

Venous Thromboembolism Prophylaxis and Screening: A Clinical Audit

AMIR HAMZA KHAN¹, AMARAH NISAR², JAWAD MABOOD³, HIDAYAT ULLAH⁴

^{1,2,4}MBBS, Post Graduate Resident, Department of Surgery, Khyber Teaching Hospital Peshawar

³MBBS, Post Graduate Resident, Department of Anesthesia, Hayatabad Medical Complex

Corresponding author: Jawad Mabood, Email: mabood.jawad12@gmail.com

ABSTRACT

Objective: We aimed to audit venous thromboembolism in surgical patients at risk of VTE presented to surgical department in 2021 using the caprini risk assessment model.

Methodology: This clinical audit was conducted in surgical D unit department of Surgery, Khyber Teaching Hospital, Peshawar from July 2021 to December 2021. A total of 150 patients each for the audit group and the re-audit group were selected through non-probability consecutive sampling for both genders. A predesigned proforma according to caprini risk assessment model was used to assess the patient's individual risk for DVT and provision of appropriate prophylaxis. Data was entered into Microsoft excel, analyzed through SPSS version 23 and results were presented in the form of descriptive writing and tables.

Results: The mean age of the study population was 50.47 with relatively equal selection from both genders. None of the patients in the audit group were properly grouped for their risk of DVT and management needed as mentioned in the caprini RAM guidelines. In the re-audit group, 100% of the patients were accurately categorized into groups and the VTE risk assessment percentage significantly improved from 0% to 80.8%.

Conclusion: The audit showed noticeable deficiencies in record keeping and clinical assessment of VTE risk in the management of hospital patients. However, through appropriate measures this insufficiency can be amended with appreciable results.

INTRODUCTION

Deep venous thrombosis (DVT) is a common complication, often subclinical and unnoticed, prevalent mostly in patients admitted in the surgical wards and orthopedic wards¹. DVT is basically a part of venous thromboembolism (VTE) and globally it is one of the most preventable causes of morbidity and mortality. It is a vascular pathology and veins in the lower legs are affected most commonly² but clots can also form in the thighs, arms and the pelvic vessels³. There are two dreadful complications of deep venous thrombosis: pulmonary thromboembolism (PE)⁴ and post thrombotic syndrome (PTS)⁵. VTE leading to DVT occurs in approximately 1 out of 1000 patients every year⁶⁻⁸.

DVT has multiple contributory risk factors which include old age, trauma⁹, sedentary lifestyle and prolonged travelling¹⁰, major surgery, pregnancy¹¹, syndromes such as antiphospholipid antibody syndrome¹², using birth control pills (oral contraceptives) being overweight and cancer¹³. In some patients DVT remains asymptomatic but in others DVT can cause severe morbidity and mortality. In certain clinical population such as pregnant women, mortality can reach up to 9%¹⁴⁻¹⁶.

Research has shown that regular on-admission and pre-operative prophylaxis decreases the risk of DVTs and PEs specifically in patients who are prone to develop this condition and also decrease the economic burden on medical institutions¹⁷. International guidelines and scores have aimed at preventing VTE to avoid such complications and also to avoid unnecessary hospital expenditures¹⁸⁻²⁰. In contrast screening for asymptomatic DVT, and its treatment has been shown to deliver harm.

Standard Criteria: According to international guidelines and policy for VTE prophylaxis in hospital setups, all patients presenting to hospital or presenting acutely to surgical departments should be individually assessed for the risk of VTE using the described scores in this guideline (caprini score) and the risk of bleeding is assessed based on individual clinical variables. The patient should be informed of the advantages of prophylaxis and the problems associated with it. It is advised to evaluate each patient's risk of VTE using a risk prediction proforma before deciding whether or not to administer VTE prophylaxis. As part of the standard procedure for obtaining informed consent for treatment, the risk assessment should be discussed between the patient and the care provider and the conclusions of that conversation should be formally documented.

