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A Prospective Study on Risk Assessment of Venous Thromboembolism Using Padua Prediction Score and Caprini Score and Barriers towards Optimal Prophylaxis in a Tertiary Care Hospital.

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ABSTRACT

Introduction:

VTE is the formation of thrombus or clot within the veins. The thrombus can be formed in any venous system, but mainly it occurs in the vessels present in the leg, which may result in deep vein thrombosis(DVT) and reach lungs, resulting in a pulmonary embolism(PE). Deep vein thrombosis and Pulmonary embolism both constitute venous thromboembolism. Around all of the VTE events occurring, half of them are inpatients but it is well established that assessing and prevention of VTE in inpatients are largely under-utilised, When there is a suspicion of VTE it can be prevented if accurate assessing of patients at high risk of thrombosis and prophylaxis is given.

Aim: To assess hospitalised patients for VTE risk and to understand barriers to provide optimal prophylaxis.

Methodology: It is a prospective study conducted in hospitalized patients for 6 months among 315 subjects who met with inclusion criteria were evaluated and monitored. Statistical procedure of chi square test was done in graph pad prism to analyse the data.

Results: In this study the mean age of study population was found to be 49 Years. But males(62.14) are predominant over females.
A total of 218 medically ill patients were evaluated. Of these patients, 31.3% are having mild risk 18.6% are having moderate risk and 50% are having high risk and only 10% received appropriate prophylaxis (i.e., the correct dose at the right time) or did not receive prophylaxis because it was contraindicated.
A total of 96 surgical patients were evaluated. Of these patients, 70% are having high risk, 24.4% are having moderate risk, 4.65% are having mild risk and only 15% received adequate prophylaxis. We evaluated the barriers for VTE prevention from Health care workers, and lack of awareness was found to be a potential barrier. Clinical pharmacist activities were performed for individual patients such as lifestyle changes for mild risk patients.

Conclusion: The assessment of prophylaxis adequacy should be considered to provide optimal prophylaxis to administer the correct dose at the correct time but also to know patients who are contraindicated. There is a need for awareness and implementation of ACCP evidence based guidelines and to assess risk, to take preventive measures for better patient care. A clinical pharmacist can play a major role in preventing VTE risk by assessing individual patients and in providing information regarding optimal prophylaxis.

I. INTRODUCTION

Venous thromboembolism (VTE) is a potentially fatal disorder and an important health problem in our aging society. However it can affect young, healthy adults, most frequently it occurs in patients who undergo multiple trauma, major surgery, immobile for a longer period of time, or having a hypercoagulable disorder. Deep vein thrombosis (DVT) is clot formation within the venous circulation and pulmonary embolism (PE) is in lungs,both constitute VTE. PE can lead to sudden death within minutes after the onset of symptoms and before treatment is given. Unfortunately, the disease doesn't show any clinical signs or symptoms, and the first indication

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may be sudden death. The treatment of VTE is worrisome with long term risks.[3]Systematic approaches to drug therapy management can reduce the long term risks, but bleeding is a common and serious complication of taking antithrombotic drugs.([5],[6],[7]) Antithrombotic drugs require accurate dosing and careful monitoring.[4, 5] When there is a suspicion of VTE it can be prevented if accurate selection of patients at high risk of thrombosis and prophylaxis is given. In order to provide adequacy of prophylaxis risk should be assessed.

Group assessment and individual assessment are the two widely used methods to assess the VTE risk in patients. Recent publications concluded the individual risk assessment approach would be more appropriate to use. Several individualized VTE risk assessment models (RAMs) have been proposed and evaluated clinically, the most notable being those developed by padua prediction score for medical patients and Caprini, Cohen, Kucher, Roger and NICE guidelines for surgical patients. We adapted padua prediction score and caprini assessment model.The Padua risk assessment model was developed to estimate the risk of Venous Thromboembolism in medically ill patients. It is the most widely used model for assessing VTE risk in medically ill patients. This model along with the risk assessment gives appropriate recommendations for prophylaxis according to the level of risk and score.

The Caprini risk assessment model is based on clinical experience and printed data. Several modifications of this model have been validated in surgical patients in the western population. In addition to risk assessment, this model also gives appropriate recommendations for prophylaxis according to the score and the level of risk. Hence this study was conducted to assess the incidence, mortality, morbidity of VTE in medically ill patients, surgical patients and to compare the risk between the medically ill patients and surgical patients using adapted Padua prediction score and Caprini scoring in risk stratification for VTE prophylaxis.([8],[9])

Despite the availability, efficacy, and safety of VTE prophylaxis, it is discouraging that only 21% to 62% of medical patients receive prophylaxis, 70% to 90% of surgical patients or critically ill patients, receive prophylaxis and only 16% to 40% receive appropriate prophylaxis. VTE prophylaxis is so underutilized in most of the hospitalised patients but the reasons are not clear.To know the possible reasons for not preventing VTE, we also conducted a study on 4 clinician groups who are involved in the hospitalized patients care to identify barriers and solutions for underutilization of thromboprophylaxis.[10]

1.1 REVIEW ON VENOUS THROMBOEMBOLISM:

VTE is the formation of thrombus or clot within the veins. The thrombus can be formed in any venous system, but mainly it occurs in the vessels present in the leg, which may result in deep vein thrombosis(DVT) and reach lungs, resulting in a pulmonary embolism(PE). Deep vein thrombosis and Pulmonary embolism both constitute venous thromboembolism, these have a high frequency in hospitals, and can leads to morbidity and possible mortality.[11]

A)Deep vein thrombosis:

A DVT is a blood clot, or thrombus, that forms in a large vein. Deep vein thrombosis not only occurs in the vessels of legs, they can also occur in other locations, such as the arms.[12] A DVT may cause swelling, pain, tenderness, discoloration, or redness in the affected leg due to the block in venous blood flow.[13]

B) Pulmonary embolism:

About two-thirds of patients with Venous Thromboembolism present with symptoms of DVT and one-third of patients present with its complication, pulmonary embolism.[13],[14] A PE begins when a thrombus from a DVT dislodges – becoming an embolus – and travels through the bloodstream. The embolus continues to travel through the circulation up to reach an artery that is smaller in diameter than it, then it will become fixed and block the distal blood flow. When this occurs within the pulmonary artery, it is called pulmonary embolism [15]. If there is not sufficient supply of blood then tissue necrosis occurs. Symptoms of PE can include shortness of breath, expectoration of bloody sputum, cyanosis, pleuritic chest pain, and cough and precisely depends on size and location of emboli. PE can lead to acute right heart failure, shock, pulmonary infarction, and in rare cases sudden death [16,17].

1.2 EPIDEMIOLOGY:

The estimated VTE incidence rates annually of European population ranges from 104 to 183 per 100,000 person/year.[19,20] General VTE incidence might be higher in populations of African Americans and lower incidence is observed in Asian and it can vary according to US geographical location. Reported incidence rates for PE ranges from 29 to 78, and for DVT alone incidence range from 45 to 117, per 100,000 person/year.[19]VTE

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mainly occurs in advanced age, and is rare for the adolescence.

The overall ratio of male-female incidence rates is 1.2:1. i.e., males are at higher risk than females, but the rates are higher in women during childbearing years than males. Whereas individuals who are >45 years are higher in men. PE incidence increases in both men and women 20. VTE incidence rates are much higher in current or recent hospitalization than in the community.21About half of all VTE events occur in patients of current or recent hospitalization i.e., 23% in surgical patients and 22% in medically ill patients.

1.3 VIRCHOW'S TRIAD:

A major theory describes the pathogenesis of venous thromboembolism (VTE), usually called Virchow's triad, which states that VTE occurs as a result of:

- Alterations in blood flow which is due to stasis
- Vascular injury.
- Alterations in the blood constituents(ie,inherited or acquired hypercoagulable state) [23].

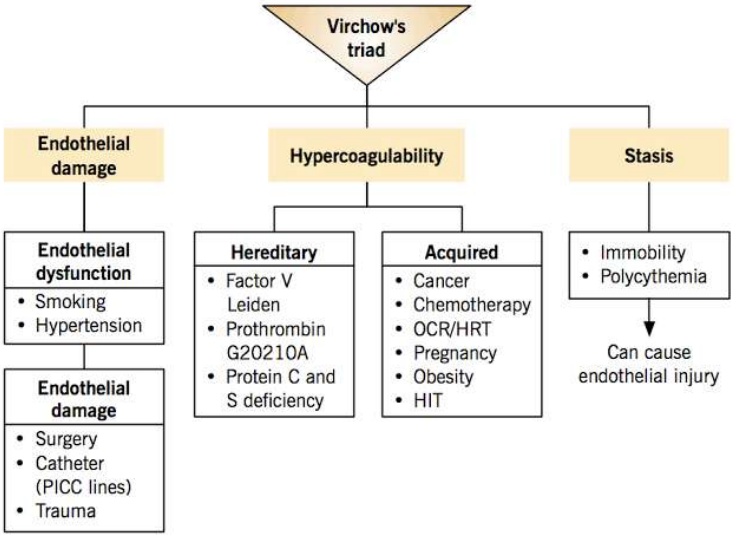

Figure 01. Virchow's triad.

1.4 RISK FACTORS:

VTE is a complex multifactorial disease. Both acquired and hereditary factors interact and play essential roles in its development and outcome. The acquired risk factors can be transient or permanent depending on how long they persist. Based on their predictive value, they can be further stratified as strong (odds ratio >10), moderate (odds ratio 2–9), and weak (odds ratio <2).

•**The strong risk factors** are orthopaedic surgery, major general surgery and major trauma.

•**The moderate risk factors** like central venous catheters, congestive heart failure, respiratory failure, malignancy, chemotherapy, hormonal replacement therapy, oral contraceptive therapy, pregnancy and postpartum.

•**The weak risk factors** include bed rest (less than 3days), travelling more than 8 hours, age (greater than or equal to 40years), and obesity.

•**Inherited factors**are also classified as strong, medium and weak. Deficiency of some natural coagulation inhibitors like antithrombin, protein C, cofactor protein S, as well as homozygosity of factor V Leiden (FVL) which are the strong risk factors causing resistance to activated protein C, homozygosity of prothrombin G20210A which results in increased prothrombin levels and leads to VTE.[24]

•**Major and orthopedicsurgery:**Major and orthopedic surgery are strong risk factors for VTE. A surgical patient is at risk of VTE both due to an increase in coagulation factors that can occur in response to tissue injury and due to blood stasis incurred from the inactivity associated with surgery. More than 50% of patients undergoing surgery may develop VTE unless they receive anticoagulants as prophylaxis.[25] However, given that it is now commonplace for VTE prophylaxis to be prescribed after major and orthopedic surgery, the risk of VTE in postoperative patients has decreased. Still, surgery represents a major cause of VTE; patients who receive VTE prophylaxis and undergo a high-VTE-risk surgery experience VTE at a rate of 1- 3% [26].

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•**Trauma**: Trauma is one of the strong risk factors for VTE. In a prospective study of patients with trauma - spinal injury, head trauma, pelvic fractures, femoral fractures, or tibial fractures - admitted to a trauma unit, almost 60% (201 out of 349) developed leg DVT in the absence of VTE prophylaxis [27].

•**Pregnancy and the postpartum period:** Interestingly, pregnancy as well as postpartum period have been known risk factors for VTE for many centuries. Doctors referred 'milk leg' to the DVT leg because of the white appearance of the leg which is thrombosed ; the public health message at the time advocated for breastfeeding to prevent milk leg. Pregnancy/postpartum period also includes strong risk factors for VTE. Two retrospective cohort studies report the incidence of DVT in women during pregnancy and the post-partum period to be about 0.7 per 1,000 deliveries. This is approximately a 10-fold higher risk of VTE compared to all women of reproductive age [28].

•**Cancer**: Cancer is a strong risk factor for VTE. MEGA, a large population-based case-control study in the Netherlands, reports the risk of first leg DVT or PE to be 7-fold (95% CI: 5.2-8.6) higher cancer patients than without cancer.

Although it is not entirely clear why cancer is a risk factor for VTE, it is likely that several factors are involved: 1) The tumor itself could increase risk of VTE through the release of humoral factors that induce a procoagulant state53; 2) cancer can lead to immobility, a known risk factor for VTE; 3) cancer treatment may have prothrombotic effects 65,66; and 4) large tumors may obstruct veins and lead to thrombosis [29].

•**Advanced age**: Advanced age is the strongest risk factor for VTE. A population-based prospective cohort study reports the risk of VTE over 8 years of follow- up to be 12-fold (95% CI: 5.35-29.7) higher in the very old as compared to a middle-aged population [30]. It is uncertain why age is a strong risk factor for VTE. However, plausible explanations exist. Other risk factors for VTE become more prevalent with advanced age (e.g., immobility and obesity) and could contribute to an age-VTE association. In addition, venous valves and muscular tone of the legs can deteriorate with age; both would contribute to poor venous return and could increase risk of VTE. It is likely that these factors interact to contribute to the increased risk of VTE seen with advanced age.

•**Obesity**: Obesity is a moderately strong risk factor for VTE70. Prospective cohort and case-control studies concur that the risk of VTE is 2- to 3-fold higher in obese individuals compared to those who are not obese. Potential mechanisms are ill-defined, but possible explanations include 1) body size, which could have a physical impact on venous return; and 2) increases in coagulation and inflammation, which are associated with obesity, could increase VTE risk70. However, a large population-based case-control study reports that the obesity-VTE relation is not explained by differences in levels of factor VIII, fibrinogen, factor IX or D-dimer[31].

