



Letter to the Editors-in-Chief

Hospitalist assessment of venous thromboembolism and bleeding risk: A survey study



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1. Introduction

The incidence of healthcare-associated venous thromboembolism (VTE) detected by screening in acutely-ill medical inpatients is up to 14.9% [1]. Evidence suggests that appropriate prophylaxis with anticoagulants or mechanical compression reduces the incidence of VTE in hospitalized medical patients by $\frac{1}{2}$ to $\frac{2}{3}$ [2]. While anticoagulants are a commonly utilized and well-studied modality, they carry a significant risk of bleeding [3]. Major professional societies have recommended that clinicians weigh VTE risk against bleeding risk when selecting VTE prophylaxis strategies for individual hospitalized patients and several VTE risk assessment models (RAMS) have been validated in medical inpatients [2,4,5]. However, general consensus about how to assess risk is lacking, and no studies have demonstrated the relative effectiveness of different RAMS when applied to clinical practice. Despite the apparent benefit of prophylaxis in selected groups of medical inpatients [6], studies have demonstrated only 30–60% of high risk patients receive adequate pharmacologic prophylaxis [7,8]. In contrast, recent evidence indicates that low risk patients are often prescribed needless prophylaxis [9].

Hospitalists participate in the care of most hospitalized medical patients in the US and are often the principal decision makers surrounding VTE prophylaxis [10]. In this study, we sought to characterize how hospitalists assess VTE and bleeding risk in hospitalized adults.

2. Methods

2.1. Design

We conducted an electronic survey of hospitalists at eight academic medical centers to: (a) understand the methods hospitalists use to assess VTE and bleeding risk for medical inpatients at the time of admission, and (b) understand how hospitalists identify and weigh predictive factors in assessing VTE and bleeding risks. The University of Vermont

Institutional Review Board granted the study exempt status.

2.2. Recruitment and participation

Eight sites agreed to participate in the study. E-mail invitations and three reminder e-mails were sent to hospitalists at each institution July through September 2017. A consent statement prefaced each survey. No incentives were offered for survey completion.

2.3. Survey development

Following a literature search, a draft survey instrument was piloted with four hospitalists and a hematologist. The instrument was iteratively refined to optimize face and content validity.

2.4. Analysis

Partially completed surveys were included for analysis. Participating sites were randomly labeled A-H for analyses and reporting. Data were summarized with descriptive statistics.

3. Results

3.1. Characteristics of respondents

Among hospitalists from the eight academic institutions invited to participate, 121 survey responses were received, representing an overall response rate of 24.2% (121/499). The number of respondents decreased with later sections of the survey: 120 respondents completed the first section (biographical characteristics) while 86 respondents completed the final section (bleeding risk assessment). Hospitalist years of experience ranged from 1 to 30 with a mean of 6.5 years. Most respondents had teaching responsibilities ($n = 109$, 90.8%) and spent the majority of their time at academic centers ($n = 117$, 97.5%).

Abbreviations: DVT, Deep venous thrombosis; HAS-BLED, Hypertension, Abnormal Renal/Liver Function, Stroke, Bleeding History or Predisposition, Labile INR, Elderly, Drugs/Alcohol Concomitantly; IMPROVE, International Medical Prevention Registry on Venous Thromboembolism; INR, International normalized ratio; MITH, Medical Inpatient and Thrombosis; NSAIDs, Non-steroidal anti-inflammatory drugs; PE, Pulmonary embolism; RAM, Risk assessment model; SD, Standard deviation; VTE, Venous thromboembolism

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Table 1
Hospitalist assessment of VTE and bleeding risk at time of hospital admission.

Category	Risk model	No. (%) of respondents
VTE risk ^a (n = 89)	Informal risk assessment performed	58 (65.2%)
	Formal risk assessment performed	29 (32.6%)
	In house tool	17 (19.1%)
	Padua	8 (9.0%)
	I don't know which tool I use	2 (2.2%)
	IMPROVE	1 (1.1%)
	Other model	1 (1.1%)
	Geneva	0 (0.0%)
	MITH	0 (0.0%)
	No risk assessment performed	2 (2.2%)
	Bleeding risk ^a (n = 86)	Informal risk assessment performed
Formal risk assessment performed		11 (12.8%)
In house tool		5 (5.8%)
HAS-BLED		4 (4.7%)
I don't know which tool I use		1 (1.2%)
Other		1 (1.2%)
IMPROVE		0 (0.0%)
Atria		0 (0.0%)
No risk assessment performed		8 (9.3%)

Note: Abbreviations: HAS-BLED, Hypertension, Abnormal Renal/Liver Function, Stroke, Bleeding History or Predisposition, Labile INR, Elderly, Drugs/Alcohol Concomitantly; IMPROVE, International Medical Prevention Registry on Venous Thromboembolism; MITH, Medical Inpatient and Thrombosis; VTE, Venous thromboembolism.

