

Improving Venous Thromboembolism Prophylaxis Through Service Integration, Policy Enhancement, and Health Informatics

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ABSTRACT

Introduction: Venous thromboembolism (VTE) prevention and management are susceptible issues that require specific rules to sustain and oversee their functioning, as preventing VTE is a vital patient safety priority. This paper aims to investigate and provide recommendations for VTE assessment and reassessment through policy enhancement and development. **Methods:** We reviewed different papers and policies to propose recommendations and theme analysis for policy modifications and enhancements to improve VTE prophylaxis and management. **Results:** Recommendations were set to enhance the overall work of VTE prophylaxis, where the current VTE protocols and policies must ensure high levels of patient safety and satisfaction. The recommendations included working through a well-organized multidisciplinary team and staff engagement to support and enhance VTE's work. Nurses', pharmacists', and physical therapists' involvement in setting up the plan and prevention is the way to share the knowledge and paradigm of experience to standardize the management. Promoting policies regarding VTE prophylaxis assessment and reassessment using electronic modules as a part of the digital health process was proposed. A deep understanding of the underlying issues and the incorporation of generic policy recommendations were set. **Conclusion:** This article presents recommendations for stakeholders, social media platforms, and healthcare practitioners to enhance VTE prophylaxis and management.

Keywords: policy enhancement, service integration, health informatics, VTE, prophylaxis

INTRODUCTION

Venous thromboembolism (VTE), which includes deep venous thrombosis (DVT) of the legs or pelvis, as well as pulmonary embolism (PE), is a common complication in hospitalized patients. It contributes to increasing the length of stay, morbidity, and mortality.^[1–4] DVT can cause serious health complications, as it can be deadly or life-threatening in some situations.^[5] The most negative DVT consequence occurs when a piece of the clot breaks off and travels through the circulation to the lungs, producing PE.^[6] People can recover from PE if the

clot is tiny and treated properly; however, developing lung injury is common.^[7] VTE affects the entire body, not just the cardiovascular system; without proper therapy and management, this illness can be fatal.^[2,3,8]

VTE is the third most prevalent cardiovascular illness, with annual incidence rates for men and women of 130 and 100 per 100,000, respectively.^[9] Approximately two-thirds of VTE patients present with DVT alone.^[10] The remainder have PE as the initial symptom and predominant cause of VTE-related death.^[11] According to most estimates, the yearly incidence of clinically validated (objectively diagnosed) VTE in adults in the

United States is 1–2 per 1000 per year, with an exponential rise with age from 1 per 10,000 in young people to 1 per 100 in elderly people.^[12] According to data from two large US cohorts, the estimated absolute lifetime risk of VTE after 45 years of age is 8.1% overall, 11.5% in Black people, 10.9% in obese people, 17.1% in people with the factor V Leiden mutation, and 18.2% in Black people with sickle cell trait.^[9]

The approach to VTE prevention and management is multifaceted, encompassing medical, economic, cultural, and psychological aspects due to the complex interplay of factors affecting both inpatients and outpatients.^[13] This comprehensive approach is necessary because of these factors' immense influence on the overall success of VTE prevention and management strategies.^[14]

VTE prevention and management and its morbidity and mortality triggers were elevated as key performance indicators and essential safety requirements in a shift toward safer practices for all admitted adult patients. They have been highlighted as an important patient safety measure by the Joint Commission International and other safety organizations. To reduce the occurrence of VTE in hospitalized patients, policies, protocols, and guidelines state that all admitted adult patients 18 years and older should go through a VTE risk assessment and screening. All patients identified as at risk of VTE with no contraindications or precautions should receive appropriate VTE prophylaxis within 24 hours of admission.^[15] Current guidelines recommend that all patients with acute DVT should be treated with intravenous heparin infusion for at least 5 days, overlapping with warfarin sodium for 4–5 days where precautions and contraindications are considered as physician judgment occurs.^[16] This necessitates immediate hospitalization, which might increase the hospital length of stay and affect bed capacity, as well as increase the risk of mortality.^[17,18]