•**Oral contraceptives and hormone therapy**: The use of oral contraceptives is a moderately strong risk factor for VTE53. A large, multicenter hospital-based case-control study reports the risk of VTE to be higher in women using oral contraceptives compared to those not using in both European and non-European countries: Odds ratios of 4.15 (95% CI: 3.09-5.57) and 3.25 (95% CI: 2.59-4.08), respectively79. It is important to remember that the incidence rate of VTE is low in young women - less than 1 per 10,000 per year - so even a quadrupling of risk equates to a low absolute risk of VTE: 2 to 3 per 10,000 per year in oral contraceptive users. Despite the low absolute risk, because of the high prevalence of oral contraceptive use, it is the most common cause of VTE in women of reproductive age 53.The use of hormone therapy is a moderately strong risk factor for VTE; studies demonstrate VTE risk is 2- to 4-fold higher in those who use hormone therapy compared to those who do not. The estrogen found in oral contraceptives and hormone therapy may at least partially explain the increased risk of VTE; estrogen can stimulate the generation of coagulation factors, mildly increased blood coagulability.[32]

•**Inherited risk factors**:

•**Factor V Leiden**. A mutation in clotting factor V is known as factor V Leiden; it causes resistance to activated protein C88 - a natural anticoagulant - and is a moderately strong risk factor for VTE. Heterozygous and homozygous carriers have a 5-fold and 50- fold, respectively, higher risk of VTE than those who are not carriers. The mutation is a common variant; approximately 5% of whites are carriers. It is less common in other races.[33]

•**Prothrombin 20210A.** A specific mutation in part of the prothrombin gene is known as prothrombin 20210A. It causes elevated production of prothrombin (i.e., coagulation factor II), a protein that is required for fibrin formation and thus clot formation. Carrying the variant prothrombin 20210A is a moderately strong risk factor for VTE; a population-based case-control study reports heterozygous carriers have an almost 3-fold (95%

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CI: 1.4-5.6) higher risk of VTE than those who are not carriers. The mutation is a common variant - with a prevalence of more than 1% - that is found almost exclusively in whites[34].

•**Deficiencies of coagulation inhibitors**. A deficiency in any one of the natural coagulation inhibitors likeAntithrombin, protein C, and its cofactor protein S can be a strong risk factor for VTE. Deficiencies are rare, affecting less than 1% of the population. Due to their rareness, most research has been from family studies; heterozygous carriers with a familial deficiency have a 10-fold higher risk of VTE than those without a deficiency. However, outpatient-based case-control studies (i.e., not family-based) report only a 2- to 5-fold higher risk of VTE in carriers of a deficiency vs. non-carriers. It is unknown why this discrepancy exists; it is hypothesized that patients with familial deficiencies have other predisposing factors as well[35].

•**Elevated procoagulant factor levels.** Elevated procoagulant factor levels are moderately strong risk factors for VTE. Individuals with the highest levels of certain procoagulant factors - prothrombin, factor VIII, factor IX, factor XI, thrombin activatable fibrinolysis inhibitor, and fibrinogen which has high risk compared to others [36]. Although it is not clear the extent that the environment versus genetics affect most procoagulant factor levels, it is likely a combination.Even though there are many risk factors for VTE, the etiology is not fully understood, especially in difference to atherothrombosis.

1.5 PATHOPHYSIOLOGY:

The arrest of bleeding following vascular injury (hemostasis) is an amazingly complex process that is essential to life. In the vascular system, blood remains in a fluid state, which transports oxygen, nutrients, plasma proteins, and waste. With vascular injury, a dynamic series of reactions involving a complex interplay of thrombogenic and antithrombotic stimuli result in the local formation of a hemostatic plug that seals the vessel wall and prevents further blood loss but does not spread to other areas of the vasculature.[38] A disturbance of this system may lead to inappropriate clot formation within the blood vessel that later obstructs blood flow or embolises to a distant vascular bed.Alterations in any one of these elements, known today as the Virchow triad, may lead to pathologic clot formation.[37]

Hemostasis occurs in steps: (1)initiation, (2)amplification, and (3)propagation.[38] Under normal circumstances, the endothelial cells which form the inner membrane of vessels maintains blood flow by physically separating extravascular collagen and tissue factor from platelets by producing substances that inhibit platelet adherence and thus prevent the activation of the coagulation cascade. Vascular injury allows key components of the coagulation process, namely platelets and factor VIII complexed to von Willebrand factor to come into contact with collagen and tissue factor bearing cells in the extravascular space initiating the hemostatic process. During **initiation**, tissue factor bearing cells produce small (picomolar) amounts of thrombin via what has traditionally been termed the "extrinsic" coagulation pathway (namely the factor VIIa/tissue factor complex and the factor Xa/ Va complex).[39]

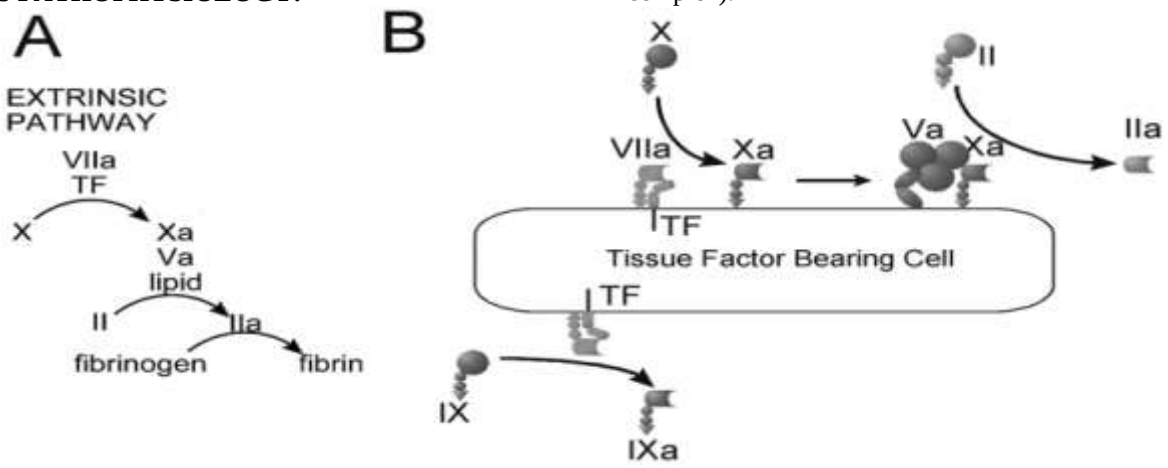

Figure 2.1. Extrinsic pathway of blood coagulation.

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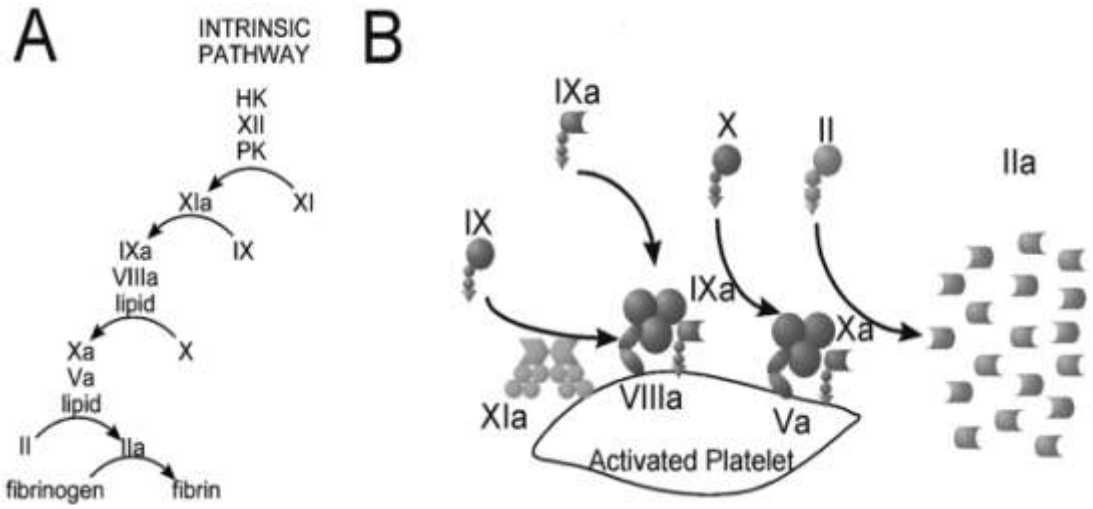

Figure 2.2. Intrinsic pathway of blood coagulation.

The thrombin produced during initiation has a major function of **amplification** of the hemostatic process by activation of platelets during adherence to collagen at the site of vascular injury and also activates cofactors V and VIII and factor XI on platelet surfaces in preparation for large-scale thrombin production.

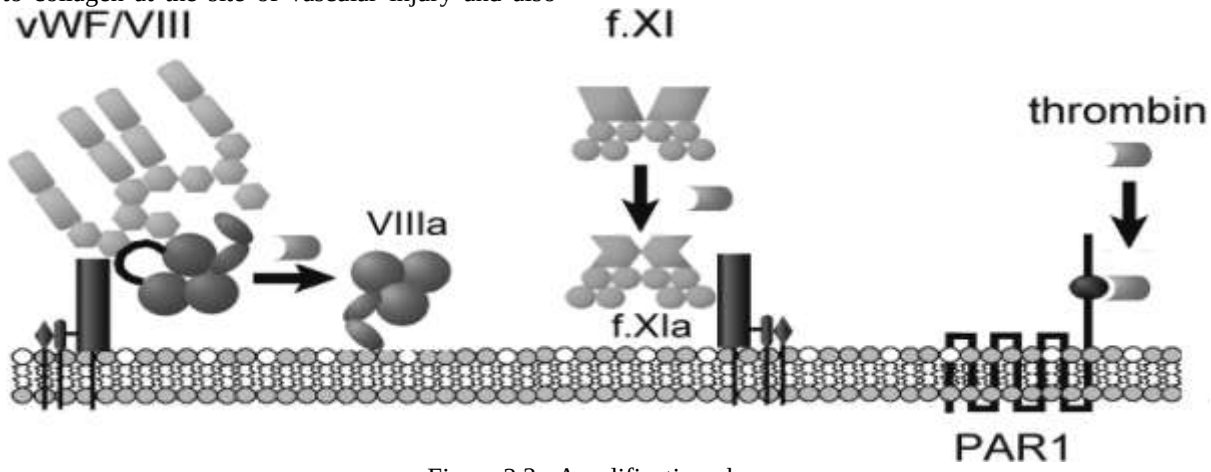

Figure 2.3. Amplification phase.

The mechanism of activation of both collagen and thrombin by which the most procoagulant form of activated platelets are produced at the site of vascular injury.[38] This so-called **propagation** phase involves much of what has traditionally been termed the "intrinsic" coagulation pathway (namely factor XIa, the factor IXa/VIIIa com- plex and the factor Xa/Va complex) occurring on the negatively charged phospholipid surfaces of activated platelets.The coagulation cascade has been divided into distinct parts based on historically : the intrinsic, extrinsic, and common pathways, as these both pathways cannot function as independent, and are not required pathways in vivo, but are required for physiological homeostasis works on different cell surfaces and playing peculiar roles.[38] The final step in hemostasis is the thrombin-mediated conversion of fibrinogen to form fibrin monomers. These fibrin monomers begin to precipitate and polymerize to form fibrin strands. Factor XIIIa covalently bonds these strands to one another and the deposition of fibrin forms an extensive mesh- work that surrounds and closes aggregated platelets and forms a stable clot and blocks the vascular injury site and prevents loss of blood. Coagulation reactions are eventually terminated when this expanding meshwork of platelets and fibrin "paves over" the initiation site and activated factors are unable to diffuse through the overlying layer of

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clot.[38]Normally, there are many abating mechanisms are present to control coagulation.[38] Without efficacious self-regulation, the coagulation cascade would remain causing vascular occlusion at the injury site. When the self-regulatory mechanisms are perfect, the fibrin clot formation is limited to the site of tissue injury. However, disruptions in the hypercoagulable states often result in pathologic thrombosis. The fibrinolytic system has a role of dissolution of blood clots formed. Impaired activation of the fibrinolytic system can lead to the increased clot formations and results in hypercoagulability and thrombotic complications.[40]

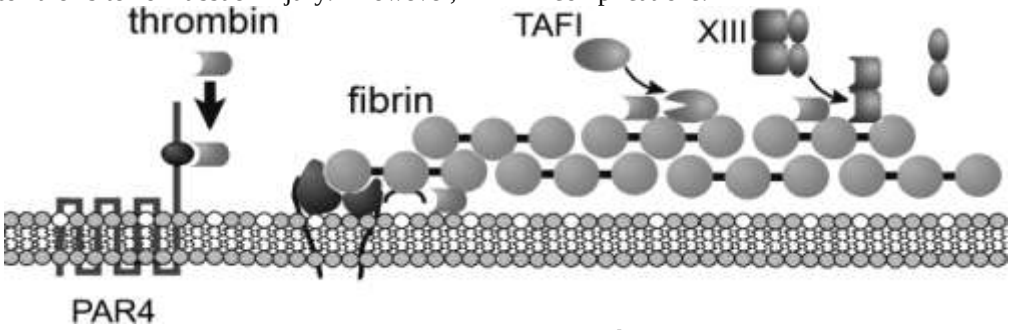

Figure 2.4. Propagation phase

1.6 CLINICAL EVALUATION:

Evaluation of venous thrombosis starts with history and physical examination. The cause for the disease is identified. The number of factors which develop VTE are age, previous history of VTE, trauma, active cancer, major orthopedic surgery, hyper coagulable state, Obesity, Heart diseases, Protein C deficiency, Protein F deficiency although a thrombus can form in any part of the venous circulation, mainly occurs in the lower extremities.[41] Venous thrombus may either (a) Remain asymptomatic (b) Spontaneously lysis (c) Obstruct the venous circulation (d) Propagate into more proximal veins (e) Embolize (f) Act in any combination of these ways. Some patients remain asymptomatic; they may develop long term consequences such as post thrombotic syndrome, recurrent VTE and PE [42]. Patients with DVT often present with unilateral leg pain and swelling. Symptomatic PE may cause dyspnea, tachypnea and tachycardia. The DVT patients complain of swelling, pain or warmth in the veins.The patient's superficial veins dilates and in the affected leg a palpable cord may be felt.[43] Symptoms are not specific and objective evidence is required to establish the diagnosis. The patient may feel pain in the back of the knee. Serum concentrations of D-dimer, a by-product of thrombin generation, is elevated. The patient may have an increased erythrocyte sedimentation rate and white blood cell count. Accurate anticoagulation management is required to improve the quality of patient care.[41-43]

1.7 PROPHYLAXIS:

The goal of VTE prophylaxis is to identify all patients at risk, determine each patient's level of risk, select and implement regimens that provide sufficient protection for the level of risk, and avoid or limit complications from the selected regimens. As hospitalized patients are frequently at high risk for VTE, screening all patients at the time of admission to determine their level of risk is the first step in an effective VTE prevention program.[44]

Effective methods of VTE prophylaxis involve **pharmacologic** and **mechanical methods** and these can be used alone or in combination. Mechanical methods improve venous blood flow, whereas drug therapy counteracts the propensity for thrombus formation by inhibiting the coagulation cascade.Based on the level of risk the preventive strategies are suggested.

