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Venous Thromboembolism Risk, Prophylaxis and Incidence among Patients attending Emergency Department of Tertiary Care Hospitals in Addis Ababa Ethiopia: A Multicenter Prospective Study

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This is to certify that the thesis prepared by Worku Degefa entitled **"**Assessment of venous thromboembolism risk, prophylaxis and incidence among patients attending emergency department of tertiary hospitals in Addis Ababa Ethiopia.**"** and submitted in partial fulfilment of the requirements for the degree of Master of Pharmacy in Pharmacy Practice complies with the regulations of the university and meets the accepted standard concerning originality and quality.

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Abstract

Background: Venous Thromboembolism (VTE) constitutes pulmonary embolism and deep vein thrombosis. This problem is a major public issue associated with significant morbidity and mortality. There is initial evidence suggesting that early recognition of acute VTE and the nonspecificity of its symptoms and signs, however, there was a paucity of data to follow the guidelines for accurate risk assessment and tailored pharmacological thromboprophylaxis.

Objective: To assess VTE risk, prophylaxis, incidence and its predictors among patients attending the emergency department (ED) of tertiary hospitals in Addis Ababa Ethiopia.

Method: A multicenter hospital-based prospective study was conducted from June 1 to September 15/ 2023 in patients admitted to the adult ED of the three tertiary care hospitals namely Tikur Anbesa Specialized Hospital, St Paulos Hospital Millennium Medical College and Addis Ababa Burn Emergency and Trauma (AaBET) Hospital. The data was collected using questionnaire prepared by reviewing different literature and the Padua VTE risk assessment tool. The collected data was entered into Epidata version 4.2 then exported to SPSS version 25 for analysis. Multivariable Cox regression was performed to identify independent predictors for VTE occurrence. Adjusted hazard ratio was used to measure the strength of association. The $P< 0.05$ was considered as statistically significant.

Result: A total of 422 patients were enrolled. About 70.64% of ED admitted patients were found to be in high risk of developing VTE according to Padua risk prediction score. Of eligible patients for pharmacological prophylaxis only 33.4% of them were given anticoagulant prophylaxis.VTE occurred in 18 (4.3%) patients after admitted in ED. The multivariable Cox regression analysis showed that the physically active patients prior to ED admission was less risk to develop VTE compared to physically inactive patients (Adjusted Hazard Ratio (AHR)= 0.67, 95% (CI): 0.082-1.579, P=0.014),getting pharmacological prophylaxis decreased the risk of developing VTE by 83% (AHR)=0.167, 95% (CI): 0.037-0.768, P=0.021), having acute infection such as sepsis increased the risk of developing VTE 8 fold than without infection(AHR=8.169, 95%CI: 1.045-63.854, P=0.045) and having active cancer (AHR=5.133, 95%CI: 1.241-21.093, P=0.023),) were independently associated with VTE event during follow up period.

Conclusion: The VTE risk and occurrence was high among ED attaining adult patients and the rate of thromboprophylaxis use for those high-risk patients was low. Absence of pharmacological prophylaxis, physically inactive patients prior to admission, active cancer and acute infection were found to be independent predictors for the occurrence of VTE during the emergency ward stay.

Key words: VTE Risk, VTE prophylaxis, Emergency Department, Padua Score

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Lists of Acronyms

AaBET --------- Addis Ababa Burn Emergency and Trauma

AAU ---------- Addis Ababa University

ACCP---------- American College of Chest Physician

DVT---------- Deep Venous Thrombosis

ICU ----------Intensive Care Unit

LMWH --------- Low Molecular Weight Heparin

PE ---------- Pulmonary Embolism

PTS ------- Post Thrombotic Syndrome

RAM ------- Risk Assessment Model

SPHMMC------St Paulos Hospital Millennium Medical College

TASH------- Tikur Anbesa Specialized Hospital

UFH---------- Unfractionated Heparin

VTE Venous Thromboembolism

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1. Introduction

1.1 Background

Venous Thromboembolism (VTE) is a blood clot that starts in the vein and blocks blood flow.[1] VTE includes Pulmonary Embolism(PE), which is a major cause of morbidity and mortality that causes chronic thromboembolic pulmonary hypertension, on the other hand Deep Vein Thrombosis(DVT) causes leg swelling and post thrombotic syndrome(PTS)[2]. In addition, VTE may develop in a splanchnic vein and other atypical locations [3]. Studies reported that VTE is the most common serious hematologic disorder that results in a high incidence of death. For example in the United States, approximately 60000 to 100000 people die from VTE each year[4].In Africa, 60% mortality rate is estimated from PE indicating seriously fatal[5].

More than half of newly diagnosed VTE cases are supposed to occur in acutely ill patients who are in a risk to develop VTE as a result of having predisposing factors including trauma, patients with a prior VTE, potent thrombophilia, active cancer, prolonged bed rest, infection, obesity, advanced age or females using oral contraceptive or hormone replacement therapy[6].Recent evidence also showed that patients admitted in emergency department(ED) with the diagnosis of Covid 19 are more likely to develop VTE [7, 8]. The occurrence of VTE after discharge from an emergency is a significant problem and resulting in readmission for seeking VTE treatment[9]. The risk of VTE continues to be high, with more than 30% of VTEs in the emergency attending population occurring after admission because of greater inflammation resulting from the illness which is also more likely associated with a hypercoagulable state in the emergency care-seeking population[10].

The formation of VTE is closely related to three aspects as stated by Virchow's triad include blood stasis, vascular endothelial injury, and the onset of blood hypercoagulability rapidly after tissue injury. Once an individual gets acute illness or injury followed by hypoxia, low temperature and tissue hypoperfusion, the exogenous coagulation pathway will be initiated by tissue factors released after tissue injury. The factors bind to activated factor VII and further activate factor X, to promote the activation of prothrombin into thrombin, which converts fibrinogen into fibrin and activates platelets to promote thrombosis even though the occurrence is rare in patients without multiple risk factors[11].

Therefore patients with additional risk factors should be assessed as soon as possible after admission to the emergency care unit to identify the risk of VTE as this can be reduced through accurate risk assessment and tailored pharmacological thromboprophylaxis in which different institutions including the American College of Chest Physicians (ACCP) developed guidelines for the use of low molecular weight heparins (LMWH) and unfractionated heparins (UFH) in the prevention of VTEs in patients with acute illnesses[12]. VTE prophylaxis needs to be initiated within 24–72 hr after injury in most traumatically injured and acutely ill patients as delaying results in a higher likelihood of developing VTE and increased mortality as time progresses[13]. The use of prophylaxis is associated with a significant reduction in the risk of VTE by 35-60% and therefore initiation early during emergency visit in patients at high risk for the development of VTE is considered standard of care though in practice it is often delayed in patients with certain injuries due to concerns about bleeding[14].

1.2 Statement of the Problem

Worldwide, an estimated 10 million VTE episodes are diagnosed annually; over half of these episodes are associated with hospital inpatient stays and result in significant loss of disability- adjusted life years[15].VTE, represent a major public health problem that affects 350,000 to 600,000 Americans each year while about 300,000 death from VTE per year has been reported, and annual incident of VTE events are estimated to cost US healthcare more than 7 billion dollars each year[16]. A study from China also reported that up to 70% of thromboembolic events and almost two-thirds of fatal PE among hospitalized patients occurred among medical patients in the country[17]. The magnitude was found to be high in Africa where 93.5% of hospital-admitted patients were assessed to have VTE risk in Cameron[17].The result of systematic review in Ethiopia also found that VTE is a major public health problem in Ethiopia with diverse clinical risk factors[18].

Even though most clinicians and nurses do not recognize the risk of VTE from critically ill patients attending the emergency wards, there was evidence that reported more than 57% of hospitalized patients have significant risk factors for the development of VTE [19].

Acutely ill patients are at increased risk of VTE due to predisposing conditions, such as the occurrence of sepsis, trauma, active cancer, acute complicated cardiovascular events and advanced age [20]. As demonstrated from different findings, the risk of VTE in patients with sepsis was 5.36-foldhigher than in those without this complication (17).Increased length of stay (LOS) is the strongest independent

predictor of VTE occurrence leading to readmission after discharge from emergencyfollowing infectious complications[21] ,renal complications, and cardiac complications and the rate of the event could be significantly high(69.4%). However; addressing the problem for those particular subgroups of patients admitted from the ED where patients are supposed to be at high risk for VTE and the incidence of VTE is reported at 1 per 1000 yearly in those populations [22] has been neglected in the literature.

A significant amount of thrombosis is caused by VTE acquired in a hospital during an acute injury which carries a high risk of morbidity and mortality. After receiving a VTE diagnosis, patients frequently experience longer, more expensive hospital stay as well as increased mortality. More than one third of patients who are admitted with VTE year after being hospitalized for trauma also present for another hospital visit, making up over 33% of the total cost.[23].

Underutilization of thromboprophylaxis against VTE among hospitalized patients found to cause 30-40% & 0.2-0.9% mortality rate secondary to PE and DVT respectively to which 80% cases complicated with post thrombotic syndrome (PTS) and chronic thromboembolic pulmonary hypertension (CTEPH). PTS and CTEPH are associated with substantial morbidity and high healthcare expenses. A study conducted in Australia revealed that PTS can be complicated in up to 50% of patients after symptomatic DVT while similar proportion of patients are diagnosed with severe pulmonary hypertension because of PE [24]. Moreover, about 30% of patients with untreated DVT develop clinically significant PE, and the mortality rate of PE at the emergency department exceeds 20%[25].The length of hospital stay and re-admission for the need of venous thromboembolism treatment become increased in magnitude and the complications from VTE also lead to the worsening of the quality of life of these patients results in disability or death. The financial burden of the health system is also significant[26].Once the patient develop VTE after hospital admission, medical service fees is the largest contributor to costs and length of hospital stay for the need of VTE treatment is factors related to higher hospitalization costs[27]. Moreover, in developing countries including Ethiopia ,priority is being given to acute disorders of current emergency admission cases with little emphasis on VTE risk assessment which later after happening results in worse outcomes and significant mortality rate reported that 10% to 30% of people dying within 1 month of diagnosis and one-half of them have long-term complications[28, 29].

Thus assessing the risk and providing thromboprophylaxis for the prevention of VTE occurrence at emergency attendance is clinically and financially beneficial compared with treatment for already occurred thrombosis[30]. But this has to be implemented only if the risk has been assessed and VTE prophylaxis is recommended based on risk assessment for every single patient, which is seen in the ACCP guideline recommendations for VTE risk assessment for emergency patients [31]to prevent unnecessary utilization which might result in a risk of bleeding[32].

Despite the guidelines recommendation, the use of VTE prophylaxis in most of health care among critically ill patients is still suboptimal. The result of the study from Zambia showed, from a total of patients found to be at risk for VTE only 38.9% of eligible patients received prophylaxis[33].The problem may result from the fear of bleeding and from focusing on the current complex illness of emergency patients rather than preventing future possible illnesses by the treating physicians [34].In addition lack of effective institutional policies including implementation of risk assessment tools and prophylaxis guidelines, or difficulties in remembering the recommendations are the most determinants for low rate of VTE prophylaxis [19].

Additionally, low degree of knowledge towards VTE prophylaxis and poor practices in VTE prophylaxis among health professionals in Ethiopia remain a problem [35, 36] and only a handful of studies addressing VTE risk and prevention techniques in critically ill patients in Ethiopia have been published to date. The majority of traumatized and critically ill patients are more likely to be at high risk for VTE early in their emergency visit but are discharged from the emergency room without having had their risk for VTE assessed.[37, 38]. This is why none of the studies included this population. For example, a study that used thromboelastograph to corroborate the findings showed that patients are susceptible to hypercoagulability soon after injury, particularly PE, which is known to significantly increase morbidity and mortality following trauma or critical illness, and can happen as soon as 72 hours after emergency [39]. Currently the results of studies reporting that prolonged stays in the emergency room commonly exceeding 24 hours indicate that there may be a place for initiation of VTE prophylaxis in the emergency department where risky populations should be assessed on admission and given appropriate prophylaxis[40, 41].Those scenarios showed early risk assessment and an indicationof VTE prophylaxis at an emergency is significant but the status has not been assessed well yet in the study area. Hence this study was designed to assess VTE risk, prophylaxis, incidence and its associated factors among patients attending emergency wards of tertiary care hospitals in Addis Ababa city, Ethiopia.

