



STEPPING UP OUR GAME

Nicole MacDonald &
Melanie McIvor

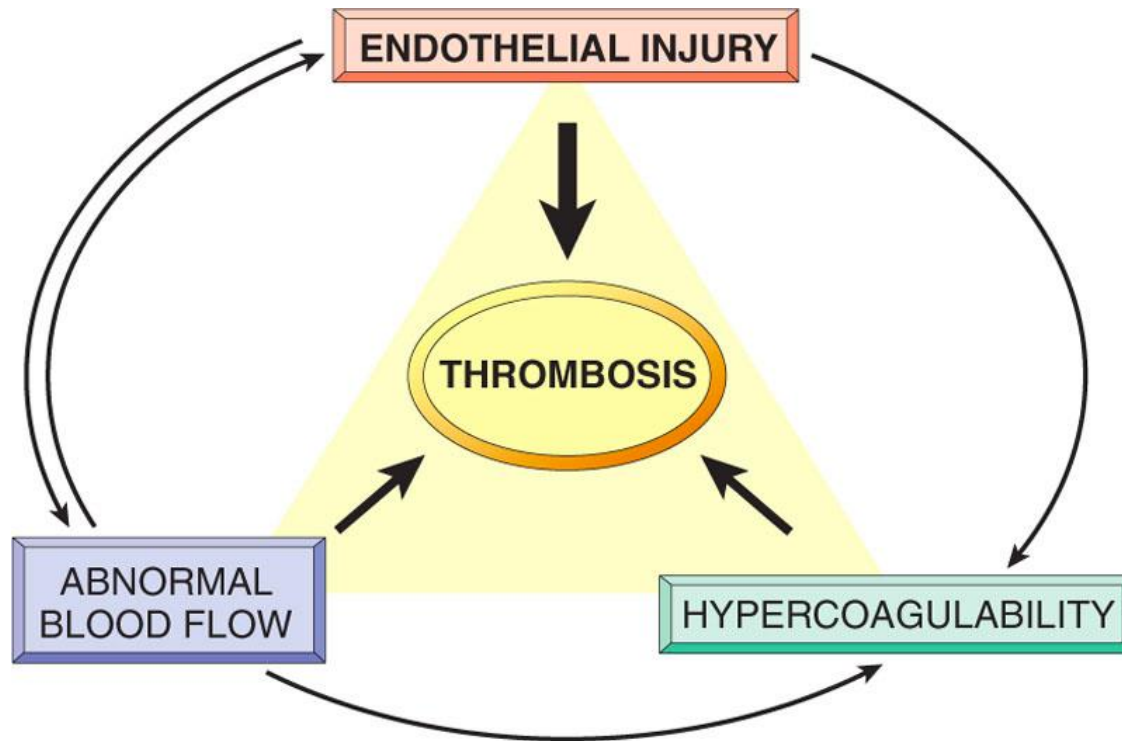
VTE Prophylaxis: Does one shoe fit all?

Learning Objectives

- ❖ 1. Review venous thromboembolism and risk factors for venous thromboembolism (VTE)
- ❖ 2. Discuss the need for VTE assessment in all patients
- ❖ 3. Discuss VTE prophylaxis and risks associated with prophylaxis
- ❖ 5. Review tools for assessment (Padua, IMPROVE, Caprini)
- ❖ 6. Review cases using validated tools

Venous Thromboembolism

Venous Thromboembolism



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Venous Thromboembolism

- Venous thromboembolism (VTE) includes both deep vein thrombosis (DVT) and pulmonary embolism (PE)
- An embolus is defined as any intravascular material that migrates from one location to occlude a vessel.
- Emboli can be a blood clot (thrombus), air, fat, amniotic fluid, or tumour
- Typically PE is caused by DVT

Venous Thromboembolism

Clinical Signs of DVT

- Recent onset of unilateral leg pain and/or swelling
- Tenderness over the course of a deep vein
- Skin that may be warm to the touch
- Reddish or blue skin discolouration
- Upper arm or neck swelling

Clinical Signs of PE

- Hypoxemia
- Unexplained tachycardia
- Presyncope or collapse
- Shortness of breath
- Pleuritic chest pain
- Hemoptysis
- Cramp in side or chest
- Painful breathing
- Unexplained cough
- Hypotension

Venous Thromboembolism Facts

- VTE is one of the most common and preventable complications of hospitalization
- VTE is the most avoidable cause of hospital death and disability
- Accreditation Canada requires organizational practice regarding VTE prevention
- 30-day fatality rate for DVT is 5% and for PE is 33%
- Each year, VTE is responsible for more deaths than breast cancer, AIDS and motor vehicle collisions combined

Geerts, W., Brown, P., Diamontouros, A., Budrevics, G., & Bartle, W. (2012). Venous Thromboembolism Prevention: Getting Started Kit. *Safer Healthcare Now!*. Available at: <http://www.patientsafetyinstitute.ca/en/toolsResources/Documents/Interventions/Venous%20Thromboembolism/VTE%20Getting%20Started%20Kit.pdf>

Heit JA, Sliverstein MD, Mohr DN, et al. Predictors of survival after deep vein thrombosis, and pulmonary embolism: a population-based cohort study. *Arch Intern Med* 1999;159:445-453

Selby R, Gerts W. Prevention of venous thromboembolism: consensus, controversies, and challenges. *Hematology* 2009;286-292

Maynard G, Stein J. Preventing Hospital-Acquired Venous Thromboembolism: A Guide for Effective Quality Improvement. Prepared by the Society of Hospital Medicine. AHQR Publication No. 08-0075, Rockville, MD. Agency for Healthcare Research and Quality. August 2008.