For low risk i.e., Patients undergoing minor surgery and fully ambulatory, Patients who are medically ill and fully ambulatory(<10%) require early and aggressive ambulation.

For moderate risk i.e., patients undergoing general, gynecological, or urological surgeries, patients who are hospitalized for an acute medical illness (e.g., MI, ischemic stroke, CHF exacerbation, acute respiratory illness) and Patients who are at moderate DVT risk and high risk for bleeding require UFH 5000 units, LMWH (at recommended dose) Fondaparinux and mechanical thromboprophylaxis

For high risk i.e., patients undergoing major lower-extremity orthopedic surgery (hip or knee arthroplasty, hip fracture repair),spinal cord injury, major trauma and patients who are at high DVT

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risk and high risk for bleeding require LMWH (at recommended dose) Fondaparinux,
Warfarin (INR goal = 2.0−3.0),Oral factor Xa inhibitors, Oral direct thrombin inhibitors and Mechanical thromboprophylaxis[44,45].

1.8 DIAGNOSIS:

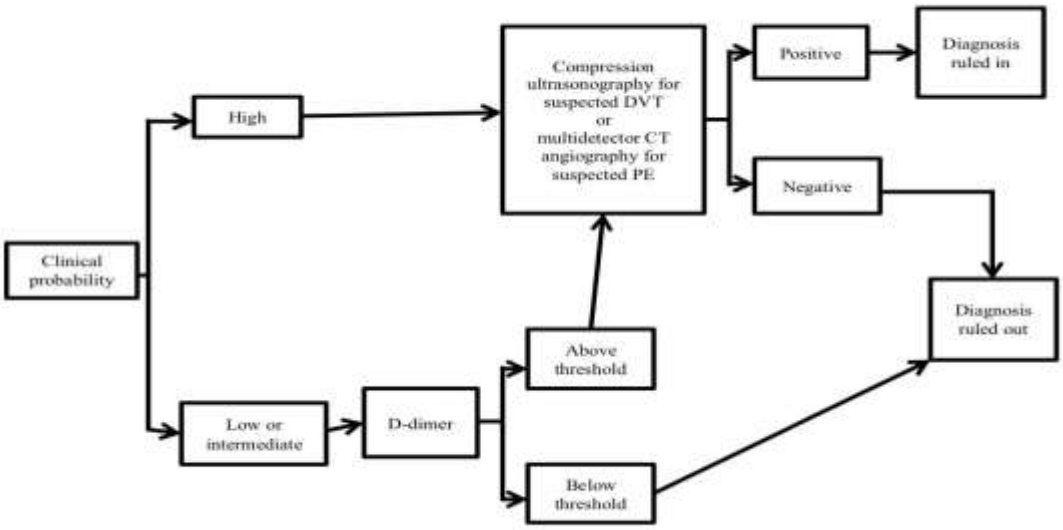

Figure 03. Flowchart(from article by Goldhaber)[46].

A diagnostic algorithm consisting of a series of tests guides the diagnosis of DVT or PE (Figure 1.2.). Use of a validated diagnostic algorithm is associated with better outcomes and is thus highly recommended [48]..
Clinical assessment of probability. The work-up for a diagnosis of VTE begins with a clinical assessment of VTE probability [47]. Probability of VTE can be assessed empirically with prediction rules or scores. Common scores are the Wells score for DVT 49 or PE 50, and the revised Geneva score19 for the diagnosis of PE.
Clinical probability assessments categorize patients who have VTE as high, intermediate, or low probability of VTE.
•High or intermediateprobability patients may receive anticoagulant treatment as they await the results of diagnostic tests[48].
•Low or intermediate probabilitypatients of VTE, a VTE diagnosis can be largely ruled out with a fibrin D-dimer test (Fibrin D-dimer is a degradation product of cross-linked fibrin, which is present in blood clots).
Therefore, a patient with acute VTE usually has an elevated concentration of fibrin D-dimer in the blood. The D-dimer test has low specificity and high sensitivity (more than 95%), making it effective at excluding, but not confirming a diagnosis[48]. So, in patients having low or intermediate probability, a negative D-dimer test(less than 500 µg/L)can safely be used in VTE diagnosis [52].If a patient tests positive on the D-dimer test, he or she goes on per the algorithm to receive either compression ultrasonography and a CT angiography for suspected DVT and PE respectively.
•CT angiography is performed if the patient is suspected PE, has high probability or tests positive on a D-dimer test 47. CT angiography provides an image of the pulmonary artery and its branches along with information on blood flow.
•Compression ultrasonography is performed if the patient is suspected DVT, has high probability or tests positive on a D-dimer test, compression ultrasonography is performed to image the veins in the leg. If a venous segment cannot be compressed with an ultrasonography probe, it is considered diagnostic of DVT 47.

1.9 TREATMENT OF VTE:

Treatment of VTE has several aims: 1) to prevent VTE recurrence; 2) to prevent a thrombus

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from forming distal to the existing embolus or thrombus; 3) to prevent PE in those with DVT only; 4) to accelerate fibrinolysis [54].

•Anticoagulants are the mainstay of VTE treatment, which include heparin or low-molecular-weight heparins(Dalteparin, Enoxaparin, Tinzaparin), vitamin K antagonists (e.g., warfarin), Anti factor Xa inhibitors(Fondaparinux, Idraparinux and biotinylated idraparinux, Rivaroxaban, Apixaban), and direct factor IIa inhibitors(Argatroban, Bivalirudin, Desirudin, Lepirudin, Dabigatron) 55. There is strong evidence that treatment with anticoagulants reduces mortality and recurrence in patients with PE, and recurrence in patients with DVT56.. Patients with a contraindication to anticoagulants may be treated with an inferior vena cava filter, which is inserted into the vena cava and can prevent pulmonary emboli [54,56].

1.10 REVIEW ON BARRIERS:

•Healthcare professional lack of attention was identified as a barrier to compliance. Some studies also reported an inattentiveness of staff to VTE risk assessment and prophylaxis. Health care professionals often declare that they were too busy to add this to their practice or they simply neglected to complete the requirements for VTE care.

• Lack of awareness was identified as a barrier. This class covers staff being unaware of what they should do if a patient had a contraindication to treat and therefore they disregard VTE management or prevention strategies. Medical practitioners were also unaware of when to prescribe VTE prophylaxis for a patient.

•Patient Factors are also identified as barriers associated with healthcare professional concern about complications like bleeding. Health care professionals stated that they only focus on patients' illness and directing their current needs and this may be a reason for not taking VTE prevention as a priority.

•Some computer applications are unable to use in all hospitals because of software incompatibilities and lack of capability of some systems. •Disputing evidence/guidelines]was reported as a barrier where medical practitioners sense that the evidence in the guidelines is inaccurate

•Lack of documentation was reported as being a barrier due to imperfect coding of patient conditions, leading to a risk assessment document not being completed

•Staff factors are recognised as a barrier and reported situations where staff did not know who was responsible for VTE initiatives. It was described that nurses did not complete the risk assessment because they sensed it was the doctor's responsibility, and also that doctors ignored.

•Lack of system support which seems to occur where there were no developed guidelines for VTE within the health service and there were no risk assessment tools to use. There was also confusion with the risk assessment model developed.

•Another barrier was detected as being financial constraints where the costs associated with supplying staff education was limiting, especially since a high amount of studies supported continued and regular staff education.

II. REVIEW OF LITERATURE

2.1. Haixia Zhou performed a study on **"Assessment of risk of venous thromboembolism in medically inpatient using Padua prediction score and caprini risk assessment model."** It turned into a retrospective case managementobservationthat'sperformed in scientific inpatients admitted to a fashionablehealth facility in China. In total, VTE showedinstancesin the course of hospitalization are 902 and 902 controls had been randomly decided on to in shapeinstances. The Caprinievaluationversionshouldpick out 84.3% of VTE instances to obtainremedyconsistent with American college of chest doctor guidelines, while the Padua prediction ratingshouldbestpick out 49.1% of the VTE instances. Both the padua prediction rating and caprinievaluationversion can pick out the VTE danger in scientific inpatient effectively, however thecaprinidangerevaluationversioncan betaken into considerationbecause the first preference in a fashionablehealth facilitydue to its incorporation of completedangerelementsbetter sensitivity to pick outsufferers who may advantage from remedy.

2.2. Xiaohan Liu carried out a study on**"Comparison between caprini and padua risk assessment models for hospitalized medical patients at risk for venous thromboembolism".** It is a retrospective observation carried out in October 2016.A overall number Of 320 VTE and 320 non VTEsufferershave been taken. Caprini and paduadangerevaluationfashionshave been used and characterrankingsof everydangerthingaccrued to generate a cumulative score. Significant variationshave beendiscovered in dangerelementsamong VTE and NON VTE sufferershave beencategorized as excessive-terrificexcessivestagevia means ofcaprini scale than

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padua scale(70.9% vs 23.4% ,P<0.01). The sensitivity and fine and terrible predictive values in caprini scale have beenbetter than padua scale (p<0.05).but the specificity of caprini scale becamedecrease than paduascale(p<0.001).The caprini scale advised to be extra effective than padua scale for identity of hospitalized clinicalaffected person at danger for VTE.

2.3. S. BARBAR,carried out a look at**"A risk assessment model for the identification of hospitalized medical patients at risk for venous thromboembolism: the Padua Prediction Score".**It is a potential cohort look at, wherein 1180 consecutive Patients admitted to a branch of innermedication in a 2-12 monthslengthhad beencategorised as having an excessive or low chance of VTE in step with a predefined chanceevaluationversion. They had been followed-up for as much asninety days to evaluate the prevalence of symptomatic VTE complications. The number onelook atfinal resultsturned intoto evaluate the adjusted hazard ratio (HR) of VTE in excessive-chancesufferers who had good enough in-medical institution to treat thrombosis in contrast with individuals who did now no longer, and that of VTE withinside the latter organization in contrast with low-chancesufferers. 469 sufferers (39.7%) had been labelled as having aexcessivechance of thrombosis. VTE evolved in 4 of the 186 (2.2%) who acquired to treat formation of clot in veins and in 31 of the 283 (11.0%) who did now no longer have VTE (HR of VTE, 0.13; 95% CI, 0.04–0.40). VTE evolvedadditionally in of the 711 (0.3%) low-chancesufferers (HR of VTE in excessive-chancesuffererswithout remedy in comparison with low chancesufferers, 32.0; 95% CI 4.1–251.0). Bleeding came about in 3 of the 186 (1.6%) excessive-chancesufferers who had to treat thrombosis. Their chanceevaluationversion can assist discriminate amongscientificsufferers at excessiveand occasionalchance of VTE. The adoption of good enough to treat thrombosis in excessive-chancesufferersall through hospitalization ends in longstanding safetyin opposition to thromboembolic activities with a low chance of bleeding.

2.4. Dr Thomas MOUMNEH performed a look at "**Validation of risk assessment models predicting venous thromboembolism in acutely ill medical inpatients: a cohort study"**. It is a retrospective evaluation of sufferersanticipatedto sign upwithinside the PREVENU trial. Patients elderly 40- years and older, hospitalized for at least 2-days on a clinical ward have been consecutively enrolled and accompanied for 3 months. Critical sicksufferershave now been no longer recruited. Patients identified with VTE inside 48-hours from admission, or receiving complete dose anticoagulant remedy or who underwent surgical operationhave been excluded. Body mass index, wanted for the Padua and Capriniratingshave beenlacking in 44% of sufferers. Among 14,910 eligible sufferers, 14,660 have been evaluated, of which 1.8% skilled symptomatic VTE or unexpected unexplained loss of lifein the course of the 3-month follow-up. The placebelow the receiver runningfunction curves (AUC) have been 0.60 (95percentCI 0.57-0.63), 0.63 (95percentCI 0.60-0.66) and 0.64 (95percentCI 0.61- 0.67) for Caprini, IMPROVE and Padua ratings, respectively. None of thoseratingsfinishedextensivelyhigher than superior age as aunmarried predictor (AUC 0.61, 95percentCI 0.58 - 0.64). In this have a look at, Caprini, IMPROVE and Padua VTE hazardratings have terrible discriminative cap potential to pick outnow no longer- significantlysickclinical inpatients susceptible to VTE, and do now no longercarry outhigher than a hazardassessmentprimarily based totallyat the patient's age alone.

2.5. MaryAnne Cronin performed an observation on **"Completion of the updated caprini risk assessment model"**. The Caprinichanceevaluationversion has been checked in over 2,50,000sufferers in extra than a hundredmedical trials worldwide. Ultimately, suitable treatment alternatives are depending on the specificfinal touch of the Caprini scale. As the numerical rating increases, the medical venous thromboembolism price rises exponentially in eachaffected personinstitutionwhereinit's beenwell tested. After a number one thromboembolic episode, VTE recurs in about 25% of sufferers over the following 10 years. Complications related to VTE consist ofpostthrombotic syndrome after DVT (20%-50% incidence) and persistent thromboembolic pulmonary high blood pressure after PE (0.1%- 3.8incidence).The Caprini scale is a dynamic tool, requiring ongoing assessment of the affected personfor the duration of their hospital direction and the postoperative recuperation period. Changes in medicalreputationmay want tobring about an etradewithinside therating, thereby ensuing in a brand newrating and probably a revised treatment option. The 2013 Caprini scoring gadgetoffers a consistent, accurate, and efficacious

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approach for chance stratification and choice of treatment •

2.6. Adam Cukerperformed a study on "**"American Society of Hematology 2018 guidelines for management of venous thromboembolism: heparin-induced thrombocytopenia(HIT)".** American society of hematologyfashioned a multidisciplinary guiding principle panel balanced to decreasecapacity bias from conflicts of interest. The McMaster University GRADE Centre supported the ruleimprovement process, together with updating or acting systematic proof reviews. The panel prioritized scientific questions and effectsin step with their significance for clinicians and sufferers .The panel agreed on 33 tips. The tipscope with screening of asymptomatic sufferers for heparin-brought about thrombocytopenia , analysis and preliminarycontrol of sufferers with suspected heparin-brought about thrombocytopenia, remedy of acute heparin-brought about thrombocytopenia , and uniqueconditions in sufferers with acute heparin-brought about thrombocytopenia or a records of heparin-brought about thrombocytopenia, together with cardiovascular surgery, percutaneous cardiovascular intervention, renal replacement therapy, and venous thromboembolism treatment. Strong tipsencompass use of the 4Ts ratingas opposed to a gestalt method for estimating the pretestopportunity of heparin-brought about thrombocytopenia and avoidance of heparin-brought about thrombocytopenia laboratory checking out and empiric remedy of heparin-brought about thrombocytopenia in sufferers with a low-opportunity 4Ts rating. Conditional tipsencompassthe selection among non-heparin anticoagulants (argatroban, bivalirudin, danaparoid, fondaparinux, direct oral anticoagulants for remedy of acute heparin-brought about thrombocytopenia.