^a Respondents who indicated they perform a formal assessment of VTE or bleeding risk at the time of admission were asked to select the instrument they utilize.

3.2. Assessment of VTE risk

Of the 89 hospitalists who responded regarding assessment of VTE risk at the time of admission, 32.6% (29/89) reported they perform a formal assessment, 65.2% (58/89) used informal assessment and 2.2% (2/89) performed no assessment (Table 1).

Of the 29 hospitalists who assessed VTE risk formally, the majority utilized RAMS developed at their home institution (Table 1) and 62.1% (18/29) were from institution B. The remaining 11 hospitalists who assessed VTE risk formally represented five other institutions.

When asked to weigh individual VTE risk factors, the respondents who did not use a published RAM to assess VTE risk assigned the highest weight to active cancer (4.76) and the lowest weight to leukocytosis (1.69) (Fig. 1).

3.3. Assessment of bleeding risk

Of 86 hospitalists who responded regarding assessment of bleeding risk at the time of admission, 12.8% (11/86) reported they perform a formal assessment, 77.9% (67/86) used informal assessment, and 9.3% (8/86) did not assess bleeding risk (Table 1). Among those who reported performing a formal assessment of bleeding risk, the most commonly used RAMS were locally developed tools (45.5%, 5/11).

Of the 11 hospitalists who assessed bleeding risk formally, 7 were from institution B. The remaining 4 hospitalists who assessed bleeding risk formally represented three other institutions.

When asked to weigh individual bleeding risk factors, the hospitalists who did not use a published RAM to assess bleeding risk assigned the highest weight to previous major bleeding (4.22) and the lowest weight to male sex (1.22) (Fig. 1).

4. Discussion

4.1. Overview

Despite national recommendations to use validated RAMS to weigh the risk of VTE and bleeding when selecting VTE prophylaxis strategies in hospitalized adults, less than one third of hospitalists in our sample formally assess their patients' risk of VTE or bleeding at the time of admission. As example, the American College of Chest Physicians 2012 guidelines cite the Padua score as the best available model for assessing VTE risk in hospitalized patients, but only 9% of hospitalists in our sample reported using the Padua score [2].

We speculate that the infrequent use of formal risk assessment may reflect any combination of factors: lack of awareness of validated RAMS, lack of readily accessible RAMS at the point of care, complexity of completing existing RAMS, absence of a single “best” RAM, lack of organizational commitment to implementing RAMS, and concerns about the validity of existing RAMS when applied broadly to medical inpatients. Of those who address VTE or bleeding risk using a formal RAM, the majority utilize a tool developed within their institution. These in-house RAMS may be incorporated more effectively into hospitalists' workflow. However, it is unlikely that they have been validated in medical inpatients, and as such, may poorly predict risks. It is also possible that hospitalists perceive the RAMS as locally developed when they are actually published RAMS.

While hospitalists report that they assess many of the identified VTE and bleeding risk factors that formal risk models employ, there is no way to evaluate the consistency or predictive value of their assessments. Hospitalists assign high weights to some factors identified as strong predictors by multiple RAMS - such as previous VTE for VTE risk. In contrast, hospitalists assign high weights to some factors identified as relatively weak predictors by formal risk models - such as intensive care unit stay for VTE risk. Certainly, the variable inclusion of risk factors, definitions of those risk factors, and risks associated with those factors in different RAMS make it challenging to assign a weight to many risk factors.

The majority of those who formally assessed VTE and bleeding risk came from a single institution. The effect of local context may be due in part to systematic processes of care such as configuration of the electronic health record, policies, or educational initiatives.

4.2. Limitations

The survey included academic medical centers in the US, so results may not be generalizable to other settings. The small sample size and low response rate introduce the possibility of sampling bias. Due to the small sample size we did not control for clustering of responses by hospital. Social approval bias may have increased the number of respondents who reported assessing VTE and bleeding risk when they actually do not. The survey focused on risk assessment at time of admission and did not address re-assessment of risk during hospitalization or at discharge.