Venous Thromboembolism Facts

- VTE can result in:
 - Fatal PE
 - Symptomatic DVT or PE
 - Prolonged hospital stay
 - Readmission
 - Patient anxiety and increased risk of subsequent DVT or PE
 - Additional costs to diagnose and treat
 - Long term anticoagulation treatment for the PE or DVT
 - Development of post-thrombotic syndrome
 - Loss of affected limb

Geerts, W., Brown, P., Diamontouros, A., Budrevics, G., & Bartle, W. (2012). Venous Thromboembolism Prevention: Getting Started Kit. *Safer Healthcare Now!*. Available at: <http://www.patientsafetyinstitute.ca/en/toolsResources/Documents/Interventions/Venous%20Thromboembolism/VTE%20Getting%20Started%20Kit.pdf>

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Venous Thromboembolism Facts

- With no prevention methods the rate of hospital-acquired VTE is:

Patient Group	DVT Incidence (%)
Medical patients	10-26
Major gynecologic, urologic, or general surgery	15-40
Neurosurgery	15-40
Tibial fracture	20-40
Congestive heart failure	20-40
Stroke	11-75
Knee/hip arthroplasty	40-60
Hip fracture	40-60
Major trauma	40-80
Spinal cord injury	60-80
Critical care patients	15-80

Geerts, W., Brown, P., Diamontouros, A., Budrevics, G., & Bartle, W. (2012). Venous Thromboembolism Prevention: Getting Started Kit. *Safer Healthcare Now!*. Available at: <http://www.patientsafetyinstitute.ca/en/toolsResources/Documents/Interventions/Venous%20Thromboembolism/VTE%20Getting%20Started%20Kit.pdf>

Maynard G, Stein J. Preventing Hospital-Acquired Venous Thromboembolism: A Guide for Effective Quality Improvement. Prepared by the Society of Hospital Medicine. AHQR Publication No. 08-0075, Rockville, MD. Agency for Healthcare Research and Quality. August 2008.

Risk Factors for VTE

Risk of Venous Thromboembolism

- The risk of VTE varies based on patient specific factors and reason for hospital admission
- Patients with surgeries, particularly orthopedic surgeries are at a higher risk of VTE than medical inpatients
- However, as some medical inpatients may score high on a risk prediction tool, these patients should be assessed as well

Possible Risk Factors for VTE

Possible risk
• Paraproteinaemia
• Behcet's disease
• Disorders of plasminogen and plasminogen activation
• Nephrotic syndrome
• Polycythaemia
• Paroxysmal nocturnal hemoglobinuria
• Elevated serum homocysteine
• Dysfibrinogenaemia
• Myeloproliferative disorders
• Age ≥ 41 years
• Sepsis (<1 month)
• Non-type O blood group

Probable Risk Factors for VTE

Probable risk

- High-dose estrogen therapy
- Obesity (BMI >25)
- Varicose veins
- Heparin-induced thrombocytopenia (HIT)
- Congenital or acquired thrombophilia
- Antithrombin deficiency
- Positive Lupus anticoagulant
- Antiphospholipid antibodies
- Protein S deficiency
- Protein C deficiency
- Positive factor V Leiden
- Elevated anticardiolipin antibodies
- Positive prothrombin gene mutation 20210A

Identified Risk Factors for VTE

High risk

- History of DVT or PE
- Family history of thrombosis
- Acute Infection
- Malignancy
- Age >75 years
- Congestive heart failure
- Stroke
- Myocardial infarction
- Prolonged immobility (≥4 days)
- Pregnancy or postpartum
- Acute or chronic lung disease
- Acute inflammatory disease
- Inflammatory bowel disease
- Shock

Risk of Venous Thromboembolism

Elevation of VTE Risk based on Surgical Procedure

Procedure	Baseline risk in the absence of prophylaxis (%)
Most outpatient or same-day surgery	< 0.5
Spinal surgery for nonmalignant disease	1.5
Gynecologic non-cancer surgery, Cardiac surgery, Most thoracic surgery, Spinal surgery for malignant disease	3.0
Major Orthopedic Surgery	4.3
Bariatric surgery ,Gynecologic cancer surgery, Pneumonectomy, Craniotomy, Traumatic brain injury, Spinal cord injury, Other major trauma	6.0

