury to blood vessels wall 3-increase the activity clotting mechanism 4-additional weight exert pressure on veins causing them to weaken[2]
Heart failure	low rate of blood flow.

Table 3. DVT Risk Score & Prophylaxis Regimen

Total Risk Factor Score	Incidence of DVT	Risk Level	Prophylaxis Regimen
0–1	10%	Low	No specific measures; early ambulatory
2	10–20%	Moderate	ES or IPC or LDUH, or LMWH
3–4	20–40%	High	IPC or LDUH, or LMWH alone or in combination with ES or IPC
5 or more	40–80% 1–5% mortality	Highest	Pharmacological: LDUH, LMWH ,Warfarin, or factor Xa inhibitors alone or in combination with ES or IPC

Table 4. Prophylaxis Safety Considerations

Anticoagulants: Factors Associated With Increased Bleeding
▪Active bleeding
▪History of heparin – induced thrombocytopenia
▪Platelet count < 100,000/mm^3
▪Concurrent use of oral anticoagulants, platelet inhibitors.
▪Abnormal creatinine clearance
If any of the above boxes are checked, the patient may not be a candidate for anticoagulant therapy and should consider alternative prophylactic measures.
Intermittent Pneumatic Compression (IPC): Cautions
▪Patient with sever peripheral arterial disease
▪Patient with congestive heart failure
▪Patient has an acute superficial / deep vein thrombosis
If any of the above boxes are checked, the patient may not be a candidate for IPC therapy and should consider alternative prophylactic measures

Methods of Prophylaxis: The process of providing appropriate thrombosis prophylaxis to medical and surgical patients is a complex issue because many times the administration of powerful anticoagulants may carry the risk of side effects, most notably bleeding (Joseph, 2005).

Pharmacological Methods: There are many clinical studies that provide various ways of pharmacological methods for prophylaxis of DVT. physicians should identify patient at risk for thromboembolism, and choose the appropriate method and regimen of treatment. [17] Adequate initial anticoagulant therapy of DVT is required to prevent thrombus growth and PE. LMWH and UFH are the most commonly used drugs, UFH is being replaced by LMWH as the anticoagulant of choice for initial treatment of VTE (Simon and McRae, 2004).

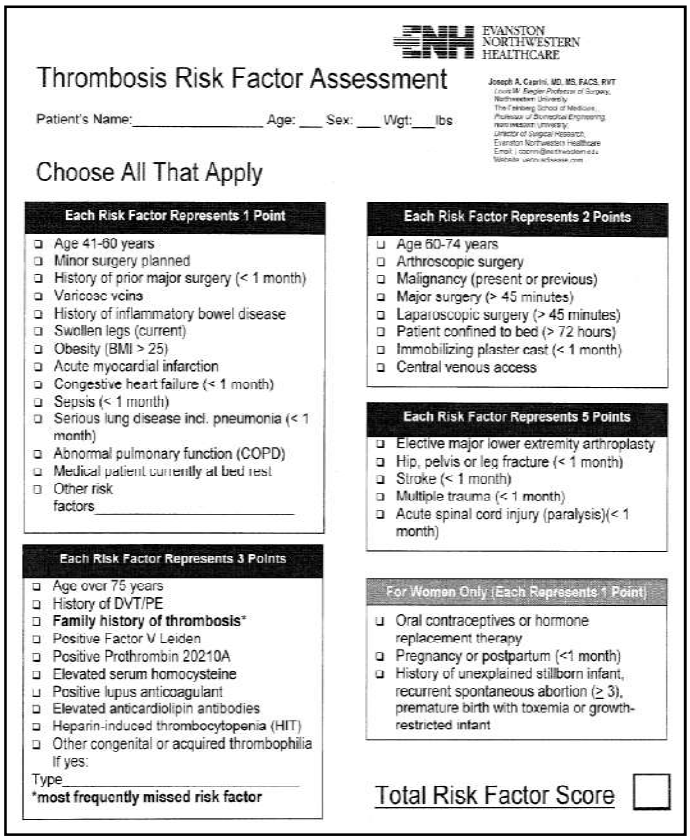
Newer agents such as Fondaparinux is also licensed for prophylaxis of DVT in medical and surgical patients, Danaparoid is licensed in the prevention of DVT in patients undergoing general or orthopedic surgery (Alison Warren, 2006). Extended anticoagulant treatment is necessary to prevent recurrent VTE, warfarin are the agents most often used for this purpose (Tapson *et al.,* 2005). Newer oral anticoagulants, such as direct thrombin inhibitors (e.g., Dabigatran etexilate) and direct factor Xa inhibitors (e.g., Rivaroxaban, Apixaban, and Edoxaban), have been developed to use in the prevention and treatment of VTE (Hlaing and Tunl, 2013).

