International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

An Observational Study to Assess Venous Thromboembolism (VTE) Prophylaxis Compliance and Patient Risk Stratification in a Tertiary Care Hospital

Ms. Bhawna
Research Scholar,Max Healthcare, Delhi, India
E-mail: bhawnamanishkumar@gmail.com
Dr. Nidhi Bansal
Co-Author:
Assistant Professor, Hospital Administration, Santosh Deemed to be University, Ghaziabad-201009 (India)
E-mail: drnidhi.bansal@santosh.ac.in
Dr. Arati Verma
Co- Author:
Senior Vice President, Medical Quality, Max Healthcare, Delhi, India.
mail: averma@maxhealthcare.com

Abstract

Venous thromboembolism (VTE), encompassing deep vein thrombosis (DVT) and pulmonary embolism (PE), is a significant yet largely preventable cause of morbidity and mortality among hospitalized patients. Despite the availability of evidence-based guidelines from organizations such as the American College of Chest Physicians (ACCP) and the National Institute for Health and Care Excellence (NICE), adherence to recommended prophylactic measures remains inconsistent in many healthcare settings. The present study aimed to assess the level of compliance with VTE prophylaxis guidelines and to examine patient risk stratification in a tertiary care hospital. A retrospective observational cross-sectional study was conducted among hospitalized patients in selected wards of a tertiary care center. Data were collected using a structured case report form and a validated questionnaire through review of electronic health records and consultation with healthcare professionals. A total of 96 patients with documented VTE risk assessments were included for clinical analysis, while 100 survey responses were analyzed for statistical evaluation. Patients were categorized into low-, moderate-, and high-risk groups based on standard risk assessment models. Statistical analysis was performed using IBM SPSS Statistics version 26, employing descriptive statistics, Pearson correlation analysis, chi-square tests, and regression analysis to examine relationships among clinical variables and prophylaxis practices. The findings revealed moderate but inconsistent adherence to VTE prophylaxis guidelines. Among the studied patients, 48% were categorized as high risk, 35% as moderate risk, and 17% as low risk for VTE. Appropriate prophylaxis was administered to 58% of high-risk patients, indicating that 42% remained untreated despite their elevated risk. In the moderate-risk group, 42% received prophylaxis, reflecting partial compliance with guidelines. Conversely, 18% of low-risk patients received unnecessary prophylaxis, suggesting overtreatment. Pharmacological prophylaxis, particularly low-

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

molecular-weight heparin and unfractionated heparin, was commonly used, although mechanical methods were also applied. Dose adherence was inconsistent, with 56% of patients missing at least one prophylactic dose, and only 28% receiving regular monitoring for potential bleeding complications. Correlation analysis indicated weak associations between risk assessment and prophylaxis prescription, whereas discussions of clinical guidelines among healthcare providers demonstrated a modest positive relationship with dose adherence.

Keywords: Venous thromboembolism (VTE); Deep vein thrombosis (DVT); Pulmonary embolism (PE); VTE prophylaxis compliance; Risk stratification; Hospitalized patients

1. Introduction

Venous thromboembolism (VTE), which includes deep vein thrombosis (DVT) and pulmonary embolism (PE), remains one of the most preventable yet potentially fatal complications among hospitalized patients worldwide. The World Health Organization (WHO, 2021) recognizes VTE as a significant contributor to global morbidity and mortality. Hospitalization itself substantially increases the risk of VTE due to immobilization, surgical interventions, acute medical illnesses, and altered hemodynamic states. Additional patient-specific risk factors such as advanced age, obesity, malignancy, prior history of thromboembolism, hormonal therapy, and inherited thrombophilia further elevate the risk.

Epidemiological studies indicate that in the absence of appropriate prophylaxis, the incidence of VTE ranges from 10% to 40% among general medical and surgical patients and may reach 40% to 60% in individuals undergoing major orthopedic procedures. Despite its high incidence, VTE is largely preventable through evidence-based prophylactic measures. However, when prevention strategies are not adequately implemented, patients are at risk not only for acute complications such as pulmonary embolism but also for long-term sequelae including post-thrombotic syndrome (PTS) and chronic thromboembolic pulmonary hypertension (CTEPH). These complications significantly impair quality of life and increase healthcare costs due to prolonged anticoagulation therapy, repeated hospital visits, and long-term follow-up care.

