VTE Risk at Discharge

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Introduction

Venous thromboembolism (VTE) poses a significant risk to patients in the hospital setting, and studies have shown that VTE prophylaxis should be incorporated into the management of high-risk patients during their hospital stay.[1-3] However, many of these patients are still high-risk for VTE at the time of discharge and for up to three months after discharge.[1] In fact, 50% of VTE events occur approximately 30 days after hospital discharge.[2] Despite this reality, patients are often discharged home without any form of VTE prophylaxis. Two recent studies, the MARINER trial and the APEX trial, revealed evidence that certain novel oral anticoagulants (NOACs) are safe and efficacious for extended VTE prophylaxis in this population of patients. The MARINER trial investigated the use of Rivaroxaban, and the APEX trial evaluated Betrixaban. Both of these drugs were found to be beneficial as VTE prophylaxis in the month following hospital discharge.[1,3] With this information in mind, we chose to examine the patients discharged from AtlantiCare hospitals who were still considered high-risk for VTE at the time of hospital discharge, based on three different risk assessments – the Padua score, the Geneva score, and the IMPROVE score. Our aim is to identify a need for change in hospital discharge protocols to reduce the incidence of VTE events among non-ICU, medically ill patients hospitalized at AtlantiCare by focusing on extended prophylaxis for patients discharged from AtlantiCare hospitals.

Methodology

This retrospective study utilized data that was collected from patients admitted to the medical service in 2019. Patients that were excluded were those who expired during their hospitalization. The patients were evaluated using three different VTE risk scales, IMPROVE, Padua, and Geneva (Figures 1-3). Each patient was evaluated using all three scoring systems to determine their risk for VTE at time of discharge.

Padua Prediction Score

Baseline Features	Score
Active cancer	3
Previous VTE (with the exclusion of superficial vein thrombosis)	3
Reduced mobility	3
Already known thrombophilic condition	3
Recent (≤1 month) trauma and/or surgery	2
Elderly age (≥70 years)	1
Heart and/or respiratory failure	1
Acute myocardial infarction or ischemic stroke	1
Acute infection and/or rheumatologic disorder	1
Obesity (BMI ≥30)	1
Ongoing hormonal treatment	1
High-risk indication for prophylaxis if score ≥4	

Figure 1: Criteria for calculating the Padua VTE risk score. Patients with a score of 4 or higher are considered high-risk and indicated to receive VTE prophylaxis.

Geneva Prediction Score

Baseline Features	Score
Cardiac failure	2
Respiratory failure	2
Recent stroke within 3 months	2
Recent myocardial infarction within 4 weeks	2
Acute infectious disease (including sepsis)	2
Acute rheumatic disease	2
Active malignancy	2
Proliferative syndrome	2
Nephrotic syndrome	2
Any prior VTE	2
Known hypercoagulable state	2
Immobilization >3 days	1
Recent travel >6 hours	1
Age >60 years	1
Obesity (BMI ≥30)	1
Chronic venous insufficiency	1
Pregnancy	1
Hormonal therapy (including contraception)	1
Dehydration	1
High-risk indication for prophylaxis if score ≥3	

Figure 2: Criteria for calculating the Geneva VTE risk score. Patients with a score of 3 or higher are considered high-risk and indicated to receive VTE prophylaxis.

IMPROVE Prediction Score

Baseline Features	Score
Previous VTE	3
Known thrombophilia	2
Current lower-limb paralysis	2
Current cancer	2
Immobilized ≥7 days	1
ICU/CCU stay	1
Age >60 years	1
High-risk indication for prophylaxis if score ≥3	

Figure 3: Criteria for calculating the IMPROVE VTE risk score. Patients with a score of 3 or higher are considered high-risk and indicated to receive VTE prophylaxis.

Results

At the time of hospital discharge, 56% of patients were at high-risk for VTE, indicated by a Padua Score ≥4 (Figure 4). 78% of patients were at high-risk for VTE based on a Geneva Score ≥3 at discharge (Figure 5). Additionally, 24% of patients were at high-risk for VTE at time of discharge with an IMPROVE Score ≥3 (Figure 6). For each of these scoring systems, a patient that is considered high-risk is indicated for VTE prophylaxis.

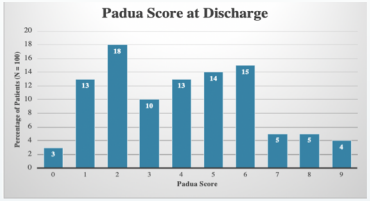

Figure 4: Padua VTE risk scores of patients at time of hospital discharge. Based on these scores, 56% of patients were still considered high-risk for VTE at time of discharge.

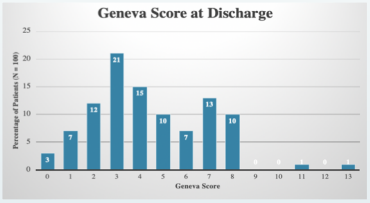

Figure 5: Geneva VTE risk scores of patients at time of hospital discharge. Based on these scores, 78% of patients were still considered high-risk for VTE at time of discharge.

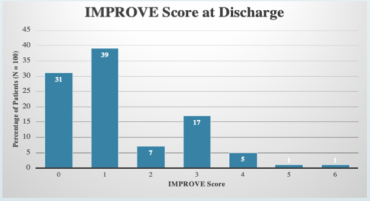

Figure 6: IMPROVE VTE risk scores of patients at time of hospital discharge. Based on these scores, 24% of patients were still considered high-risk for VTE at time of discharge.

Conclusion

Conclusions:
Patients are at high risk for VTE during hospital stays, and this risk often remains elevated even after discharge. However, many of these at-risk patients are sent home without any form of extended VTE prophylaxis. Our investigation revealed that there is a need for continued prophylaxis after discharge. Anywhere from 24-78% of the patients we included in our study were still at high-risk for VTE at the time of discharge, based on three different risk assessment tools, which is an indication for VTE prophylaxis. Based on this information and the results of the APEX and MARINER trials, our recommendation is to implement a new protocol at AtlantiCare that requires patients with a high-risk score for VTE to receive extended prophylaxis upon discharge, either with Rivaroxaban or Betrixaban.

Limitations:
Our investigation had several limitations. First, the sample size was small at only 100 patients. The study was also limited by human error in data analysis and the potential for variation between investigators in the review of hospital charts. We also encountered limitations in chart review due to lack of information included in some patient charts and variation in how information was charted for different patients.

Future Directions:
The next step in our investigation process will be to reexamine our set of patients to determine how many patients were discharged on either Rivaroxaban or Betrixaban. We will also investigate how many patients in our study developed VTE after discharge. Finally, we plan to look into the variance that exists between the three different risk assessment tools in determining VTE risk. These next steps will allow us to better understand the need for a discharge protocol for VTE prophylaxis at AtlantiCare and determine which risk scoring system to utilize.

Acknowledgments

Research Mentors:

Dr. Anthony Macchiavelli, MD

Alison Hallam, RN

References

1. Raskob et al. *Thrombosis and Haemostasis.* **2016**, *115.6*, 1240-1248.
2. Ramacciotti et al. *Thrombosis and Haemostasis.* **2017**, *23.7*, 701-702.
3. Cohen et al. *The New England Journal of Medicine.* **2016**, *375*, 534-544