Non-Pharmacological Methods: To reduce the side effects of pharmacological agents and to increase the effectiveness of prophylaxis and treatment of DVT and PE, non-invasive method was introduced. Graduated compression stocking (GCS) reduce the cross-sectional area of the veins and increase the velocity of venous blood flow up to 75% and prevent intraoperative distention of the calf veins in patients receiving general anesthesia (Juan, 2010). It is important to differentiate GCS used for primary prophylaxis of DVT from therapeutic graduated stocking which apply a pressure of 30 to 40 mm Hg at the calf and are used for the secondary prevention of post thrombotic syndrome after a DVT is diagnosed or as therapy once this syndrome arises. These devices are called EPC or IPC devices. There are two types of IPC: Pneumatic Compression Devices (PCD) and Sequential Compression Devices (SCD).

Both systems use an intermittent regimen that delivers a sustained pressure in distal to proximal manner, The difference between them are that the compartments in PCD devices are uniformly inflated to the same pressure rather than in a graded-sequential fashion as in SCD devices. In addition to the local effects IPC devices also have general (systemic) effects Several studies showed that venous compression secondary to IPC results in the release of plasminogen and Nitric Oxide) into the blood stream from the endothelial layer of the vein wall that increase the fibrinolysis and reduce the stasis.

Source: http:// www.circulationfoundation.org.

Figure 1. Elastic compression stocking



EVANSTON NORTHWESTERN HEALTHCARE

Thrombosis Risk Factor Assessment

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Patient's Name:_____ Age: ___ Sex: ___ Wgt:___lbs

Choose All That Apply

Each Risk Factor Represents 1 Point

- ❑ Age 41-60 years
- ❑ Minor surgery planned
- ❑ History of prior major surgery (< 1 month)
- ❑ Varicose veins
- ❑ History of inflammatory bowel disease
- ❑ Swollen legs (current)
- ❑ Obesity (BMI > 25)
- ❑ Acute myocardial infarction
- ❑ Congestive heart failure (< 1 month)
- ❑ Sepsis (< 1 month)
- ❑ Serious lung disease incl. pneumonia (< 1 month)
- ❑ Abnormal pulmonary function (COPD)
- ❑ Medical patient currently at bed rest
- ❑ Other risk factors_____

Each Risk Factor Represents 2 Points

- ❑ Age 60-74 years
- ❑ Arthroscopic surgery
- ❑ Malignancy (present or previous)
- ❑ Major surgery (> 45 minutes)
- ❑ Laparoscopic surgery (> 45 minutes)
- ❑ Patient confined to bed (> 72 hours)
- ❑ Immobilizing plaster cast (< 1 month)
- ❑ Central venous access

Each Risk Factor Represents 5 Points

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

Each Risk Factor Represents 3 Points

- ❑ Age over 75 years
- ❑ History of DVT/PE
- ❑ **Family history of thrombosis***
- ❑ Positive Factor V Leiden
- ❑ Positive Prothrombin 20210A
- ❑ Elevated serum homocysteine
- ❑ Positive lupus anticoagulant
- ❑ Elevated anticardiolipin antibodies
- ❑ Heparin-induced thrombocytopenia (HIT)
- ❑ Other congenital or acquired thrombophilia

If yes:
Type_____
***most frequently missed risk factor**

For Women Only (Each Represents 1 Point)

- ❑ 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

Total Risk Factor Score ☐

Figure 2. Assessment of risk factors for venous thromboembolism
Josef A. capriny, MD, MS, FACS, RVT
Louis W. biogler professor of surgery. Northwestern university.

Aims of the study

1. Assess the prevalence of VTE risk in acute hospital care setting in
2. AL-Sulaimaniyah.
3. Determine proportion of at-risk patients receiving prophylaxis.
4. Evaluate the type of prophylaxis measures used and compare it with London Hospitals.

PATIENTS AND METHODS

AL-Sulaimaniyah Hospitals: During four months period from December 2012 to March 2013, 250 patients over the age of 18 who were admitted to the AL-Sulaimaniyah Hospitals General Wards were selected based on Caprini Risk Score, according to the presence of one or more of VTE risk factor. One Hundred patients from internal medicine and internal care unit and 150 patients from general surgery hospitals with 2 major department (orthopedic 85 patients) and general surgery (65 patients) The patients total risk score determined. then the patients are classified into four risk groups :

Low risk (from 0-1point)
Moderate risk (2 point)
Higher risk (from 3-4 point)
Highest risk (from 5 point and more)

For each group a first line strategy is recommended and other options are suggested (Table 3). These patients selected according to inclusion questionnaire present in the following published standard protocol Caprini's risk stratification score model).