1.3. Significant of the Study

Patients having different medical conditions and accidental trauma are at increased risk of VTE despite they discharged after recovery of current illness without risk assessment for VTE. Various studies conducted in worldwide showed that nearly half case of asymptomatic VTE occurrence as a result of the presence of additional risk factors along with current acute illness. The absence of thromboprophylaxis for high VTE risk patients could results in an estimated 50% risk of complication including death. Despite the proposed significant problems, VTE risk assessment in the area of emergency care in Ethiopia has not been given emphasis yet due to the assumption that no more than 24 hour duration will be expected as per standard emergency protocol but significant gap for implementing the protocol led patients stay longer in emergency much more than expected with potential VTE risk and therefore identifying the risk in the area helpful to take appropriate action towards VTE prevention.

This study also primarily designed to disclose the magnitude of VTE risk in emergency wards and determinant factors for providing thromboprophylaxis for those risky groups so that the result of this finding will provide input for policymakers including ministry of health to develop guidelines to revise the existing emergency protocol towards VTE prevention. Furthermore, it is helpful to make hospital leadership, clinicians and nurses aware of to determine optimal and safe strategies for VTE prophylaxis for critically ill patients and this appropriate intervention offers potential strategies for improving patient outcomes. The finding of this research will also be used as baseline data for other readers and researchers interested in the area.

2. Literature Review

2.1. Burden of Venous Thromboembolism

VTE is a major concern after acute survival from trauma and other critical acute illness resulting in life-threatening conditions in the absence of appropriate prevention protocol but the incidence can be reduced even below 4% through applying standard VTE prevention protocol[42]. Therefore having a simple tool to aid in risk assessment and prophylaxis prescription is essential [43]. However, lack of implementation of guidelines in a practical fashion resulted in significant VTE incidence and economic burden prominently increased [44].

The healthcare costs of treating a patient with an incident VTE include the costs of treating the acute event as well as the costs of complications of VTE; Costs associated with complications of acute VTE contribute to the economic burden of VTE[45]. Moreover once acute complications occurred rapidly and unpredictably and may be difficult to diagnose specially PE where up to 50% of diagnosed VTE is asymptomatic PE which results in sudden death [46]. The result from a prospective cohort study conducted in Tunisia also reported that out of ICU-attending traumatic patients, 41.5% of them developed VTE within 72 hours of injury and 18% of the patients were even diagnosed with PE on the day of admission within 24 hour[41].

Complications of acute VTE include PTS which can result in chronic limb heaviness, swelling, pain, paresthesia, and, in severe cases, venous leg ulcers, which occur in 4–6% of survivors of proximal lower-extremity. Chronic thromboembolic pulmonary hypertension is the other VTE complication that results from a pulmonary embolism which requires lifelong anticoagulation and is much more expensive to treat than other PE costs with average monthly expenditures of 5500USD[47].In terms of affecting the quality of life and increasing mortality, complications from VTE are highly prominent[48]. A Prospective cohort study conducted in seven European countries among 1399 study participants showed that once patients were complicated with PE the mortality rate was significantly higher especially in patients having active cancer the mortality was more significant than in those without active cancer (42.7% vs. 4.7%, p- value $\leq$ 0.0001)[49]. The result of retrospective study conducted at the Emergency Department of University Hospital Sveti Duh also showed that the mortality rate from PE exceed 20%[50].

2.2. **Risk assessment and factors associated with Venous Thromboembolism event**

Numerous risk assessment models have been proposed ranging from those a few factors to very detailed models designed to capture all of the important factors that could lead to a thrombotic event[51]. Most of these models attempted to simplify the assessment process by including only the most frequently associated factors known to increase the incidence of VTE[52]. The problem with this approach is many patients with risk factors not included in the model may be denied Prophylaxes but remain at high risk[53]. Risk stratification of VTE risk during hospital admission may assist clinicians and clinical pharmacists in determining the best and appropriate intervention before the occurrence of VTE [54].The result of clinical trial revealed that stratifying VTE risk through adoption of Padua Prediction Score is associated with a 50% reduction in the incidence of VTE in medically ill patients compared with clinical judgment being employed by health professions [55]. The report of other randomized controlled trial showed that the use of Padua prediction score for VTE risk assessment in medically ill patients was associated with a higher rate of appropriate thromboprophylaxis prescription compared to physicians own decision[56].

VTE risk assessment scores such as the Padua score and Improve score are recommended to be applied in medical, intensive care units and emergency departments though the Caprini RAM has been a widely used and comprehensive tool in surgical patients [57]. The systematic review involved 51 observational studies that evaluated the risk assessment model other than the above RAM for predicting the risk of developing VTE in hospital inpatients and found that VTE risk assessment model have generally weak predictive accuracy and most have a high risk of bias as well as lack of methodological clarity which leads to difficulty in assessing the applicability of the individual study results [58].

Despite the choice of VTE risk assessment models, studies have found incidence and potential risk factors for VTE in hospitalized patients. Even though the incidence of VTE among medically ill patients varied substantially, higher rate has being reported. The pooled result from systematic and meta-analysis conducted by including 42 studies found that VTE event in hospitalized patients was 10.0%[59].

The other systematic review involved 17 studies found the incidence of VTE among hospitalized patients was 6.4%[60]. A prospective study conducted in California among non-trauma hospitalized patients reported 9.8% of VTE incidence[61]. Moreover, the finding of prospective study included 102 study

participants in medically ill patients reported 7.8% of VTE event occurred after 24 hour of hospital admission[62].And also A prospective observational study conducted at Hospital of Chongqing Medical University found that the cumulative VTE incidence within 7 days after hospital admission was as high as 4.45%[63].A Large population-based registry from Germany screened 35000 trauma patients to identify potential risk factors for VTE incidence demonstrating that 66.5% of all VTEs occurred during the first 3 weeks after admission to emergency ward because of acute illness [64].

Most occurrences of VTE was associated with higher frequencies of sepsis (25%) single organ failure (63.6%) and multiple organ failure (49%) and prolonged in-hospital length of stay(27%). A prospective observational study conducted in India medical ward identified different variables associated with VTE event, such as, age, gender, body mass index (BMI), personal or family history of VTE, known thrombophilia disorder, smoking, alcohol, oral contraceptive, recent hospitalization, and activity level, admitting diagnosis such as sepsis, trauma, malignancy, chronic cardiac, respiratory, peripheral vascular disease, renal, or central nervous system disease[65].A review involving 6,710,066 trauma patients was performed in the USA and found that infections such as advanced acquired immune deficiency syndrome and anemia, arthritis, congestive heart failure, coagulopathies, hypertension, lymphoma, metastatic cancer, other neurological disorders, obesity, paralysis, pulmonary circulation disorders, renal failure, solid tumor without metastasis, was associated independently with 1.04 (95% CI: 1.02−1.06) to 2.91 (95% CI: 2.81−3.00) times increased likelihood of VTE diagnosis than among hospitalizations ofadults without any of these corresponding conditions[66].

A retrospective study conducted in New York to evaluate the risk factors for hospital- acquired VTE showed that the overall rates of hospital-acquired VTE was 0.94% where the neurosurgical patients had higher rate and active cancer as well as older patients were the higher risk for VTE incidence[67]. Multistage study design conducted in Atlanta USA reported, the rate of primary diagnosis of VTE at emergency was higher among patients >70 years of age, when compared to younger patients[68].Overall,multipile risks have been found to be determinant for VTE event. Study conducted in Europe among hospitalized medically ill patients reported that about 75% have multiple risk factors including age, immobility, hypercoagulability, and renal insufficiency leading to an 8-fold increase in VTE risk when compared to the general population[69].

Additional risk factors for the occurrence of VTE had been found that missing the dose of

anticoagulation among patients in hospital admission is common after it was initiated which lead to an increase in the diagnosis of VTE later in which the reason of missing the dose might be due to patient preference, nursing concerns, drug delivery, or withholding of dose because of fear of bleeding.[70].A Prospective cross-sectional study conducted in Portland found that the overalloccurrence of DVT was 23.5% as a result of interruption of prophylaxis where more than half of (58.9%) hospitalized patients and who initiated with prophylaxis missed at least 1 dose of DVT prophylaxis [71].

Single-centred retrospective cross-sectional study conducted in Africa,Tanzania,Dareselam on VTE risk assessment among 300 medical and surgically admitted patients using Caprini RAM identified the most common risk factors include advancing age, history of major surgery, obesity and patient immobilized at bed rest. Upon VTE assessment of patients, 23% and 11% of surgical patients were considered to be at moderate and high risk respectively of developing VTE. Whereas 11% and 3% of medical patients were considered at moderate and high risk respectively[72] .Overall, a multinational, observational, cross-sectional study conducted in sub saran African countries including Madagascar, Nigeria, Cameroon, Democratic Republic of Congo, Namibia; to assess prevalence of VTE risk in hospitalized patients reported 62.3% medical patients were at high risk of VTE [73]. A cross-sectional and case–control mixed study conducted in Senegal, Africa demonstrated that oral contraception, immobilization by casts, surgery, and blood group were significantly associated with VTE occurrence[74].

A retrospective cross-sectional study conducted in Ethiopia among 219 patients admitted to Tibebe Ghion Specialized Hospital from 1 December 2018 to 31 May 2019 to assess VTE risk in hospitalized medical patients reported that the most common risk factors for VTE were acute infection/and rheumatologic disorder (76.7%), reduced mobility (41.1%), having heart and /or respiratory failure (21.5%), elderly age ⩾70years (13.7%), active cancer (10.5%), and acute myocardial infarction or ischemic stroke(12.8%) [75]. Moreover, Covid-19 has also been identified as risk of developing thrombosis. Single-centered prospective study conducted in Netherland found that 20% patients with Covid-19 developed VTE during a median follow-up of 7 days in hospital[76]. A prospective observational study conducted in United kingdom had reported cumulative incidence of VTE as 27% among patients with Covid-19[77]. A multicenter retrospective cross-sectional study conducted in Ethiopia also reported that 8.9% of admitted Covid 19 patients developed thrombosis during their hospital stay[78].

2.3. **VTE prophylaxis use and associated Factors**

Patients admitted through the ED with some specific risk factors are at high risk of VTE. Despite this; VTE prophylaxis is underutilized and rarely started after the first day of hospitalization[79]. Guidelines for VTE prophylaxis exist, yet prophylaxis is underutilized and inadequately studied in the context of ED admission[80]. A multinational observational study conducted in the united States of America assessed the practice of thromboprophylaxis in 15156 patients from 52 hospitals and reported that only approximately 60% of patients who either met the ACCP criteria for requiring prophylaxis were eligible for pharmacologic prophylaxis received prophylaxis [81].

A study conducted in Portugal to assess VTE risk and prophylaxis risk in patients admitted to medical and surgical ward also reported that 37.6% of patients considered not to have evidence of VTE risk, were got prophylaxis with any anticoagulant, which was considered to be inappropriate[82].According to the finding from study conducted in Palestine, VTE prophylaxis among hospitalized medically ill patients was mostly inappropriate; as around 80.18% of the patients received inappropriate prophylaxis and only 60.3% of eligible patients received appropriate Prophylaxis[35]. The pooled result from systematic review and meta-analysis included 20 countries for a total of 137 288 patients to evaluate the rate of pharmacological prophylaxis among higher VTE risk medically ill patients showed that the use of thromboprophylaxis was 66.8% in Europe , 68.6% in North America, 58.3% in South America and 44.9% in Africa[83].

Regarding the use of pharmacological prophylaxis, numerous results have been reported from African countries. A prospective observational study conducted among hospitalized medical patients of the Military Hospital of Bamenda north-west region-Cameroon showed, of high VTE risk patients, almost all the patients received appropriate prophylaxis with heparin during their hospital stay[84].

A cross-sectional audit of general surgical inpatients was performed on two dates during July and August 2017 at a tertiary government hospital in the Eastern Cape, South Africa reported that despite a high proportion of patients at risk for VTE, the rate of adequate thromboprophylaxis prescription was very low in risky patients and the correct therapy was prescribed to only 27% of emergency patients [85].

The reason associated to underutilization was not reported enough but studies demonstrated different factors related to awareness among health professionals towards guidelines implementation[86]. The cross-sectional survey conducted in China by including 2079 medical staffs working in emergency departments from different hospitals to assess the knowledge, attitudes, and practices regarding VTE prophylaxis among medical staff concluded that more than half (58.2%) study participants concerned about increased workload, increased medical cost, extended hospital stay for the patient for the prophylaxis completion while the remaining have not fully recognized the importance of VTE prophylaxis at all [87]. A cross-sectional study conducted on April1 30, 2021, in the Amhara region, Northwest, Ethiopia to assess about DVT prevention practice revealed that the knowledge and practice of nurses working in different wards of Amhara region comprehensive specialized hospitals were poor enough for DVT prevention [88].

