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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/23536
DOI URL: http://dx.doi.org/10.21474/IJAR01/23536

RESEARCH ARTICLE

RATE OF VENOUS THROMBOEMBOLISM RISK ASSESSMENT AND CALORIC REQUIREMENT CALCULATION IN PATIENTS WITHIN 24-HOURS AFTER ADMISSION AT A TERTIARY CARE HOSPITAL OF MALDIVES

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Manuscript Info

Manuscript History
Received: 14 March 2026
Final Accepted: 16 April 2026
Published: May 2026

Key words:-
Patient safety, Quality improvement, Risk, Venous thromboembolism.

Abstract

Background: Venous thromboembolism and malnutrition are significa nt contributors to increase morbidity and mortality in hospitalized patients. It is therefore important to ensure quantified assessment of risk of venous thromboembolism and daily caloric requirement of these patients.This project was conducted to determine and improve the rate of venous thromboembolism risk assessment and caloric requirement calculation in patients within 24-hours after admission at a public tertiary care hospital of Maldives.

Methods: This audit and quality improvement project was held at Addu Equatorial Hospital, S. Hithadhoo, Maldives from 02/03/2026 to 10/05/2026. First step was to audit the pre-intervention rate of venous thromboembolism risk assessment and caloric requirement calculation. After this, structured intervention was introduced for five weeks period. At completion of intervention period, re-audit was performed.

Results: In this study, initial audit of 15 admission files revealed that the rate of venous thromboembolism risk assessment and caloric requir ement calculation in patients within 24-hours after admission was 6.7% and 0%, respectively. In re-audit, the compliance rate was observed to increase to 68% for rate of both the venous thromboembolism risk assessment and caloric requirement calculation.

Conclusion: Structured implementation of simple measures can result in a significant improvement in the quality of healthcare in terms of improved compliance to assess venous thromboembolism risk and daily caloric requirement in admitted patients.

Introduction:-

Venous thromboembolism (VTE), encompasses any clot in the venous system but its common types are deep vein thrombosis (DVT) and pulmonary embolism (PE). DVT refers to abnormal coagulation of blood in the form of a clot in the venous channels. [1] DVT primarily involves the veins of legs, however it can also occur in any other vein. [2] PE contributes to mortality significantly in hospitalized and post-surgery patients. [3] Globally, VTE occurs affects 1-2 per 1000 patients. [4] There are several factors that contribute towards VTE occurrence including immobilization, pregnancy, hyper-coagulable conditions, smoking, old age, hypertension, obesity, diabetes, COVID-19 infection and

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cancer. [5, 6] VTE develops due to combination of venous stasis, state of hyper-coagulation and disruption in the integrity of the endothelium caused by the injury; with the triad commonly termed as the Virchow's Triad. [7]

Owing to potentially life-threatening nature of VTE, it is essential to ensure appropriate preventive measures are provided to the patients to improve outcomes and reduce mortality. In fact, based on international standards, it is recommended that the rate of assessment of VTE risk in patients who are hospitalized should be 100%. [8] Parmar et al. reported that at a healthcare facility in Dubai, this rate of VTE risk assessment within 24-hours of admission was 99.86%. [8] In contrast, Farogh et al., it was found that the rate of VTE risk assessment in patients admitted at a tertiary care hospital of low socioeconomic country was only 14.84%. [9]

When it comes to rate of calculation of daily caloric requirement, prior data availability at national and international levels is quite scarce. In addition, rate of VTE risk assessment also varies with the geographical location of the healthcare centres due to diversity in health culture, workload and clinical awareness of healthcare professionals. Therefore, present audit and quality improvement project was conducted to assess and improve the rate of venous thromboembolism risk assessment and caloric requirement calculation in patients within 24-hours after admission at a public tertiary care hospital of Maldives.

Materials and Methods:-

This audit and quality improvement project (QIP) was held at Addu Equatorial Hospital, S. Hithadhoo, Maldives from 02/03/2026 to 10/05/2026.

Inclusion criteria: Admission document of all the patients, age more than 18 years, of any gender, admitted due to any medical reason at medical ward were assessed and included in this audit and QIP.

Exclusion criteria: Patients with known history of thrombocytopenia, thrombophilia, bleeding disorder, coagulation disorder, active bleeding manifestation, anticoagulation use and pregnant women were excluded. This research project was conducted in two steps. In first step, an audit was performed in which pre-intervention rate of VTE risk assessment and calculation of daily caloric requirement was assessed through complete evaluation of the consecutively selected admission files of 15 admitted patients after 24-hours of admission in the medical ward. To avoid bias, it was ensured that none of the ward personnel had prior knowledge of this pre-intervention audit.