2.7. ArashMahajerin, performed a look at on **"Hospital- associated venous thromboembolism in pediatrics: a systematic review and meta-analysis of risk factors and risk-assessment models**' '.. They performed a literature seek on pediatric venous thromboembolism chancethru PubMed (1946-2014) and Embase (1980-2014). Data on chanceelements and chance-evaluationfashionshad been extracted from case-manipulateresearch, while incidencestatistics on medicaltraitshad beenacquired from registries, big (n>forty) retrospective case series, and cohort research. Meta- analyses had beenperformed for chanceelements or medicaltraitssuggested in at least3research. Variety amongstresearchwas assessed with the Cochran Q check and measured through the I2 statistic. From 394 preliminary articles, 60 met the very last inclusion criteria (20 case-manipulateresearch and forty registries/big case series/cohort research). Significant chanceelementsamongst case-manipulateresearchhad been:extensive care unit live (OR: 2.14, 95% CI: 1.97-2.32); significant venous catheter (OR: 2.12, 95% CI: 2.00-2.25); mechanical ventilation (OR: 1.56, 95percentCI: 1.42-1.72); and duration of live in hospital (according toeveryextra day, OR: 1.03, 95% CI: 1.03-1.03). Three research developed/carried outchance- evaluationfashions from a mixtureof thosechanceelements. Fourteen extensivemedicaltraitshad beenrecognizedvia non-case-manipulateresearch. This meta- evaluation confirms significant venous catheter, extensive care unit live, mechanical ventilation, and duration of live as chanceelements. A few pediatric hospital-obtained venous thromboembolism chancerankings have emerged usingthoseelements. Prospective validation is vitalto tellchance-graded prevention trials.

2.8.C.Michael Gibson Conducted a study on "**Prevention of VTE in Nonsurgical Patients: Antithrombotic Therapy and Prevention of Thrombosis, American College of Chest Physicians Evidence-Based Clinical Practice Guidelines''.** Recent suggestions from the American College of Chest Physicians endorse that acutely medically unwellsufferers admitted with congestive coronary heart failure or excessivebreathing disease, or folks who are constrained to mattress and have as a minimum one extradanger for VTE, ought toobtain treatment for thrombosis. For acutely unwellclinicalsufferers with excessivedanger they endorse anticoagulants to treat thrombosis and for acutely unwellclinicalsufferers with low danger we endorse mechanical and pharmacological prophylaxis.

2.9. Anderson FA Jr, Spencer FA. Conducted **"Risk factors for venous thromboembolism."** Written through VTE epidemiology researchers, this completeevaluation examines the proof implicating a breadth of dangerelementsrelated to VTE. The authors stratified thosedangerelements into huge categories: personaldangerelementswhich areenough to justify the usage of antithrombotic capsules for prophylaxis, and elements that grow VTE dangerhowever are now no

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longerenoughpersonally to justify pharmacologic techniques for prevention. The strongest dangerelements for VTE (OR > 10) consist of hip or leg fracture, hip or knee substitute, most importanttrendy surgery, most important trauma, and SCI. The use of antithrombotic capsulesis virtually warranted in those populations. Factors that vicinitysufferers at slightdanger (OR 2-9) consist of previous VTE, arthroscopic knee surgery, malignancy, CVCs, most cancers chemotherapy, coronary heart failure, breathing failure, being pregnant or postpartum period, oral contraceptives, hormone substitute therapy, and thrombophilia. Among thoseslightdangerelements, the authors counseled that malignancy, coronary heart failure, and breathing failure pose enoughdanger to warrant pharmacologic prophylaxis for the duration of hospitalization—a premise that has been shownthrough randomized medical trials. It is critical to observe that thrombophilias, such as antithrombin deficiency, protein C or S deficiency, activated protein C resistance or thing V Leiden, and the thing II G20210A mutation, are now no longer, in and of themselves, considered sufficiently sturdydangerelements to warrant number one prophylaxis with antithrombotic capsules. Factors which areexceedinglysusceptibleparticipants to VTE danger (OR < 2) coveredmattressrelaxation for extra than three days, extended sitting (e.g., because ofautomobile or air travel), growing age, obesity, and varicose veins. These dangerelements are additive, and maximumsufferers who increase VTE will have or extra identifiable dangerelements.

2.10. NedaaSkeik Conducted a study on **"Recommendations for VTE prophylaxis in medically ill patient"•** They concluded that VTE stayscommon in medically unwellsufferers and ends inmultiplied mortality throughout hospitalized and published discharge with pulmonary embolism. The hazard of VTE regularly extends some distance beyond medical institution discharge and no proof to guide extending prophylaxis after medical institution discharge. The choice of VTE treatment requires cost, availability, sufferers preference, compliance and underlying comorbidities and highlights of personaltechnique and recommendations.

2.11. Alex c.spyropoulos md conducted a study on **"Predictive and associative models to identify hospitalized medical patients at risk for VTE"**.the study was conducted in 2011. They concluded that acutely sick hospitalized clinicalsufferers are at chance for VTE and Data from 15,156 clinicalsufferershad beenanalyzed to decide the cumulative occurrence of clinically discovered VTE over three months after admission out of 184 sufferers who advanced symptomatic VTE seventy six had pulmonary embolism and sixty seven had Lower extremity DVT cumulative occurrencebecame 1.0% came about after discharge. At admission sixty seven% of sufferers had a ratingmore than the same as 1. During hospitalization 31 percent had ratingmore than the same as two foe ratings 2 or threediscovered VTE became1.5% vs5.7%. For ratingmore than the same to 4. Among thoseratingmore than the same twobecamebetter than ordinary VTE associated mortality. VTE chancerating from 4 hospital admission can be expecting VTE chance in acutely sick hospitalized sufferers. Score at some stage in seven scientificelementsat some stage in hospitalization might also additionallyassist further symptomatic VTE chance and rankingscalls foroutside validation.

2.12. CLIFFORD M TAKEMOTO conducted a study on **"Hospital associated VTE in children incidence and clinical characteristics' '.** They concluded that 270 episodes of related VTE in 90. 485 admissions price 30 /ten thousand admissions. Young adults (18 - 21years) and adolescents (14 - 17years) had considerablyelevatedcharges of VTE in comparison with children (2 - 9years) occurrenceprice ratio (IRR) 7.7,95%,cl 5.1 12 ;IRR 4.3,95% medical.7 6.8. A crucial venous catheter (CVC) becomessupplied in 50% of sufferers and surgical approachesbecomecompleted in 45percentof sufferers before VTE analysis CVC associated VTE analysismaximumoften in infants (<1 year old). Renal cardiac disordershave beenrelated to the bettercharges of VTE 51 and 48/ten thousand. Rates have beenbetteramongstthe onesextra than the same to 4clinicalsituations. Older age and a couple ofclinicalsituationshave beenrelated toelevatedcharges of Hospital related VTE • Thesefacts can make contributions to the layout of destinymedical trials to prevent Hospital related VTE in excessivechance children.

III. NEED OF THE STUDY

•Around all of the VTE events occurring, half of them are inpatients but it is well established that assessing and prevention of VTE in inpatients are largely under-utilised, so this study emphasis the need of identification of inpatients at risk of

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Venous Thromboembolism and Barriers for better understanding of mechanisms involved so that safe and effective prophylaxis can be implemented.
•A clinical pharmacist can play a major role in assessing individual patients at risk and in providing information regarding optimal prophylaxis.

IV. AIMS AND OBJECTIVES

•**AIM**: To assess hospitalised patients for VTE risk and to understand barriers to provide optimal prophylaxis.
•**OBJECTIVES:**
•To evaluate VTE risk in individual patients.
•Assessing patients for VTE risk and patient counselling to improve lifestyle to decrease chances of getting VTE.
•To provide accurate and avoid inadvertent prophylaxis for VTE prevention.
•To reduce early mortality in hospitalised patients
•To identify barriers for underutilisation of VTE assessment and potential solutions to address this important safety concern in hospitalised patients.

V. METHODOLOGY

5.1. STUDY SITE:
This study was carried out in Chalmeda Ananda Rao Institute of Medical Sciences, Karimnagar.
5.2. STUDY DESIGN:
Prospective observational study conducted in tertiary care hospital in inpatient departments
5.3.STUDY SAMPLE: 315
5.4. STUDY DURATION:
This study was conducted over a period of six months.
5.5. STUDY CRITERIA:
Inclusion criteria:
•Patients of all ages
•Both men and women
•Exclusion criteria:
•Out-patient department
•Patient admitted in hospital for less than 4days
5.6. SOURCE OF DATA:
By communicating patients and their representatives, patient data records (Inpatient)
5.7. PARAMETERS TO BE CONSIDERED:
•Demographic details
•Past medication history, family history
•Symptoms
•Risk factors for VTE
5.8. DATA COLLECTION FORM:
Based on inclusion and exclusion criteria the patients were selected and data is collected in pre designed data collection form which includes demographic characteristics, risk factors for VTE, barriers for optimal prophylaxis.
5.9. STUDY PROCEDURE:
Study approval from the Institutional Review Board (IRB) as well as the head of the hospital was obtained. The study protocol and data collection form was submitted for a review and a written/oral consent was obtained from head of the hospital
After getting permission from the IRB, patients matching for study criteria were identified by regular review of the patient's record during the study period and documented in a predesigned data collection form.
The study was conducted at general medicine, general surgery, and pulmonology by communicating with patients and their representatives.
Patient data collected includes demographic details, past medical history, family history, and social history, diagnosis on admission, treatment chart, date of admission and date of discharge. Additionally, risk assessments were collected using Padua prediction score and Capriniscore . All the details will be kept confidential. Later for analysis, the data collected was entered into Microsoft Excel Database and subjected for further analysis.

VI. RESULTS

A total of 315 cases were included in the study. Out of which one is a deep vein thrombosis case so it is excluded from the study.

6.1.AGE WISE DISTRIBUTION:

Table 01 shows Age wise distribution of hospitalised patients at risk(n%)

Age	Count	Share
0-10	5	1.76
11-20	11	3.87
21-30	22	7.75

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31-40	40	14.08
41-50	57	20.07
51-60	65	22.89
61-70	60	21.13
70 and above	24	8.45

In this study, we have clubbed the age of the patients into 8 age groups. It is found that 84% of our study group are older than 30 years. 51% of the patients are more than 50 years old. 5% of patients lie with age less than 20 years.

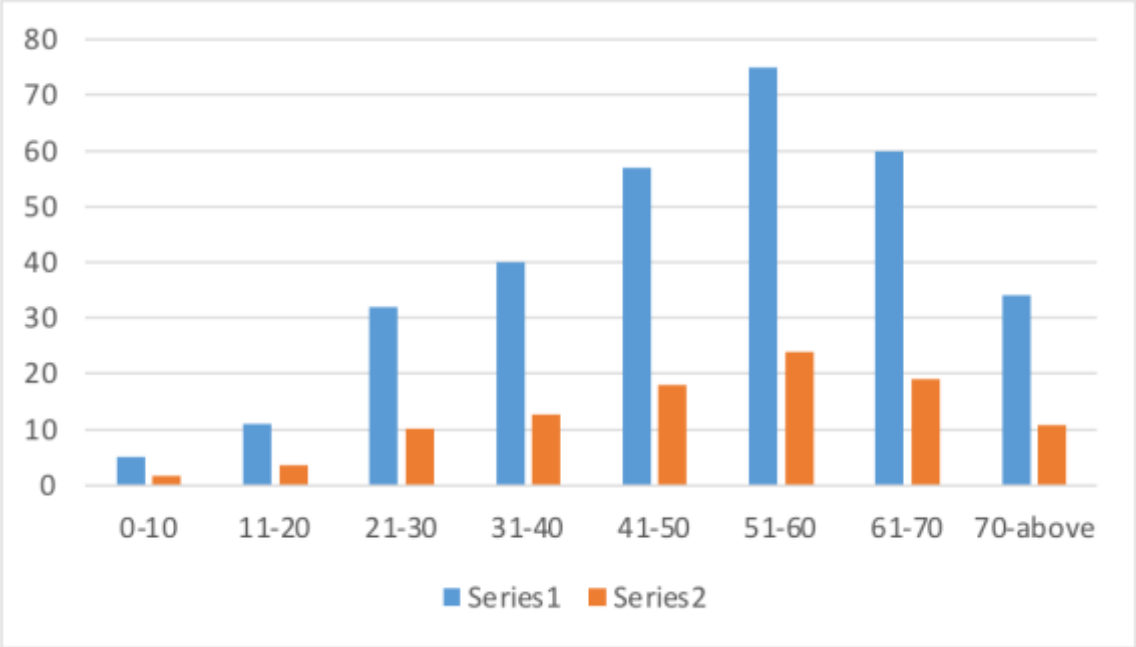

Figure 04. Age wise distribution of hospitalised patients at risk(n%)

Table 2 Statistical analysis

Mean	49.95
Median	52.1
STD DEV	17.03
Q1	38.1
Q3	63.08
Quartile deviation	0.24

The Mean age group of the study group is found as 49 years with standard deviation ±16 years.