METHADODOLOGY

In order to check the surgical patients admitted in surgical department in 2021, we took a sample of these patients and

examined the files of all adult patients admitted to the surgical department excluding pre-op patients. We checked the files of these patients including examination notes, progress notes, surgical notes and medication history. We compared this clinical practice with the policy of venous thromboembolism prophylaxis which was approved and effective since August 2017.

We checked the following in each patient's files:

- stratification of risk for VTE using the caprini score
- dividing the patients into very low, moderate and high risk for VTE according to caprini score
- whether VTE prophylaxis was given or not especially for deserving patients.

Then a process of re-audit began for 3 months starting from October 2021 to December 2021 in which the same number of patients who presented to surgical department were assessed according to international standards for the risk of VTE prophylaxis using caprini score and treatment was given accordingly. The risks and benefits of prophylaxis was discussed with the patient and permission was granted through informed consent. It was observed how this measure improved patient outcomes as well as hospital standards. Data collection and analysis was done as already mentioned in the methodology section.

Ethical approval to conduct this audit was granted from the chairperson audit committee (Khyber teaching hospital Peshawar) and consultant surgeons. Data entry was done continuously using a data collection sheet designed to address caprini RAM guidelines. VTE prophylaxis recommendations were taken from the categories major, minor and major trauma surgery as mentioned in the caprini RAM model. The completed data sheets were statistically analyzed using SPSS version 23 software and a unique spreadsheet.

RESULTS

a. Audit group:

A total of 150 patients' drug charts were reviewed over a 3-month period from July 2021 to September 2021. There were 80 female patients (53.3 %) and 70 male patients (46.7%) and the mean age of the study population was 50.47. For type of intervention, according to the caprini model, it was found that majority of patients underwent major procedures (n= 90, 60%), minor surgeries for 56 patients (37.3%) and only 4 remaining patients had major lower extremity surgeries.

b. Re-audit group:

A total of 150 patients' drug charts were reviewed over a 3-month period from October 2021 to December 2021. There were 98 female patients (64.9 %) and 52 male patients (34.4%) and the

mean age of the study population was 51.7 (Table 1) (Table 2). According to the caprini model the majority of patients underwent major procedures (n= 127, 84.1%), minor surgeries for 17 patients (11.3%) and only 6 remaining patients had major lower extremity surgeries (Table 3).

Categorization of the patients as per the caprini risk for VTE protocol was done as follows (Table 4):

1. High risk for VTE: 6 patients (4%)
2. Moderate risk for VTE: 31 patients (20.5%)
3. Low risk for VTE: 112 patients (74.2%)

Type of thromboprophylaxis needed for patients according to caprini RAM model (Table 5):

1. Early mobilization + low molecular weight heparin: 2 patients (1.3%)
2. Early mobilization + TED stockings: 17 patients (11.3%)
3. Early mobilization + TED stockings + low molecular weight heparin: only 1 patient
4. Low molecular weight heparin + TED stockings: 4 patients (2.6%)
5. TED stockings: 24 patients (15.9%)
6. No treatment given: only 1 patient

Treatment guidelines followed according to caprini (Table 6):

1. Proper thromboprophylaxis done according to caprini RAM model: 122 patients (80.8%)
2. Incomplete thromboprophylaxis done according to caprini RAM model: 27 patients (17.9%)

Therefore, as a result of this re-audit, our VTE risk assessment completion rate was increased to 80.8% and we ensured that maximum patients received accurate VTE thromboprophylaxis according to international guidelines.

