

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

4 **ABSTRACT**

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

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

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

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

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

26 **INTRODUCTION**

27 Venous thromboembolism (VTE), encompasses any clot in the venous system but its
28 common types are deep vein thrombosis (DVT) and pulmonary embolism (PE). DVT refers to
29 abnormal coagulation of blood in the form of a clot in the venous channels. ¹ DVT primarily
30 involves the veins of legs, however it can also occur in any other vein. ² PE contributes to
31 mortality significantly in hospitalized and post-surgery patients. ³ Globally, VTE occurs affects 1-
32 2 per 1000 patients. ⁴ There are several factors that contribute towards VTE occurrence
33 including immobilization, pregnancy, hyper-coagulable conditions, smoking, old age,
34 hypertension, obesity, diabetes, COVID-19 infection and cancer.^{5, 6} VTE develops due to
35 combination of venous stasis, state of hyper-coagulation and disruption in the integrity of
36 the endothelium caused by the injury; with the triad commonly termed as the Virchow's Triad. ⁷

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

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

52 MATERIALS AND METHODS

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

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

58 **Exclusion criteria:** Patients with known history of thrombocytopenia, thrombophilia, bleeding
59 disorder, coagulation disorder, active bleeding manifestation, anticoagulation use and pregnant
60 women were excluded.

61 This research project was conducted in two steps. In first step, an audit was performed in which
62 pre-intervention rate of VTE risk assessment and calculation of daily caloric requirement was
63 assessed through complete evaluation of the randomly selected admission files of 15 admitted
64 patients after 24-hours of admission in the medical ward. To avoid bias, it was ensured that none
65 of the ward personnel had prior knowledge of this pre-intervention audit.

66 After the pre-intervention audit, QIP was initiated based on PDSA (Plan, Do, Study, Act) cycle.
67 **Plan** included to display VTE risk assessment scale (*Padua prediction scale*) and caloric
68 requirement formula at admission counters of ward and ICU, send reminder communication in
69 the medical ward chat group and temporary addition of dedicated section of VTE risk assessment
70 score and caloric requirement in admission document template for increasing rate VTE risk
71 assessment and caloric requirement calculation from pre-intervention levels. **Do** included
72 implementation of the aforementioned structured plan for a period of five weeks. **Study** involved
73 performance of re-audit of randomly selected admission files of 25 admitted patients after 24-
74 hours of admission in the medical ward to determine any improvement in rate of risk assessment
75 and caloric requirement calculation after completion of five weeks of intervention. **Act** involved
76 submission of the QIP report to medical administration department of the institute for official
77 inclusion of Padua prediction scale score and caloric requirement formula in the admission
78 document.

79 Analysis of the collected data was performed by using Microsoft Excel version 2019 and SPSS
80 software version 25. Age of the patients was represented as mean \pm standard deviation (SD).

81 Gender, reason for admission, pre-intervention and post-intervention rate of VTE risk assessment
 82 and daily caloric requirement calculation was represented in the form of frequency and
 83 percentage. Visual demonstration of the pre- and post-intervention audit results was performed
 84 through bar charts.

85 **RESULTS**

86 In this study, mean age of all the patients whose admission notes were assessed was $61.05 \pm$
 87 17.44 years. There were 14 (35.00%) male and 26 (65.00%) female patients. Patient
 88 demographics are tabulated in Table-I:

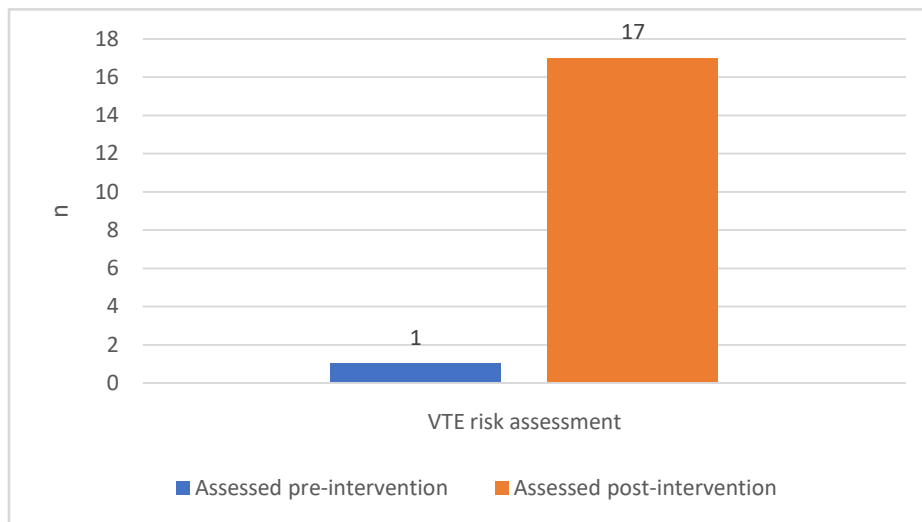
89 **Table-I: Patient demographics(n = 40)**

Demographic	Mean \pm SD; n (%)
Age	61.05 \pm 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%)

90 COPD = Chronic obstructive pulmonary disease

91 Pre-intervention audit showed that the rate of VTE risk assessment and calculation of daily
 92 caloric requirement was 6.70% and 0%, respectively. At completion of 5-weeks of intervention,
 93 the compliance rate to assess VTE risk and calculate daily caloric requirement in admitted