London Hospitals: During a one month period from April to May 2013, data was collected from 3 general hospitals in London (Royall Free Hospital, Guy's and ST Thomas Hospital and General Heart Hospital) in which 100 patient were taken. The DVT risk factor assessment and prophylaxis measured were analyzed.

Exclusion Criteria: The exclusion criteria to all patients were the pediatric age group, patients who had less than 24 hours of hospitalization, patients with total risk factor score less than 3, patients receiving anticoagulant therapy in therapeutic dose for medical conditions other than prophylaxis such as recurrent DVT or PE or atrial fibrillation.

Table 5. Distribution of patients from London Hospitals

Department	Patients
Medical Department	30 patients
Orthopedic Department	15 patients
Neurological Department	15 patients
Vascular surgery Department	22 patients
Cardiac surgery Department	6 patients
Plastic surgery Department	12 patients
Total number of the patients	100 patients

Data Collection: The data was collected from patients by taking medical and surgical history, patients files and also from EPR (electronic patient's records regarding the patients in London hospitals). Patients were followed during hospitalization to record any changes in the risk categories and document any signs of PE or DVT if present and if any prophylaxis for DVT or PE was given.

Statistical Analysis: Each returned questionnaire was given an identity number (ID). Prior to data entry and analysis, the questions of study were coded. The data was entered into a Microsoft Excel Spreadsheet, after data cleaning; the data was transported into SPSS 21 (Statistical Package for the Social Sciences-version 21) package software program for statistical analysis. Descriptive statistics (numbers and percentage) were calculated for all variables, as well as analytical statistics was done to find the relations between variables by using fisher exact and Chi square test. A p-value < 0.05 was considered as significant.

Ethical Issue: The research protocol was approved by Medical Research Ethics Committees of the Faculty of Medicine, University of Sulaimaniyah, School of Pharmacy and Health Directorate of AL-Sulaimaniyah.

RESULTS

Patients Sample (No. 250) from AL-Sulaimaniyah Hospitals:

Orthopedic Patients Sample: The most common risk factors for patients from both orthopedics and surgical Wards were listed in Table (6). The results indicated that the most prevalent risk factors were patient confined to bed (Immobilization) (92%), Age > 40 years (72%), major orthopedic surgery (90%), Hip, pelvic or leg fracture (54%) as shown in (Table 6). The relationship between risk scores with prophylaxis assessment in orthopedic patients was shown in Table (7). the percentage of patients who received prophylaxis are different according to risk score ; 40% of patients with score 14 received prophylaxis and 20% with score 4 were received it, while 100% especially of highest risk patients (5and more) should receive appropriate prophylaxis. This association between score level and prophylaxis receiving patients was statically not significant (P value 0.073). The final analyzing of orthopedic patients reviled that; small percentage of risky patients only were received prophylaxis (31%).

General Surgery Sample: The most common risk factors among patients in general surgery were ; major general surgery (100%), patients confined to bed > 72 hour(100%), age >40 (87.6%), malignancy (33.8%) (Table 6). Table 8 shows 65 patients from general surgery were scored according to their total risk and the study found that only 26% of Patients were on treatment. The table show that score 5(36.9%) and score 6 (26.2) were be the highest scores in this patients sample. The relationship between all risky patients and their prophylaxis management are week and considered statistically not significant

Medical Patients Sample: Many patients of the medical sample had two or more VTE risk factor, Table (9) show that immobilization for more than 72 hours (100%), stroke (31%), serious lung disease including pneumonia (27%), heart failure (18%) and malignancy (14%) were the most common risk factors among these patients. Table (10) shows the total risk score among medical patients and their prophylaxis assessment. High percentage of patients who received prophylaxis were reported among patients with lowest risk score as in score 5 (38.9%) and score 4(19.4%) while no patients with the highest risk score were received it (0 % in score 11) this association was statistically significant (P value=0.017). Data analyzing from medical sample show that 36% only of the studied patient received prophylaxis and the remaining patients 64% were unprotected against VTE. (Table 11) show association between prophylaxis receiving in surgical and medical patients with different risk scores. In score 4; high % of medical patients (43%.8) were received prophylaxis in relation with only 20% in surgical specialty, this association statically was not significant (P value=0.344). Within score 5 (60.9%) of medical patients were received prophylaxis comparing with (12.5%) in surgical specialty this retaliation considered highly significant statistically (P value= 0.001).Comparing the final result in AL-Sulaimaniyah hospitals, regarding the VTE prophylaxis, the medical group show higher percentage of adherence than surgical group.

