



Patterns of Discharge Disposition among Patients Diagnosed with Venous Thromboembolism in the Emergency Department: A Multicenter Retrospective Cohort Evaluation

Marielys Figuroa-Sierra, Joanna Young, Blake Goodbar and Stephanie Parks Taylor*

Department of Internal Medicine, Carolinas Medical Center, USA

Background

Venous Thromboembolism (VTE) includes both Deep Venous Thrombosis (DVT) and Pulmonary Embolism (PE) and can range from asymptomatic to fatal. It is a common medical condition annually affecting at least 9,00,000 individuals in the United States [1]. Mortality for untreated PE is approximately 30%, which can decrease to 2-8% with adequate treatment. In 2008, according to the Centers for Disease Control and Prevention, VTE caused more deaths than breast cancer, human immunodeficiency virus, and traffic accidents combined. It has been estimated that up to 100,000 people die each year from VTE [1]. Given its high mortality, patients with VTE are frequently admitted to the hospital for initiation of anticoagulation therapy. However, there has been increasing evidence to support treat-and-release of VTE patients who are at low risk of recurrence or bleeding and can be safely managed in the outpatient setting [2,3].

One study analyzed the safety of immediate discharge and home treatment of rivaroxaban in low-risk VTE patients and found a low rate of VTE recurrence (1.47%) and bleeding (0.81%) [4]. A systematic review reported that the rate of adverse events associated with outpatient PE management was low with an overall 3-month mortality rate of 1.58% (95% CI: 0.71 to 2.80%) [5].

In a retrospective study, Singer, et al. [6] reported that rates of hospital admission for VTE continue to remain high despite recent American College of Chest Physicians (ACCP) guidelines in the management of VTE [7]. Remarkably, Singer, et al.'s analysis suggested that up to 50% of patients diagnosed with PE may have been eligible for early discharge or outpatient management [6].

Despite the growing evidence supporting the safety of early discharge and ease of outpatient treatment with newer direct oral anticoagulants, most studies continue

to demonstrate the low discharge rates for PE patients from the Emergency Department (ED) [8]. Of those who are discharged from Emergency Departments, little is known about their discharge disposition. The goal of this study was to focus on the distribution of discharge dispositions in patients discharged from the ED with a diagnosis of acute VTE in order to better design programs for implementation of outpatient anticoagulation for appropriate risk patients diagnosed with VTE in the ED.

Methods

We conducted a retrospective review of medical records from 12 Emergency Departments in the Carolinas Healthcare System between January 1, 2016 and December 31, 2016. We used ICD-10 codes to identify patients with an ED diagnosis of acute VTE who were discharged from the ED. Descriptive statistics were calculated and Chi-square and ANOVA testing were used for comparisons.

Results

Of 9,567 patients diagnosed with acute VTE in 12 emergency departments across our healthcare system, 8,419 were admitted to the hospital associated with the ED of presentation and 1,148 were discharged from the ED of presentation. The mean age of patients who

***Corresponding author:** Stephanie Parks Taylor, MD, Department of Internal Medicine, Carolinas Medical Center, 1000 Blythe Blvd MEB 5th floor, Charlotte, NC 28203, USA, E-mail: Stephanie.p.taylor@carolinashealthcare.org

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Table 1: Distribution of discharge dispositions in patients released from the ED with diagnosis of acute VTE.

Disposition	Age (years), mean	All VTE number (%)	Upper DVT number (%)	Lower DVT number (%)	PE number (%)	DVT and PE number (%)
Home	51.1	915 (79.7)	83 (87.4)	615 (88.1)	194 (59.3)	23 (82.1)
Inter-hospital transfer	46.9	192 (16.7)	6 (6.3)	55 (7.9)	127 (38.8)	4 (14.3)
Skilled nursing facility	81.8	10 (0.87)	0	9 (1.3)	0	1 (3.5)
Against medical advice	46.3	15 (1.3)	2 (2.1)	9 (1.3)	4 (1.2)	0
Other (Jail, Psychiatric facility)	61.5	16 (1.4)	4 (4.2)	10 (1.4)	2 (0.6)	0

VTE: Venous Thromboembolism; DVT: Deep Vein Thrombosis; PE: Pulmonary Embolism.

were discharged from the ED was 55.5 years. Overall, 327 (28.48%) patients were diagnosed with pulmonary embolism whereas 753 (65.59%) were diagnosed with DVT only. A total of 33 (2.87%) patients were diagnosed with both DVT and PE. Of the patients with DVT, 698 (88.02%) had lower extremity DVT and 95 (11.98%) had upper extremity DVT.