3. Objectives

3.1. General Objectives

To assess VTE risk, prophylaxis, incidence and its associated factors among adult patients admitted to the ED of TASH, AaBET and SPHMMC from June to September 15, 2023

3.2. Specific Objectives

- ✓ To determine the incidence of VTE among patients attending ED of the three selected hospitals
- ✓ To assess the level of VTE risk using Padua RAM among patients attending ED of the three selected hospitals.
- ✓ To determine the rate of VTE prophylaxis using ACCP guideless use among adult patients admitted to ED of the three selected hospitals.
- ✓ To identify factors independently associated with the occurrence of VTE among adults patients admitted to the ED of the three selected hospitals

4. Methods

4.1. Study Settings

The study was conducted from June 1 to September 15, 2023 in patients admitted to the adult emergency wards of three public hospitals in Addis Ababa city, Ethiopia namely Tikur Anbesa Specialized Hospital (TASH), Addis Ababa burn emergency and trauma Hospital, (AaBET), St. Paulos Hospital Millennium Medical College St.Paulos Hospital (SPHMMC). Of 14 public hospitals found in Addis Ababa city, the three mentioned above are selected because of high referral and emergency flow than the remaining government hospitals.

The TASH was established in 1972.The hospital is located in Lideta Sub-City, Addis Ababa, Ethiopia. It is the largest hospital affiliated with the College of Health Sciences, Addis Ababa University, which is a teaching hospital for both clinical and preclinical training in different disciplines and popular institution where specialized medical services are rendered to the people referred from different regions of the country. The hospital serves more than 500,000 patients per year in its 20 outpatient specialty clinics, inpatient, and ED where the average monthly reception of adult emergency is estimated to be 800 patients.

The AaBET hospital is part of SPHMMC and one of the largest trauma centers in Addis Ababa city in Ethiopia which was established in 2007.AaBET provides a tertiary level referral treatment and is also open twenty-four hours for emergency services. The hospital is administered by the federal minister of health and it is the teaching hospital. Providing teaching about medical students and other health-related fields. The average annual emergency reception of the hospital is estimated to be 10,379 injured patients.

The SPHMMC is one of the popular tertiary care and teaching hospital in Ethiopia which was established in 1969.Currently the hospital has more than 392 beds and 1300 staffs who are providing service for over 20000 patients visiting the hospital annually. The hospital also receives, and serves referral critical emergency cases referred from other hospitals and health institutions with a total of 25 adult emergency beds.

4.2. Study Design and Study Period

The multicenter hospital- based prospective study design was employed at ED of the three selected hospital from June 1 to September 15, 2023.

4.3. Source of Population

All patients admitted to the ED of the three selected hospitals in Addis Ababa city were the source of population.

4.4. Study Population

Adult patients admitted to ED at the three selected hospitals during the study period and who fulfilled the inclusion criteria were recruited.

4.5. Eligibility Criteria

4.5.1. Inclusion Criteria

- ✓ Patients who had medical history with completed data.
- ✓ Patients willing to participate

4.5.2. Exclusion Criteria

- ✓ Patients admitted with established VTE diagnosis
- ✓ Patients with incomplete data

4.6. Sampling and Sample Size Determination

4.6.1. Sample Size Determination

The sample size for this study was calculated by using single proportion population formula considering as W= marginal error of 5% (w=0.05), Z α/2= the degree of accuracy required (95% level of significance = 1.96).The p- value is determined by using the following assumptions; since the proportion of occurrence of VTE had not been studied at ED in the study areas, it was taken as 50%(0.5).Then calculated as follow:

$$n = \frac{(Z\alpha/2)2p(1-p)}{W2}$$

$$n = \frac{(1.96)2(0.5)\ (0.5)}{(0.05)2} = 384$$

Finally, considering a 10% contingency for possible non-response rate, and missed data, the calculated sample size was 422.A total of 2080 patients attending the ED each month with an average of 800,760 and 522 from TASH, AaBET and SPHMMC was taken respectively as the study population. Proportional allocation was done to get the representative sample by taking the total number of attending patients in each study area (TASH 800/2080×422=162, AaBET 760/2080×422=154 and SPHMMC 522/2080×422=106) patients were included.

4.6.2. Sampling Techniques

All adult patients admitted to the emergency wards during the study period of the three consecutive months who fulfil the inclusion criteria other than emergency triage and those are inaccessible for follow-up, all were included in the study and a consecutive technique was used for the purpose of data collection [89-91].

4.7. Study Variables

4.7.1. Dependent Variables

- ✓ Anticoagulant prophylaxis
- ✓ VTE occurrence

4.7.2. Independent Variables

- ✓ Age
- ✓ Gender
- ✓ Physical exercise
- ✓ Co morbidity
- ✓ Duration of emergency stay
- ✓ Receiving thromboprophylaxis
- ✓ Acute infection
- ✓ Active cancer
- ✓ Immobility
- ✓ Level of VTE risk
- ✓ Previous VTE

4.8. Data Collection Procedures

The data was collected using a questionnaire which was prepared by reviewing different literatures and guidelines to review all necessary information from the patient's medical chart. The patient's demographic status like age, sex, cigarette smoking and alcohol consumption status, habit of physical exercise was also assessed through patient interview. Patient was considered physically active if had habit of walking, cycling, wheeling, doing sports. Padua Risk Assessment Model [92]was used to determine the risk of thromboembolism of each patient where a risk value of 1 to 4 was given for each criterion according to its contribution to the development of thromboembolism.The total risk score was calculated by adding points given for each Padua Risk Assessment Parameter seen in the patient. A total score of 4 or more indicates a high risk for thromboembolism which makes the patient a candidate for pharmacologic prophylaxis provided that the patient is free of any contraindication for it. Whereas a total score less than 4 was considered as low risk in which the patient below this cut of point will not be a candidate for pharmacological prophylaxis. The provision of thromboprophylaxis was assessed from the patient medical chart and nursing medication chart. The incidence of VTE was assessed through prospectively observing whether the patient has developed VTE or not during emergency ward stay. Hence, new VTE events occurring after emergency admission were considered as incidence. The occurrence of VTE was determined only if the result of Doppler ultrasound and physician's diagnosis is recorded on patient medical card. Pharmacological prophylaxis was considered inappropriate if the patient is being given pharmacologic prophylaxis while not eligible or with an absolute contraindication or if they are not given while the prophylaxis is indicated and not contraindicated for them. Contraindication was determined from ACCP guidelines using the parameters such as bleeding from current trauma, gastrointestinal bleeding within 3 months, severe thrombocytopenia and intracranial haemorrhage. Data was collected by three nurses (one nurse at each hospital) after they were trained on the basic procedures of data collection and the objectives of the study.

4.9. Data Analysis

The collected data was cleaned, coded and entered into Epi-data version 4.2 then exported to Statistical Package for Social Science (SPSS) version 25 to be analyzed. Mean and standard deviation for continuous variables and frequency and percentage for categorical variables were computed by using descriptive statistics in SPSS to summarize socio-demographic and relevant clinical characteristics of the study participants. The association between predictors and the time to a

VTE occurrence was explored using Cox regression models. The Cox model was yield hazard ratio (HRs) with corresponding 95% CI confidence interval. All independent variables were initially tested for an association with rate of VTE occurrence in bivariate Cox proportional hazard models. Those variables demonstrating a bivariate association with at least marginal significance (P< 0.25) was included in a multivariable model. Multivariable Cox regression was performed to identify independent predictors for VTE occurrence. Adjusted hazard ratio was used to measure the strength of association. The P< 0.05 was considered as statistically significant. A Kaplan-Meier curve was used for showing survival outcome. Finally, the result was presented by using text, tables, figures and charts.

4.10. Data Quality Assurance

For completeness and consistency, a standardized questionnaire in English version was translated into the local Amharic language. Then it was back translated into English and checked by the principal investigator.Pre-test was conducted at Yekatit 12 hospital medical college emergency ward on 5% of the patients sample to assure clarity, avoidance of ambiguity, comprehensiveness and content uniformity and to carry out the necessary amendment before commencing data collection. At the end of each data collection days, the principal investigator checked the completeness of filled questionnaire information to ensure its quality.

4.11. Ethical Consideration

Ethical approval was obtained from the School of Pharmacy, Addis Ababa University Ethical Review Board through the letter number ERB/SOP/524/15/2023 and institutional review board of St. Paul's Hospital Millennium Medical College letter number Pm23/60.Then permission to conduct the study was obtained from TASH, AaBET and SPHMMC administration. After participants were given information regarding the objectives of the study and they have the right either to refuse or participate in this study, written consent from participants was obtained.

4.12. Operational Definitions

Adult: According to WHO definition adult means a person older than 18 years of age

Alcohol drinker: Those who have consumed a drink containing alcohol of 2 drinks or more in a day for men or 1 drink or more in a day for women[93].

Already established VTE: Venous thromboembolism diagnosis occurred before patients ED admission.

Appropriate VTE pharmacologic Prophylaxis: If patient was given a pharmacologic prophylaxis while he/she was eligible according to Padua prediction score given that they were without an absolute contraindication[94].

Incompletes data: Any missed patient information from medical card and patients themselves

Padua Risk Assessment Model (RAM)-This is the widely used tool to stratify patients at a different level of VTE risks based on the risk factors that exist in hospitalized patients[95].

Pharmacologic-prophylaxis: The use of anti-coagulants to prevent the development of thrombosis in those patients considered at risk for developing thrombosis

Physically active: according to WHO definition, include walking, cycling, wheeling, doing sports or any form of non-motorized activity[96].

Severe thrombocytopenia: is low platelet count less than 50000cell per micro liter**[**97**,** 98**]**.

VTE incidence: The occurrence of VTE at any time after patient's emergency admission where the diagnosis is recorded by physicians or proven from the result of the Doppler ultrasound attached to patients' medical record

4.13. Dissemination Plan

The result of the study will be given to the Department of Pharmacology and Clinical pharmacy School of Pharmacy College of Health Science Addis Ababa University as well as TASH, AaBET and SPHMMC and the research findings will also be made available to the scientific communitythrough the presentation and will be published either national or international scientific journal.

5. Results

5.1. Socio -demographic characteristics

From a total of 422 participants recruited for this study with 100% respond rate, 218 patients (51.7%) were male. The mean (±SD) age of the patients was 49.36(±17.12) years with the range of 19 to 97 year. More than half (52.1%) of emergency attendants at three study setting were not resident of Addis Ababa city. About 214 patients (50.7%) had community based health insurance for the coverage of their medical expenses. Nearly one-third of the patients (130, 30.8%) were unable to do physical activity due to chronic medical problem and aging.

Table 1: Socio-demographic characteristics of Study Participants Attending Emergency Ward At AaBET, SPHMMC, TASH From June to September 15, 2023 (n=422)

characteristics	Category	Frequency (%)			
		ABET	SPHMMC	TASH	Total
Age	18-29	32(7.6%)	7(1.7%)	11(2.6%)	**50(11.8%)**
	30-49	47(11.1%)	43(10.2%)	74(17.5%)	**164(38.9%)**
	50-69	50(11.8%)	28(6.6%)	44(10.4%)	**122(28.9%)**
	>=70	25(5.9%)	28(6.6%)	33(7.8%)	**86(20.4%)**
Sex	Male	97(23%)	48(11.4%)	73(17.3%)	**218(51.7%)**
	Female	57(13.5%)	58(13.7%)	89(21.1%)	**204(48.3%)**
Address	Addis Ababa	56(13.3%)	54(12.8%)	92(21.8%)	**202(47.9%)**
	Out of Addis Ababa	98(23.2%)	52(12.3%)	70(11.6%)	**220(52.1%)**
Payment status	Health insurance	50(11.8%)	67(15.9%)	97(23%)	**214(50.7%)**
	Out of pocket	83(19.7%)	39(9.2%)	62(14.7%)	**184(43.6%)**
	Covered by other	21(5%)	0(0%)	3(0.7%)	**24(5.7%)**
Physical activity	Yes	121(28.7%)	65(15.4%)	106(25.1%)	**292(69.2%)**
	No	33(7.8%)	41(9.7%)	56(13.3%)	**130(30.8%)**
Social habit	Alcohol drinker	26(6.2%)	16(3.8%)	19(4.5%)	**61(14.5%)**
	Cigarette smoker	6(1.4%)	1(0.2%)	2(0.5%)	**9(2.1%)**
	Both	3(0.7%)	3(0.7%)	5(1.2%)	**11(2.6%)**
	None	119(28.2%)	86(20.4%)	136(32.2%)	**341(80.8%)**

5.2. Baseline Clinical Characteristics of Study participants

Out of the total, about two-third (322, 76.3%) of the patients had co-morbid illnesses. The most frequently reported co- morbidity illnesses were Hypertension (49.5%) followed by

cancer(26.3%),heart disease (24.4%),diabetes mellitus (20.3%).The most frequent admission diagnosis was trauma (23.7%) followed by infectious disease(19.2%),Sepsis and septic shock (14.7%),stroke(9.7%),acute kidney injury (5.9%) .The admitted patients stay in the emergency ward for the minimum of 1 day to the maximum of 32 days with an average of 8 days ±6.06 days (Figure;1depicited the length of emergency stay).Of total participants followed in ED during study period, (47.4%) were discharged, (34.6%) were transferred to internal medicine ward, (7.8%) transferred to ICU,(3.1%) linked to surgical ward ,(4%) linked to oncology ward and (3.1%) patients were died as stated in Table 2.