Despite the availability of preventive strategies, the rate of hospital-acquired VTE and its accompanying mortality remains unacceptably high.^[19] This reveals a fundamental gap in the present approach to VTE prophylaxis, implying that existing policies and protocols may be insufficient or inconsistently administered.^[20] The need to close this gap has been heightened by the COVID-19 pandemic, which observed an increase in the incidence of DVT and PE among COVID-19 and hospitalized patients.^[8] As a result, there is an urgent need to improve and develop policies to improve service delivery, promote uniform implementation of best practices across all healthcare settings, and eventually lower the incidence of hospital-acquired VTE and its related mortalities.^[8,18,21,22] This paper aims to investigate and provide recommendations for VTE assessment and reassessment through policy enhancement and development.

METHODS

We conducted a thematic analysis of published literature and policies to recommend policy changes and enhancements to improve VTE prevention and management from a patient safety standpoint. The search strategy included articles published in English from 2010–2023 that were found on EBSCO, PubMed, Scopus, ScienceDirect, or Google Scholar; we included studies of VTE risk assessment systems, prophylaxis, and tracking methods. This study did not involve human participants; however, approval to conduct this research was obtained from the institution review board at King Fahad Medical City, Riyadh, Saudi Arabia.

RESULTS

Our review highlights four critical themes that serve as recommendations for policy makers and healthcare providers. These themes emphasize the importance of multidisciplinary team involvement, the adoption of electronic risk assessments, a deep understanding of the underlying issues, and the incorporation of generic policy guidelines.

Multidisciplinary Team Engagement

A multidisciplinary team may work with multiple patients, but each patient receives individualized attention from each team member.^[23,24] This unit collaborates on a detailed care plan to organize their services, optimize treatments, and define specific objectives.

Nurse involvement and experience in VTE assessment and reassessment is crucial for improving VTE prophylaxis, management, and prevention, as well as patient and community health, as part of policy development and enhancement. This leads to evidence-based practice with defined outcomes.^[25] Nurses play a crucial part in promoting awareness and ensuring compliance with essential requirements for VTE prophylaxis and management through assessing the VTE risks and figuring out health issues, owing to their hands-on involvement in disease management and prevention.^[26]

Nurses, because of their experience and engagement in patient care, should be involved in VTE prevention and management from the first day of patient admission.^[27] Further, involving other healthcare practitioners, such as pharmacists and physiotherapists, who have a direct role in VTE prevention and management plays an additional role in VTE screening, prevention, and management.^[24]

Quality improvement project initiatives, such as Kaizen or FOCUS-PDSA, may successfully investigate incorporating additional personnel in the improvement cycle, which may improve and enhance the work of VTE prophylaxis, build a strategy or policy for change, and engage the staff in the change, such as physicians, nurses, pharmacists, physical therapists, and others.^[21,28]

Electronic Risk Assessment

VTE prophylaxis necessitates activating the electronic VTE risk assessment and screening in all hospitals and healthcare facilities and rescreening. The development, creation, and enhancement of VTE prophylaxis policies are essential due to the absence of clear and focused proper VTE prevention and management.^[29,30]

The Caprini Score guideline was first published in 1991.^[31] It was created as a prospective score to estimate the risk of VTE.^[30] The assessment tool asks about several thrombosis risk factors.^[31] This scoring method may be used in electronic assessments to facilitate scoring and risk detection. However, VTE assessment and screening still needs a thorough review of the improvement plan (assessment, reassessment, screening, and rescreening) to provide a clear strategy and advice for VTE prevention and treatment.