The distribution of age and discharge disposition across VTE location is shown in Table 1. Overall, the majority, 915 (79.70%) patients were discharged home and 192 (16.72%) were transferred to a facility providing a higher level of care. The age of patients was significantly different across disposition destinations ($p = 0.009$). Patients leaving against medical advice were the youngest and patients discharged to SNF were the oldest.

There was a significant association between VTE location and discharge disposition ($p < 0.0001$). Patients with DVT were more likely to be discharged home than were patients with PE. Of patients with a diagnosis of PE, 127 (38.83%) underwent inter-hospital transfer and 194 (59.33%) were discharged home. Of patients with DVT, only 61 (7.69%) underwent inter-hospital transfer and 698 (88.02%) were discharged home. Discharge to other facilities, such as skilled nursing facility, was rare ($< 1\%$). Fifteen (1.31%) of patients with acute VTE left the ED against medical advice.

Discussion

Patients with acute VTE diagnosed in emergency departments in the United States, who have a low-risk for recurrence or bleeding, have low all-cause mortality, around 1.58% [4]. Our review found that only 12% of patients with VTE and 6% of patients with PE were discharged home. Given that VTE is a common medical condition affecting almost 1 million individuals annually, the low percentage of patients discharged home for acute VTE in our hospital system likely represents a substantial amount of overutilization of healthcare resources.

Of patients coded as discharged from the ED, we determined discharge disposition in order to evaluate the current state of resource utilization. We also aimed to determine location for intervention for post ED visit follow-up to better design programs optimizing volume of

ED discharges after VTE diagnosis. Our results demonstrate that the majority of patients discharged from the ED were discharged home. Outpatient treatment and follow-up for the patients in this dataset are unknown and would be useful to define in future studies. Our data highlight a moderate volume of inter-hospital transfers in patients diagnosed with acute VTE. Further analysis of this data would be helpful to determine the reason for inter-hospital transfer and the extent to which it represents high-value versus low-value allocation of resources. The high percentage of inter-hospital transfers may indicate a high burden of comorbid conditions and complex medical presentations, which this limited analysis did not examine. It could also represent transfers from freestanding emergency facilities. Similar to our study, a recent retrospective cohort study reported that patients with VTE were more likely to undergo inter-hospital transfer. Further work could include a more detailed analysis identifying reasons for transfer and the value of transfer for VTE.

The value of this analysis lies in its ability to identify the characteristics and needs of our population to implement programs for effective and safe discharge from the ED on outpatient anticoagulation. The hope is that the needs of our diverse system are generalizable to the larger population and will help other healthcare systems identify common needs. Our data show that the majority of patients diagnosed and discharged with acute VTE in the ED are discharged home, with very few patients going to other destinations such as SNF. The low rate of direct discharge to SNF likely reflects a high burden of comorbidity, but may represent an opportunity to identify and resolve barriers to SNF discharge. Presumably, the majority of patients discharged directly to SNF are those already residing in those facilities. We noted a high rate of inter-hospital transfer which deserves further investigation.

Future research should examine patterns of follow up, patient education, financial factors, and other associations with outcome after discharge. For example, patients being discharged home may benefit from a short-term telemedicine visit with a clinician to identify resolution of symptoms, onset of bleeding, and barriers to treatment adherence. The cost to support one clinician

providing follow-up versus the clinical and nonclinical staff as well as infrastructure that is involved in a hospital stay are vastly different. Likewise, an allied health provider such as a clinical social worker may be pivotal for success in an outpatient anticoagulation program for VTE treatment to ensure that patients have access to the direct oral anticoagulant for the duration of therapy. If factors contributing to treatment failure or symptom progression could be identified, this would create a potential for improvement in outcomes for patients discharged home and possibly identify high risk factors for those who should instead be hospitalized for initiation of anticoagulation.

This study is subject to the limitations inherent in its retrospective design. We did not have information about patients who were admitted to the hospital for comparison purposes. The majority of our patients were discharged to home, but we did not include information about outpatient treatment or follow-up as detailed above. We did not have access to important information such as patient's comorbidities, psychosocial factors, or severity as an influence on discharge disposition.

Conclusion

Despite the ease of direct oral anticoagulant therapy, a limited number of patients presenting to the ED with acute Venous Thromboembolism are discharged. In our exploration of discharge dispositions, notable findings include a high rate of inter-hospital transfer and a very

low rate of discharge back to skilled nursing facility.

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