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6.2.GENDER WISE DISTRIBUTION:

Table 3 shows gender wise distribution of patients(n%)

Gender	Count	Share
Males	177	62.32
Females	107	37.68

In this study we have included 62% of Male patients and 38% Female patients. Majority of the patients studied are male.

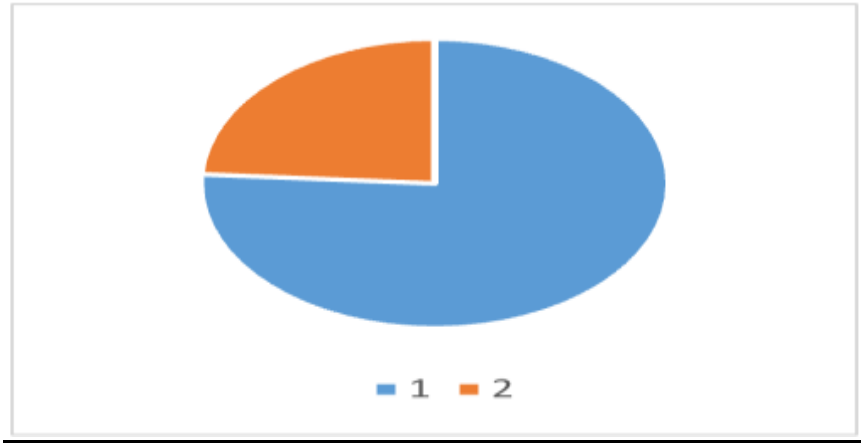

Figure 05: Gender wise distribution of hospitalised patients at risk.

6.3.SCALES WISE DISTRIBUTION:

6.3.1.PADUA PREDICTION SCORE:

A total of 218 medically ill patients were included in the study. Out of which 198 patients are at risk.

Table 4 shows Age wise distribution of medically ill patients(n%)

Age group	Count	Share
0-10	2	1%
11-20	8	4%
21-30	20	9%
31-40	25	11%
41-50	38	17%
51-60	56	26%
61-70	42	19%
70 and above	27	12%

In this study, we have clubbed the age of the patients into 8 age groups. It is found that 86% of our study group are older than 30 years. 57% of the patients are more than 50 years old. 5% of patients lie with age less than 20 years.

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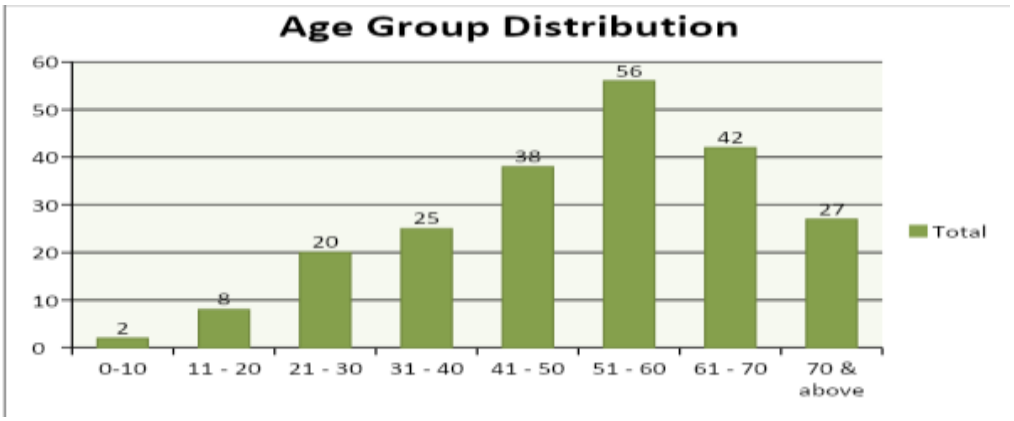

Figure 06: Age wise distribution of medically ill patients.

Table 5: shows the Gender distribution of the medically ill patients .

Gender	Count	Share
Females	80	37%
Males	138	63%

In this study we have included 63% of Male patients and 37% Female patients. Majority of the patients studied are male.

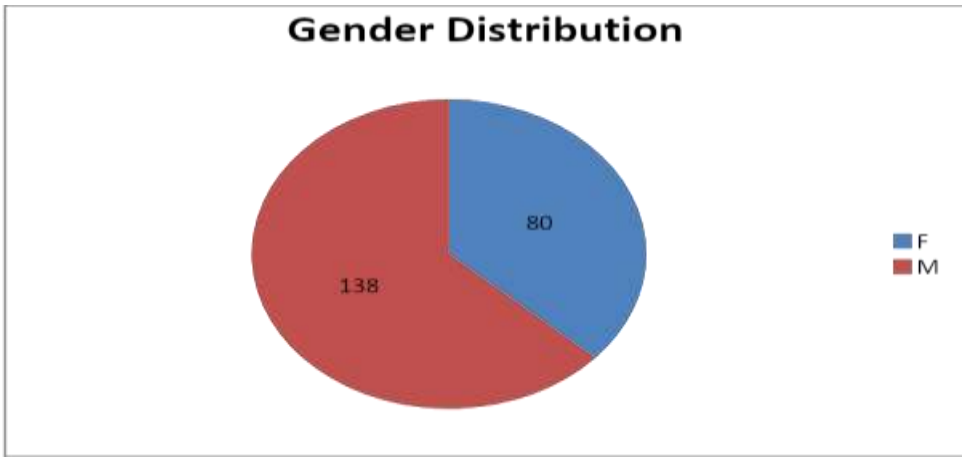

Figure 07: Gender wise distribution of medical patients.

Table 6 : shows the Gender distribution as per the Age group in medically ill patients.

Age group	Female		Male		Grand total
0-10	1	1%	1	1%	2
11-20	3	4%	5	4%	8
21-30	5	6%	15	11%	20
31-40	12	15%	13	9%	25

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41-50	8	10%	30	22%	38
51-60	18	23%	38	28%	56
61-70	19	24%	23	17%	42
70 and above	14	18%	13	9%	27

In this study, Female patients are almost evenly distributed for age above 30 years, i.e. 15% in 31 – 40 age group, 10% in 41 – 50 age group, 23% in 51 – 60 age group, 24% in 61 – 70 age group and 18% in 70 & above age group. Only 11% of the patients are in the age group less than 30 years.

Male patients distribution also follows similar distribution as females as shown in figure 3 (below). 87% of male patients lie within the age group of 21 to 70 years age group. Only 5% of our male study group are under 20 years.

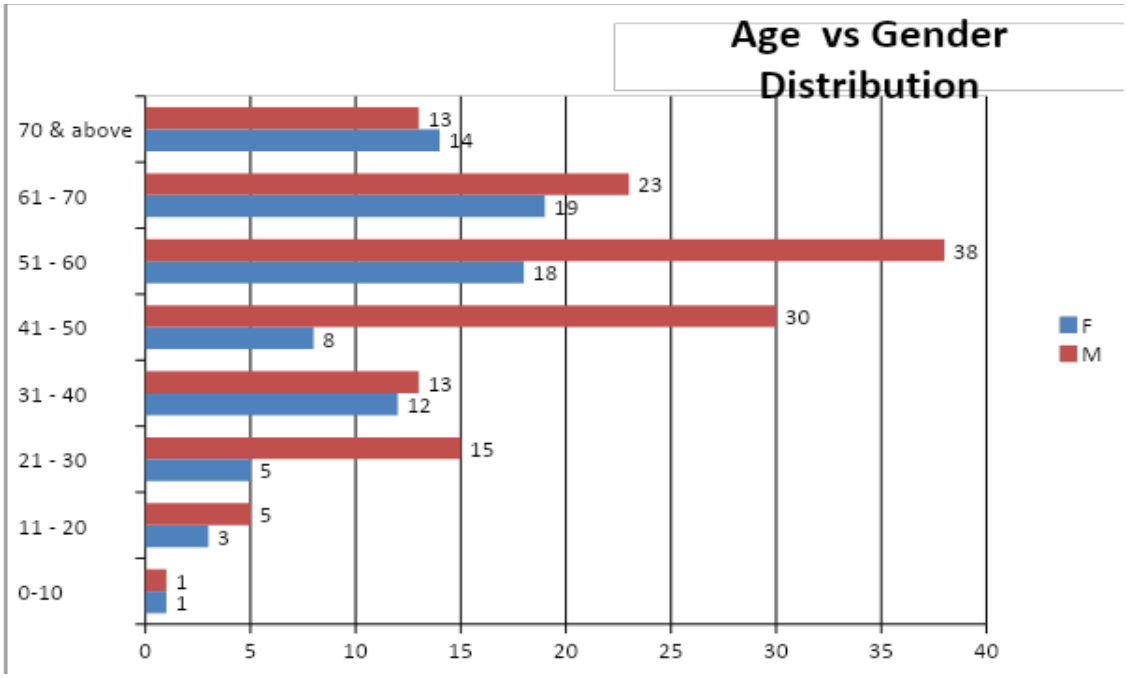

Figure 08: Gender distribution as per the Age group in medically ill patients.

Table 7: Shows statistical analysis:

Statistics	Total study group	Females	Males
Mean	51.3	53.9	49.9
Median	53	59	52
STV DEV	17.08	18.01	16.41
Mode	53	61	53
Quartile3	63.00	67.25	61.00
Quartile1	40.25	40.00	41.00

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IQR	22.75	27.25	20.00

The Mean age group of the study group is found as 51.3 years with standard deviation ±17.08 years
The Mean age group of the female study group is 53.9 years and STD DEV is ±18.01 years
The Mean age group of the male study group is 49.9 years and STD DEV is ±16.41 years
It is observed that female patients are more dispersed than male patients as highlighted by high STD DEV and IQR (table7)

6.3.2.RISK FACTOR WISE DISTRIBUTION:

Table 8: Risk factors wise distribution in medically ill patients:

Risk factors	Male	Female	Total
Active cancer	7	13	20
Previous VTE	0	1	1
Reduced mobility	87	55	142
Known thrombophilic condition	0	0	0
Recent trauma/surgery	2	4	6
Age≥70 years	9	23	32
Heart Failure/Renal failure	18	22	40
Myocardial infarction stroke	15	40	55
Infection or Rheumatic disorder	13	30	43
Ongoing hormonal treatment	4	0	4

In this study, we identified Reduced mobility as the major risk factor for development of VTE.

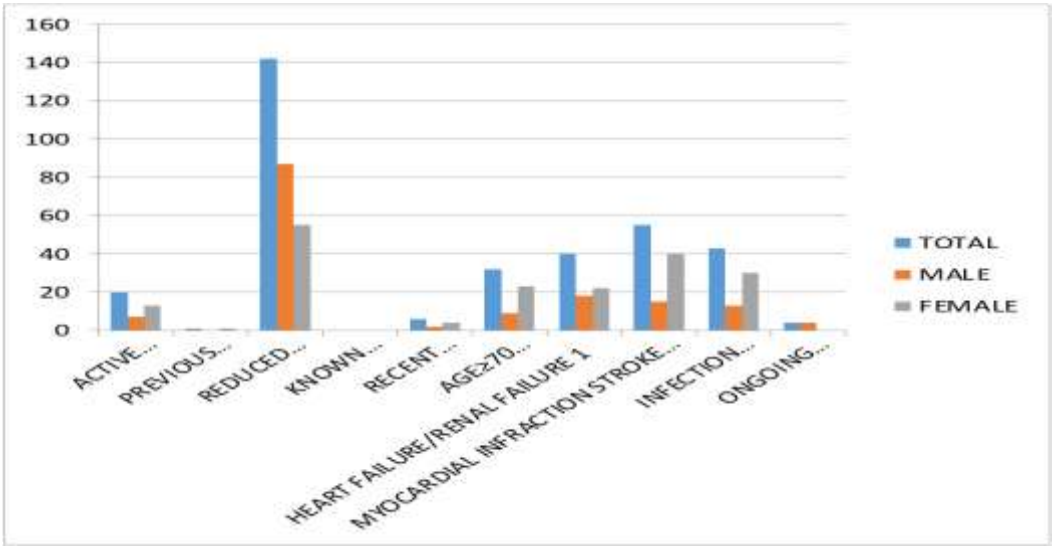

Figure 09: Risk factors wise distribution in medically ill patients:

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Table 9: Validation of Risk in risk factors

RISK FACTORS	FREQUENCY	P VALUE	RESULT
ACTIVE CANCER:	20		
Age	20	0.02534(<0.05)	Dependent on risk level.
Gender	20	0.6392(>0.05)	Independent of risk level.
REDUCED MOBILITY:	142		
Age	142	0.00000135(<0.05)	Dependent on risk level.
Gender	142	0.6985(>0.05)	Independent of risk level.
AGE>70	32	0.2663(<0.05)	Dependent on risk level.
HEART FAILURE/RENAL FAILURE:	40		
Age	40	0.8841(>0.05)	Independent of risk level.
Gender	40	0.2122(<0.05)	Dependent on risk level.
RECENT STROKE/MYOCARDIAL INFARCTION:	55		
Age	55	0.02468(<0.05)	Dependent of risk level.
Gender	55	0.09701(<0.05)	Dependent of risk level.
INFECTION/RHEUMATIC DISORDER:	43		
Age	43	0.06(>0.05)	Independent of risk level.
Gender	43	0.812(>0.05)	Independent of risk level.

6.3.2.SEVERITY WISE DISTRIBUTION IN MEDICAL PATIENTS

Table10: Severity wise distribution in medical patients:

Severity	Male	Percentage	Female	Percentage	Total	Percentage
Mild	48	37.5%	14	20.5%	62	31.3%
Moderate	19	14.8%	16	23.5%	37	18.6%
High	61	47.6%	38	55.8%	99	50%
Total	128	100%	68	100%	198	100%

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In this study, we found 31.3% patients are at low risk,18.6% are at moderate risk and 50% are at high risk.