Not all healthcare providers properly determine patients' risk of VTE or provide VTE prophylaxis. In order to help healthcare providers and enhance VTE prevention, computerized risk assessment model support systems have been developed.^[31,32] Allow them to get all the details on VTE assessment reassessment, including VTE score, VTE level, precautions, contraindications, and what kind of prophylaxis is recommended.^[31]

Root Causes of the Problem

Root cause analysis (RCA) is a well-established investigative approach investigating the how, why, and, most importantly, why of patient safety accidents.^[33] Using RCA for VTE occurrences and events provides a systematic and evidence-based technique for determining what causes or events contribute to a patient suffering from VTE.^[34] The findings of the RCA will assist the organization in gaining a better knowledge of the contributing variables and causes connected with VTE incidences and events,^[35] taking steps to reduce the probability of this happening in the future and involving stakeholders in decision-making and management.

Organizations should establish local triggers to determine which occurrences spark an RCA study. The RCA is a well-established investigative approach investigating the how, what, and, most importantly, why of patient safety accidents.^[33] Clinical teams, with the assistance of risk managers (or someone skilled in RCA methodologies) and thrombosis teams, should make up the inquiry team. The team immediately involved in the patient's treatment should not be in charge of conducting the RCA because they may not be able to examine the course of events objectively. The analysis team leader should be impartial and engage the team in charge of the patient's care in the inquiry. There are two stages of investigation:

1. Single RCA. This is for a patient who had a VTE and died as a result of it.^[36]

2. Aggregate RCA. This is the process of researching multiple reports of identical situations to identify fundamental causes and build a plan of action to solve these concerns.^[36]

Policy Recommendations

General policy recommendations call for a comprehensive approach to address the issue of avoidable VTE in medical and surgical patients.^[37] First, it's essential to determine a clear definition of what constitutes "avoidable" VTE in these patients. An essential part of this strategy is to measure the accuracy and completeness of recorded VTE rates by comparing them with benchmark hospitals. This will provide insights into where improvements can be made. Furthermore, the healthcare system should consider evaluating and then implementing a mechanism that can automatically assess the risk of VTE and recommend appropriate prevention measures.

Despite the disease's relevance, there are few recent studies on the overall number of VTE events (incident and recurring) occurring in the United States each year because national surveillance is not performed.^[37] As a result, the data are imprecise, with most previous epidemiological investigations hampered by small sample sizes, geographic limits, or dependence on administrative databases with varying data quality for case identification.^[37] Understanding the influence of surveillance bias on VTE rates is critical. To this end, there is a need to delve deeper into the study of indications and triggers for VTE diagnostic studies. Standardizing these among physicians and various hospitals or institutions will help in gaining more consistent data.

An increasing volume of research indicates that proper VTE prophylaxis is underused in individuals at risk.^[38] Patients with a lower educational level and those with no history of previous VTE require increased knowledge of VTE and thromboprophylaxis.^[39] Clinical pharmacists and nurses must focus on delivering information about VTE and improving patients' perceptions of VTE and thromboprophylaxis to raise knowledge of VTE and, as a result, improve health outcomes.^[40] On the information dissemination front, it is crucial to examine the most effective ways to communicate VTE risk assessment and preventive measures to healthcare practitioners. Equally important is educating patients and their families about the dangers of VTE.

Additionally, it is beneficial to compare the VTE risk rating with upcoming pharmacological and mechanical preventive measures.^[41] This can provide a more holistic view of how best to approach VTE prevention in the future. Addressing missed prophylaxis doses and improving compliance is paramount, and strategies should be evaluated to identify the most effective means to achieve this. Lastly, the role of nurse practitioners and clinical nurse specialists should be amplified, especially in the areas of VTE prevention and

management. Their expertise and leadership can provide invaluable guidance in this critical healthcare concern.^[42,43]

DISCUSSION

Understanding the complexity of the system and how it interacts is critical for effectively conducting any quality improvement initiative.^[44] Similarly, issue solving and process improvement in thromboembolism prophylaxis and management requires a systematic strategy engaging all stakeholders to enhance the supporting system such as policies and regulatory documents.^[45]

