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### How good are we at determining risk? Quantifying the accuracy of clinician determined risk for VTE prophylaxis

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## Introduction

- Venous Thromboembolism (VTE), inclusive of deep vein thrombosis (DVT) and pulmonary embolism (PE), is the most common preventable cause of death in hospital admissions.<sup>1</sup>
- Hospital acquired VTE is used as a quality metric, publicly reported and used in value based purchasing models.
- Thomas Jefferson University Hospital (TJUH) uses an electronic medical record (EMR) decision support tool based on a modified Caprini risk assessment model (RAM) to risk stratify patients and to prescribe recommended prophylaxis depending on the risk
- Epic implementation required for development of a new strategy for clinical decision support with VTE risk stratification.

## Objectives

- Create and validate a simple tool for concurrent audits of risk stratification, compliance and documentation
- Evaluate accuracy of clinician risk stratification and prophylactic ordering practice compared with a standardized Caprini RAM across different assigned risk categories.
- Provide recommendations for Epic VTE Prophylaxis CDS Development

## Methods

- Audit tool was developed in REDCap—a HIPPA compliant, cloud based, data management platform—through review of current standard of care and local expert consensus of best practices
- Institutional data was reviewed to identify three nursing units with the highest rates of VTE.
- Trained medical students performed random concurrent audit of 100 patients across the three units using the previously developed REDCap audit tool, which included chart review or patient/clinician interviews.
- Clinician risk assessment accuracy was determined by an independent application of the Caprini RAM (Figure 1) and recommendations (Table  $1).^{1}$
- The low/very low and high/very high Caprini risk categories were combined in our analysis.

Total Risk Factor Score	Risk Level	Prophylaxis Regimen
0	VERY LOW	Early ambulation
1-2	LOW	Sequential Compression Device (SCD)
3-4	MODERATE	Choose <u>ONE</u> of the following medications +/- compression de Sequential Compression Device (SCD) - Optional Heparin 5000 units SQ TID Enoxaparin/Lovenox: 40mg SQ daily (WT < 150kg, CrC 30mg SQ daily (WT < 150kg, CrC 30mg SQ BID (WT > 150kg, CrC (Please refer to Dosing Guidelines on the back of this form)
5 or more	HIGH	Choose <u>ONE</u> of the following medications <u>PLUS</u> compression Sequential Compression Device (SCD) Heparin 5000 units SQ TID (Preferred with Epidurals) Enoxaparin/Lovenox (Preferred): 40mg SQ daily (WT < 30mg SQ daily (WT < 30mg SQ BID (WT > (Please refer to Dosing Guidelines on the back of this fe

**Table 1: Caprini RAM recommendations.** Published recommendations for prophylaxis
 regimen according to the score calculated according to the Caprini RAM. For Items included in the Caprini RAM, please see Figure 1 replicated directly from our audit tool.

# How good are we at determining risk? Quantifying the accuracy of clinician determined risk for VTE prophylaxis

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## evices: Cl > 30mL/min)Cl = 10-29mL/min) l > 30 mL/minn devices: : 150kg, CrCl > 30mL/min)

: 150kg, CrCl = 10-29mL/min) 150kg, CrCl > 30mL/min)

## Results

Caprini Risk Assessment chart review and patient interview	<ul> <li>Age 41-59 Years</li> <li>Swollen Legs (current)</li> <li>Varicose Veins</li> <li>Obesity (BMI&gt;25)</li> <li>Minor Surgery Planned</li> <li>Sepsis (&lt; 1 month)</li> <li>Acute Myocardial Infarction</li> <li>Congestive Heart Failure (&lt; 1 month)</li> <li>Medical Patient Currently at Bed Rest</li> </ul>	3 point risk factors	<ul> <li>Age over 75 years</li> <li>History of DVT/PE</li> <li>Family history of thrombosis</li> <li>Positive factor V Leiden</li> <li>Positive Prothrombin 20210A</li> <li>Positive lupus anticoagulant</li> <li>Elevated serum homocysteine</li> <li>Heparin-induced thrombocytopenia (HIT)</li> <li>Elevated anticardiolipin antibodies</li> <li>Other congenital or acquired thrombophilia</li> </ul>
1 point risk factors	<ul> <li>History of Inflammatory Bowel Disease</li> <li>History of Prior Major Surgery (&lt; 1 month)</li> <li>Abnormal Pulmonary Function (COPD)</li> <li>Serious Lung Disease Including Pneumonia (&lt; 1 month)</li> <li>Oral Contraceptives or Hormone Replacement Therapy</li> </ul>	5 point risk factors What is the caprini raw score	<ul> <li>Stroke (&lt; 1 month)</li> <li>Elective major lower extremity arthroplasty (Hip, pelvis or leg fracture) (&lt; 1 month)</li> <li>Acute spinal cord injury (paralysis) (&lt; 1 month)</li> <li>Multiple trauma (&lt; 1 month)</li> </ul>
	<ul> <li>Pregnancy or Postpartum (&lt; 1 month)</li> <li>History of Unexplained Stillborn Infant, Recurrent Spontaneous Abortion (&gt; or = to 3), premature Birth with Toxemia or Growth-Restricted Infant</li> <li>Other minor risk factor</li> </ul>	Caprini Risk Level:	<ul> <li>Low Risk</li> <li>Moderate Risk</li> <li>High Risk</li> <li>Highest Risk</li> </ul>
2 point risk factors	<ul> <li>Age 61-74 years</li> <li>Arthroscopic surgery</li> <li>Malignancy (present or previous)</li> <li>Major Surgery (&gt;45 mins)</li> </ul>	What are the recommended prophylactic measures for the Caprini risk category?	<ul> <li>Ambulatory Orders</li> <li>Pharmacologic Orders</li> <li>Pneumatic Compression Boot Orders/Compression Stocking Orders</li> </ul>
	<ul> <li>Laparoscopic surgery (&gt;45 mins)</li> <li>Patient confined to bed (&gt;72 hours)</li> <li>Immoilizing plaster cast (&lt;1 month)</li> </ul>	Do the Caprini recommended and documented risk score match?	<ul> <li>⊕ Ves</li> <li>♥ ● No</li> </ul>
	Central venous access	Are the Caprini recommended orders and the resident orders the same?	<ul> <li>⊕ @ Yes</li> <li>&gt; ○ No</li> </ul>