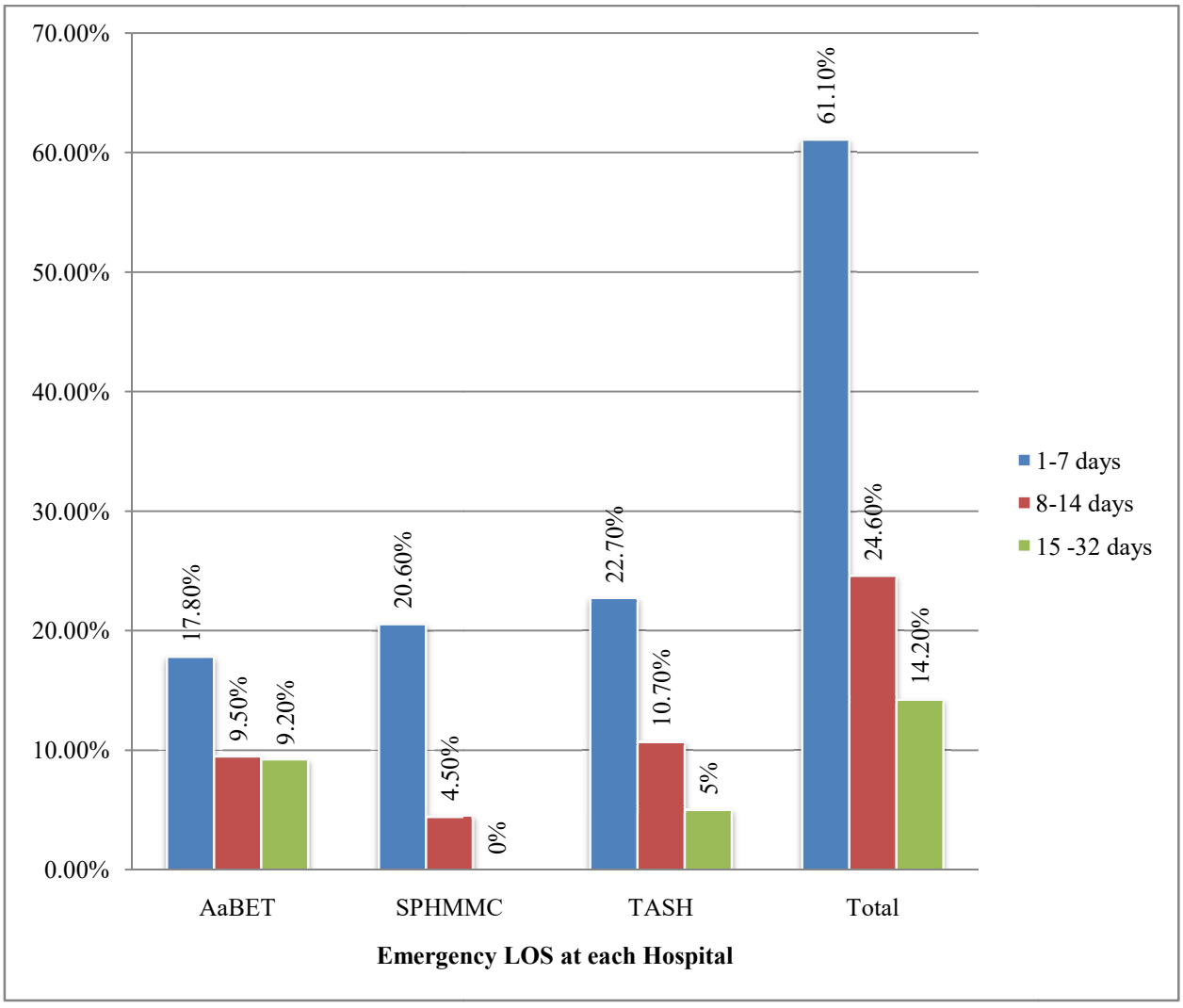

Figure 1: Length of Emergency Stay in Days among Patients Admitted to AaBET, SPHMMC, TASH from June to September 15, 2023 (n=422)

Table 2: Baseline Clinical Characteristics of Study Participants attending Emergency Ward at ABET, SPHMMC, TASH from June to September 15, 2023 (n=422)

Characteristics	Category	Setting N(%)			
		ABET	SPHMMC	TASH	Total
Co- morbidity	Yes	78(18.5%)	93(22%)	151(35.8%)	**322(76.3%)**
	NO	76(18%)	13(3.1%)	11(2.6%)	**100(23.7%)**
Co-morbidity types	Hypertension	67(21.3%)	43(13.7%)	46(14.6%)	**156(49.5%)**
	Heart disease	10(3.2%)	27(8.6%)	40(12.7%)	**77(24.4%)**
	DM	18(5.7%)	16(5.1%)	30(9.5%)	**64(20.3%)**
	Cancer	0(0%)	15(4.8%)	68(21.6%)	**83(26.3%)**
	Asthma	6(1.9%)	6(1.9%)	9(2.9%)	**21(6.7%)**
	HIV	4(1.3%)	10(3.2%)	17(5.4%)	**31(9.8%)**
	CKD	2(0.6%)	9(2.9%)	10(3.2%)	**21(6.7%)**
	COPD	1(0.3%)	6(1.9%)	0(0%)	**7(2.2%)**
	Other	29(6.9%)	31(7.3%)	24(5.7%)	**84(19.9%)**
Admission Diagnosis	Sepsis	11(2.6%)	13(3.1%)	38(9%)	**62(14.7%)**
	Other infectious disease	6(1.4%)	18(4.3%)	57(13.5%)	**81(19.2)**
	AKI	0(0)%)	15(3.6%)	10(2.4%)	**25(5.9%)**
	Acute heart failure	1(0.2%)	11(2.6%)	13(3.1%)	**25(5.9%)**
	Acute asthma	3(0.7%)	6(1.4%)	2(0.5%)	**11(2.6%)**
	Malignancy	1(0.2%)	2(0.5%)	4(0.9%)	**7(1.7%)**
	Acute COPD	2(0.5%)	4(0.9%)	3(0.7%)	**9(2.1%)**
	Trauma	100(23.7%)	0(0%)	0(0%)	**100(23.7%)**
	Stroke	22(5.2%)	14(3.3%)	5(1.2%)	**41(9.7%)**
	Severe Anemia	2(0.5%)	4(0.9%)	9(2.1%)	**15(3.6%)**

	Electrolyte abnormality	1(0.2%)	4(0.9%)	5(1.2%)	**10(2.4%)**
	Others	5(1.2%)	15(3.6%)	16(3.8%)	**36(8.5%)**
Emergency outcome	Home discharge	110(26.1%)	25(5.9%)	65(15.4%)	**200(47.4%)**
	Transfer to IM ward	12(2.8%)	58(13.7%)	76(18%)	**146(34.6%)**
	Transfer to ICU	18(4.3%)	9(2.1%)	6(1.4%)	**33(7.8%)**
	Transfer to Surgical	4(1%)	3(0.7%)	6(1.4%)	**13(3.1%)**
	Transfer to oncology	0(0%)	8(1.9%)	9(2.1%)	**17(4%)**
	Death	10(2.4%)	3(0.7%)	0(0%)	**13(3.1%)**

5.3. Level of VTE risk and identified Padua prediction score among study participants

The minimum and maximum Padua score was 1 and 9 respectively with the median score of 4 point. Of total study participants, 70.62% were scored >4 point and at high risk of developing VTE according to Padua prediction score. Reduced mobility was the most common frequent risk factor (63.5%) followed by acute infection (47.4%), trauma (29.1%), active cancer (20.6%).

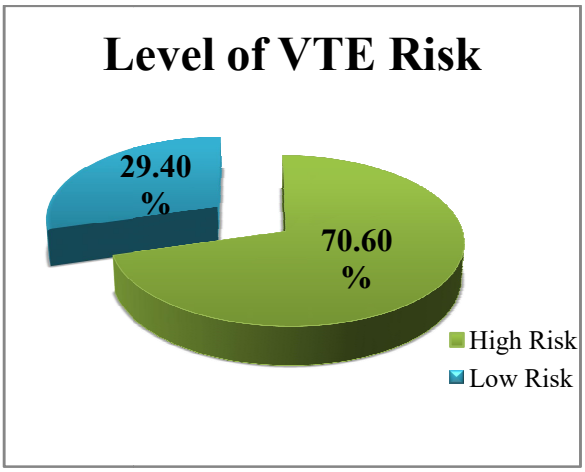

Figure 2: Level of Venous Thromboembolisim Risk among Patients attending Emergency Department of ABET, TASH and SPHMMC (n=422)

Table 3: Padua VTE Risk Prediction Score among Study Participants Attending Emergency Ward at AaBET, SPHMMC, TASH from June to September 15, 2023(n=422)

Padua VTE risk factors	Score	N(%)			
		ABET	SPHMMC	TASH	Total
Active Cancer	3	1(0.2%)	16(3.8%)	70(16.6%)	87(20.6%)
Previous VTE	3	1(0.2%)	5(1.2%)	1(0.2%)	7(1.7%)
Reduced mobility	3	112(26.5%)	74(17.5%)	82(19.4%)	268(63.5%)
Known thrombophilia	3	0(%)	0(0%)	2(0%)	2(0.5%)
Trauma and/or Surgery	2	110(26.1%)	4(0.9%)	9(2.1%)	123(29.1%)
Age >=70 years	1	24(5.7%)	27(6.4%)	33(7.8%)	84(19.9%)
Heart/Respiratory Failure	1	8(1.9%)	18(4.3%)	27(6.4%)	53(12.6%)
Acute MI/Ischemic Stroke	1	17(4%)	12(2.8%)	18(4.3%)	47(11.1%)
Acute Infection/Rheumatoid	1	30(7.1%)	57(13.5%)	115(27.3%)	202(47.9%)
Obesity	1	1(0.2%)	3(0.7%)	3(0.7%)	7(1.7%)
Ongoing Hormonal Therapy	1	4(0.9%)	10(2.4%)	10(2.4%)	24(5.7%)

5.4 Thromboprophylaxis Utilization Pattern and Contraindication Conditions among Study participants

Of total participants, 73.9% patients were not given pharmacological prophylaxis regardless of VTE risk. The only utilized pharmacological prophylaxis was unfractionated heparin (UFH) in which 86(20.4%) patients were given UFH 7500 IU SC twice a day, 13(3.1%) were given UFH 5000 IU SC twice a day and 11(2.6%) patients were given 17500 IU SC twice a day. UFH prophylaxis was initiated within 24 hour of emergency admission for 43(10.2%) patients while the prophylaxis was initiated within 48 hour of emergency admission for 27(6.4%) and about 14(3.3%) &26(6.2%) patients were initiated UFH prophylaxis within 72 hour of admission and more than 72 hours of emergency admission respectively. Among study participants (73.9%) pharmacological prophylaxis was not given for the reason that 114(36.7 %%) patients were not actually candidate because they had Padua risk prediction score <4. Despite the high risk of developing VTE, 62(19.9%) patients were not given pharmacological prophylaxis because of fear of bleeding, 25(8%) were skipped without any reason, 44(14.1%) patients were skipped anticoagulant prophylaxis due to immediate plan of physicians to transfer even patients were stay with the risk, 2(0.6%) patients resist buying the medication despite social support from the facility,64(20.6%)patients were skipped pharmacological prophylaxis while only advising the patients for physical prophylaxis such as early ambulation, leg elevation and flexion was considered. Of total enrolled study participants 78(18.5%) patients were contraindicated for pharmacological prophylaxis. Of these, 10(12.8%) patients were given anticoagulant in the presence of contraindication. Figure:3 illustrates the identified reasons for contraindications.

