Characterization of Venous Thromboembolism Risk in Medical Inpatients Using Different Clinical Prediction Rules

Reza Rafizadeh BSc(Pharm), Ricky Turgeon BSc(Pharm), ACPR, Josh Batterink BSc(Pharm), ACPR, Victoria Su BSc(Pharm), ACPR, PharmD, Anthony Lau

Background

- Symptomatic venous thromboembolism (VTE) occurs in ~1% of patients within 3 months of being admitted to a medical ward
- Current evidence for thromboprophylaxis:
  - No net effect on mortality
  - 0.28% absolute reduction in clinically-detected pulmonary embolism (PE)
  - 0.19% absolute increase in major bleeding events
- American College of Chest Physicians (ACCP) and Accreditation Canada recommend careful stratification and treatment of patients based on risk of VTE and bleeding events
- VTE risk assessment tool used at St Paul's Hospital (SPH) provides non-specific definitions for VTE risk factors and is not based on data derived from medical inpatients
- Risk assessment models suggested by ACCP guidelines 2012:
  - Padua and IMPROVE Predictive and associative models:
    - Specific to medical patients
    - Quantitative and assign score and percentage

Study Objectives

- To assess and compare the proportion of patients considered at elevated risk for VTE, and thus eligible for VTE prophylaxis, as per four risk stratification models:
  - SPH pre-printed order (PPO)
  - Padua Prediction Score
  - IMPROVE Predictive Model (pre-admission)
  - IMPROVE Associative Model (post-admission)
- To characterize the presence and documentation of risk factors for VTE in patients admitted to the medical unit of SPH

Methods

Design:
- Retrospective chart review

Population:
- n = 298 (Convenience sample)
- Patients admitted to SPH Internal Medicine Service
- Admitted from April 2013 to July 2013

Exclusion:
- Admission for VTE, bleeding events, or receiving therapeutic anticoagulation

Statistical analysis:
- Patient characteristics reported using descriptive statistics
- Kappa measure of agreement was used to compare different risk assessment models

Results

Table 1. Patient characteristics

Age Mean ± SD	59.58 ± 18.99
Female gender	136 (45.6%)
Patients receiving VTE prophylaxis	238 (80%)
VTE Risk Factors	
Age ≥ 70	97 (32.6%)
Age > 60	151 (50.7%)
Previous VTE	9 (3.0%)
Known Thrombophilia	2 (0.67%)
Active Cancer	12 (4.02%)
Recent trauma or surgery (≤1 month)	5 (1.68%)
Heart and/or Respiratory Failure	49 (16.44%)
Acute MI or Ischemic Stroke	10 (3.4%)
Acute Infection or Rheumatologic Disorder	116 (38.9%)
Immobility (Padua definition) Immobility (IMPROVE definition)	47 (15.8%) 39 (13.1%)
BMI > 30	202 (67.8%)
Ongoing Hormonal Therapy	8 (2.7%)
ICU/CCU Stay	14 (4.7%)
Current Lower Limb Paralysis	2 (0.7%)

Figure 1. Candidates for VTE prophylaxis according to risk assessment model

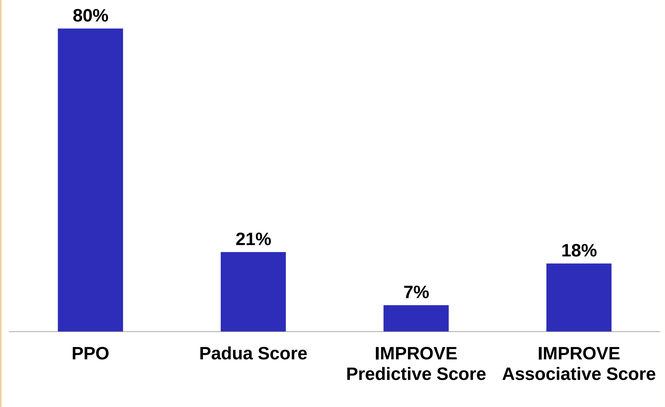

Table 2. Level of agreement between risk assessment models

Decision to provide thromboprophylaxis		Padua: Yes (Provide)	Padua: No (Withhold)	Measure Of agreement (Kappa)
PPO	Yes (Provide)	21%	59%	0.109
	No (Withhold)	<1%	19%	
IMPROVE (Predictive)	Yes (Provide)	6%	1%	0.373
	No (Withhold)	15%	78%	

Decision to provide thromboprophylaxis		IMPROVE (Predictive): Yes (Provide)	IMPROVE (Predictive): No (Withhold)	Measure Of agreement (Kappa)
PPO	Yes (Provide)	6%	73%	0.01
	No (Withhold)	1%	19%	

Table 3. Clinical outcomes collected from admission to discharge

VTE events	0
Fall in hemoglobin level (20g or more per L)	53 (18%)
Major bleeding events:	
Packed red/whole blood transfusions	4 (1%)
Major therapeutic intervention required	1 (<1%)
Retroperitoneal/ intracranial/ intraocular hemorrhage	2 (<1%)

Limitations

- Observational, retrospective design
- Only clinical outcomes that occurred during current hospitalization were collected
- Lack of clarity and consistency in definitions of some risk factors in Padua; redefinition by investigators could potentially introduce bias and subjectivity

Conclusions

- Our data suggests that more patients may be receiving unnecessary VTE prophylaxis based on current PPO; the use of a risk assessment model such as the Padua Prediction Score would result in a greater than 75% relative reduction in use of thromboprophylaxis compared to current practice
- Reduction of unnecessary prophylaxis could improve patient safety and reduce costs to the healthcare system while maintaining the benefits of thromboprophylaxis