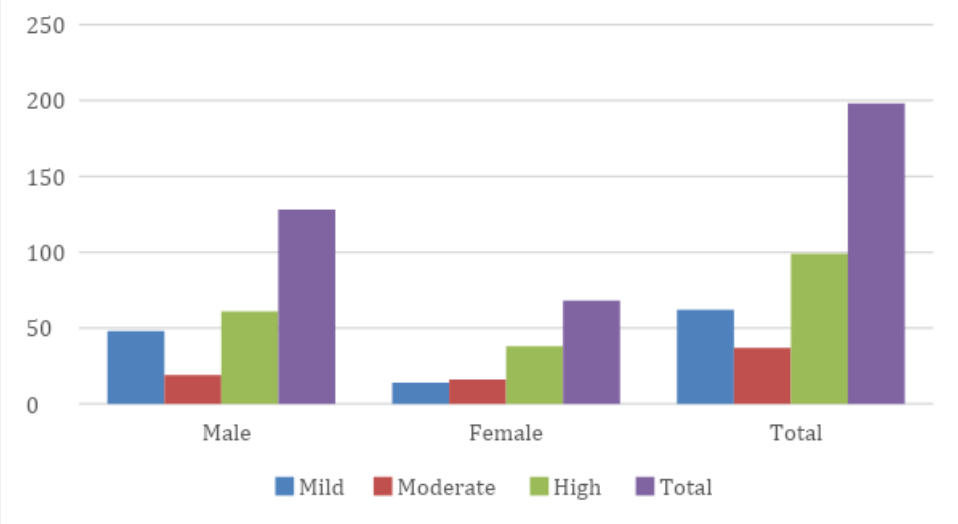

Figure 10: Severity wise distribution in medical patients:

6.4.CAPRINI SCORE (surgical patients)

A total of 96 surgical patients are included in this study. Out of all 86 patients are at risk.

Table 11: shows age wise distribution in surgical patients:

Age group	Count	Share
10-20	5	5.20%
21-30	11	11.45%
31-40	16	16.66%
41-50	21	21.87%
51-60	18	18.75%
61-70	16	16.66%
70 and above	9	9.37%
Grand total	**96**	

In this study, we have clubbed the age of the patients into 8 age groups. It is found that 93% of our study group are older than 30 years. 66% of the patients are more than 50 years old. 6% of patients lie with age less than 20 years

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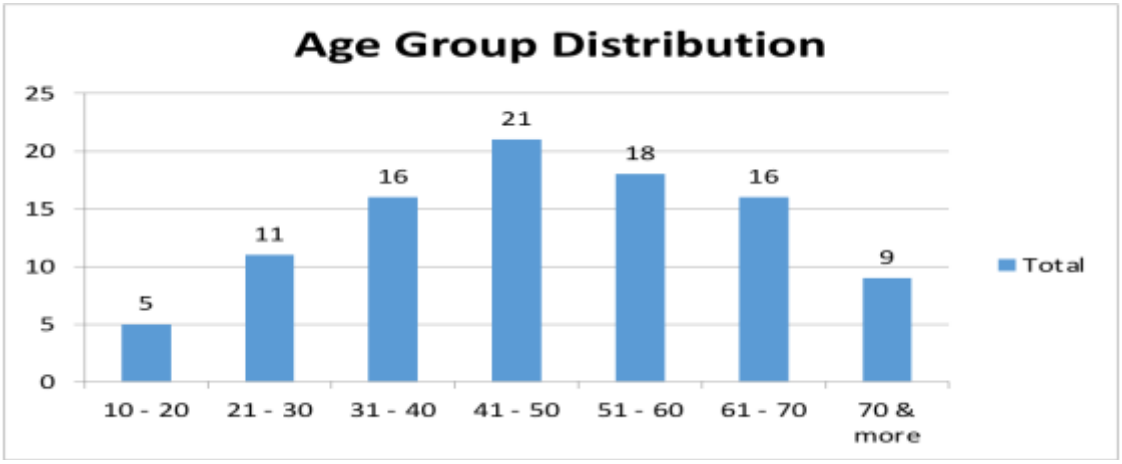

Figure 11:shows age wise distribution in surgical patients:

Table 12: shows Gender wise distribution in surgical patients:

Gender	Count	Share
Males	59	61.45%
Females	37	38.54%
Grand total	**96**	

In this study we have included 62% of Male patients and 38% Female patients. Majority of the patients studied are male.

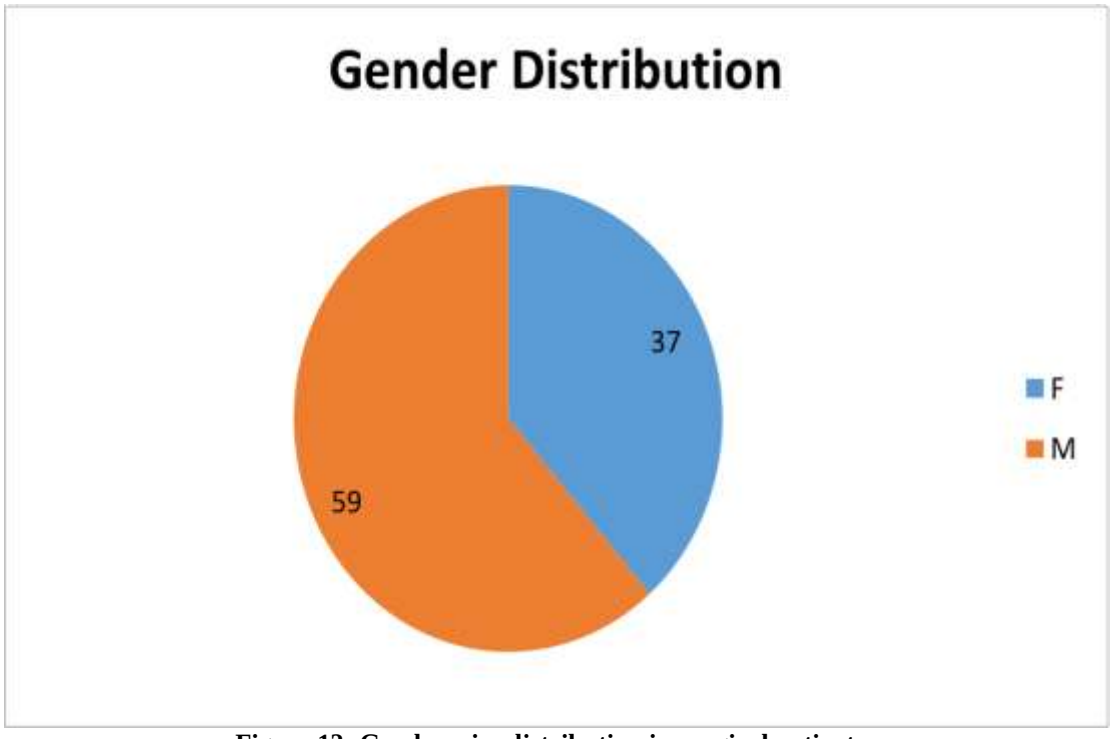

Figure 12: Gender wise distribution in surgical patients:

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Table 13: shows Gender distribution as per age group:

Gender	Females	Males	Grand total
10-20	2	3	5
21-30	4	7	11
31-40	6	10	16
41-50	9	12	21
51-60	7	11	18
61-70	7	9	16
70 and above	2	7	9
Grand total	**37**	**59**	**96**

In this study, Male patients are almost evenly distributed for age above 30 years, i.e. 15% in 31 – 40 age group, 17% in 41 – 50 age group, 24% in 51 – 60 age group, 19% in 61 – 70 age group and 8% in 70 & above age group. Only 17% of the patients are in the age group less than 30 years.

Female patients distribution also follows similar distribution as females as shown in figure 3 (below). 90% of female patients lie within the age group of 21 to 70 years age group. Only 5% of our female study group are under 20 years.

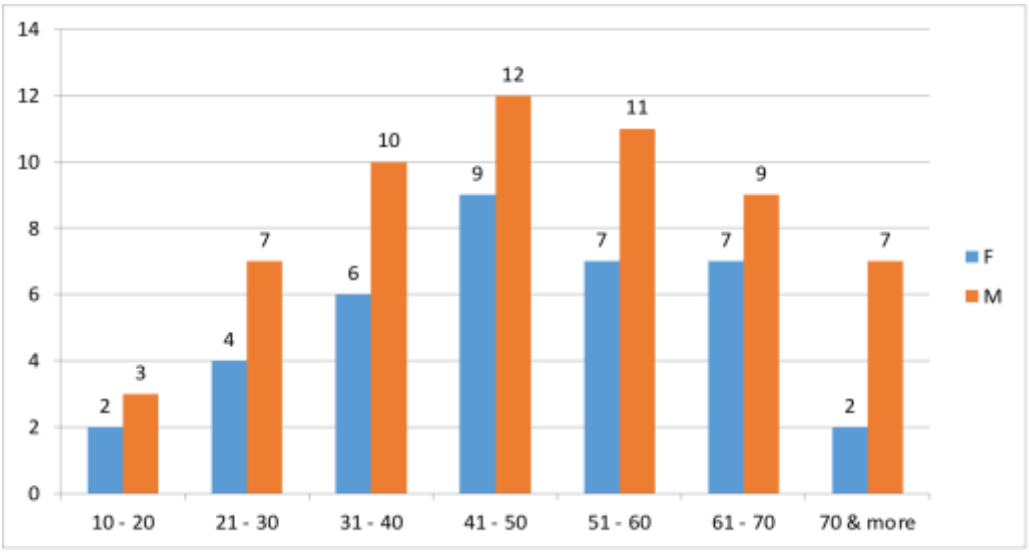

Figure 13: Gender distribution as per age group:

Table 14: Statistical analysis

Statistics	Total	Males	Females
Mean	47.11	48.5	46.2
Median	48.39	50.8	46.6
STD DEV	17.43	17.06	16.9

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Quartile 1	34.5	35.7	34.2
Quartile 3	61.5	61.3	60.08
Quartile deviation	0.2	12.92	12.91

The Mean age group of the study group is found as 47.11 years with standard deviation ±17.43 years
The Mean age group of the female study group is 46.2 years and STD DEV is ±16.9 years

The Mean age group of the male study group is 48.5 years and STD DEV is ±17.06 years
It is observed that Male patients are more dispersed than female patients as highlighted by high STD DEV and IQR

Table 15: Severity wise distribution in surgical patients:

A total of 96 surgical patients, 86 patients are identified as having risk for VTE.

Severity	Male	Percentage	Female	Percentage	Total	Percentage
Mild	3	5.5%	1	3.1%	4	4.6%
Moderate	16	29.6%	5	15.6%	21	24.4%
High	25	46.2%	16	50%	41	47.6%
Very high	10	18.5%	10	31.25%	20	23.2%
Total	**54**	**100%**	**32**	**100%**	**86**	**100%**

In this study, we found 4.65% patients are at low risk, 24.4% are at moderate risk and 70% are at high risk.

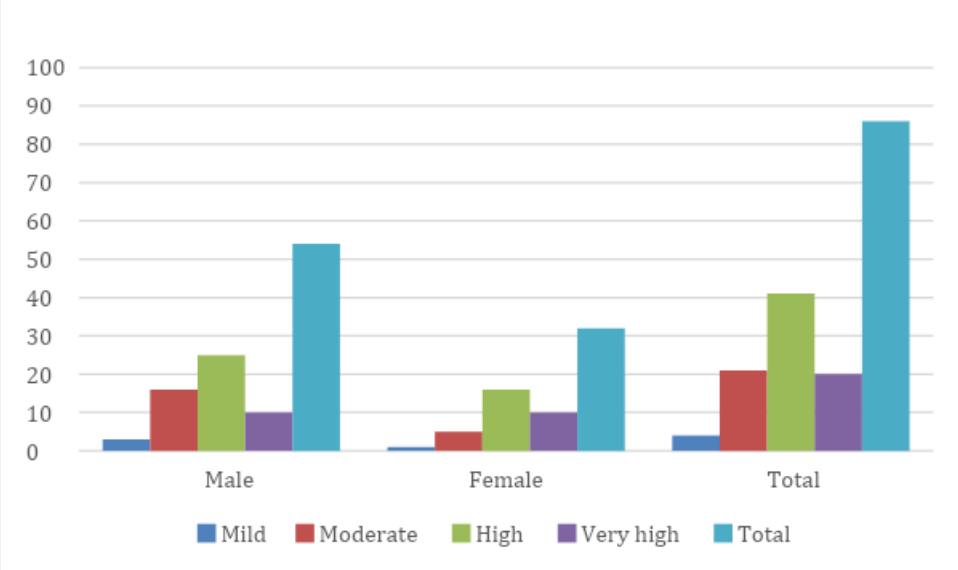

Figure 14: Severity wise distribution in surgical patients:

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6.5.MEDICALLY ILL PATIENTS AND SURGICAL PATIENTS:

Table 16: Severity distribution in both medical and surgical patients:

Severity	Count	Percentage
Mild	66	23%
Moderate	58	20%
High	160	56%
Total	**284**	**100%**

In this study, we identified 23% are at mild risk, 20% at moderate risk, 56% are at high risk.

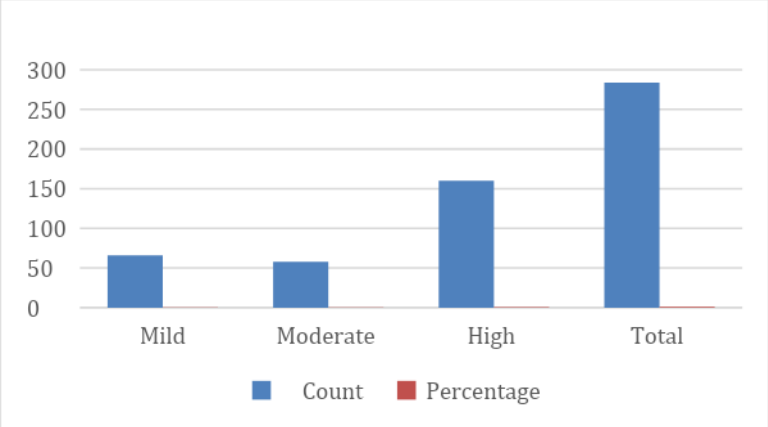

Figure 15: Severity distribution in both medical and surgical patients:

Table 17: severity in both medical patients and surgical patients are clubbed together as per age group:

Age Group	0-10	0-10	11-20	11-20	21 - 30	21 - 30	31 - 40	31 - 40	41 - 50	41 - 50	51 - 60	51 - 60	61 - 70	61 - 70	70 & more	70 & more
Risk Levels	Padua	Caprini	Padua	Caprini	Padua	Caprini	Padua	Caprini	Padua	Caprini	Padua	Caprini	Padua	Caprini	Padua	Caprini
MILD	100%	0%	63%	0%	50%	18%	48%	13%	37%	0%	23%	0%	14%	0%	0%	0%
MODERATE	0%	0%	0%	40%	25%	55%	28%	38%	34%	14%	11%	17%	7%	6%	11%	0%
HIGH RISK	0%	0%	38%	60%	25%	27%	24%	50%	29%	52%	66%	67%	79%	19%	89%	22%
VERY HIGH RISK	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	17%	0%	75%	0%	78%

In this study, it shows that in both medical patients and surgical patients the highest risk is between 51-70 years. Moderate risk between 31-50, low risk between 21-40 years.