Table 4: Reasons for not Initiating Pharmacological Prophylaxis among Study Participants Attending Emergency Ward at AaBET, SPHMMC, and TASH from June to September 15, 2023 (n=422)

Characters	Variable Category	Setting			
		ABET n(%)	SPHMMC n(%)	TASH n(%)	Total n(%)
Pharmacological prophylaxis given	Yes	61(14.5%)	26(6.2%)	23(5.5%)	110(26.1%)
	No	93(22%)	80(19%)	139(32.9%)	312(73.9%)
	Total	154(36.5%)	106(25.1%)	162(38.4%)	422(100%)
Reason for not initiation prophylaxis	patient was not at risk	40(12.9%)	35(11.3%)	39(12.5%)	114(36.7%)
	Fear of bleeding	33(10.6%)	18(5.8%)	11(3.5%)	62(19.9%)
	Reason was unknown	3(1%)	4(1.2%)	18(5.8%)	25(8%)
	Immediate transfer was planned	8(2.6%)	22(7.1%)	14(4.5%)	44(14.1%)
	Patient resistance	0(0%)	1(0.3%)	1(0.3%)	2(0.6%)
	Only leg elevation /ambulation advised	8(2.6%)	0(0%)	56(18%)	64(20.6%)
	Total	92(29.6%)	80(25.7%)	139(44.7%)	312(100%)

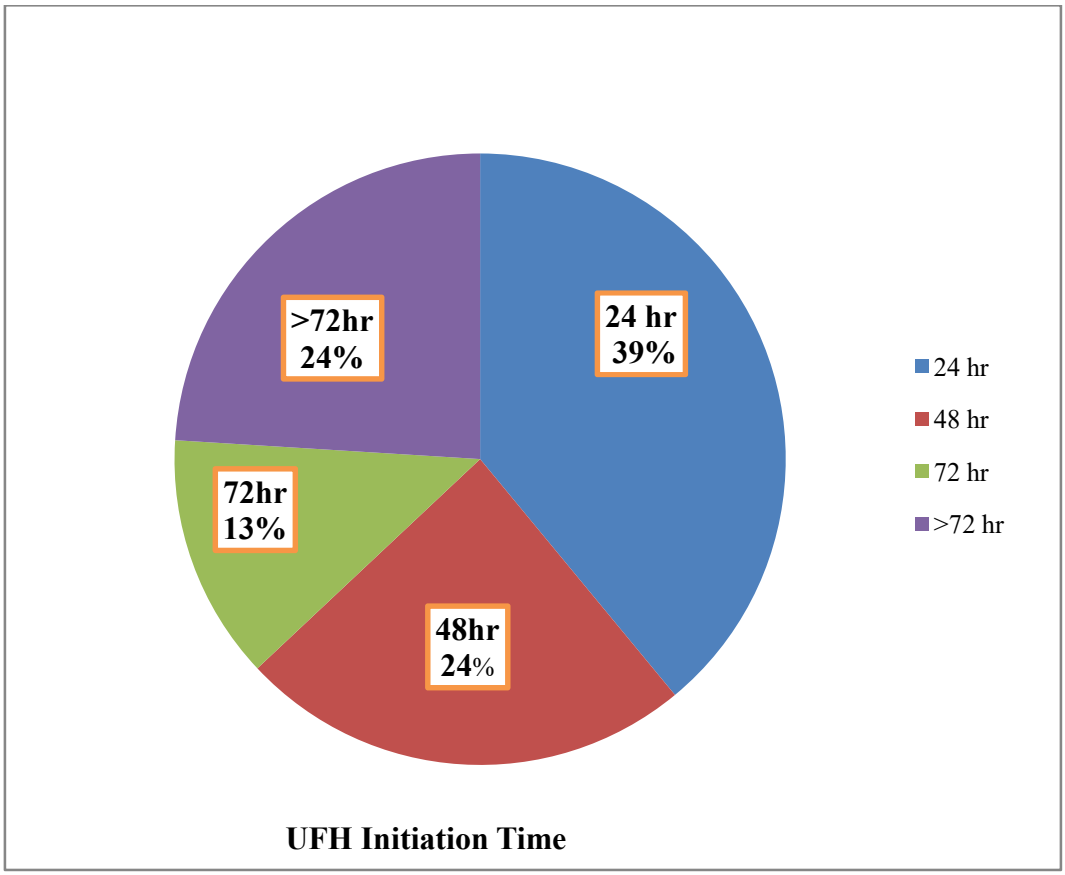

Figure 2: Pharmacological Prophylaxis Initiation Time Pattern among Study Participants at AaBET, SPHMMC, and TASH from June to September 2023 (n=422)

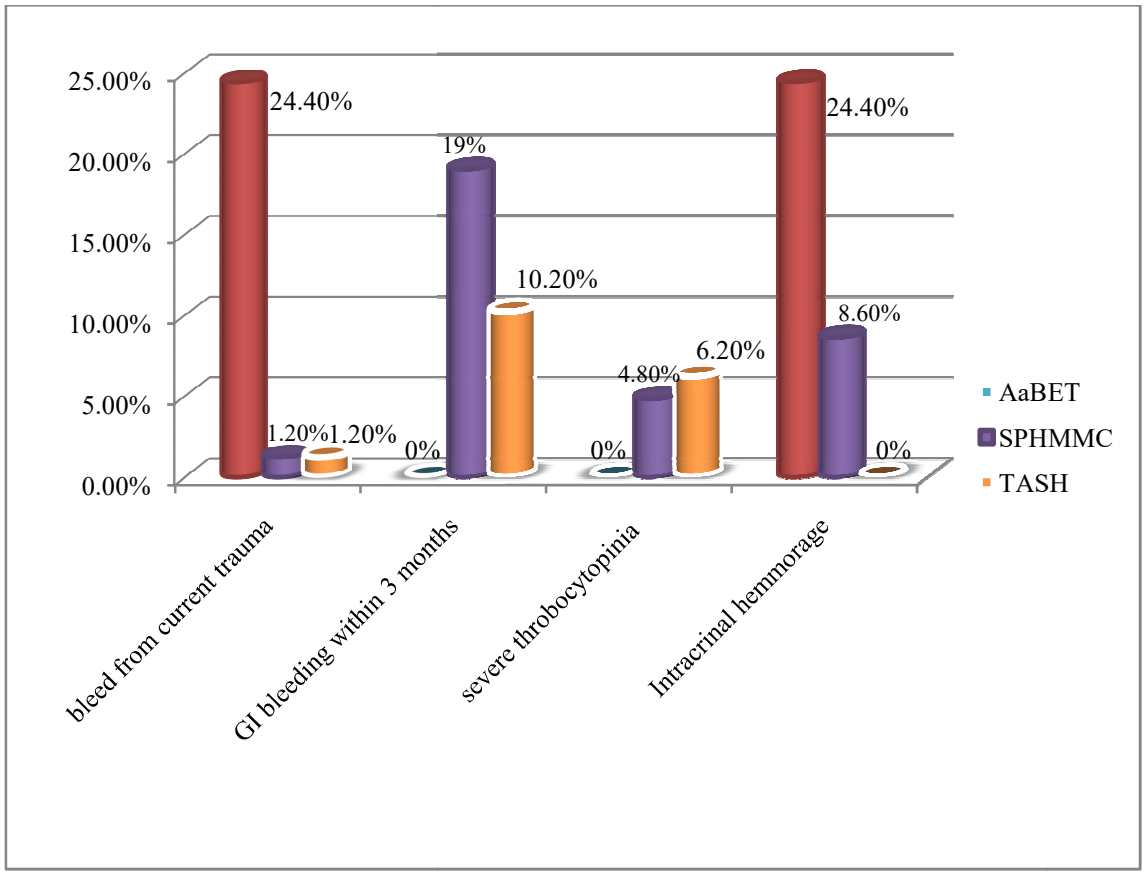

Figure 3: Pharmacological Prophylaxis Contraindication reasons among Study Participants Attending Emergency Ward at AaBET, SPHMMC and TASH from June to September 15, 2023(N=422)

5. 5 Appropriateness of pharmacological prophylaxis among patients at emergency wards of selected hospitals

From total 296 eligible patients, only 99(33.4%) of them were given pharmacological prophylaxis and 11(8.7%) were given pharmacological prophylaxis inappropriately while they were not eligible for pharmacologic thromboprophylaxis.

Table 5: Appropriateness of Pharmacological Prophylaxis among Study Participants Attending Emergency Ward at AaBET, SPHMMC, TASH from June to September 15, 2023(n=422)

Eligibility status	ABET N(%)	SPHMMC N(%)	TASH N(%)	Total N(%)
Eligible for Pharmacologic thromboprophylaxis and received prophylaxis	59(19.9%)	21(7.1%)	19(6.4%)	99(33.4%)
Eligible for pharmacological thromboprophylaxis but not given	52(17.6%)	45(15.2%)	100(33.8%)	197(66.6%)
Not eligible for pharmacological thromboprophylaxis and not given	41(32.5%)	35(27.8%)	39(31%)	115(91.3%)
Not eligible for pharmacologic thromboprophylaxis but it was given	2(1.6%)	5(4%)	4(3.1%)	11(8.7%)

5.6 Factors associated with the use of pharmacological prophylaxis

Logistic regression analysis was employed to identify determinants of receiving pharmacological prophylaxis during ED follow up. On bivariate logistic regression analysis, older age >70 year, trauma, length of emergency stay, immobility for ≥3days, previous history of VTE, level of VTE risk, cancer and infection were significantly associated with receiving pharmacological prophylaxis during emergency stay. These all variables were taken into a multivariable logistic regression to control covariates simultaneously. Accordingly, length of hospital stay, immobility, age >70 year, history of previous VTE, having active cancer and infection were significantly associated with getting pharmacological prophylaxis. Patients who were bedridden for ≥3days were 3 times more likely to get VTE pharmacological prophylaxis when compared to their counterparts (AOR=3.129; 95% CI: 1.310-7.474) and those their duration of emergency stay less than one week were less likely given anticoagulant prophylaxis(AOR 0.192(95%CI :0.095-0.385) P-value <0.001as illustrated in table below.

Table 6: Factors Associated With The use of Pharmacological Prophylaxis among Study Participants attending Emergency Ward at ABET, SPHMMC, TASH from June to September 2023 (n=422)

Variables	Category	PPx given N (%)		COR(95%CI)	AOR(95%CI)	P-value
		Yes	No			
VTE risk	High	99(90%)	199(63.8%)	5.111(2.640-9.915)	2.180(0.860-5.524)	0.101
	Low	11(10%)	113(36.2%)			
Previous VTE	Yes	6(5.5%)	1(0.3%)	17.92(2.13 ,150.77)	47.561(4.072- 555.51)	0.002
	No	104(94.5%)	311(99.7%)			
Immobility	Yes	99(90%)	166(53.4)	7.916(4.085-15.37)	3.129(1.310-7.474)	0.001
	No	11(10%)	146(46.6%)			
Cancer	Yes	10(9.9%)	76(24.4%)	0.311(0.153-0.567)	0.365(0.156-0.844)	0.018
	No	100(90.1%)	236(75.6%)			
Infection	Yes	37(33.6%)	162(51.9%)	0.468(0.298 -0.766)	0.619(0.342-1.122)	0.014
	No	73(66.4%)	150(48.1%)			
LOS in emergency	≤7 days	41(37.3%)	217(69.6%)	0.388(0.202-0.732)	0.192(0.095-0.385)	<0.001
	>7days	69(62.7%)	95(30.4%)			
Age ≥70 year	Yes	35(31.8%)	49(15.7%)	2.505(1.513-4.146)	1.880(1.007-3.510)	0.047
	No	75(68.2%)	263(84.3%)			
Trauma	Yes	46(41.8%)	77(24.7%)	2.102(1.388-3.458)	1.102(0.568-2.136)	0.774
	No	64(58.2%)	236(75.3%)			

5.7 VTE Event and Associated Factors among Study Participants during Follow up Period

A total of 18 patients (4.3 %.) had VTE diagnosis during their emergency stay. Of those 16(3.8%) events were DVT and 2(0.5%) cases were PE. The median time of VTE onset from emergency admission to the diagnosis was 7 days. Both bivariate and multivariate Cox regression model was used to determine the association of independent variables with the occurrence of VTE.