Table 1: Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.7	.7	.7
male	52	34.4	34.4	35.1
female	98	64.9	64.9	100.0
Total	151	100.0	100.0	

Table 2: Statistics Age

N	Valid	150
	Missing	1
Mean		51.700
Median		50.000
Mode		40.0
Std. Deviation		10.1226
Minimum		22.0
Maximum		80.0
Percentiles	25	42.000
	50	50.000
	75	60.000

Table 3: Type of Surgery according to caprine

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.7	.7	.7
major	127	84.1	84.1	84.8
major lower extremity surgery	6	4.0	4.0	88.7
minor	17	11.3	11.3	100.0
Total	151	100.0	100.0	

Table 4: Risk for VTE according to caprini

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1.3	1.3	1.3
high	6	4.0	4.0	5.3
low	112	74.2	74.2	79.5
moderate	31	20.5	20.5	100.0
Total	151	100.0	100.0	

Table 5: Treatment given in the ward

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.7	.7	.7
Early mobilization + LMWH	2	1.3	1.3	2.0
early mobilization	101	66.9	66.9	68.9
early mobilization+ TED stockings	17	11.3	11.3	80.1
Early mobilization+TED stockings+LMWH	1	.7	.7	80.8
Low molecular weight heparin LMWH + TED stockings	4	2.6	2.6	83.4
No treatment	1	.7	.7	84.1
TED stockings	24	15.9	15.9	100.0
Total	151	100.0	100.0	

Table 6: Caprini treatment guidelines followed

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	.7	.7	.7
no	27	17.9	17.9	18.5
yes	122	80.8	80.8	99.3
Yes	1	.7	.7	100.0
Total	151	100.0	100.0	

DISCUSSION

Our study evaluated the use of thromboprophylaxis amongst 300 patients admitted in our unit, who had undergone various procedures for their respective diseases. Interpretation of the results and discussion with the ward in-charge, registrars, nursing staff and surgery residents led to remarkable improvement in patient care, clinical knowledge of the staff and utilization of hospital resources. The prospect of a high-risk patient being managed appropriately for VTE increased to almost 80%.

During the audit cycle it was noticed that categorization for risk of VTE using the caprini score was not done for any patient and it was not mentioned in the patients records that what type of VTE, if any, was prescribed especially for deserving patients. However, this does not imply that the patients were not prescribed appropriate treatment. They were managed according to clinical judgment and experience rather than following international protocols. In high-risk patients, the dosage of antithrombotic therapy is dependent on the weight of the patient. In the audit group none of the patients had their weight, height and BMI measured however in the re-audit group 50% of the patients had these demographics documented in their respective charts. These variables should be measured irrespective of patient's disease status.

Whilst this clinical audit seemed a beneficial exercise in creating awareness among the health staff and the patients regarding thorough VTE prevention, it was definitely not without its limitations. It was conducted in a simple retrospective (audit) and prospective manner (re-audit), the study duration was only six months, the sample population was only 300 patients and the relative experience of the health staff at the time of each audit was also likely to be minimal. Furthermore, financial, moral and structural support if provided by the hospital administration is a vital factor for a study's success.

CONCLUSION & RECOMMENDATION STATEMENT

Ensuring compulsory VTE prophylaxis training for all junior doctors as well as the nursing staff can definitely lead to better compliance with appropriate risk assessment and satisfactory prophylaxis. This will reduce the risk of unnecessary morbidity and mortality from VTE in hospitalized inpatients. Patient awareness can also be enhanced by delivering written pamphlets for VTE prevention, specially to high-risk patients, on admission and in pre-operative assessment. Thromboprophylaxis stockings (TEDs) should be appropriately prescribed to non-contra-indicated patients at risk of thrombosis. Furthermore, to ensure the proper dosage is administered, the weighing of all patients prior to the prescription of

pharmacological VTE prevention needs to be improved. The Caprini RAM model is a very economical and not harmful method which can be used more widely to prevent the risk of VTE.