London Patients sample: Regarding the patients from London hospitals the Table (12) show the distribution of the patient from different General Hospitals wards. The result of analyzing the London patients sample show that 98% of the patients were assessed for VTE risk factors and managed individually and anti-thrombotic prophylaxis was ordered taking in consideration the risk of bleeding and contraindications, the remaining 2% patients were not assessed accidentally each patient from different hospital.

Table 6. Distribution of 150 surgical patients according to their risk factors

Risk factors	Orthopedic		G. Surgery	
	No.	%	No.	%
Age group > 40 years	62	72.94	57	87.69
Patient confined to bed >72 hours	79	92.94	65	100.00
Major orthopedic surgery >45 minutes	77	90.59	0	0.00
Major general surgery >45 minutes	0	0.00	65	100.00
Arthroscopic surgery	6	7.06	0	0.00
Multiple trauma	26	30.59	0	0.00
Hip, pelvis or leg fracture	46	54.12	0	0.00
Malignancy(at present time or previous)	7	8.24	22	33.85
Elective major lower extremity Arthroplasty	6	7.06	0	0.00

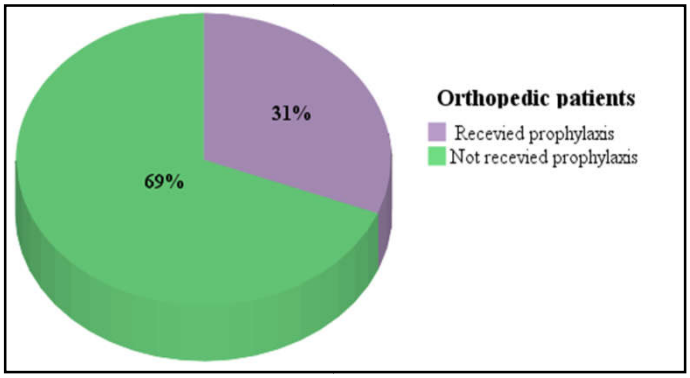

Figure 3. Percentage of prophylaxis among orthopedic patients in Al-Sulaimaniyah sample

Comparison of Prophylaxis Measures used in AL-Sulaimaniyah Versus London: After comparison the type of VTE prophylaxis measures used with the two patients samples (Table 13 medical, 14 surgical) from AL-Sulaimaniyah and London hospitals, the result was highly significant in which one patients of 250 patients from AL-Sulaimaniyah hospitals was received mechanical prophylaxis (stocking) which consider internationally safe and effective measure of VTE prophylaxis comparing with 37% from London sample. The differences between most type of prophylaxis measures used in two cities in two specialties medical and surgical are highly significant (P value <0.001) In comparing use of UFH among medical patients in two cities samples Table (13) showed that 92.3 of % patients in AL-Sulaimaniyah Hospitals were treated

Table 7. Risk Score &Orthopedic Prophylaxis Assessment Relationship

Score of total risks	Prophylaxis receiving in orthopedics		Total N(%)	Percentage Of Prophylaxis Assessment	P value
	No N(%)	Yes N(%)			
Score 3	3(5)	0(0.0)	3(3.5)	0%	
Score 4	4(6.7)	1(3.8)	5(5.9)	20%	
Score 5	9(16.7)	5(19.2)	14(16.5)	36%	
Score 6	4(6.7)	2(7.7)	6(7.1)	33%	
Score 7	9(15.2)	2(7.7)	11(12.9)	18%	
Score 8	6(10)	3(11.5)	9(10.6)	33%	0.073
Score 9	11(18.6)	1(3.8)	12(14.1)	8%	
Score 10	5(8.5)	2(7.7)	7(8.2)	29%	
Score 11	4(6.7)	2(7.7)	6(7.1)	33%	
Score 12	1(1.7)	6(23.2)	7(8.2)	85%	
Score 14	3(5)	2(7.7)	5(5.9)	40%	
Total	59(100.0)	26(100.0)	85(100.0)	31%	