On bivariate Cox regression analysis, female gender [CHR; 1.928; 95 % CI, 0.747, 4.977; P=0.175], age ≥ 70 years [CHR, 2.152; 95% CI, 0.831, 5.553; p=0.013], being physically active prior to emergency admission [CHR, 0.36; 95% CI, 0.051, 1.269; p=0.001] ,physical prophylaxis of advising for early ambulation and leg elevation [CHR, 0.614; 95% CI, (0.210, 1.727); p=0.151], presence of active cancer [CHR, 5.891; 95 % CI, 2.207, 17.729; p<0.001], infection [CHR, 19.19; 95% CI 2.537, 144.235; p=0.004], having co morbid disease [CHR, 6.08; 95 % CI, 0.815, 45.754; p=0.075],pharmacological prophylaxis [CHR, 0.118; 95% CI 0.272, 0.581; p=0.005], all had a p-value at <0.25 significant levels in the bivariate Cox regression analysis to be included in the final multivariate Cox regression analysis as presented in table 7.Accordingly, the multivariable Cox regression analysis showed that being physically active prior to emergency admission, pharmacological prophylaxis, active cancer and infection were statistically associated with VTE event during emergency stay.

The likelihood of VTE occurrence was about eight times among patients admitted with infection such as sepsis. Adjusted Hazard ratio (AHR=8.169, 95%CI: 1.045-63.854, P=0.045) than their comparators. And also the hazard of developing VTE among cancer patients who were on chemotherapy was about five times than without having the condition.(AHR=5.133, 95%CI: 1.241-21.093, P=0.023),on the other hand, receiving pharmacological prophylaxis was associated with decreasing VTE incidence by 83%. (AHR)=0.167, 95% (CI): 0.037-0.768, P=0.021), and also being physically active had decreased VTE event by about 33 %.(AHR=0.67,95% CI; 0.082-1.579; P=0.014).

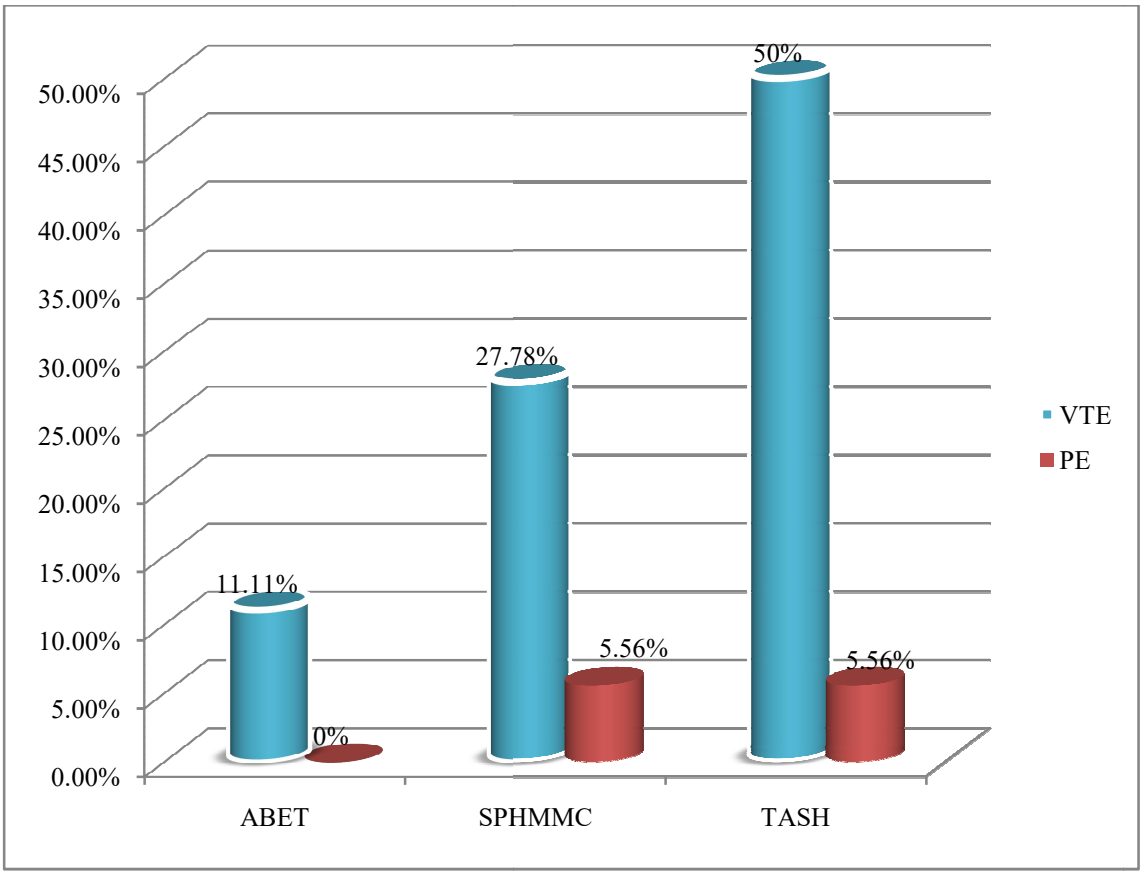

Figure 4: VTE Events and Type among Emergency Admitted Patients at AaBET, SPHMMC, and TASH from June to September 15, 2023 (n=422)

Table7: Factors Associated with VTE Occurrence among Study Participants Attending Emergency Ward at AaBET, SPHMMC and TASH from June to September 15, 2023 (n=422)

Variables	Category	VTE event N(%)		CHR(95%CI)	P-value	AHR(95%CI)	P-value
		Yes	No				
Gender	Female	11(61.1%)	193(47.8%)	1.928(0.747-4.977)	0.175	1.073(0.367-3.142)	0.897
	Male	7(38.9%)	211(52.2%)				
Physically Active	Yes	1(5.6%)	296(73.3%)	0.36(0.05- 1.269)	0.001	0.67(0.08- 1.579)	0.014
	No	17(94.4%)	108(26.7%)				
Co-morbidity	Yes	17(94.4%)	302(74.8%)	6.08(0.81 -45.754)	0.075	1.482(0.157 -12.89)	0.731
	No	1(5.6%)	102(25.2%)				
Cancer	Yes	12(66.7%)	74(18.3%)	5.89(2.207-17.72)	<0.001	5.13(1.24-21.09)	0.023
	No	6(33.3%)	330(81.7%)				
Infection	Yes	17(94.4%)	182(45%)	19.19(2.53 -144.2)	0.004	8.169(1.045-63.84)	0.045
	No	1(5.6%)	222(55%)				
Physical prophylaxis advised	Yes	5(27.8%)	181(44.8%)	0.614(0.21 -1.727)	0.151	0.671(0.209-2.15)	0.520
	No	13(72.2%)	223(55.2%)				
Age ≥70 year	Yes	7(38.9%)	77(19.1%)	2.152(0.83 -5.55)	0.013	2.13(0.512-8.87)	0.210
	No	11(61.1%)	327(80.9%)				
Pharmacological prophylaxis given	Yes	2(11.1%)	108(26.7%)	0.118(0.27-0.581)	0.005	0.167(0.037-0.76)	0.021
	No	16(88.9%)	296(73.3%)				

5.8. Kaplan Meier Survival Outcome analysis

On the Kaplan Meier survival outcome analysis, variables such as being physically active, (Log rank $p<0.001$) and receiving pharmacological prophylaxis up on emergency admission (Log rank $p=0.001$) had higher cumulative survival time to develop VTE. However, there were also statistically significant between patents with active cancer and without it(Log rank $p<0.001$) in survival time to develop VTE and also acute infection(Log rank $p<0.001$)where both active cancer and infection had poor survival outcome and lower cumulative survival time to VTE event than without having the conditions (Figure 5).

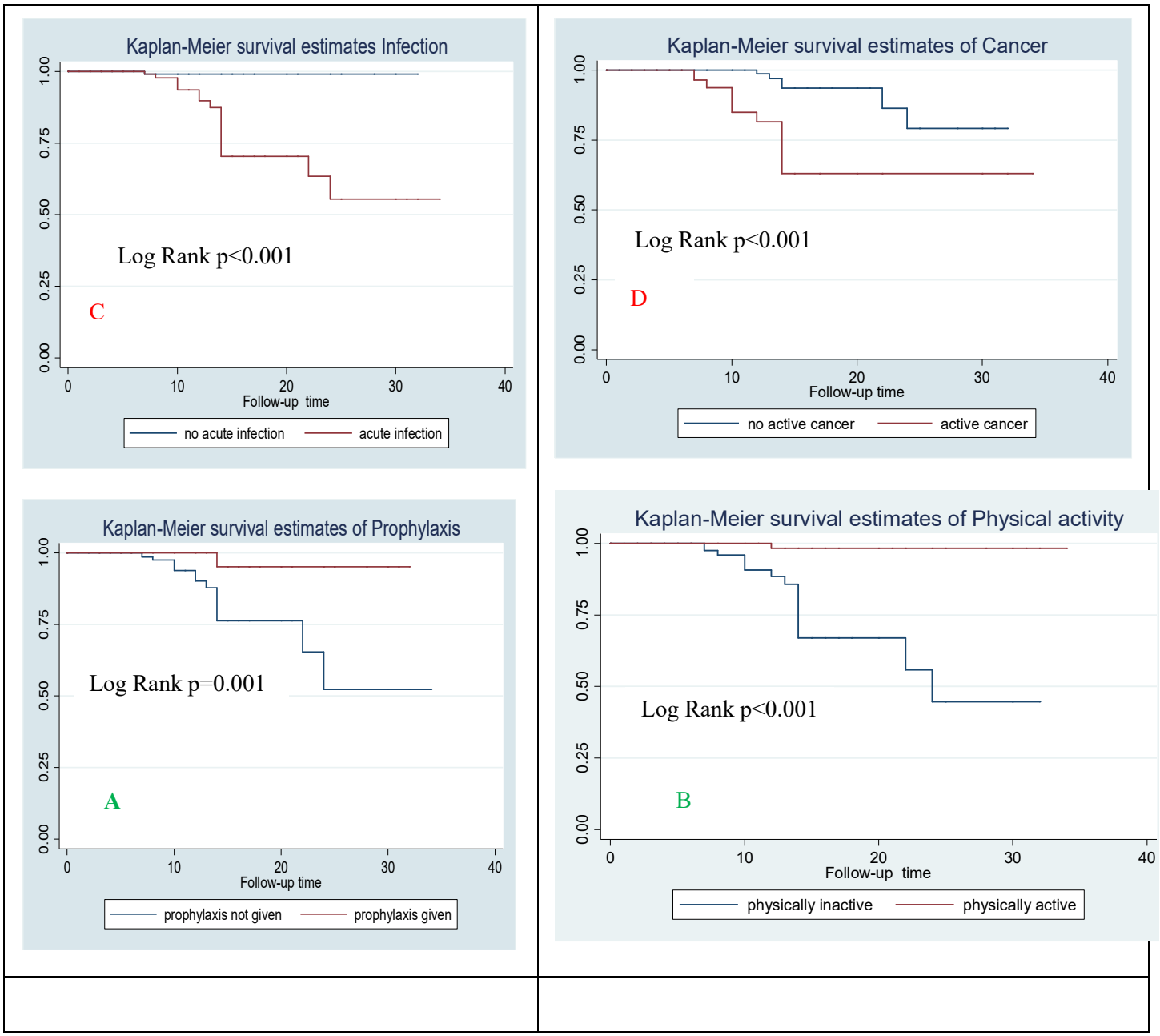

Figure 5: Survival function estimate of VTE event for Having Pharmacological Prophylaxis (A), Physical activity (B), Acute infection(C) and Active cancer (D)

6. Discussion

Prolonged duration of stay in the ED is being a global problem as millions of individuals access health care through EDs but much less concern of VTE risk which later puts patients at 25% risk for death from VTE unless appropriate action is taken for prevention[99]. In lower-income countries including study areas, prolong duration of patient stay in ED remain challenge because of increasing number of patients who needs acute care in ED which results in mismatching of service demand and patient flow towards specialized units to enable timely access to care and stabilization of patients at respective wards particularly due to lack of inpatient beds, delay of investigations and waiting for senior consultation for transferring patient that creates overcrowding at ED and patients may have prolonged duration of stay at ED[100].According to previous studies, prolonged duration of patient stay at ED was 4% in England, 72.5% in Botswana, 80% in south Africa and 91.5% in Ethiopia,[101-103] which indicates highest prevalence in Lower Income Countries. Current study also revealed that patients admitted to ED are staying for prolonged duration at ED much more than expected as per recommendation by Ethiopian hospital services transformation guidelines[104] with an average of 8 days ±6.06 days. Many of these patients admitting the ED for medical causes are under a direct risk for thromboembolic events unless attention is given for appropriate intervention due to acute illness severity, older age, co morbidity, immobility and other risk factors. [50]. Despite this, yet VTE prophylaxis is underutilized as per guidelines and the risk also inadequately assessed in the context of emergency department admissions. This multicenter prospective study examined the risk of developing VTE in emergency admitted patients found that nearly two-third (70.62%) of patients at ED of tertiary hospitals in Addis Ababa city, Ethiopia had high risk of developing VTE which is higher than the result reported from previous studies conducted using the same Padua VTE risk assessment tool showed (51%) and (46.7%) [105, 106]. In fact, identifying VTE risk and providing prophylaxis in these vulnerable individuals is a life saving and can also reduce the extra cost spent for the treatment of already occurred VTE. It prevents the occurrence of post thrombotic syndrome which is estimated to occur in 15-40% of patients with a history of DVT and PE which contributes mortality rate of 30% [107, 108].