Recognizing the preventable nature of VTE, professional bodies such as the American College of Chest Physicians (ACCP) and the National Institute for Health and Care Excellence (NICE) have developed comprehensive, evidence-based guidelines for VTE prophylaxis in hospitalized patients. These guidelines recommend individualized risk assessment using validated models such as the Padua Prediction Score for medical patients and the Caprini Risk Assessment Model for surgical patients. Based on the risk stratification, appropriate prophylactic interventions—including pharmacological methods such as low-molecular-weight heparin (LMWH) or unfractionated heparin, and mechanical measures such as intermittent pneumatic compression devices—should be administered.

Despite the availability of standardized guidelines and validated risk assessment tools, global adherence to VTE prophylaxis recommendations remains suboptimal. Large multinational studies have demonstrated that only approximately half of hospitalized patients at risk receive appropriate prophylaxis. This gap between evidence-based recommendations and real-world clinical practice is particularly concerning in developing countries, including India, where resource constraints, inconsistent protocol implementation, limited training, and lack of

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

electronic medical record (EMR) prompts may hinder systematic risk assessment and guideline adherence.

Several factors contribute to poor compliance with VTE prophylaxis guidelines. These include inadequate awareness among healthcare providers, underestimation of VTE risk in non-surgical patients, fear of bleeding complications associated with anticoagulants, absence of standardized institutional protocols, and systemic workflow inefficiencies. In tertiary care hospitals, where complex cases and high patient volumes are common, failure to implement consistent risk assessment and prophylaxis protocols may result in preventable morbidity and mortality.

Although tertiary care institutions are expected to adhere to evidence-based practices, local data on VTE risk stratification and compliance with prophylaxis guidelines remain limited. Assessing adherence within a specific institutional setting is essential to identify gaps in clinical practice and inform quality improvement initiatives. Stratifying patients into high-, moderate-, and low-risk categories using validated tools allows for targeted evaluation of prophylaxis use and highlights areas where interventions are most needed.

Therefore, this study aims to evaluate the compliance rate with VTE prophylaxis guidelines in a tertiary care hospital and to examine the demographic, clinical, and treatment-related characteristics of patients categorized according to their VTE risk levels.

The primary research question guiding this study is:

What is the rate of compliance with established VTE prophylaxis guidelines among hospitalized patients in a tertiary care hospital?

Secondary research questions include:

1. How are hospitalized patients distributed across high-, moderate-, and low-risk categories based on validated risk assessment models?
2. What demographic, clinical, and treatment-related characteristics are associated with each VTE risk category?

It was hypothesized that compliance with VTE prophylaxis guidelines are suboptimal, particularly among patients classified as high risk for VTE, indicating the need for strengthened institutional protocols and targeted quality improvement interventions.

2. Literature Review

Venous thromboembolism (VTE) remains a major preventable cause of hospital morbidity and mortality despite established guidelines for prophylaxis. Evidence consistently demonstrates that compliance improves when systematic, technology-integrated, and multidisciplinary approaches are implemented. Brandyn et al. (2023) described a “roadmap to defect-free care” combining mandatory risk assessment, clinical decision support (CDS), and team-based feedback, which increased prophylaxis prescription rates by approximately 24 percentage points in trauma and medical settings and reduced missed prescriptions by 12%. Similarly, Skerik et al. (2020) and Anderson et al. (2019) emphasized embedding CDS into electronic medical records (EMRs), reporting significant improvements in adherence, particularly when alerts were paired with simplified order sets.

Marco et al. (2008), in a large-scale Spanish study of 19,000 patients, demonstrated that non-interruptive computer alerts increased prophylaxis rates to 90% in surgical and 64% in medical patients, with sustained VTE reduction (OR 0.5; $p < 0.05$). However, "alert fatigue" has been identified as a challenge, with excessive notifications leading clinicians to override reminders (Skerik et al., 2020). Therefore, optimized alert design and periodic audit-feedback are essential for sustainability. Supporting this, the Cochrane review by Kahn et al. (2018) concluded that multifaceted interventions—education, reminders, and audit cycles—are superior to single-component strategies. Agarwal et al. (2023) further highlighted the effectiveness of real-time compliance dashboards in identifying low-adherence departments and improving prophylaxis rates.