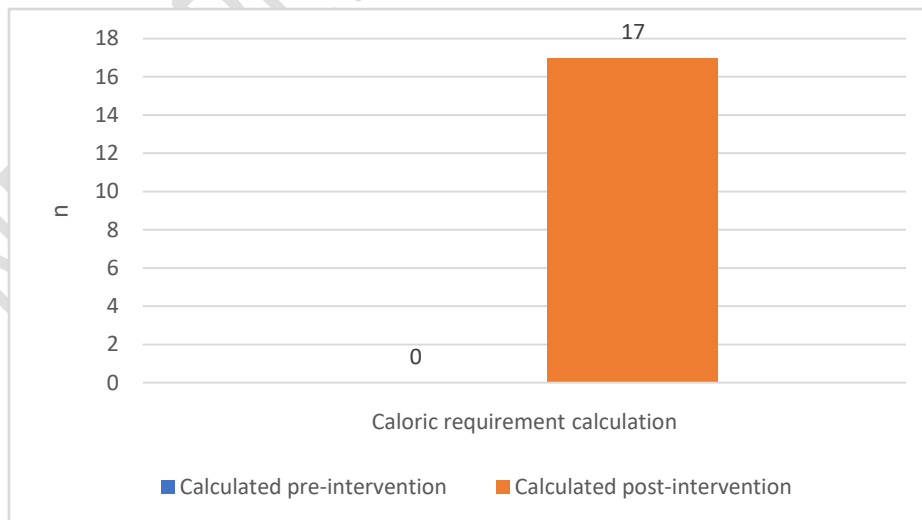
94 patients after 24-hours of admission at medical ward increased to 68.00% and 68.00%,
95 respectively. Comparison of pre-intervention and post-intervention compliance rate to assess
96 VTE risk and calculate daily caloric requirement in admitted patients after 24-hours of admission
97 at medical ward is depicted in Figures 1 and 2, respectively:



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

99

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



101

102

103 **DISCUSSION**

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

114 In the pre-intervention audit of the present QIP, VTE risk assessment was performed in only
115 6.7% of admitted patients within 24 hours, while caloric requirement calculation was not
116 performed in any admitted patient (0%). These baseline figures were concerning and
117 considerably below the internationally recommended standard of 100% compliance with VTE
118 risk assessment on admission. Following implementation of the PDSA-based structured
119 intervention, the compliance rates for both VTE risk assessment and caloric requirement
120 calculation increased significantly to 68% in the re-audit phase. This is consistent with findings
121 from similar healthcare settings in low- and middle-income regions. Faroghet *al.* reported a
122 baseline VTE risk assessment compliance of merely 14.84% at a tertiary care hospital in
123 Pakistan.⁹ Similarly, Khan *et al.*, in their QIP conducted at a tertiary care hospital in Ireland,
124 found that only 24% of admitted patients had a documented VTE risk assessment at baseline.
125 ¹⁴In stark contrast, Parmar *et al.* demonstrated a compliance rate of 99.86% at a private tertiary
126 hospital in Dubai.⁸ Similarly, Kanabaret *al.* conducted an audit on VTE risk assessment rate at a
127 hospital in United Kingdom and reported that VTE risk assessment rate within 24-hours after
128 hospital admission was 63%.¹⁵ This reflects how resource availability, institutional culture and
129 digital integration of risk assessment tools can significantly influence compliance. The disparity
130 between high-income and resource-limited healthcare settings has been well documented in the
131 literature, and the findings of the current study further reinforce this gap.¹⁶ The improvement in
132 VTE risk assessment rates in post-intervention audit demonstrate that simple interventions can

133 have a major impact on the patient management protocols. Similar to this, a surgical audit
134 conducted at Port Sudan Doctors Hospital, compliance with VTE prophylaxis guidelines rose
135 dramatically from 6% at baseline to 85.4% post-intervention following the introduction of a
136 standardized risk assessment tool and staff training.¹⁷

137 With respect to caloric requirement calculation, the pre-intervention rate of 0% in the present
138 study highlights a critical and underappreciated gap in nutritional care at the study
139 institution. Following implementation of the PDSA-based structured intervention, the compliance
140 rates increased to 68%. The importance of early caloric assessment in hospitalized patients
141 cannot be overstated. Malnutrition is a highly prevalent yet systematically underdiagnosed
142 condition among hospitalized patients. It is associated with increased infection rates, impaired
143 wound healing, prolonged length of hospital stay and markedly increased morbidity and
144 mortality.^{18, 19} Critically, the interplay between malnutrition and VTE is bidirectional. Evidence
145 indicates that malnourishment significantly elevates the risk of developing VTE, with an
146 adjusted hazard ratio of 2.79.²⁰ This finding strengthens the rationale for simultaneously
147 assessing both VTE risk and caloric requirement in all admitted patients, as adopted in the
148 present QIP.

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

153 **Recommendations:** To maintain the achieved improvement in the rate of VTE risk assessment
154 and calculation of caloric requirement in admitted patients, following steps should be continued
155 including use official inclusion of these measures in the hospital admission notes, periodic
156 reminders will be shared with medical staff and regular audits conductance to ensure continued
157 compliance.

158 **Limitations:** In this QIP, a relatively small sample size confined in a single department was
159 used. Since the implementation period was identified and announced, this may have increased
160 the awareness of doctors towards these aspects which may have influenced the compliance.

161 **CONCLUSION**

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

167 **CONFLICT OF INTEREST**

168 None

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