Table 8. Risk Score & General Surgery Prophylaxis Assessment Relationship

Scores	Prophylaxis receiving in general surgery patients		Total	Percentage of prophylaxis Assessment	P value
	No N(%)	Yes N(%)			
Score 4	4 (8.2)	1 (6.3)	5 (7.7)	20%	
Score 5	21 (42.9)	3 (18.8)	24 (36.9)	12.5%	
Score 6	13 (26.5)	4 (25.0)	17 (26.2)	23.5%	
Score 7	4 (8.2)	5 (31.3)	9 (13.8)	55.6%	0.154
Score 8	5 (10.2)	3 (18.8)	8 (12.3)	37.5%	
Score 9	1 (2.0)	0 (0.0)	1 (1.5)	0%	
Score 10	1 (2.0)	0 (0.0)	1 (1.5)	0%	
Total	49 (100.0)	16 (100.0)	65(100.0)	25.6%	

Table 9. Distribution of 100 medical patients according to their risk factors

Risk Factors	Percentage of patients
Age > 40	96 %
Morbid obesity	4%
Sepsis <(1month)	7%
Serious Lung Disease including Pneumonia	27%
Pregnancy or Postpartum<1 month period	4%
Acute myocardium infarction	9%
Congestive heart failure	18%
Medical patients currently at bed rest >72 hours	100%
History of prior major surgery <1 month	5%
Abnormal Pulmonary Function (COPD)	7%
Stroke(<1month)	31%
Malignancy at present time or previous	14%

Table 10. Risk Score of Medical patients & Prophylaxis Assessment Relationship

Score of total risks	Prophylaxis receiving in medical patients		Total	Percentage of prophylaxis Assessment	P value
	No N(%)	Yes N(%)			
Score 4	9(14.1)	7(19.4)	16(16.0)	43.7%	
Score 5	9(14.1)	14(38.9)	23(23.0)	60.8%	
Score 6	13(20.3)	4(11.1)	17(17.0)	23.5%	
Score 7	7(10.9)	3(8.3)	10(10.0)	30%	0.017
Score 8	6(9.4)	2(5.6)	8(8.0)	25%	
Score 9	9(14.1)	3(8.3)	12(12.0)	25%	
Score 10	4(6.3)	3(8.3)	7(7.0)	42.8%	
Score 11	7(10.9)	0(0.0)	7(7.0)	0%	
Total	64(100.0)	36(100.0)	100(100.0)	36%	

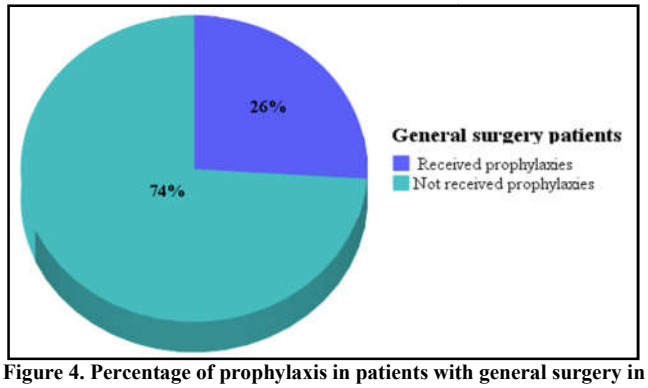

Figure 4. Percentage of prophylaxis in patients with general surgery in Al-Sulaimaniyah sample.

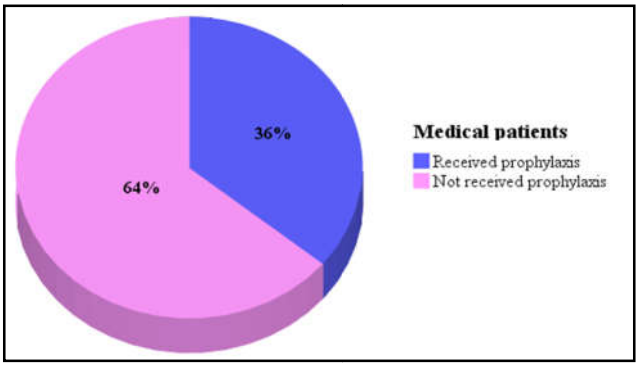

Figure 5. Percentage of prophylaxis among medical patients in Al-Sulaimaniyah sample.