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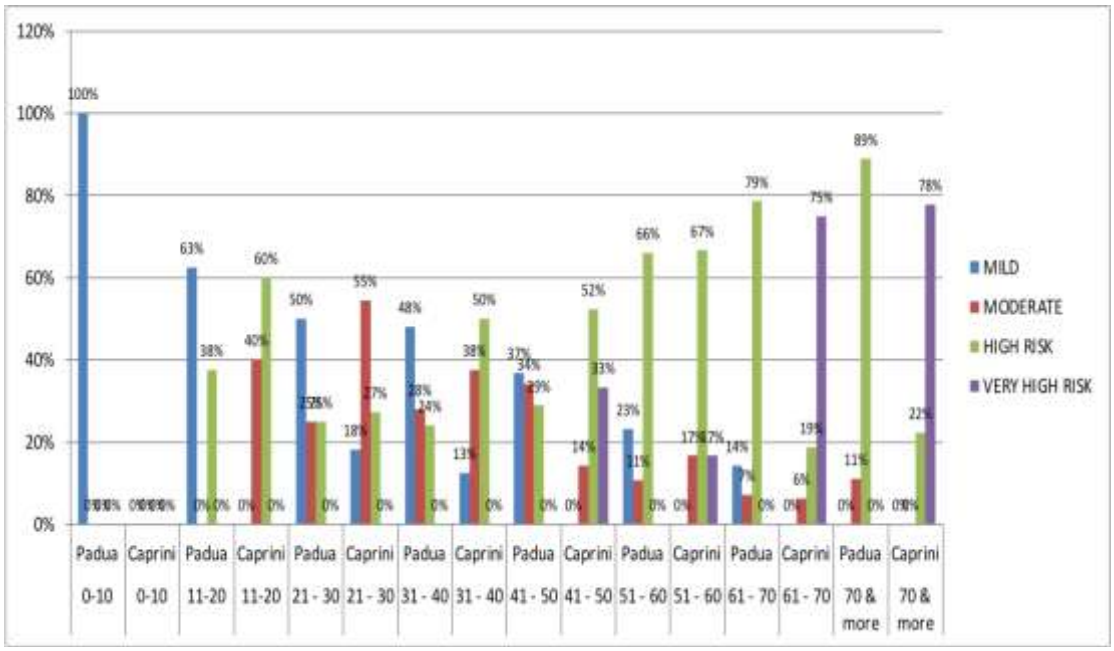

Figure 16: severity in both medical patients and surgical patients are clubbed together as per age group

Table 18: shows severity comparison of medically ill patients and surgical patients as per gender:

Gender	Females	Females	Males	Males
Risk levels	**Caprini score**	**Padua score**	**Caprini score**	**Padua score**
Mild	3%	18%	5%	35%
Moderate	14%	21%	27%	14%
High risk	43%	61%	44%	51%
Very high risk	41%	0%	24%	0%

In this study, it shows that severity of male and female in medical patients and surgical patients are not same.

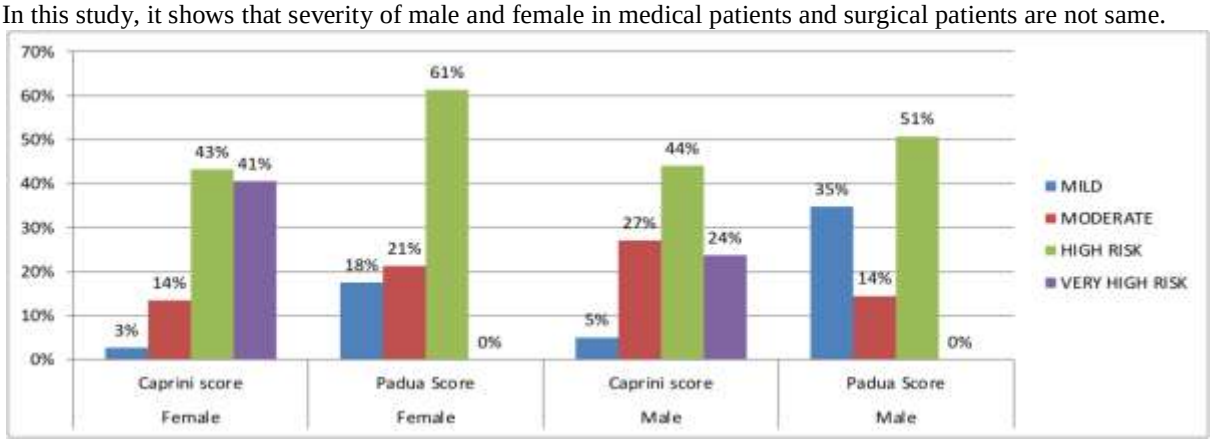

Figure 17: shows severity comparison of medically ill patients and surgical patients as per gender

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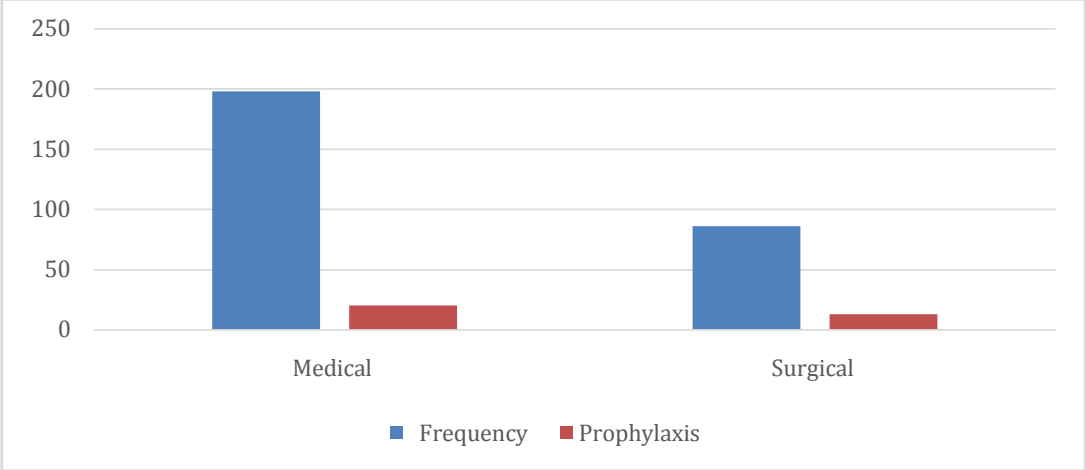
6.6.PROPHYLAXIS DISTRIBUTION:

Table 19: Department wise prophylaxis distribution.

Department	Frequency	Prophylaxis	Percentage
Medical	198	20	10.10%
Surgical	86	13	15.11%
Total	**284**	**33**	**11.6%**

In this study, out of 284 patients at risk 10% of medical patients and 15% of surgical patients received prophylaxis.



6.7.BARRIERS FOR OPTIMAL PROPHYLAXIS:

Tables 20-22:

PROFESSION	IMPORTAL	EFFECTIVE	SAFE	UNDER UTILISED
Physician 1	3	2	3	7
Physician 2	4	4	4	6
Physician 3	6	6	7	5
Physician 4	7	3	2	4
Physician 5	2	2	4	4

Table 20

In our study, physicians feel it is 62% important, 48% effective, 57% safe and 74% under-utilised for VTE prophylaxis.

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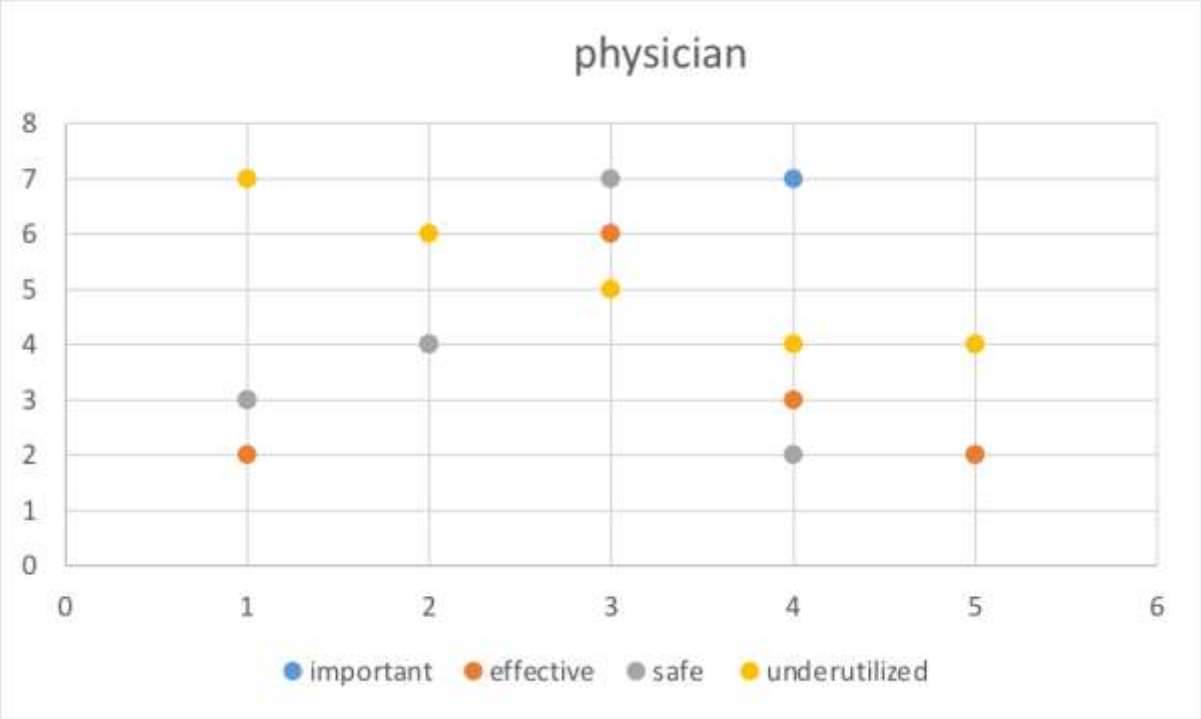

Figure 18

PROFESSION	IMPORTAL	EFFECTIVE	SAFE	UNDER UTILISED
Nurse 1	7	2	3	6
Nurse 2	2	4	6	5
Nurse 3	4	3	4	5
Nurse 4	3	6	4	4
Nurse 5	6	4	2	3

Table 21

In this study, nurses feel it is 62% important, 54% effective, 54% safe and 65% under-utilised for VTE prophylaxis.

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Figure 19

PROFESSION	IMPORTANT	EFFECTIVE	SAFE	UNDER UTILISED
Physiotherapist 1	2	2	3	6
Physiotherapist 2	4	3	4	4
Physiotherapist 3	6	4	7	5
Physiotherapist 4	7	7	7	6
Physiotherapist 5	3	6	5	4

Table 22

In this study, physiotherapists feel it is 62% important, 62% effective, 74% safe and 71% under-utilised for VTE prophylaxis.

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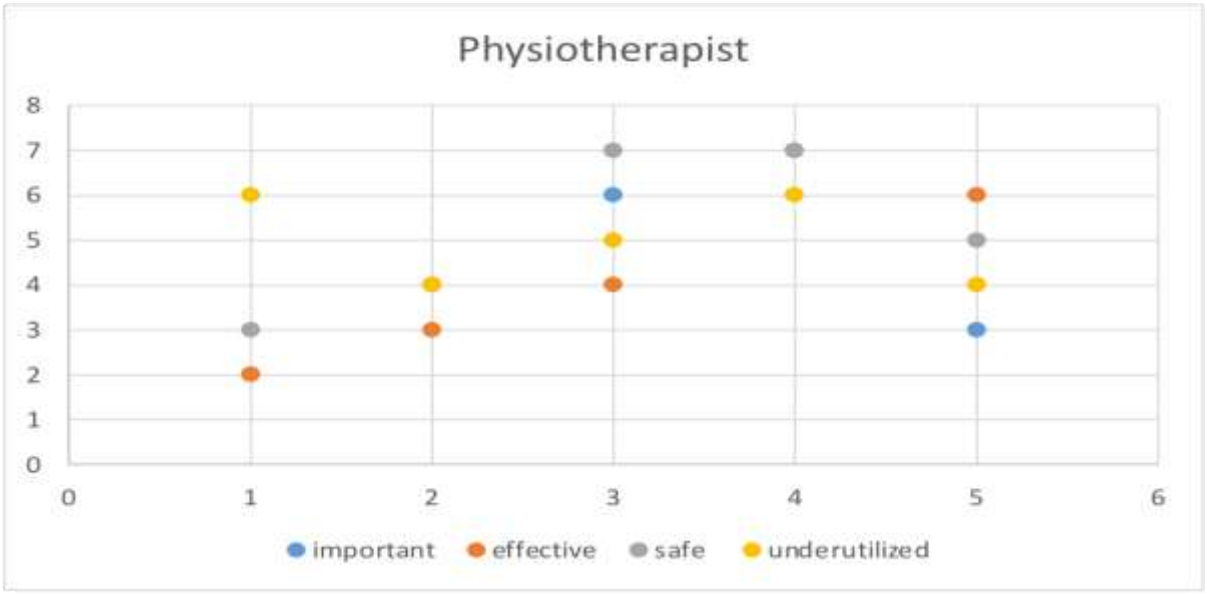

Figure 20

In over all Perceptions regarding VTE prophylaxis in hospitalized medical patients study, shows VTE prophylaxis is important, ineffective, safe and under-utilised.