After the pre-intervention audit, QIP was initiated based on PDSA (Plan, Do, Study, Act) cycle. Plan included to display VTE risk assessment scale (Padau prediction scale) and caloric requirement formula at admission counters of ward and ICU, send reminder communication in the medical ward chat group and temporary addition of dedicated section of VTE risk assessment score and caloric requirement in admission document template for increasing rate VTE risk assessment and caloric requirement calculation from pre-intervention levels. The caloric requirement formula used was a weight-based equation: Total Caloric Requirement = Basal Energy Expenditure (25–30 kcal/kg/day) × Stress Factor × Activity Factor. Stress factors applied were: surgery/infection = 1.2, trauma = 1.5, sepsis = 1.6, and burns = 2.0. Activity factors ranged from 1.2 (sedentary) to 1.5 (very active). Macronutrient distribution was guided as 70% carbohydrates (4 kcal/g), 30% lipids (9 kcal/g), and protein at 1.5 g/kg/day. Do included implementation of the aforementioned structured plan for a period of five weeks. Study involved performance of re-audit of consecutively selected admission files of 25 admitted patients after 24-hours of admission in the medical ward to determine any improvement in rate of risk assessment and caloric requirement calculation after completion of five weeks of intervention. Act involved submission of the QIP report to medical administration department of the institute for official inclusion of Padua prediction scale score and caloric requirement formula in the admission document.

Analysis of the collected data was performed by using Microsoft Excel version 2019 and SPSS software version 25. Age of the patients was represented as mean ± standard deviation (SD). Gender, reason for admission, pre-intervention and post-intervention rate of VTE risk assessment and daily caloric requirement calculation was represented in the form of frequency and percentage. Visual demonstration of the pre- and post-intervention audit results was performed through bar charts.

Results:-

In this study, mean age of all the patients whose admission notes were assessed was 61.05 ± 17.44 years. There were 14 (35.00%) male and 26 (65.00%) female patients. Patient demographics are tabulated in Table-I:

Table-I: Patient demographics(n = 40)

Demographic	Mean ± SD; n (%)
Age	61.05 ± 17.44 years
Gender	
Male	14 (35.00%)
Female	26 (65.00%)
Reason for admission	
Lower respiratory tract infection	11 (27.50%)
Hyperglycaemic hyperosmolar state	3 (7.50%)
Opioid poisoning	1 (2.50%)
Acute exacerbation of COPD	4 (10.00%)
Urosepsis	4 (10.00%)
Acute febrile illness	3 (7.50%)
Acute pulmonary oedema	2 (5.00%)
Acute kidney injury	4 (10.00%)
Acute respiratory failure	5 (12.50%)
Septic shock	3 (7.50%)

COPD = Chronic obstructive pulmonary disease

Pre-intervention audit showed that the rate of VTE risk assessment and calculation of daily caloric requirement was 6.70% and 0%, respectively. At completion of 5-weeks of intervention, the compliance rate to assess VTE risk and calculate daily caloric requirement in admitted patients after 24-hours of admission at medical ward increased to 68.00% and 68.00%, respectively. Comparison of pre-intervention and post-intervention compliance rate to assess VTE risk and calculate daily caloric requirement in admitted patients after 24-hours of admission at medical ward is depicted in Figures 1 and 2, respectively:

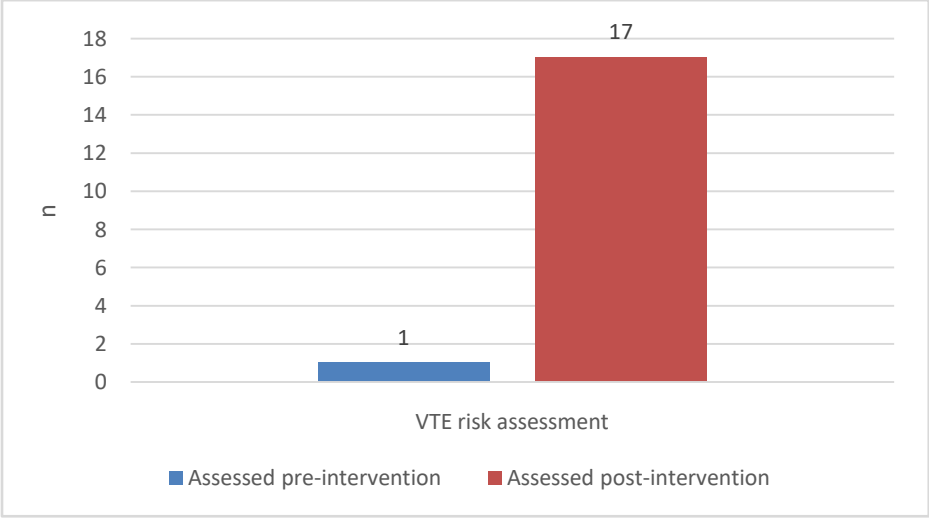

Figure-1: Pre- and Post-intervention rate of VTE risk assessment

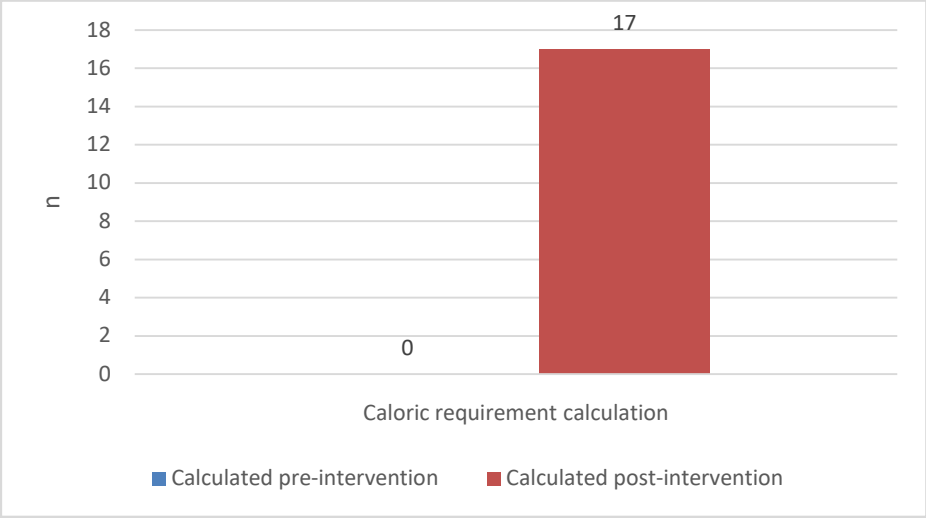

Figure-2: Pre- and Post-intervention rate of calculation of daily caloric requirement

Discussion:-

According to NICE guideline on VTE prevention, all the patients admitted at hospital should undergo VTE risk assessment within 24 hours of hospital admission. [10] Similarly, European Society for Clinical Nutrition and Metabolism (ESPEN) and the American Society for Parenteral and Enteral Nutrition (ASPEN) recommend an energy intake of up to 70% of nutritional needs within first week of hospital admission, [11] which can only be achieved if estimated caloric requirement is known. This QIP was conducted to assess and improve the rate of venous thromboembolism risk assessment and caloric requirement calculation in patients within 24-hours after admission at a public tertiary care hospital of Maldives. For assessment of VTE risk, Padua prediction scale was used which is a well-known and validated tool in this regard and has used globally in various clinical studies that focused on VTE. [12, 13]

In the pre-intervention audit of the present QIP, VTE risk assessment was performed in only 6.7% of admitted patients within 24 hours, while caloric requirement calculation was not performed in any admitted patient (0%). These baseline figures were concerning and considerably below the internationally recommended standard of 100% compliance with VTE risk assessment on admission.Following implementation of the PDSA-based structured intervention, the compliance rates for both VTE risk assessment and caloric requirement calculation increased significantly to 68% in the re-audit phase. This is consistent with findings from similar healthcare settings in low- and middle-income regions. Farogh et al. reported a baseline VTE risk assessment compliance of merely 14.84% at a tertiary care hospital in Pakistan. [9] Similarly, Khan et al., in their QIP conducted at a tertiary care hospital in Ireland, found that only 24% of admitted patients had a documented VTE risk assessment at baseline. [14] In stark contrast, Parmar et al. demonstrated a compliance rate of 99.86% at a private tertiary hospital in Dubai. [8] Similarly, Kanabar et al. conducted an audit on VTE risk assessment rate at a hospital in United Kingdom and reported that VTE risk assessment rate within 24-hours after hospital admission was 63%. [15] This reflects how resource availability, institutional culture and digital integration of risk assessment tools can significantly influence compliance. The disparity between high-income and resource-limited healthcare settings has been well documented in the literature, and the findings of the current study further reinforce this gap. [16] The improvement in VTE risk assessment rates in post-intervention audit demonstrate that simple interventions can have a major impact on the patient management protocols. Similar to this, a surgical audit conducted at Port Sudan Doctors Hospital, compliance with VTE prophylaxis guidelines rose dramatically from 6% at baseline to 85.4% post-intervention following the introduction of a standardized risk assessment tool and staff training. [17]