Table 11. Association Between Prophylaxis Receiving in Surgical and Medical Specialty in Different scores levels

Prophylaxis receiving	Specialties		Total N(%)	P values
	Surgery N(%)	Medicine N(%)		
Score 4				
No	4(80.0)	9(56.3)	13(61.9)	**0.344**
Yes	1(20.0)	7(43.8)	8(38.1)	
Total	5(100.0)	16(100.0)	21(100.0)	
Score 5				
No	21(87.5)	9(39.1)	30(63.8)	**0.001**
Yes	3(12.5)	14(60.9)	17(36.2)	
Total	24(100.0)	23(100.0)	47(100.0)	
Score 6				
No	13(76.5)	13(76.5)	26(76.5)	**1.000**
Yes	4(23.5)	4(23.5)	8(23.5)	
Total	17(100.0)	17(100.0)	34(100.0)	
Score 7				
No	4(44.4)	7(70.0)	11(57.9)	**0.255**
Yes	5(55.6)	3(30.0)	8(42.1)	
Total	9(100.0)	10(100.0)	19(100.0)	
Score 8				
No	5(62.5)	6(75.0)	11(68.8)	**0.500**
Yes	3(37.5)	2(25.0)	5(31.3)	
Total	8(100.0)	8(100.0)	16(100.0)	
Score 9				
No	1(100.0)	9(75.0)	10(76.9)	**0.769**
Yes	0(0.0)	3(25.0)	3(23.1)	
Total	1(100.0)	12(100.0)	13(100.0)	
Score 10				
No	1(100.0)	4(57.1)	5(62.5)	**0.408**
Yes	0(0.0)	3(42.9)	3(37.5)	
Total	1(100.0)	7(100.0)	8(100.0)	

Table 12 Comparison of prophylactic measures used among medical patients in AL-Sulaimaniyah and London Samples

Type of treatment	City	Medicine N(%)	P values
Mechanical(stocking)	Sulaimaniyah	1(20.0)	<0.001
	London	4(80.0)	
	Total	5(100.0)	
UFH	Sulaimaniyah	12(92.3)	<0.001
	London	1(7.7)	
	Total	13(100.0)	
Enoxaparin	Sulaimaniyah	24(57.0)	0.255
	London	18(43.0)	
	Total	42(100.0)	
Tinzaparin	London	0(0.0)	
	Total	0(0.0)	
LMWH +Warfarin	London	0(0.0)	
	Total	0(0.0)	
Both pharmacological and mechanical stocking	London	7(100.0)	
	Total	7(100.0)	

Table 13. Comparison of prophylactic Measures used among Surgical Patients in AL-Sulaimaniyah and London Samples

Type of treatment	City	Surgery N(%)	P values
Mechanical(stocking)	Sulaimaniyah	0(0.0)	<0.001
	London	11(100.0)	
UFH	Sulaimaniyah	3(33.3)	<0.001
	London	6(66.7)	
	Total	9(100.0)	
Enoxaparin	Sulaimaniyah	39(72.0)	<0.001
	London	15(28.0)	
	Total	54(100.0)	
Tinzaparin	London	30(100.0)	
	Total	30(100.0)	
LMWH +Warfarin	London	7(100.0)	
	Total	7(100.0)	
Both pharmacological and mechanical stocking	London	15(100.0)	
	Total	15(100.00	

by UFH comparing with7.7% patients in London sample. In surgical sample the use of UFH in London Hospitals was double to that of AL-Sulaimaniyah sample (Table 14). Also multiple type of LMWH were used more than UNFH in London sample comparing with Enoxaparine that used in AL-Sulaimaniyah hospitals widely, This may be attributed to it is availability in our locality. long period prophylaxis by using warfarin after using LMWH was noted only in surgical patients from London Sample.

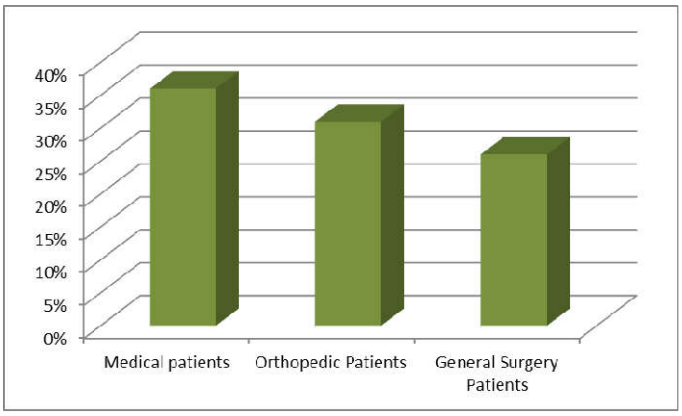

Figure 6. Comparison of percentage of prophylaxis among different patient samples