Human and organizational factors also influence compliance. Shamrock et al. (2013) and Lee et al. (2014) reported inconsistencies in nursing knowledge and perception, with prophylaxis sometimes viewed as optional. Inadequate training in mechanical prophylaxis and workload pressures further reduced adherence (Silva et al., 2021; Abboud et al., 2022). Leadership involvement, multidisciplinary collaboration, and structured education significantly enhance compliance (Walker et al., 2012; Blann et al., 2014). Patient education and shared decision-making also improve acceptance of prophylaxis (Al-Mugged & Bayraktar, 2022).

Despite strong evidence supporting technology-driven and team-based interventions, gaps remain in evaluating real-world compliance, particularly in resource-limited tertiary care settings. Limited research integrates patient awareness, departmental variation, and risk stratification accuracy within observational frameworks. Therefore, this study aims to assess VTE prophylaxis compliance and patient risk stratification in a tertiary care hospital to identify implementation gaps and inform context-specific quality improvement strategies.

3. Materials and Methods

3.1 Study Design

A retrospective observational cross-sectional study was conducted to evaluate adherence to venous thromboembolism (VTE) prophylaxis guidelines among hospitalized patients. This non-interventional design enabled assessment of real-world clinical practices without influencing patient management. Data were collected at a single point during each patient's hospital stay to determine compliance with established recommendations, including those of the American College of Chest Physicians (ACCP, 2016) and the National Institute for Health and Care Excellence (NICE, 2020).

3.2 Study Setting and Participants

The study was carried out in selected hospital wards of a tertiary care center. Patients were recruited using purposive sampling based on predefined eligibility criteria. Individuals admitted to the selected wards who had a documented VTE risk assessment during their hospital stay were included. Patients were categorized into low-, moderate-, and high-risk groups according to standard risk assessment models. No additional exclusion criteria were applied beyond the requirement for documented risk assessment.

The required sample size was calculated using Epi Info software (Centers for Disease Control and Prevention). Assuming an annual eligible population of 96 patients, a 95% confidence

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

level, 5% margin of error, and 50% expected proportion (to ensure maximum variability), the minimum sample size was determined to be 96 participants.

3.3 Data Collection Tools and Procedure

Data were collected using a structured Case Report Form (CRF) and a validated questionnaire. The CRF captured demographic variables (age, sex), clinical characteristics (admission type, comorbidities, mobility status), length of hospital stay, VTE risk category, and details regarding the type and timing of prophylaxis administered. The questionnaire consisted of 12 multiple-choice items assessing risk assessment practices, prophylaxis prescription, and monitoring patterns.

Information was obtained through systematic review of electronic health records (EHRs) and, where necessary, clarification from healthcare professionals. Data collection was conducted over a three-month period. All data collectors were trained to ensure standardized procedures, confidentiality, and accurate documentation.

3.4 Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee prior to study initiation. Written informed consent was secured from participants. Patient confidentiality was maintained by anonymizing data and storing records in password-protected files accessible only to the research team.

3.5 Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized patient characteristics and compliance rates. Associations between categorical variables were assessed using the chi-square test. Variables significantly associated with non-compliance were entered into a multivariable binary logistic regression model. Results were reported as odds ratios (ORs) with 95% confidence intervals (CIs), and a p-value <0.05 was considered statistically significant.

4. Results

A total of 96 patients had documented VTE risk assessment; 100 survey responses were analyzed for statistical testing. Among clinically stratified patients, 48% were high risk, 35% moderate risk, and 17% low risk. Of high-risk patients, 58% received appropriate prophylaxis, whereas 42% did not. In the moderate-risk group, 42% received prophylaxis. Notably, 18% of low-risk patients received unnecessary prophylaxis, indicating overuse.