With respect to caloric requirement calculation, the pre-intervention rate of 0% in the present study highlights a critical and underappreciated gap in nutritional care at the study institution. Following implementation of the PDSA-based structured intervention, the compliance rates increased to 68%. Malnutrition is a highly prevalent yet systematically underdiagnosed condition among hospitalized patients. It is associated with increased infection rates, impaired wound healing, prolonged length of hospital stay and markedly increased morbidity and mortality. [18, 19] Critically, the interplay between malnutrition and VTE is bidirectional. Evidence indicates that malnourishment

significantly elevates the risk of developing VTE, with an adjusted hazard ratio of 2.79. [20] This finding strengthens the rationale for simultaneously assessing both VTE risk and caloric requirement in all admitted patients, as adopted in the present QIP. Beyond documentation compliance, it is important to acknowledge the clinical actions that followed the improved screening rates. Following the rise in VTE risk assessment compliance, a concurrent increase in the prescription of appropriate pharmacological and mechanical prophylaxis was observed (including low-molecular-weight heparin (LMWH) and sequential compression devices) in patients identified as high-risk by the Padua Prediction Scale. This suggests that improved documentation translated into meaningful clinical decision-making rather than remaining a purely administrative exercise. With regard to nutritional care, the completion of caloric requirement calculations was observed to prompt some nutritional interventions, including enteral feeding initiation and dietary referrals in select patients, however, these outcomes were not formally tracked as part of the audit protocol. In future QIPs, plan isto incorporate a formal tracking mechanism for post-assessment therapeutic actions to fully demonstrate the patient-level clinical impact of improved compliance.

Despite achieving 68% compliance, a gap of 32% remains between the post-intervention rate and the target of 100% compliance for both VTE risk assessment and caloric requirement calculation. This necessitates conductance of interval audits to reduce this gap and ensure achievement of optimal rates of VTE risk assessment and caloric requirement calculation.

Recommendations:-

To maintain the achieved improvement in the rate of VTE risk assessment and calculation of caloric requirement in admitted patients, the following steps should be continued and expanded. First, official inclusion of VTE risk assessment and caloric requirement calculation in the hospital admission notes should be formalized as a mandatory documentation requirement. Second, periodic reminders should be shared with medical staff andregular audits should be conducted to ensure continued compliance. Third, nurse-led audit teams should be appointed within the medical ward to conduct monthly internal reviews and share performance metrics with department head, thereby creating accountability loop to sustain compliance beyond the immediate post-intervention period. Fourth, given that Addu Equatorial Hospital operates on a mixed paper-electronic documentation system, a critical next step is the addition of VTE risk assessment and caloric requirement calculation fields into the electronic components of the admission workflow also as mandatory fields.

Limitations:-

In this QIP, a relatively small sample size confined to a single medical department was used, with 15 files audited pre-intervention and 25 post-intervention. Primary reason for the small sample size is the limited number of admissions per month and conductance of this audit (first of its kind at this hospital) at a single indoor department.This limited sample size may amplify or distort compliance percentages and findings may not be generalizable. It is recognized that the small denominators mean that a change of even one or two files can produce a large percentage swing, which should be considered when interpreting the reported compliance rates. Since the implementation period was identified and announced, this may have introduced a Hawthorne effect, whereby heightened awareness among clinical staff influenced documentation behavior beyond the effect of the structural intervention itself. Additionally, institutional barriers specific to Addu Equatorial Hospital may have contributed to the persistent compliance gap of 32%. Notably, chronic nursing and medical officer shortage created additional workload pressure on admitting teams, which may explain why caloric requirement calculations (a more time-intensive task compared to a structured scoring tool) lagged relative to VTE screening in some cases. Future studies should aim for larger, multi-departmental samples and incorporate blinded audit phases to minimize observer-effect bias.

Conclusion:-

After implementation of plan, the percentage of patients in which VTE risk assessment (through Padau prediction score) and calculation of caloric requirement was performed within 24 hours of admission, increased to 68% and 68%, respectively. This QIP demonstrated that structured implementation of simple measures can result in a significant improvement in the patient care and adopting important preventative measures to reduce hospital admission related morbidities.

Conflict Of Interest:-
None

Funding:-
None

Acknowledgements:-

I would like to thank medical admin of Addu Equatorial Hospital in assisting me with completion of this audit and QIP.

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