



**PREDICTIVE VALUE OF VENOUS THROMBOEMBOLISM RISK ASSESSMENT
SCORING TOOLS AMONG SURGICAL PATIENTS**

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ABSTRACT

Venous thromboembolism represents a spectrum of conditions that includes deep venous thrombosis (DVT) and pulmonary embolism (PE). It affects hospitalized and non-hospitalized patients, recurs frequently, is often overlooked, and results in long-term complications including chronic thromboembolic pulmonary hypertension (CTPH) and the post-thrombotic syndrome (PTS). This prospective study aimed at assessing the total risk score of VTE among surgical patients from the departments of General Surgery, Orthopaedics, Obstetrics and Gynaecology before a major operation using three tools- Venous thromboembolism Risk Factor Assessment by Caprini et al (tool 1), Revised Geneva Score for pulmonary embolism (tool 2) and Pretest probability of Deep Venous Thrombosis by Wells (tool 3) thus comparing their predictive value of VTE. Nine hundred and twenty patients were recruited, forty died within 48 hours, forty died during follow up and twenty were lost to follow up. Data from 820 patients (250 from General Surgery, 300 from Orthopaedics; and 270 from O&G) were analysed and assessed for the risk of VTE. The administration of prophylactic anticoagulant and the modality chosen by the managing team was documented. The mean age of the patients were 44.5 ± 15.0 years with 72% of the patients being female. Tool 1 assessed the half of the patients 410 (50%) to have moderate risk of developing VTE while tool 2 and tool 3 assessed 65.9% and 92.7% to have low probability of VTE respectively. 100 (12%) of the patients studied had prophylactic anticoagulant. It was observed that the use of prophylaxis was highest in the group with the highest risk for VTE irrespective of the tool used. None of the 820 patients developed clinically overt VTE, however, the causes of death of the 100 patients excluded from analysis could not be investigated to rule out VTE. It was concluded that that none of the three tools used could be convincingly declared better than the others because no patient developed symptomatic VTE during the study period and cause of death was unknown among the patients who died.

KEYWORDS: Deep, venous, thromboembolism, predictive, tool, embolism.

INTRODUCTION

A common complication of major surgical procedures is venous thromboembolism (VTE). It comprises of deep vein thrombosis (DVT) and pulmonary embolism (PE).^[1] It is a serious threat to recovery from surgery and is the third most common vascular disease, after ischaemic heart disease and stroke.^[2] PE is seen in 1-2% of all major surgical procedures while DVT occurs in approximately 20%; with prophylaxis, the incidence of VTE remains about 5-20%.^[3,4] Factors influencing the wide range in the incidence of VTE includes variation in patients' characteristics like age, sex, type of surgical procedure, duration of surgical procedure and nature of surgical patient's perioperative care. Others are choice of

prophylaxis and modalities of screening and detection of VTE.^[1,5]

VTE is known to be mostly preventable; for this reason all international consensus groups on venous thromboprophylaxis recommend that hospital patients should be assessed for clinical risk factors and an overall risk of thromboembolism. These patients should then receive prophylaxis according to their risk categories.^[6] With this in mind, various risk assessment methods (RAMs) have been introduced for assessing VTE risk factors in hospitalized patients; these include VTE Risk Factor Assessment by Caprini et al, Revised Geneva Score for pulmonary embolism and Pretest probability of Deep Venous Thrombosis by Wells. These RAMs are, in

general, easy to use and relatively short.^[7] Nevertheless, there is a need to compare them to determine which one best fits the African patient.

MATERIALS AND METHODS

This prospective study was carried out in the departments of Surgery, Orthopaedics and Obstetrics and Gynaecology of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State, Nigeria. Patients in the three departments who presented for surgery were recruited via purposive sampling.

The study was aimed at assessing the total risk score of VTE among surgical patients before a major operation using three tools- Venous thromboembolism Risk Factor Assessment by Caprini *et al* (tool 1), Revised Geneva Score for pulmonary embolism (tool 2) and Pretest probability of Deep Venous Thrombosis by Wells (tool 3) thus comparing their predictive value of VTE. Patients were monitored for three months post surgery for the development of clinically overt VTE.

Data was collected on age, sex, height, weight, diagnosis, date of admission and the name and type of the planned surgery.

Upon recruitment, the objectives and methodology of the study was explained to the patients and, they were interviewed using three tools for risk assessment for VTE. A total risk score was determined using each tool. In addition, the implementation of prophylactic anticoagulant and the modality chosen by the managing team was noted. Data obtained was analyzed using the Statistical Package for Social Sciences (SPSS) version 21 with *p*-value ≤ 0.05 .

RESULTS

Nine hundred and twenty patients were recruited into the study but samples from eight hundred and twenty patients (250 from General Surgery, 300 from Orthopaedics and 270 from O&G) were available for analysis, giving a drop out rate of 10.9%.

Table 1: Characteristics of patients.