Table 22-24: Perceptions regarding barriers to the optimal use of VTE assessment and prevention in clinical groups.

Profession	Lack of time	Lack of indication	Lack of clear contrain dication	Lack of awarene ss	Lack of Physician agreemen t	Patient educat ion	Clinician concern About bleeding
Physician 1	3	7	7	2	4	4	5
Physician 2	4	4	6	1	2	5	4
Physician 3	6	5	5	2	3	7	5
Physician 4	4	4	6	2	2	5	3
Physician 5	5	6	2	3	4	4	6

Table 23

In this study, physicians feels lack of awareness, patients discomfort and concern about bleeding as the major barrier for underutilisation of VTE prophylaxis.

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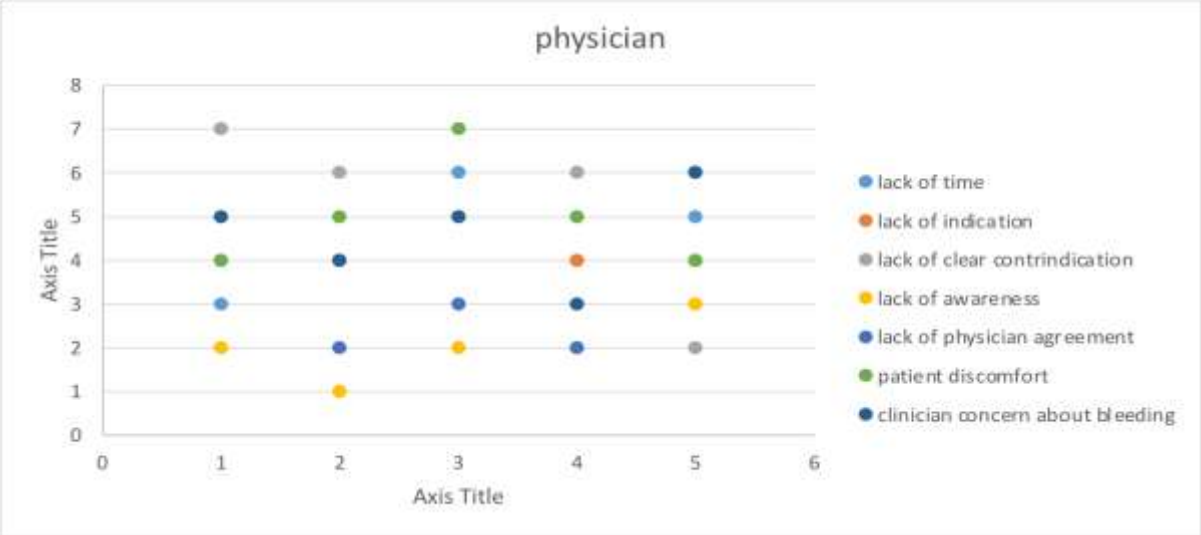

Figure 21

Profession	Lack of time	Lack of indication	Lack of clear contraindication	Lack of awareness	Lack of Physician agreement	Patient education	Clinician concern About bleeding
Nurse 1	2	5	4	4	4	5	5
Nurse 2	1	6	5	3	5	7	6
Nurse 3	1	5	6	5	6	6	4
Nurse 4	2	4	5	4	5	5	5
Nurse 5	1	6	4	4	6	4	6

Table 24

In our study, nurses feel lack of time and lack of awareness as major barriers for VTE prophylaxis.

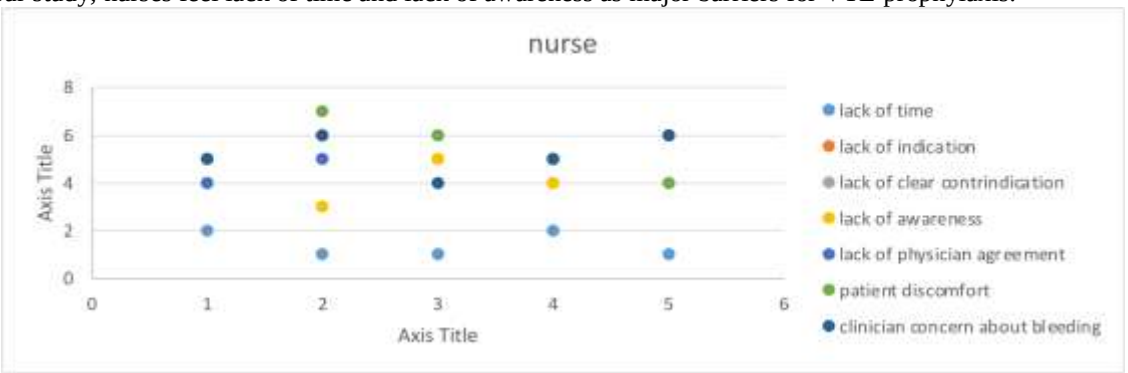

Figure 22

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Profession	Lack of time	Lack of indication	Lack of clear contraindication	Lack of awareness	Lack of Physician agreement	Patient education	Clinician concern About bleeding
Physiotherapist 1	2	4	3	2	6	7	5
Physiotherapist 2	1	5	2	4	5	6	4
Physiotherapist 3	2	5	5	6	4	5	3
Physiotherapist 4	3	4	4	5	6	4	4
Physiotherapist 5	2	3	3	4	3	7	2

Table 25

In this study, physiotherapists feel lack of time, lack of clear contraindication and concern about bleeding as the major barrier for VTE prophylaxis.

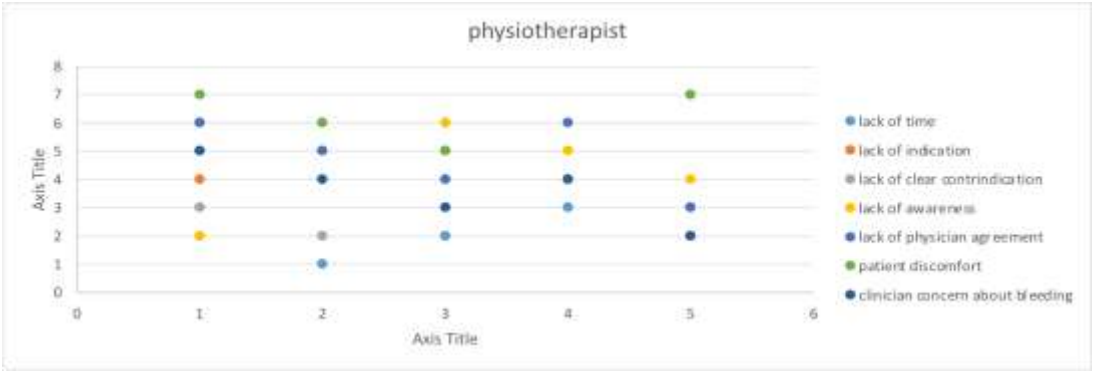

Figure 23

In overall, Perceptions regarding barriers to the optimal use of VTE assessment and prevention, lack of time and lack of awareness was identified as the major barrier for VTE prophylaxis.

VII. DISCUSSION

VTE is a common and potentially preventable disease in hospitalized patients. Risk assessment and prophylaxis is an important quantity of care measure.

The study was carried out in a tertiary care hospital located in Karimnagar. This study includes a total of 315 subjects, 218 are from the medical department and 96 are from the surgical department.

•In our study we found 90%(n=284) of subjects are at risk, Out of all patients at risk 198 are medical patients and 86 are surgical patients which is consistent with the Canadian CURVE study and other studies, where 78–90% of all hospitalized patient groups had at least one major risk factor for VTE.

•In this study, we have clubbed the age of the patients at risk into 8 age groups. It is found that 84% of our study group are older than 30 years. 51% of the patients are more than 50 years old. 5% of patients lie with age less than 20 years. The Mean age group of the patients at risk are found as 49 years with standard deviation ±16 years which is consistent with the study conducted in Saudi Arabia. In this study we have found 62%(n=177) of Male patients and 38%(n=107) Female patients. Majority of the patients at risk are male.

•Out of 218 medically ill patients, 198 patients at risk and 63% were males and 37% were females. The percentage of males was higher than females. This is consistent with the study conducted by Tunisian study.

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• In this study, Female patients are almost evenly distributed for age above 30 years, i.e. 15% in 31 – 40 age group, 10% in 41 – 50 age group, 23% in 51 – 60 age group, 24% in 61 – 70 age group and 18% in 70 & above age group. Only 11% of the patients are in the age group less than 30 years. Male patients distribution also follows similar distribution as females as shown in figure. 87% of male patients lie within the age group of 21 to 70 years age group. Only 5% of our male study group are under 20 years. The Mean age group of the study group is found as 51.3 years with standard deviation ±17.08 years. This is similar to the study conducted in pakistan. The Mean age group of the female study group is 53.9 years and STD DEV is ±18.01 years. The Mean age group of the male study group is 49.9 years and STD DEV is ±16.41 years.

•By our study we also found an association between risk and risk factor by performing chi-square test in graph pad prism 8.0.1 (244). **P value (<0.05)** which is statistically significant that means risk level is dependent on risk factor.

In our study, the highest risk found for VTE development in medical patients were reduced mobility (65%), stroke (25%), acute infection (19.72%), congestive heart failure (18.35%) and present cancer (9.35%) . A study conducted in Pakistan also reported immobility was identified as the important risk factor for occurrence of VTE. In this study, we found 31.3% patients are at low risk,18.6% are at moderate risk and 50% are at high risk. 50% patients were at highest risk (having ≥ risk factors) and it is more when compared to reports from Sub Saharan Africa (46.5%) and less compared to Bahl et al. (52.1%) studies. Furthermore, in our study the percentage of patients at moderate risk for VTE (18%) was slightly lesser than the Pakistan study (20%). However, a Tunisian survey showed that only 46% of all hospitalized patients are at risk for VTE development.

•In this study, surgical Male patients are almost evenly distributed for age above 30 years, i.e. 15% in 31 – 40 age group, 17% in 41 – 50 age group, 24% in 51 – 60 age group, 19% in 61 – 70 age group and 8% in 70 & above age group. Only 17% of the patients are in the age group less than 30 years.

Female patients' distribution also follows a similar distribution as male. 90%of female patients lie within the age group of 21 to 70 years age group. Only 5% of our female study group are under 20 years. The Mean age group of the patients at risk is found as 47.11 years with standard deviation ±17.43 years which is consistent with the study conducted by pakistan.

A total of 96 surgical patients, 86 patients are identified as having risk for VTE. In this study, we found 4.65% patients are at low risk, 24.4% are at moderate risk and 70% are at high risk.

•Out of all 284 patients at risk, we identified 23% are at mild risk, 20% at moderate risk, 56% are at high risk. 56% patients were at highest risk (having ≥ risk factors) and it is more when compared to reports from Sub Saharan Africa (46.5%) and less when compared with Bahl et al. (52.1%) studies. Furthermore, in our study the percentage of patients at moderate risk for VTE (35%) was higher than the Pakistan study (20%) but highest in the USA study. However, a Tunisian survey showed that only 46% of all hospitalized patients are at risk for VTE development.

In this study, out of 284 patients at risk only 10% of medical patients and 15% of surgical patients received prophylaxis. Underutilization prophylaxis was also reported in Canadian CURVE (16%)studies. Our medical patients received lesser prophylaxis (10%) compared with the patients in the Canadian CURVE study, which showed that 90% of acutely ill medical patients had an indication for thromboprophylaxis; however, only 16% received appropriate prophylaxis

•In our study on barriers for optimal prophylaxis, physicians feel it is 62% important, 48% effective, 57% safe and 74% under-utilised for VTE prophylaxis and nurses feel it is 62% important, 54% effective, 54% safe and 65% under- utilised for VTE prophylaxis. In a study by Nancy S. Lloyd et al. VTE prophylaxis was considered to be under-utilised by physicians and nurses. This is consistent with our study.

•In our study on barriers, the potential barriers are found to be lack of awareness, lack of time and clinician concern about bleeding. In other studies bleeding concern and lack of clear indications were observed. Both attending nurses and physicians feel that daily assessment of a patient's need for DVT prophylaxis is their responsibility. Confusion about roles and respon- sibilities in this area of patient care was reported by Cook et al., who identified that multidisciplinary care was perceived as a barrier to effective VTE preven- tion.

•Finally, the prospective data collection in a single hospital could be perceived as a methodological weakness. The patient data collection also requires informed consent at our institution. This could have affected the validity of our results by introducing

potential bias, in that patients being asked to enroll in the study prospectively may have been more likely to ask their prescribing physicians about VTE prevention. This, in turn, could have led to increased prophylaxis rates that would not be an accurate reflection of real-world practice or of our intervention.

VIII. CONCLUSION

•Venous thromboembolism (VTE) is considered to be the most common preventable cause of hospital-related death. Hospitalized patients undergoing major Surgery and hospitalized patients with acute medical illness have an increased risk of VTE. And the prophylaxis is often suboptimal due to difficulty in identifying at risk patients. We sought to assess the VTE risk in hospitalized patients using Padua prediction score for medical patients, caprini risk score for surgical patients and barriers for optimal prophylaxis.

•The Padua prediction score and caprini risk score demonstrated very good discrimination to identify hospitalized patients at VTE risk as low, moderate, and high risk.

•It showed that the medical and surgical patients are at high VTE risk, but thromboprophylaxis is under-utilised, especially in medical patients. Appropriate risk stratification and adequacy of prophylaxis for hospitalised patients can prevent VTE and it also showed lack of awareness is the potential barrier for VTE prevention.

•To prevent early mortality for the patients who are admitted in the hospital due to other illnesses. There is a need for awareness and implementation of ACCP evidence based guidelines and to assess risk, to take preventive measures for better patient care. A clinical pharmacist can play a major role in preventing VTE risk by assessing individual patients and in providing information regarding optimal prophylaxis**.**

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