VTE is a dangerous, avoidable illness that mainly affects hospitalized inpatients. Although there is strong evidence to support the use of risk stratification and preventative treatments, several variables impede full acceptance, compliance, and efficacy, which may explain the continuation of VTE during the last several decades.^[46] This policy statement delves further into VTE, risk grading systems, prophylaxis, and tracking methodologies. This summary includes key areas of policy suggestions that the American Heart Association believes will contribute to enhanced VTE incidence implementation, tracking, and prevention.^[37] They include performing VTE risk assessment and reporting the level of VTE risk in all hospitalized patients, using preventable VTE as a benchmark for hospital comparison and pay-for-performance programs, supporting appropriations to raise public awareness of VTE, tracking VTE nationwide using standardized definitions, and developing a centralized data steward for data tracking VTE risk assessment, prophylaxis, and treatment.^[37]

According to published research, providing risk-appropriate prophylaxis to hospitalized patients can prevent up to 70% of VTE incidents.^[47] Failure to detect VTE can result in deadly PE, and excessive anticoagulation can result in wasteful bleeding.^[48] A systematic approach to VTE diagnosis, which incorporates clinical prediction criteria, evaluation, and screening, has allowed for speedy, cost-effective, and accurate VTE diagnosis, although issues remain.^[49] Failure to do an adequate evaluation, reassessment, screening, and rescreening might result in a misdiagnosis and additional morbidity and mortality, as there will be a risk of underdiagnosis of VTE with reassessment and rescreening.

As an example of a policy change and enhancement including the guidelines and protocols due to the needs, a randomized controlled, adaptive, open-label clinical trial was conducted during the COVID-19 pandemic at 28 hospitals in Brazil, Canada, Ireland, Saudi Arabia, the United Arab Emirates, and the United States. The study conducted by Sholzberg et al^[8] to evaluate the effects of therapeutic heparin versus prophylactic heparin in moderately ill COVID-19 patients admitted to hospitals revealed that there was a real need to revise the VTE guidelines, protocols, screening and rescreening,

and policy in order to manage patients with COVID-19 and at risk of developing DVT and PE.

Cost and length of stay remain serious issues with regard to DVT and PE as well as other critical diseases and life-threatening conditions.^[18,50] Therapy for acute VTE is projected to cost \$12,000–15,000 (2014 US dollars) per individual in the first year of recovery. Around 18% of VTE patients are readmitted within 30 days, costing nearly \$10,000 per patient.^[51] The costs of VTE treatment can be used to calculate the potential economic benefit of preventative activities.^[52] The lack of appropriate regulations, strategies, and guidelines for implementing VTE prophylaxis may exacerbate the problem further.

A uniform, consistent electronic risk screening and rescreening may streamline and improve VTE prevention and treatment efforts.^[53] Using social media and puzzle words is essential to VTE prevention and management as it raises awareness among patients.^[54] Lastly, developing a national program lead in terms of VTE prevention and management will expand VTE early detection and service enhancement.^[3,55]

The analysis of the four themes emphasizes the importance of multidisciplinary team involvement, the use of electronic risk assessments, a thorough understanding of the underlying issues, and the incorporation of general policy guidelines, demonstrating the need to highlight it as a key patient safety priority in VTE prophylaxis. Furthermore, the limitations of policy change and service improvement must be minimized.

CONCLUSION

This call to action raises public awareness of the risk factors, triggering events, and symptoms of VTE and PE, and supports the establishment of evidence-based procedures for screening and rescreening, prevention, diagnosis, and proper treatment. It is intended to support new scientific research to collect essential information to bridge knowledge gaps concerning VTE and PE. This knowledge should be swiftly and easily transmitted to the general population and implemented by health professionals as policies, guidelines, and protocols. We presented recommendations for stakeholders, social media platforms, and healthcare practitioners to enhance VTE prophylaxis and management in terms of policy creation, enhancement, and health informatics.

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