REFERENCES

1. Bui MH, Hung DD, Vinh PQ, Hiep NH, Anh LL, Dinh TC. Frequency and Risk Factor of Lower-limb Deep Vein Thrombosis after Major Orthopedic Surgery in Vietnamese Patients. *Open access Macedonian journal of medical sciences.* 2019;7(24):4250-4.
2. Stone J, Hangge P, Albadawi H, Wallace A, Shamoun F, Knuttien MG, et al. Deep vein thrombosis: pathogenesis, diagnosis, and medical management. *Cardiovascular diagnosis and therapy.* 2017;7(Suppl 3):S276-s84.
3. Centers for Disease Control and Prevention. Venous Thromboembolism (Blood Clots). (<https://www.cdc.gov/ncbddd/dvt/facts.html>) Accessed 3/28/2022.
4. Kearon C. Natural history of venous thromboembolism. *Circulation.* 2003;107(23_suppl_1):I-22-I-30.
5. Kahn SR. The post-thrombotic syndrome. *Hematology American Society of Hematology Education Program.* 2016;2016(1):413-8.
6. Beckman MG, Hooper WC, Critchley SE, Ortel TL. Venous thromboembolism: a public health concern. *American journal of preventive medicine.* 2010 Apr 1;38(4):S495-501.
7. White RH. The epidemiology of venous thromboembolism. *Circulation.* 2003 Jun 17;107(23_suppl_1):I-4.
8. Silverstein MD, Heit JA, Mohr DN, Petterson TM, O'Fallon WM, Melton LJ. Trends in the incidence of deep vein thrombosis and pulmonary embolism: a 25-year population-based study. *Archives of internal medicine.* 1998 Mar 23;158(6):585-93.
9. McLaughlin DF, Wade CE, Champion HR, Salinas J, Holcomb JB. Thromboembolic complications following trauma. *Transfusion.* 2009;49 Suppl 5:256s-63s.
10. Lapostolle F, Surget V, Borron SW, Desmaizières M, Sordelet D, Lapandry C, et al. Severe pulmonary embolism associated with air travel. *The New England journal of medicine.* 2001;345(11):779-83.
11. McLendon K, Goyal A, Attia M. Deep Venous Thrombosis Risk Factors. [Updated 2022 Apr 21]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470215/>
12. Bustamante JG, Goyal A, Singhal M. Antiphospholipid Syndrome. StatPearls. Treasure Island (FL): StatPearls Publishing Copyright © 2022, StatPearls Publishing LLC.; 2022.
13. Sørensen HT, Mellekjaer L, Steffensen FH, Olsen JH, Nielsen GL. The risk of a diagnosis of cancer after primary deep venous thrombosis or pulmonary embolism. *The New England journal of medicine.* 1998;338(17):1169-73.
14. Chang J, Elam-Evans LD, Berg CJ, Herndon J, Flowers L, Seed KA, et al. Pregnancy-related mortality surveillance--United States, 1991--1999. *Morbidity and mortality weekly report Surveillance summaries (Washington, DC : 2002).* 2003;52(2):1-8.
15. The National Institute for Clinical Excellence. Why mothers die 2000-2002 — report on confidential enquiries into maternal deaths in the United Kingdom. London: Royal College of Obstetricians and Gynaecologists Press, 2003.
16. The Confidential Enquiry into Maternal and Child Health (CEMACH). Saving mothers' lives: reviewing maternal deaths to make motherhood safer — 2003-2005: the seventh report on confidential enquiries into maternal deaths in the United Kingdom. London: CEMACH, 2007.
17. Rahman S, Ananth S, Mukeshimana F, et al 22 An audit of adult VTE risk assessment compliance with NICE guidelines *Postgraduate Medical Journal* 2018;94:A16.
18. Geerts WH, Bergqvist D, Pineo GF, Heit JA, Samama CM, Lassen MR, Colwell CW. Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest.* 2008 Jun 1;133(6):381S-453S.
19. Nicolaidis AN, Fareed J, Kakkar AK, Breddin HK. Prevention and treatment of venous thromboembolism International Consensus Statement (guidelines according to scientific evidence). *International angiology.* 2006 Jun 1;25(2):101.
20. Lyman GH, Khorana AA, Falanga A, Clarke-Pearson D, Flowers C, Jahanzeb M, Kakkar A, Kuderer NM, Levine MN, Liebman H, Mendelson D. American Society of Clinical Oncology guideline: recommendations for venous thromboembolism prophylaxis and treatment in patients with cancer. *Journal of clinical oncology.* 2007 Dec 1;25(34):5490-505.