Despite the above potential benefit of VTE prophylaxis, global report from multinational study conducted in 32 countries showed only 39% of pharmacological prophylaxis was utilized among identified VTE-risk groups[109].But according to Padua risk prediction score RAM, patients who had a total risk score of 4 and above should receive pharmacological VTE prophylaxis unless contraindicated for the risk of bleeding[92].In this regard, current study identified that, only 33.4% eligible patients were given pharmacological prophylaxis. Even though this rate was comparable with the results reported from elsewhere Senegal 35.2 %(60), Cameron 32.5%.[110], Gonder Ethiopia.(31.6%)[94] and the rate was lower than the report from Lebanon, USA, and Italy showed that 58.5%, 47.5% and 39% respectively [92, 111, 112], the trend of VTE prevention and adherence to VTE prophylaxis guidelines in the study setting is remain poor as per recommendation by guidelines[113].

The underutilization of VTE prophylaxis in the area of the study might be because of failure of recognizing high VTE risk in ED while emergency care providers give more emphasis for multiple admission diagnosis [92].The other possible reason could be lack of awareness of clinicians towards VTE risk stratification practice and the trend of implementing VTE prevention guidelines at ED is also poor. Previous studies conducted to assess health professional's knowledge and practice towards VTE prevention found that majority of professionals (71.8%) were using their own clinical judgment to determine a patient's risk as they are unfamiliar with standardized guideline and risk assessment model (57). The other more possible explanation for lower rate of anticoagulant prophylaxis use in high VTE risk emergency attending patients could be fear of bleeding from clinicians perspective where 19.9% patients were not given pharmacological prophylaxis because of fear of bleeding though the rate was much lower than the result reported from Canada showed 52.1% patients were skipped thromboprophylaxis due to fear of bleeding[114].Immediate plan of transferring patients from emergency to respective ward before initiating anticoagulants for high VTE risk patients could be the other reason identified in this study in that 14.1% of patients were skipped anticoagulant prophylaxis due to immediate plan of physicians to transfer even patients were stay with the risk starting from the baseline of their admission where similar problem was reported from previous study showed that about 84.3% of clinicians did not reassess the need for VTE prophylaxis at transition of emergency care during transfer or home discharge.[114].

With regard to optimal utilization of anticoagulant prophylaxis ,the observed inadequacy could also be improved by involving clinical pharmacists in all setting of EDs while they may play a key role in improving appropriate use of pharmacological prophylaxis through implementing VTE prophylaxis guidelines, policies and reminding clinicians that helps in reducing the occurrence of VTE ,bleeding complications and overall preventing under or extreme utilization of anticoagulant which leads to adverse outcome and increase in overall cost among acutely ill patients in EDs[115, 116]. Given that better outcome could be achieved based on the findings from Previous studies suggesting that interdisciplinary collaboration between pharmacists and physicians within the hospital setting can significantly increase rates of appropriateness of prophylaxis and significantly decrease rates of VTE occurrence by 74%[117], inappropriate utilization of anticoagulant in hospitalized patients remains problematic as reported 27.3%, 36.7%, 31.6% from Saud Arabia, Iran and Ethiopia respectively [118-120] may be because of little contribution of clinical pharmacists in the area could affect the result .

In this context, inappropriate use of anticoagulation prophylaxis in the current study was found that 11(8.7%) patients who had Padua prediction score <4 received pharmacological prophylaxis unnecessarily, 10(12.8%) patients were given anticoagulant in the presence of contraindication as these may cause life threatening side effects like bleeding[121]. The finding was consistent with previous study conducted by Barbara Kocher et al., 2023 [122]. About 2.6% patients were given therapeutic dose of UFH 17500 IU SC twice a day which was inappropriate dose for prophylaxis according to ACCP guide line[123].This proportion was lower than the study conducted by Abdullah Damin *et al*.,2022 showed 39.7% patients were given anticoagulant beyond prophylaxis dose[32]. The variation of the finding might be more types of anticoagulant other than UFH like low molecular weight heparin was utilized in the study conducted by Abdullah Damin *et al*.

Regarding the anticoagulation prophylaxis initiation time, this study found that about 39% patients were initiated within 24 hour of emergency admission which is in line with the result of study conducted by Barbara Kocher *et al.,* 2023 reported as 35.5%.[124].previous studies found that delay in initiation of thromboembolic prophylaxis can potentially lead to increased thromboembolic complication[125] even delay of more than three days in initiating VTE prophylaxis for high risk patients is associated with three fold increasing in occurrence of VTE[126, 127] while initiation of earlier than 48 hour following

hospitalization or initiating at least <72 hour of admission lower the incidence of VTE by 42% compared to initiating after 72 hour of admission.([128, 129].

However, in this study 24% of patients were initiated pharmacological prophylaxis delayed after more than 72 hour of their emergency admission despite having the risk at baseline of their admission time.

The multivariate logistic regression analysis in this study showed that the pharmacological prophylaxis for VTE prevention at ED of study settings was significantly more likely utilized in patients with older age >70 year, immobility for ≥3days, previous history of VTE and less likely given for those with less than one week length of emergency stay, active cancer and infection. The finding was inconsistent with study conducted by J.Harbison *et al*.,2017 and Sonia Jiménez *et al.,* 2014 reported that immobilized patients were less likely to receive anticoagulant prophylaxis and patients with active malignancy and infection showed greater odd ratio to receive anticoagulant prophylaxis during ED stay respectively[130, 131].The reason for variation of the result could be an indication of lack of clinician's adherence towards standard VTE prevention guideline and perception of emergency physicians for own decision[132].

The finding of this study showed the overall VTE occurrence in emergency admitted patients was 4.3%.This much VTE occurrence could be because of lack of optimal VTE risk stratification for emergency admitting patients by physicians and as a result of underuse of prophylaxis for high-risk patients may be resulting the patients unnecessarily exposed to VTE event.However,the finding was in line with the result reported from Nigeria (3.1%), India(3.2%), Italy(2.4%),Netherland(3.6%) [133, 134].[135, 136] and lower than the result reported from study conducted in medical ward at Tibebe Ghion hospital of northern Ethiopia and Hawasa referral hospital (6.84%&10.6%) respectively [75, 137].This slight difference might be as a result of poor VTE risk assessment practice and underutilization of early intervention through VTE prophylaxis provision at emergency before transferring high risk patient to other wards leads to increase the rate of post-emergency VTE event later at medical ward[138].

This study found that having cancer, acute infection such as sepsis, absence of pharmacological prophylaxis in high risk individuals and physical inactivity prior to hospital admission are independent predictors for the occurrence of VTE among acutely ill emergency attending patients. The result of multivariate Cox regression analysis showed that having active cancer or patients on cancer chemotherapy were 5 fold more likely to develop VTE than their comparators during follow up period which was supported by previous studies [139, 140].

Having the habit of physical activity reduce the risk of VTE by 33% compared with being inactive. In line with this finding, reports from Norway and Sweden demonstrated that performing physical activity at least once a week had 28%&17% lower risk of developing VTE respectively [141, 142]. The reason could be explained as blood stasis because of physical inactivity leads to a massive localized or generalized inflammatory response with the release of inflammatory mediators from multiple tissues and circulatory cells causing extensive damage to the vascular endothelium which played an important role in the pathophysiology of intravascular coagulation[143].

Furthermore, patients presented at ED with acute infection were about 8 times more likely to develop VTE than those without infection. The finding was also consistent with retrospective study conducted in Spain among acutely ill patients which reported that having an acute infectious disease increase the likely hood of VTE event[144].The possibility could be explained as infection may contribute to the pathogenesis of VTE by accelerating the effects of immobility and also pathogenesis may be related to infection induced systemic inflammation and endothelial disruption which results in hypercoagulable state[145] moreover active inflammatory response and immobilization leads to venous stasis and effects on lung or cardiac function and thereby blood flow and homeostasis disruption[146].

Evidences showing that the use of anticoagulant prophylaxis through full implementation of ACCP guidelines in those VTE-risk acutely ill patients would reduce number of deaths from VTE by 25%[147].The result of multivariate analysis in this study also revealed that the use of pharmacological prophylaxis for high VTE-risk patients was a significant predictor showing 83% hazard risk reduction. The finding was consistent with results reported from Italy and Rwanda showed that adequate pharmacologic prophylaxis reduced the risk of VTE event at 90% [92, 148].Moreover, the finding was also supported by study conducted by Piter K. *et al., 2023* reported that omission of VTE prophylaxis up on patient's hospital admission without obvious contraindication increased odd of VTE by 85% [149].

7. Strength and limitation of the study

7.1. The Strength of the Study

As the study was multicenter and conducted in largest tertiary hospitals of the country where higher flow of emergency cases referred from all nations, it could provide more generalizable findings and also as the study was prospective, all potential VTE risk factors proposed by Padua risk assessment model and patients Sociodemographic factors associated with VTE could be assessed and followed without limitation in obtaining all necessary patient information which determines both VTE risk status and prophylaxis pattern.

7.2. Limitation of the Study

Since all patients were not screened for asymptomatic VTE events and the outcome was only depended on symptomatic events confirmed by physicians. Thus the number of episodes could be underestimated in this study. Furthermore, long-term follow-up in terms of occurrence of VTE after discharge and at transition wards was not assessed. Moreover, non probability sampling was used because of the nature of pattern of the data.

8. Conclusion

The proportion of VTE risk and occurrence was found to be high among emergency admitted patients and the rate of thromboprophylaxis use for those high risk patients was low. Absence of pharmacological prophylaxis, physical inactivity prior to emergency admission, active cancer and acute infection were found to be independent predictors for the occurrence of VTE during emergency follow up.

9. Recommendation

Based on the finding of this study, the following recommendations are forwarded;

To patients

Based on the finding of this study, having habit of physical activity, ambulation is recommended to individuals especially with long periods confined on bed leads increase blood stasis.

To each hospital, and health workers

Hospital administrators shall facilitate training to healthcare providers for additional awareness and knowledge of VTE risk assessment and prophylaxis to follow guidelines for all patients at the time of

emergency admission and shall involve clinical pharmacists in monitoring of VTE prophylaxis utilization at ED. Furthermore, health care practitioners in all settings should also look for those who are at risk of developing VTE such as individuals with active malignancy and acute infection like sepsis or septic shock should be offered pharmacologic prophylaxis whenever they become candidate for it as per standard risk assessment guideline.Morevere, clinical pharmacists shall be involved in the VTE risk assessment and prophylaxis recommendation in all settings of ED.

To policymakers

The Federal Ministry of Health (FMoH) better to revise the existing protocol for emergency EDs as critically ill patients are being stayed at emergency department for more than expected longer duration as per existing standard emergency admission protocol with less attention given for VTE risk assessment.

To researchers

Since this study focussed on magnitude of VTE occurrence at emergency, future studies conducted at this area should include the outcome after VTE event. Future studies should also focus on VTE event after discharge or transferred from the emergency department.