#### Figure 1: REDCap Audit Tool Independent Caprini RAM factors. Screenshot from audit tool used to capture patient risk factors from chart review and patient interview and calculate the Caprini RAM.

<b>Risk Levels Chart review</b>

Risk Levels Chart review	
What risk level was allotted to the patient by the physician	<ul> <li>Low risk</li> <li>Moderate risk</li> <li>High risk</li> <li>Very high risk</li> <li>No risk level was given</li> </ul>
What are the recommended prophylactic measures by the category documented in the EMR?	<ul> <li>Ambulatory Orders</li> <li>Pharmacologic Orders</li> <li>Pneumatic Compression Boot Orders/Compression Stocking Orders</li> </ul>
What are the prophylactic orders for this patient?	<ul> <li>Ambulatory orders</li> <li>Pharmacologic orders</li> <li>Pneumatic compression boots</li> <li>Compression stockings</li> </ul>
Are the EMR recommended orders and the resident orders the same?	H ◎ Yes
What are the ambulatory orders prescribed to the patient?	<ul> <li>Ambulate TID</li> <li>No specific orders, ongoing</li> <li>Other</li> </ul>
What were the pharmacological orders prescribed to the patient?	<ul> <li>Heparin q12</li> <li>heparin q 8</li> <li>Lovenox 40mg q day</li> <li>Lovenox 30 mg q 12h</li> <li>Fondaparinux 2.5 mg q day</li> </ul>

Figure 2: REDCap Audit Tool Questions Related to Clinician Risk Assessment and Ordering of Prophylaxis Options.

33 hours

Project duration

#### **Audit Time Requirements for Medical Students Required time** Task Purpose Training for audit Familiarization with EMR, training to obtain 2 hours consent and to perform interviews. tool use Data entry Includes chart review, required interviews 20 minutes requirement (i.e., patient, nurse, etc.), and data entry (per patient) 100 patient chart reviews were performed,

Table 2: Metrics for data collection duration using the DVT audit tool. Time includes duration of training and data entry per patient. Medical students were trained by residents to obtain consent for participation and training for use of EMR.

76% of patients agreed to participate in a bedside interview.



#### **Figure 3: Agreement between** stratified by Clinician Risk As



### Indep

## based on independently calculated Caprini RAM.

- to independently determine their Caprini RAM.
- less accurate than high risk category (Figure 3).
- been stratified into a moderate/low risk category.

### **Conclusions and Recommendations**

- prophylaxis compliance in real time.
- low risk groups that complies with current evidence.
- formalized risk stratification.

### References

*Mon*. 2005;51:70–78. doi:10.1016/j.disamonth.2005.02.003.



	5% (1/21)		22% (2/9)	
linicoin	Moderate	acamant	Low	
Clinicain Clinician essment.	Moderate <b>Risk Asse</b> <b>Risk Assess</b>	essment sment and	Low I <b>Caprini R</b>	RAM
Clinicain Clinician essment.	Moderate <b>Risk Asse</b> <b>Risk Assess</b> 20% (1/5)	essment ment and	Low Caprini F 33% (1/3)	RAM
Clinicain Clinician essment.	Moderate <b>Risk Assess</b> <b>Risk Assess</b> 20% (1/5)	essment ment and	Low Caprini R 33% (1/3)	RAM
Clinicain Clinician essment.	Moderate Risk Assess Risk Assess 20% (1/5)	essment ment and	Low Caprini R 33% (1/3)	
Clinicain Clinician essment.	Moderate Risk Assess Risk Assess	essment ment and	Low Caprini R 33% (1/3)	
Clinicain Clinician essment.	Moderate <b>Risk Assess</b> <b>Risk Assess</b> 20% (1/5)	essment ment and	Low Caprini R 33% (1/3) Low	
Clinicain Clinician essment.	Moderate <b>Risk Assess</b> <b>Risk Assess</b> 20% (1/5) Moderate <b>AM Risk A</b>	essment ment and	Low Caprini R 33% (1/3)	

Figure 4: Ordering Compliance with Caprini Recommended Prophylaxis

• One hundred patients were included – 43% were male and 45% were on a surgical service. Seventy six (76%) were able to complete a bedside interview

Clinician assignment of moderate and low risk categories was significantly

Patients identified as high risk by independent Caprini RAM were prescribed appropriate VTE prophylaxis 93% of the time, even though they might have

• A simple concurrent audit tool that is HIPAA compliant can be used successfully to perform DVT risk assessment and to assess prescriber

• The rates of agreement among clinician determined risk and the independently determined Caprini RAM was poor for low and moderate risk.

• CDS must provide clearer criteria and recommendations for moderate and

• In spite of incorrect risk stratification, the recommended prophylactic regimen was still ordered, calling into question the benefit or utility of