5. Conclusions

Few hospitalists in our survey used formal RAMS to assess VTE or bleeding risk. Urgent work is required to: 1) integrate the use of validated RAMS into standard hospital practice; 2) compare performance of different RAMS; and 3) test how the application of RAMS will impact prescribing decisions and clinical outcomes.

Declarations of interest

None.

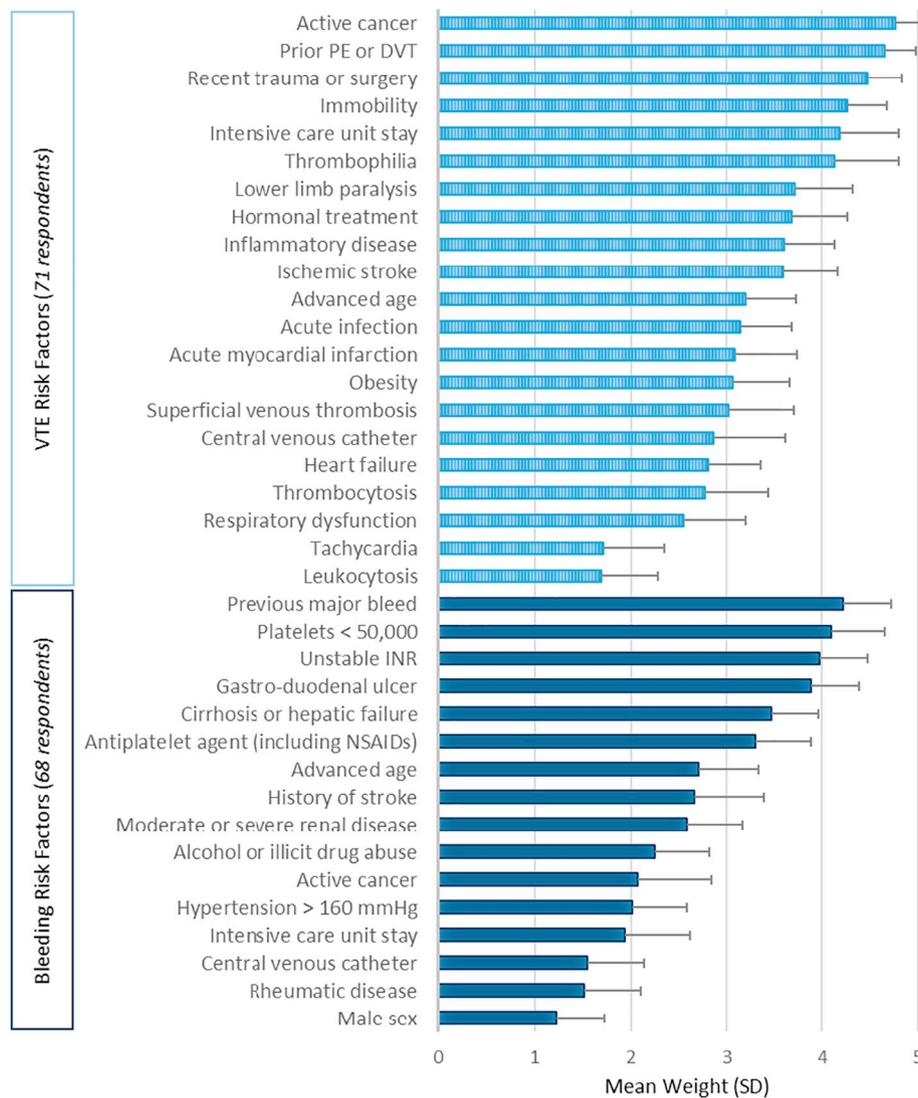


Fig. 1. Weights assigned to individual VTE and bleeding risk factors.

Respondents who indicated that they perform an informal assessment, use an in-house tool, or selected “I don’t know which tool I use” were asked to assign weights to a list of risk factors using a five-point Likert-type rating scale with a gradation of response options from “low” (1) to “high” (5).

NOTE: Abbreviations: DVT, deep venous thrombosis; INR, international normalized ratio; NSAIDs, non-steroidal anti-inflammatory drugs; PE, pulmonary embolism; VTE, venous thromboembolism.

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