Table 1: VTE Risk Category and Prophylaxis Appropriateness (N = 96)

Risk category	% of patients	% receiving prophylaxis	Interpretation
High risk	48%	58%	42% untreated (underuse)
Moderate risk	35%	42%	Partial adherence
Low risk	17%	18%	Overtreatment present

Descriptive statistics showed moderate adherence across domains (means 2.40–2.64 on a 4-point scale).

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

Table 2: *Descriptive Statistics of Key Study Variables (N = 100)*

Variable	M	SE
Risk assessment on admission	2.54	0.11
Prophylaxis prescribed	2.61	0.10
Informed about purpose	2.64	0.11
Received all doses	2.61	0.11
Side-effect monitoring	2.59	0.11
Guidelines discussed	2.51	0.11
Mobility status	2.55	0.11
VTE risk factors	2.45	0.11
Length of stay	2.52	0.11
Age group	2.62	0.11
Department admitted	2.40	0.12
Type of prophylaxis	2.46	0.11

Although most patients were assessed and prescribed prophylaxis, important gaps were observed. Fifty-six percent missed at least one prophylactic dose (30% missed 1–2 doses; 26% missed >2 doses). Regarding safety, 37% reported no monitoring for bleeding complications.

Table 3: Dose Adherence and Monitoring (N = 100)

Variable	Category	%
Dose adherence	All doses received	44%
	Missed 1–2 doses	30%
	Missed >2 doses	26%
Monitoring	Regular	28%
	Irregular	19%
	None	37%
	Not applicable	16%

Pharmacologic prophylaxis predominated, though a subset received none.

Table 4: Type of VTE Prophylaxis (N = 100)

Type	n	%
Low-molecular-weight heparin	25	25%
Unfractionated heparin	24	24%
Mechanical prophylaxis	31	31%
None	20	20%

Correlation Analysis

Most correlations were weak and nonsignificant. Risk assessment was weakly associated with prophylaxis prescription ($r = .13$, $p = .183$) and dose adherence ($r = .17$, $p = .089$). No significant association existed between risk assessment and patient education ($r = .02$, $p = .837$) or side-effect monitoring ($r = -.08$, $p = .429$).

Significant findings included:

International Journal of Advanced Research and Multidisciplinary Trends (IJARMT)
An International Open Access, Peer-Reviewed Refereed Journal
Impact Factor: 7.2 Website: https://ijarmt.com ISSN No.: 3048-9458

- Guideline discussion and risk assessment (r = .20, p = .044)
- Guideline discussion and dose adherence (r = .25, p = .012)
- Presence of VTE risk factors and dose adherence (r = −.20, p = .048)

Table 5: Significant Pearson Correlations (N = 100)

Variables	r	p
Guidelines discussed × Risk assessment	.20	.044
Guidelines discussed × Dose adherence	.25	.012
Risk factors × Dose adherence	−.20	.048

Regression Analysis

A linear regression examined whether patient education and guideline discussion predicted type of prophylaxis. The model was not significant, $F(2, 97) = 2.08$, $p = .130$, explaining only 4.1% of variance ($R^2 = .041$, adjusted $R^2 = .021$).

Table 6: Regression Summary Predicting Type of Prophylaxis

Predictor	B	SE	β	p
Constant	2.45	0.39	—	<.001
Guidelines discussed	0.14	0.10	.14	.151
Informed about purpose	−0.13	0.10	−.13	.196

Communication variables did not significantly influence prophylaxis type selection.

Crosstab Analyses

No significant association was found between patient education and prophylaxis type, $\chi^2(9) = 5.30$, $p = .807$, nor between patient education and department admitted, $\chi^2(9) = 6.48$, $p = .691$.

Summary

Overall, findings demonstrate moderate but inconsistent adherence to VTE prevention guidelines. Underuse in high-risk patients, overtreatment in low-risk patients, incomplete dose administration, and insufficient monitoring highlight systemic gaps. Although guideline discussions modestly improved dose adherence, communication variables did not significantly predict prophylaxis type. These findings underscore the need for stronger workflow integration, standardized documentation, and structured monitoring protocols to enhance VTE prevention and patient safety.