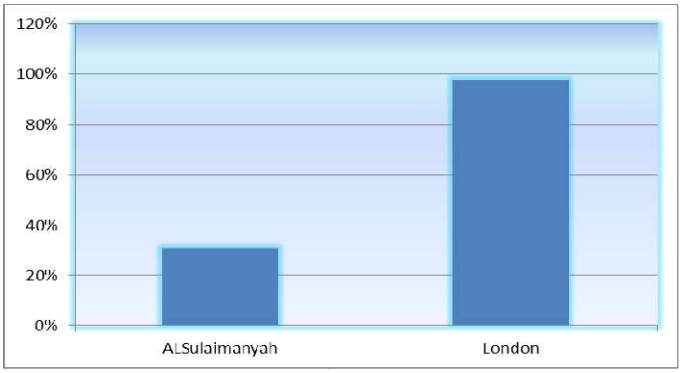

Figure 7. Percentage of Thromboprophylaxis in AL-Sulaimaniyah Versus London Hospitals.

DISCUSSION

VTE consider the most common preventable causes of hospitals death and a source of substantial long term morbidity. Furthermore, it is the most negligible field in Iraqi Health System.

Risk factors assessment in Al-Sulaimaniyah sample: The results of current study showed that the patients confined to bed > 72 hours (immobilization) was the first prevalent factor among all subgroups in AL-Sulaimaniyah samples (orthopedic 93%, general surgery 100% and medical 100%). The second most prevalent risk factor was age > 40; (73%), (88%) and (96%) in orthopedic, general surgery and medical respectively. The results were consistent with the results in a study done in Iran which reported that old age were be the highest risk factors and most likely to benefit from VTE prophylaxis especially when they become immobilized due to acute illness or surgery. In medical patients sample of the current study it has been estimated that stroke (31%), serious lung disease including pneumonia (27%), heart failure (18 %) and malignancy (14%) were among the most frequently documented risk factors (see Table 2 mechanism of acquired risk to developed DVT). These finding were in-agreement with (ENDORSE) a cross sectional study in India in which stroke, Chronic pulmonary disease, heart failure and complete immobilization were the most common risk factors before and

during hospitalization. Most of the studied patients were at highest risk score (5 points & more) in both medical and surgical specialty with two or more risk factors with no statistically significant difference between medical and surgical in all caprini risk scores except in score 5 where the different was significant (P value 0.001) This results was consistent with the study in united states which is a Cross-sectional study of adherence to VTE in which the majority of patients at the hospitals were in the high and very high risk scores for VTE with no significant difference between medical and surgical department. And this result was also consistent with study done in Chicago USA (Dorfman and Chan, 2006) which found that most of studied patients had two or more risk factors with highest risk group.

Assessment of thromboprophylaxis: The study found that only a minor fraction, 31% of all 250 patients, received prophylaxis in Al-Sulaimaniyah Sample (36% in medical, 31% in surgical and 26% in orthopedic department). comparing with 98% of patients in London Hospitals who were on prophylaxis. In study done in Iran (Khalili *et al.,* 2010) 88.4% of patients received appropriate anticoagulant and in the study done in South Africa (Wessels and Riback, 2012) Adequate prophylaxis was given to 70.9% of all patients. Other study done in Chicago USA (Dorfman and Chan, 2006) showed that 88.5% of patients received adequate VTE prophylaxis. In other studies as in (Agnihotri *et al.,* 2012) study done in India the finding were 16.3% in surgical and 19.1% among medical patients received anticoagulants. In spite of similar finding between current study and India study in that there is underutilization of thromboprophylaxis, and this necessitate to increase the rate of prophylaxis to reach the international base line. The cause behind this finding could be decrease in a awareness of this medical problem or fearing of bleeding side effect of anticoagulant or may be cost effective.