Characteristics	Orthopaedics N= 300	O&G N=270	Surgery N=250	Total N=820
Age (years)	42.9±17.5	38.3±8.1	53.1±13.9	44.5±15.0
Sex				
Female	170(56.7%)	270(100%)	150(60%)	590(72.0%)
Male	130(43.3%)	0	100(40%)	230(28.0%)
BMI (kg/m ²)	27.8±4.3	28.7±6.6	26.0±5.0	27.5±5.4
Underweight	0	10(3.7%)	10(4.0%)	20(2.4%)
Normal	70(23.3%)	70(25.9%)	100(40%)	240 (29.3%)
Overweight	130(43.3%)	90(33.3%)	90 (36.0%)	310(37.8%)
Obese	100(33.3%)	100(37.1%)	50(20%)	250 (30.5%)
Used prophylaxis*	80(26.7%)	0	20(8%)	100 (12.2%)
* All the patients had	LMW heparin			

Table 1 shows the characteristics of patients in the study. The mean age of the patients was 44.5±15.0 years. Five hundred and ninety (72%) of the patients were female while 230(28%) were males. The mean BMI was 27.5±5.4 with 310(37.8%) of the patients being overweight while 250 (30.5%) were obese. 100 (12%) of the patients studied had prophylactic anticoagulant. Eighty (80%) of them had orthopaedic surgery while the remaining 20(20%) had general surgery. Eighty (80%) of the patients who had prophylactic anticoagulant had LMW heparin alone while 20 (20%) had both LMW heparin and warfarin.

Table 2 shows the risk distribution among newly admitted surgical patients before a major surgical operation using three tools. The risk distribution was determined from each tool after calculating the total risk score for VTE.

Using tool 1, most of the patients, 410(50.0%) had moderate risk for VTE, followed by high risk 350(42.7%) with low risk being the least, 60(7.3%). On further analysis, most of the obstetric and gynaecologic patients 200 (74.1%) were in the high risk group unlike the other two specialties in which more than 60% of the patients had moderate risk. When tool 2 was used, majority of the patients 540(65.9%) had low probability of having VTE, only twenty (2.4%) had a high probability of having VTE. Tool 3, yielded 760(92.7%) with low risk for VTE and 10 (1.2%) with high risk for VTE.

Table 3 depicts the use of anticoagulant across risk groups gotten from the three tools. It is seen that the use was highest in the group with the highest risk irrespective of the tool that was employed.

Table 2: Risk group distribution among surgical patients.

Tools	Orthopaedics N=300	O&G N=270	Surgery N=250	Total N=820
Tool 1				
Low risk	30(10.0%)	10(3.7%)	20(8%)	60 (7.3%)
Moderate risk	190(63.3%)	60(22.2%)	160(64.0%)	410 (50.0%)
High risk	80(26.7%)	200(74.1%)	70(28%)	350 (42.7%)
Tool 2				
Low probability	210(70.0%)	220(81.5%)	110(64.0%)	540(65.9%)
Intermediate probability	70(23.3%)	50(18.5%)	140(36.0%)	260(31.7%)
High probability	20(6.7%)	0	0	20(2.4%)
Tool 3				
Low risk	270(90.0%)	250(92.6%)	240(96.0%)	760(92.7%)
Moderate risk	20(6.7%)	20(7.4%)	10(4.0%)	50(6.1%)
High risk	10(3.3%)	0	0	10(1.2%)

Table 3: Use of anticoagulant prophylaxis across risk groups.

Tools	Total N=820	Used prophylaxis N=10
Tool 1		
Low risk	60 (7.3%)	0
Moderate risk	410 (50.0%)	40 (9.8%)
High risk	350 (42.7%)	60 (17.1%)
Tool 2		
Low probability	540(65.9%)	40 (7.4%)
Intermediate probability	260(31.7%)	40 (15.3%)
High probability	20(2.4%)	20 (100%)
Tool 3		
Low risk	760 (92.7%)	70 (9.2%)
Moderate risk	50(6.1%)	20 (40%)
High risk	10 (1.2%)	10 (100%)

DISCUSSION

Assessing the risk of VTE in surgical patients and evaluating the pattern of use of prophylactic anticoagulant will help reduce the burden of VTE in our environment. Unfortunately, there is a paucity of information about VTE and tools needed to assess the risk for it in Nigeria.^[8]

The mean age of the patients was 44.5±15.0 years. This is in agreement with the findings that VTE is known to be predominantly a disease of middle aged and the elderly.^[8,9] only 100(12%) of the study population had prophylactic anticoagulant, this is also in agreement with documented evidence that there is limited use of prophylactic anticoagulant among surgeons despite the availability of effective prophylaxis; various reasons have been adduced for these.^[1,10]

Eighty percent of those that used prophylaxis were in Orthopaedic surgery and the reason may be because venous thromboembolism is said to be especially common in lower extremity surgeries and athroplasties.^[11]

The risk distribution for VTE among patients in the study was assessed using three different tools. It was discovered that different risk distribution was seen across the departments studied. Tool 2 and 3 classified most of the patients as low risk, unlike tool 1 that put most of

them in the moderate risk group. Since no patient developed VTE, one may be led to choose tool 3 as the most predictive.

However, forty patients died within 48hours of surgery while twenty died during follow up; the causes of death could not be investigated. It may be that the patients died from asymptomatic VTE which could have been detected at autopsy as there is evidence from routine autopsies that from 10-25% of all deaths in hospital involve emboli in the lungs, many of which are extensive enough to be considered as being the cause of death.^[12] Apart from this, it was observed that the use of prophylaxis was highest in the group with the highest risk for VTE irrespective of the tool used to assess the risk for VTE. This might have been responsible for none of the patients developing VTE.

CONCLUSION

The results of this study showed that none of the three tools used could be convincingly declared better than the others because no patient developed symptomatic VTE during the study period and cause of death was unknown among the patients who died.

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