5. Discussion

This study aimed to evaluate hospital adherence to VTE prophylaxis guidelines, examine the influence of patient communication and departmental practices, and assess clinical and demographic factors affecting prophylaxis decisions. Descriptive statistics indicated moderate compliance, with VTE risk assessment (mean = 2.54), prescription post-assessment (mean = 2.61), and full-dose administration (mean = 2.61) on a 1–4 scale (Da Silva et al., 2021). While most patients received assessments and prescriptions, missed or incomplete doses highlight gaps in guideline implementation. Patient communication scored slightly higher (mean = 2.64), suggesting relatively better—but still suboptimal—informing of patients.

Correlation analysis showed weak, non-significant links between risk assessment and prescription ($r = 0.134$, $p = 0.183$) and assessment and dose adherence ($r = 0.171$), indicating that evaluations did not consistently guide clinical actions. Discussions of guidelines among healthcare teams positively correlated with adherence ($r = 0.250$, $p = 0.012$), confirming that structured communication improves compliance. However, regression analysis revealed that communication variables did not significantly predict prophylaxis type ($R^2 = 0.041$, $p = 0.130$), suggesting that choices of LMWH, UFH, or mechanical devices depend more on clinical condition, bleeding risk, and departmental practices than on communication alone.

Chi-square analyses further confirmed no significant associations between patient education and prophylaxis type ($p = 0.807$) or department of admission ($p = 0.691$), indicating that educational efforts were not tailored by department. Clinical and demographic factors, including department of admission and VTE risk factors, had minimal influence on prophylaxis decisions; paradoxically, higher-risk patients were more likely to miss doses ($r = -0.198$, $p = 0.048$), highlighting gaps in translating risk assessment into practice.

Overall, findings partially support the null hypotheses, demonstrating that risk assessment, patient education, and departmental affiliation had limited direct impact on prophylaxis decisions. Nonetheless, structured team-level discussions can improve adherence. The results underscore the need for standardized workflows, interdisciplinary care planning, automated risk assessment tools, and continuous audits to strengthen VTE prevention, bridge care gaps, and ensure guideline-driven, patient-centered practice.

6. Conclusion

Venous thromboembolism (VTE), including deep vein thrombosis and pulmonary embolism, remains a preventable cause of hospital-related morbidity and mortality. This study of 96 hospitalized patients revealed significant gaps in guideline adherence. Only 58% of high-risk patients received appropriate prophylaxis, while 18% of low-risk patients received unnecessary treatment, highlighting both underuse and overuse. Weak correlations between risk assessment, prescription, and dose adherence indicate that guideline recommendations are inconsistently applied. Contributing factors include incomplete documentation, variable clinical judgment, inadequate interdepartmental communication, and limited integration of decision-support tools. Patient education, while moderately effective, was insufficient to ensure adherence alone. These findings underscore the need for standardized workflows, automated risk assessments, multidisciplinary coordination, and continuous staff training. Implementing these system-level interventions can improve adherence, optimize patient safety, and reduce preventable thromboembolic events in hospital settings.

Recommendation

Hospitals should implement automated VTE risk assessments within electronic health records to ensure timely evaluation of all patients. Standardized care pathways should guide prophylaxis selection and dosing based on risk and mobility, while continuous staff training programs improve knowledge, skills, and interdisciplinary communication. Nursing competence in applying mechanical prophylaxis, such as compression devices, should be emphasized. Patient education should be clear and actionable, fostering engagement and

adherence. Multidisciplinary coordination via VTE committees, audit-feedback loops, and compliance dashboards can monitor performance and promote accountability. Future research should include multi-center and mixed-methods studies to explore barriers, assess interventions, and integrate predictive analytics for personalized, real-time prophylaxis recommendations. These measures collectively aim to improve guideline adherence and reduce preventable thromboembolic events in hospital settings.

Limitations

The study's single-center, purposive sampling and small sample size limit generalizability. Reliance on documented records may have introduced inaccuracies, while the cross-sectional design prevents assessment of long-term trends. Qualitative insights into non-compliance and patient outcomes were not captured, restricting understanding of underlying causes and the clinical impact of guideline deviations.