Comparison of prophylaxis measures used in AL-Sulaimaniyah Hospitals versus London Hospitals: The most challenge that face the physicians in deciding use of anticoagulant drugs is the side effect of bleeding especially in surgical patients, but the result of the study shows that the decrease of adherence to the importance of DVT risk factor assessment play a major role in our situation because only 1 patient (0.4%) was received mechanical prophylaxis (stocking) which is consider effective and safe prophylaxis methods especially with risk of bleeding, (Table 14) in contrast 40 % of patients from London hospitals sample received it either alone or in combination with other pharmacological prophylaxis. This result was inconsistent with Review study included united kingdom and United State and other European countries identifying Eleven studies, six of them randomized controlled trials, The trials compared the use of compression stocking alone with the use of combined methods (stocking and anticoagulants) which reduced significantly the incidence of both symptomatic PE from about 3% to 1% and DVT from about 4%to 1% while Compared with pharmacological prophylaxis alone, the use of combined methods significantly reduced the incidence of DVT from 4.21% to 0.65%. The differences between most types of prophylactic measures used in AL-Sulaimaniyah and London Hospitals in both specialty (medical and surgical) were statically highly significant (P value <0.001) Table (13, 14). Patient sample analysis from London hospitals revealed that 98% of patients were received VTE prophylaxis in form of anticoagulant medications or mechanical prophylaxis or both, The VTE medical and surgical risk factors assessment and bleeding risk assessment lists are present in each patients file and should be completed on admission and review during hospitalization and the types of anticoagulant measures (pharmacological or mechanical prophylaxis or both), route of administration, dose, frequency, starting day and suspected stopping day are ordered on DVT/PE prophylaxis prescribing section in patients files by the doctor depending on the patients conditions and hospital guideline which facilitate choosing the appropriate type of anticoagulant ,while those patients in our hospitals sample who received prophylaxis they didn't receive it at the date of admission like patients in London and some of them received anticoagulant drugs after developing signs of DVT or PE. The dose of Enoxaparine which is the most anticoagulant drug used for patients in our hospitals was ranged from 2000 to 8000 I.U with variable duration of treatment and without presence of uniform clear strategy to be adapted by doctors and pharmacist to provide best patients care and simplifies the prescription of thromboprophylaxis. Long term prophylaxis by using warfarin was not found in Al-Sulaimaniyah Hospitals sample comparing with 7% among surgical patients in London Hospitals. This finding was not compatible with the recent study [23] demonstrated that 40 % of DVT and PE occurred more than 21 days after surgery.

The major limitations of this study were the:

1. Small samples size
2. Short period of study
3. The patients files were not organized
4. There is no epidemiological study for assessment the real incidence of VTE in our locality.

Conclusion

1. The current study highlights that a significant proportion of patients have increased risks for DVT during their acute illness, which, if overlooked, could be responsible for life-threatening complications at the later stages.
2. Most of the studied patients were at highest risk score (5 points &more) in both medical and surgical specialties with no statistically significant difference between them.
3. The most common reported prevalent risk factors in AL-Sulaimaniyah sample were:
    a. Immobilization and age group > 40 years old in all subgroups.
    b. Major surgery, lower extremity fractures and multiple trauma in surgical sample.
    c. Stroke, serious lung disease including pneumonia, heart failure and malignancy among medical patients.
4. The study found that only a minor fraction in AL-Sulaimaniyah sample, 31% received thromboprophylaxis.
5. The study found a lack of implementation of DVT prophylaxis strategy among acutely ill patients in our hospitals.
6. Patient sample analysis from London hospitals showed that:
    a) About 98% of patients were received VTE prophylaxis.

b) All patient were assessed for total risk score and giving appropriate prophylaxis at date of admission.
c) c)The differences between most types of prophylactic measures used in AL-Sulaimaniyah versus London Hospitals in both specialties (medical and surgical) were statically highly significant (P value <0.001).

Recommendations

1. We recommend the greater significance of implementing locally adapted clinical guideline in initial management of patients to be started in Kurdistan region and hoping to be extended all over Iraqi regions.
2. We suggest to employ entry system for screen VTE at the time of patients admission which can raise physicians, awareness of the need for the use of prophylaxis and it can detect the majority of asymptomatic VTE event in medical and postsurgical hospitalized patients.
3. 3-We recommend a further studies to determine the true incidence of DVT&PE and most common risk factors in our country, this can be done by performing a large multicenter study (ENDORSE) study during a short period of time or by using a restricted number of study center and expand the observation period.

List of abbreviations

ACCP	American College of Chest Physician
CT	Computed Tomography
DVT	Deep Venous Thrombosis
EPC	External pneumatic compressions
EPR	Electronic patients records
ENDORSE	Epidemiologic International Day for the Evaluation of Patients at Risk for Venous Thromboembolism in the Acute Hospital Care setting
GCS	Graduated compression stocking
IPC	Intermittent pneumatic compression
LDUH	Low dose unfractionated heparin
LMWH	Low molecular weight heparin
MRI	Magnetic Resonance Imaging
PCD	Pneumatic compression device
PE	Pulmonary Embolism
SCD	Sequential compression device
THR	Total hip replacement
TNR	Total knee replacement
UFH	Unfractionated Heparin
VTE	Venous thromboembolism

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