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11. Annex

11.1. Data collection tool

Part I: Socio-Demographic Characteristics				
MRN_____	Emergency Hospital Name_____			
1.**Age in years**)_____	2**. Sex** Male ☐ Female ☐		3. **Weight** ……. **height**	
4.Residence (Address)	Addis Ababa ☐		Out of Adds Ababa ☐	
5.payment status .	Community based health insurance ☐ Cash payment ☐ Covered by other organization ☐			
6**. Social habits**	Cigarette Smoker ☐	Alcohol ☐	Both ☐	None ☐
7.Physical activity		Yes ☐	No ☐	

Part II: Base line characteristics	
1. **Date of emergency admission…_____**	2. **Length of emergency stay (LOS)**……
3.**Reason for emergency/admission diagnosis** :_____	
4. **Co morbid condition**	No ☐ Yes ☐ If yes list type of co morbidity _____
5. **Emergency outcome**	☐ Discharge improved ☐ Transferred internal medicine ward ☐Transferred to surgical ward ☐ Transferred to ICU ☐ Transferred to other specify ☐Death
6.**VTE occurrence during emergency stay**	Yes ☐ No ☐
7. **If VTE occurred what type?.**	DVT ☐ PE ☐ Both ☐

8. **How long it took to be occurred?**	---------hrs/days after emergency admission

VTE Risk	**Response and score give for each**	
	YES	No
Active cancer	3 ☐	0 ☐
Previous VTE	3 ☐	0 ☐
Reduced mobility	3 ☐	0 ☐
known thrombophilia	3 ☐	0 ☐
Trauma and/or surgery	2 ☐	0 ☐
Age (≥70 years)	1 ☐	0 ☐
Heart/respiratoryfailure.	1 ☐	0 ☐
Acute MI/ischemic stroke	1 ☐	0 ☐
Acute infection and/or rheumatologic disorder	1 ☐	0 ☐
Obesity (BMI ≥ 30)	1 ☐	0 ☐
Hormonal therapy	1 ☐	0☐
Total	☐	
Level of VTE risk	High(>=4) ☐	Low (<4) ☐
Eligible for VTE prophylaxis based pauda score?	Yes ☐	No ☐
Pharmacological prophylaxis given?	Yes ☐	No ☐
Name of anticoagulant given	Dose and frequency	Time of initiation

UFH LMWH Warfarin Rivaroxaban Other specify		
Was the patient advised for early ambulation or leg elevation?	Yes ☐	No ☐
Anticoaguagulant contraindication	Yes ☐	No ☐
Reason for not initiation pharmacological prophylaxis	☐ Not actually indicated because not in risk ☐ Indicated but the prescribed drug was not available ☐ Indicated but the patient could not afford it ☐ Indicated but fear of bleeding ☐ Indicated but forgotten to consider the risk ☐ Indicated but the reason was unknown ☐ Other specify	
Reason for contraindication of pharmacological prophylaxis	☐ Risk of bleeding due to trauma or recent surgery ☐ GI bleeds within the last 03 months ☐ Severe thrombocytopenia ☐ Heparin sensitivity Sever PAD ☐ Other specify	
Was pharmacological prophylaxis given while the patient in contraindication?	Yes ☐	No ☐

ክፍል I: .ግላዊና ማህበረሰባዊ መረጃዎች				
ካርድቁ_____		የድንገተኛ ሆስፒታል ስም_____		
1.እድሜ_____አመት		2. ፆታ፣ .ወንድ ☐ ሴት ☐	3. ክብደት ……. ቁመት	
4.መኖሪያ አድራሻ		አዲስ አበባ ☐	ከአዲስ አበባ ውጭ ☐	
5.የህክምና ክፍያ		ጤና መድህን ☐ ካሽ ☐	በሌላ ተቋም የሚሸፈን ☐	
6. ማህበረሰባዊ ልማ ድ	ሲጋራ አጨሳለሁ	አዎ ☐ አይ ☐	አልኮሆል እጠጣለሁ	አዎ ☐ አይ ☐
7.የአካል እንቅስቃሴ		አዎ ☐ አይ ☐		☐ ☐
ክፍል II: .የታካሚው የህክምና ባህሪያትን በተመለከተ				
1. ወደ ድንገተኛ ክፍል የገቡበት ቀን_____		2. ድንገተኛ ክፍል የቆዩበት ቀናት_____		
3. ድንገተኛ ክፍል የተኙበት ምክንያት:				
4. ተጓዳኝ		አለ ☐ የለም ☐ለ ዘርዝር		
5. ድንገተኛ ክፍል ቆይታ ዉጤቱ		☐ አገግመው ወደ ቤታቸው ተመልሷል ☐ ወደ የውስጥ ደዌ ህክምና ክፍል ☐ ወደ ቀዶ ጥገና ክፍል ☐ ጽኑ ህክምና ክፍል ተዛውሯል ☐ወደ ሌላ ክፍል ተዛውሯል ☐ፈኝል		
6. ታካሚው/ዋ ድንገተኛ ክፍል በቆዩበት ቀናት የደም መርጋት ችግር ኣጋጥሟቸኝል?		አዎ ☐ አይ ☐		
7. ካጋጠመ ምን አይነት ነበር?		☐.የደም መላሽ ቧንቧ ውስጥ መርጋት ☐ የሳንባ ዉስጥ መርጋት ☐ ሁለቱም		
8. በገቡ በስንተኛው ቀን?/ግለጽ				

ለደምመርጋት አደጋ ስጋትየተለዩ ምክንያቶች	ውጤት	
	አለ	የለም
1. ካንሰር 2. የቀደመ ደም መላሽመርጋት ችግር 3. መንቀሳቀስ አለመቻል 4. የታወቀ/የተወረሰ የደም መርጋት 5. አደጋ ጉዳት/ቀዶ ጥገና 6. እድሜ (≥70 አመት) 7. የልብ/የሳንባ ችግር 8. ስትሮክ 9. እንፌክሽን 10. ውፍረት (BMI ≥ 30) 11. የሆርሞን ህክምና ጠቅላላ ነጥብ;	3 ☐ 3☐ 3☐ 3☐ 2 ☐ 1 ☐ 1 ☐ 1 ☐ 1 ☐ 1☐ ☐	0☐ 0☐ 0☐ 0☐ 0☐ 0☐ 0☐ 0☐ 0☐ 0☐
.የተጋላጭነት ደረጃ	ከፍተኛ(>=4) ☐	ዝቅተኛ (<4) ☐
በ pauda መስፈርት መሰረት ደም ማቅጠኛ መውስድ ይችሉ ነበር?	አዎ ☐	አይ ☐
የደም መርጋት ቅድመ መከላከያ መድሃኒት ወስደዋል?	አዎ ☐	አይ ☐
የተሰጠው ደም ማቅጠኛ አይነት	መጠን	የተጀመረበት ሰአት
ሄፓሪን እኖክዛፓሪን ዋርፋሪን ሪቫሮክሳባን		

ሌላ ግለጽ		
.ከአልጋ ወርደው እንዲንቀሳቀሱ ይመከሩ ነበር?	☐ አዎ	☐ አይ
ደም ማቅጠኛ መድሃኒቱ ለታካሚው የተከለከለ ነው?	☐ አይ	☐ አይ
የማቅጠኛ መድሃኒቱን ያልወሰዱበት ምክንያት	☐ ምንም ለችግሩ ተጋላጭ ስላልሆኑ ኣያስፈልጋቸውም ☐ ያስፈልጋቸዋል ግን መድሃኒቱ የለም ☐ ያስፈልጋቸዋል ግን መድሃኒቱን መግዛት ኣይችሉም ☐ ያስፈልጋቸዋል ግን መድማት ስለተፈራ ☐ ያስፈልጋቸዋል ግን በመዘንጋት ነበር ☐ ያስፈልጋቸዋል ግን ያልተሰጠበት ምክንያቱ አልታወቀም ☐ ሌላ ግለጽ_____	
ቅድመ መከላከያ (ደም ማቅጠኛ)መድሃኒቱ ለታካሚው የተከለከለ ነው የተባለበት ምክንያት	☐ የመድማት ተጋላጭነቱ ከፍተኛ ስለሆነ ☐ ባለፉት 3 ወራት የአንጀት መድማት ነበረባቸው ☐ ፕላትሌት ሴል ቁጥር በጣም የወረደ ☐ የሄፓሪን አለርጂ ☐ የቆዳ ቁስለት ☐ ሌላ	

የተከለከለም ሆኖ ታካሚው ደም ማቅጠኛ መድሃኒት ተሰጥቶታል?	አዎ ☐ አይ ☐

የመረጃ መስጫና የስምምነት ቅፅ

እኔ አቶ ወርቁ ደገፉ በአዲስ አበባ ዩንቨርሲቲ ጤና ሳይንስ ኮሌጅ የሁለተኛ ድግሪ የክሊኒካል ፋርማሲ ተማሪ ስሆን በአሁኑ ግዜ ድህረ ምረቃ ጽሁፍ የሚሆን ጥናት በዚህ ሆስፒታል በድንገተኛ የህክምና መስጫ ክፍል "የደም መላሽ ቧንቧ መፍሰስ አደጋ እና ቅድመ መከላከያ ማቅጠኛ መድሃኒት ጋር ተያያዥ ጉዳዮችን በማስመለከት ችግሮቸን ለማጥናት የተዘጋጀ" ምርምርን እያደረኩ ስለሆነ ከእርስዎ አስፈላጊ መረጃዎችን እንድጠይቅዎና ከህክምና ካርዶ መረጃን እንድወስድ እንድፈቅዱልኝ በትህትና እጠይቆታለዉ። በዚህ ምርምር ዉስጥ በመሳተፎ በእርሶ ለይ የምደርስቦት ጉዳት ወይም በመሳተፍዎ በፊት ከሚያገኙ የህክምና አገልግሎት የሚጎልቦት የለም። ሆኖም ግን በምርምሩ ዉስጥ ከተሳተፉ ምናልባት ከመድሃኒት ጋር የተያያዘ የህክምና ችግር ካለ ከሚደረገዉ ማስተካከያ ሊጠቀሙ ይችላሉ፡ እንድሁም የወደፊቱ የህክምና እንክብካቤ እንደግባት ይጠቅማል። እርስዎ የሰጡን መረጃ ሁለም በምስጢር ይያዛል። እንድሁም የግላዎ መረጃ አይፃፍም። በተጨማሪም በዚህ ምርምር ዉስጥ መሳታፍዎ ሙሉ በሙሉ በፍላጎትዎ ላይ የተመሰረተ ነዉ። በምርምሩም ላይ ያልገባዎት ነገር ካለ በማንኛዉም ግዜ ዋናዉን ተመራማሪ መጠየቅ ይችላሉ።

የተሳታፊዉ ፊርማ፡ _____

የመረጃ ሰብሳቢ ፊርማ፡ _____

11.2. Ethical Clearance

በ ፋርማሲ ት/ቤት
የኢቲካል ሪቪው ኮሚቴ

አዲስ አበባ ዩኒቨርሲቲ
Addis Ababa University

School of Pharmacy
Ethical Review Committee

ቀን Date: May 08, 2023

ቁጥር Ref. No.: ERB/SOP/524/15/2023

To: **Worku Degefa**
School of Pharmacy

Re: Ethical Clearance

It is to be recalled that you submitted a research project proposal entitled "**Assessment of Venous Thromboembolism Risk, Prophylaxis and Incidence Among Patients Attending Emergency Department of Addis Ababa City Hospitals in Ethiopia: A Multicenter Hospital Based Prospective Study".** The committee thoroughly reviewed the proposal based on its operational guideline and found that, it fulfills all the ethical requirements stipulated in the guideline. This is, therefore, to inform you that the proposal is ethically approved for implementation.

With best regards,

Shemsu Umer (PhD)
Chairperson, ERC
School of Pharmacy
College of Health Sciences
Addis Ababa University

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Ref. No. PM23/60

Date: 2/8/2023

Institutional Review Board (IRB) of St. Paul's Hospital Millennium Medical College (SPHHMC)

Ethical Clearance

Research Title: Assessment of venous Thromboembolism RISK prophylaxis and incidence among patients attending Emergency Department of Addis Ababa City Hospitals in, Ethiopia: A multicenter Hospital Based Prospective Study

Principal Investigator: Worku Degefa

The IRB of SPHMMC has reviewed the above mentioned research proposal and made the following decision:

- Approved:- _____x_____
- Approved with recommendation:- _____
- Approved on condition :-_____
- Disapproved:- _____

The decision is valid for 12 months and the research should be conducted in compliance with the protocol/proposal approved by the IRB of SPHMMC. Any subsequent revision/amendment of the protocol/proposal needs approval before conduct of the research. The researcher should also submit written summaries of the research status to the IRB every 03 months. Upon the conclusion of the study, manuscripts and thesis work to the final/completed research project needs to be submitted to the IRB.

IRB Chair:

Signature: _____

Date: July 27, 2023

Mahteme Bekele (MD)
Professor of Surgery
Research Directorate Director

Federal Ministry of Health
St. Paul's Millennium Medical College

Cc:

- Vice Provost for Academic and Research
- IRB
- Worku Degefa
  SPHMMC