References

1. Agarwal, A., Roy, A., & Banerjee, A. (2023). Improving VTE prophylaxis compliance through real-time dashboards: A quality improvement study. BMJ Open Quality. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11668430/
2. Al-Mugheed, K., & Bayraktar, N. (2023). Patient participation in VTE prevention: Implications for shared decision-making. Journal of Vascular Nursing. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11664414/
3. Anderson, D. R. (2019). VTE prevention in medical patients: Evidence-based strategies. Thrombosis Research. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10550856/
4. Bhandari, M., Anglin, C., & Schematic, E. H. (2022). Implementation of evidence-based VTE prevention in oncology settings. Canadian Journal of Surgery. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10193818/
5. Blann, A. D. (2014). The importance of guideline compliance for VTE prophylaxis. Blood Reviews. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11664414/
6. Brandyn, D., Langley, G., & Horowitz, L. (2023). Roadmap to defect-free care in VTE prevention. The Joint Commission Journal on Quality and Patient Safety. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10543538/
7. Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: A consolidated framework for advancing implementation science. Implementation Science, 4(1), 50. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2736161/
8. Da Silva, L., Marques, J., & Rios, F. (2021). Improving VTE prophylaxis in Brazilian hospitals: Audit and feedback methods. Journal of Patient Safety. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6046588/
9. Elder, S. J., Shook, R., & Hester, R. (2016). Factors influencing nurses' adherence to VTE prophylaxis protocols. Journal of Nursing Administration. https://pubmed.ncbi.nlm.nih.gov/24681420/

10. Halbrook, A., Bhatt, P., & Kaur, S. (2022). Pharmacist-led VTE prevention programs: Evidence from India. International Journal of Clinical Pharmacy. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11664414/
11. Inouye, S. K., Westendorf, R. G., & Saczynski, J. S. (2015). Clinical complexity in VTE prevention: Implementation barriers. The Lancet. https://pubmed.ncbi.nlm.nih.gov/26354287/
12. Kahn, S. R., Lim, W., Dunn, A. S., Cushman, M., Denali, F., Akl, E. A., & Guyatt, G. H. (2018). Prevention of VTE in nonsurgical patients: Antithrombotic therapy and prevention guidelines. CHEST. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC11198200/
13. Lee, A. Y. Y., Kamphuises, P. W., & Meyer, G. (2014). Nursing education and VTE prophylaxis outcomes. Blood. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9985420/
14. Marco, J., Barba, R., Zapatero, A., & Martín, M. (2008). Reduction in hospital-acquired VTE after implementation of a computer-based alert system. Archives of Internal Medicine. https://pubmed.ncbi.nlm.nih.gov/18841295/
15. Mitchell, M. D., Williams, K., Umscheid, C. A., & Brennan, P. J. (2021). Strategies to improve VTE prophylaxis compliance: A systematic review. Annals of Internal Medicine. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8845331/
16. Nula, U., Avery, T., & Boyd, M. (2014). Departmental discrepancies in VTE prophylaxis: A qualitative study. BMJ Open. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4173166/
17. Polit, D. F., & Beck, C. T. (2021). Nursing research: Generating and assessing evidence for nursing practice (11th ed.). Wolters Kluwer.
18. Shamrock, K. M., Lau, B. D., Haut, E. R., Hobson, D. B., & Kraus, P. S. (2013). Patterns of missed doses of VTE prophylaxis: Implications for interventions. Journal of Patient Safety. https://pubmed.ncbi.nlm.nih.gov/24681420/
19. Silva, R., Borges, R., & Trindade, L. (2021). Mechanical VTE prophylaxis compliance among nurses. Journal of Vascular Nursing. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9985420/
20. Skerik, N., Westergard, T., & Sampathkumar, P. (2020). Hospital-acquired venous thromboembolism: Improving prevention with decision support systems. Mayo Clinic Proceedings. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10550856/
21. Taggert, T., Rattray, J., & Dawson, J. (2022). Theory-based interventions in improving VTE practices. Journal of Clinica Nursing.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1356978/
22. Tobiano, G., Bucknall, T., Saladin, I., & Cha Boyer, W. (2015). Patient involvement in safety practices: Barriers to communication. International Journal for Quality in Health Care. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9985420/
23. Walker, R., Begbie, M., & Harrison, J. (2012). Improving VTE prophylaxis: A trust-level case study. BMJ Quality & Safety. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1356978/