

Missed Doses of Venous Thromboembolism (VTE) Prophylaxis at Community Hospitals: Cause for Alarm

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INTRODUCTION

Venous thromboembolism (VTE) is a leading cause of potentially preventable harm. Randomized controlled trials have demonstrated that VTE prophylaxis, when administered completely, significantly reduces the risk for deep vein thrombosis, pulmonary embolism (PE), and fatal PE.¹

Numerous interventions have been successful in improving the prescription of VTE prophylaxis.² Unfortunately, few interventions have ensured that prescribed VTE prophylaxis is actually administered. One study from a large academic hospital reported that 10% of VTE prophylaxis doses were not administered.³ A larger study in another academic hospital found that 12% of VTE prophylaxis doses were not administered, where 40.6% of all hospitalized patients and 46.2% of all medically ill patients missed ≥ 1 dose.⁴

This small but growing body of evidence has come entirely from academic hospitals, and thus provides no insight into practice at community hospitals, which account for the vast majority of hospitals and hospital admissions. This study compared VTE prophylaxis medication non-administration between a major quaternary academic university hospital and three community hospitals within a large health system.

METHODS

In this retrospective study, we included four hospitals within the Johns Hopkins Health System: The Johns Hopkins Hospital (JHH; academic), Howard County General Hospital (community), Sibley Memorial Hospital (community), and Suburban Hospital (community). We queried the electronic medication administration record system for each hospital from January 1

through December 31, 2015, to identify patients who were prescribed pharmacological VTE prophylaxis, including unfractionated heparin (5000 U q12h/q8h or 7500 U q12h/q8h), enoxaparin (30 mg q12h/q24h or 40 mg q12h/q24h), fondaparinux (2.5 mg q24h), and dalteparin (5000 U q24h). Nurses must document every dose as either administered or not administered for each scheduled administration time. We calculated the proportion of overall doses not administered and the proportion of patients who missed ≥ 1 dose, by individual hospital and hospital type. Proportions were compared using chi-square tests. This study was approved by the Johns Hopkins Medicine Institutional Review Board.

RESULTS

At JHH, 10.9% (33,971/311,294) of VTE prophylaxis medication doses were not administered. Overall, non-administration was significantly higher 13.6% (21,580/158,938, $p < 0.001$, Table 1) at the three community hospitals. The proportion of doses not administered varied significantly, from 10.9% to 15.0% ($p < 0.001$), among community hospitals.

At JHH, 43.7% (10,795/24,709) of patients who were prescribed VTE prophylaxis medication missed ≥ 1 dose. At the three community hospitals, a similar proportion of patients (43.6%, 8002/18,355, $p = 0.852$) missed ≥ 1 dose. Among community hospitals, the proportion of patients who missed ≥ 1 dose varied greatly, from 36.2% to 52.0% ($p < 0.001$, Table 1).

DISCUSSION

Non-administration of VTE prophylaxis medication is a pervasive problem in both academic and community hospitals, where 10–15% of doses are not administered. Nearly half of hospitalized patients missed ≥ 1 dose. Overall, non-administration was lowest at the academic hospital and significantly higher at the three community hospitals.

Table 1 VTE Prophylaxis Non-Administration in a Large Health System from January 1 through December 31, 2015, by Hospital

Hospital	Type	VTE prophylaxis doses not administered	P-value	Patients who missed ≥ 1 dose	P-value
The Johns Hopkins Hospital	Academic	33,971/311,294 (10.9%)	<0.001*	10,795/24,709 (43.7%)	0.852*
Combined community hospitals	Community	21,550/158,938 (13.6%)		8002/18,355 (43.6%)	
Howard County General Hospital	Community	11,952/79,544 (15.0%)	<0.001†	3854/7406 (52.0%)	<0.001†
Sibley Memorial Hospital	Community	3367/31,003 (10.9%)		1477/4076 (36.2%)	
Suburban Hospital	Community	6231/48,391 (12.9%)		2671/6873 (38.9%)	

*Comparing combined community hospitals with academic hospital

†Comparing across community hospitals

A study assessing nursing perceptions regarding VTE prophylaxis found that nurses frequently use their clinical decision-making skills to determine when patients might be of sufficiently low risk to justify omitting prescribed VTE prophylaxis.⁶ Higher VTE prophylaxis non-administration at community hospitals may be consistent with an anecdotal notion that patients in community hospitals are at lower risk for VTE. However, evidence suggests that missing doses of prophylaxis may lead to potentially preventable VTE among hospitalized patients.⁵ These findings underscore the importance of identifying patients who are at high risk both for developing VTE and for missing prophylaxis.

We were not able to categorize patients by specialty (i.e. surgery vs. medicine) from our dataset. However, it has been reported that medically ill patients miss significantly more doses than other hospitalized patients.⁴ Also, we did not report VTE outcomes, as this was beyond the scope of the current study. The association between non-administration of VTE prophylaxis and development of VTE would require accounting for specific patient-level risk factors that were not available, and information about the sequence of non-administration; reporting VTE outcomes alone would oversimplify the development of VTE.

These data support the need to promote efforts to reduce the incidence of VTE by improving administration of prescribed doses of VTE prophylaxis. All hospitals should monitor VTE prophylaxis medication administration practice, and adopt successful and sustainable interventions to improve these practices. While VTE prophylaxis prescription has historically been the focus, the next frontier of VTE prevention should focus on interventions to improve administration of prescribed VTE prophylaxis in all hospital settings.

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Compliance with Ethical Standards:

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