Discuss Need for Assessment

Assessment

- Different methods for assessment:
 - Group-based approach
 - Opt-out policy
 - Individual patient assessment
- There are several potential pros and cons regarding the need to the individual patient assess approach

Pros and Cons for Individual Assessment

Pros

- Identify patients that do not require VTE prophylaxis based on low risk
- Save on cost of prophylaxis
- Validation of tools
- Prevent unneeded adverse effects

Cons

- Time consuming
- Cost of performing assessment
- Human error in misclassification of patient

Venous Thromboembolism Prophylaxis

Venous Thromboembolism Prophylaxis

- ❖ Options for VTE prophylaxis include:
 - ❖ Mobilization
 - ❖ Mechanical compression
 - ❖ Pharmacotherapy
- ❖ Therapeutic options have specific indications
- ❖ Prophylactic anticoagulation will decrease a patient's risk for VTE formation, however it increases a patient's risk of adverse events related to the use of therapy

Venous Thromboembolism Prophylaxis

Recommended Doses of Anticoagulant Prophylaxis

Agent	Comments	Recommended Dose(s)*
Low Molecular Weight Heparin (LMWH)	dalteparin (Fragmin®)	5,000 units subcutaneously once daily
	enoxaparin (Lovenox®)	40 mg subcutaneously once daily OR 30 mg subcutaneously twice daily
	tinzaparin (Innohep®)	4,500 units subcutaneously once daily
Heparin		5,000 units subcutaneously every 12 hours OR every 8 hours
Fondaparinux (Arixtra®)		2.5 mg subcutaneously once daily
Rivaroxaban (Xarelto®)	Hip or knee replacement only	10 mg by mouth once daily
Dabigatran (Pradaxa®)	Hip or knee replacement only	220 mg by mouth once daily (150 mg if age >75 or CrCl 30-50 ml/min)
Apixaban (Eliquis®)	Hip or knee replacement only	2.5 mg by mouth twice daily

* recommended dose may be altered by renal dysfunction, low body weight, obesity, pregnancy

Risks of Prophylaxis

Risks of Prophylaxis

- **Bleeding**
 - Major bleeding: fatal bleeding, bleeding into a critical organ, serious GI bleeding, bleeding requiring transfusion, resulting in hemoglobin drop ≥ 5 g/dL and bleeding leading to reoperation.
 - Minor bleeding: all other bleeding
- **Heparin induced thrombocytopenia (Heparin, LMWH)**

Risks of Prophylaxis

- Risk of bleeding is increased by recent surgery, trauma, and invasive procedures
- In hospitalized patients, increasing number of comorbidities, such as age > 60 y, supratherapeutic clotting times, and worsening hepatic dysfunction increase the risk of anticoagulant-associated bleeding
- Antidotes exist for some anticoagulants, however there is not currently one for all

Patient Populations

Patient Populations

- In general the select patient groups targeted for VTE prophylaxis include:
 - Surgical patients
 - Orthopedic patients
 - Cancer patients
 - Acutely ill medical patients

Patient Population Cases



Non-Surgical



Surgical



Orthopedic

Case 1: Dee P. Vane

- D.V. is a 72 year old female who has been admitted for suspected pneumonia.
- BMI: 35 CrCl = 30 mL/min
- Current Medications:
 - Lisinopril 2.5mg daily - Hypertension
 - Rosuvastatin 10mg daily – Dyslipidemia
 - Premarin 0.3mg PV daily – Recurrent UTIs



Case 2: Paul Munnary

- P.M. is a 40 year old male admitted for a hernia repair.
- BMI: 35
- Current Medications:
 - Ramipril 10mg daily – Hypertension
 - Amlodipine 5mg daily – Hypertension
 - Atorvastatin 80mg daily – Dyslipidemia
 - Nicotine Gum – Smoking Cessation



Case 3: Arthur Plastie

- A.P. is a 58 year old male admitted for a left knee arthroplasty
- BMI: 27
- Current Medications:
 - ASA 81mg daily – Cardioprotective from MI
 - Metformin 500mg BID – Diabetes Type II
 - Ramipril 10mg daily – Hypertension
 - Rosuvastatin 20mg daily – Dyslipidemia
 - Metoprolol 50mg BID - Hypertension



Tools for Assessment

Tools to Assess Risk Factors

- There are multiple VTE prediction tools that are available for use in practice. Some tools have only been validated in certain patient populations.
- We will discuss three validated tools used in current practice:
 - **Padua** Prediction Score
 - **IMPROVE** Risk Assessment Tool
 - **Caprini** VTE Risk Assessment Model

Tools to Assess Risk Factors



Medical Inpatients

- Thrombosis Canada does not currently use a tool
- CHEST guidelines uses Padua Prediction Score
- Neither are using the IMPROVE risk assessment tool

Padua Prediction Score



- Risk assessment tool for VTE among hospitalized medical patients.
- 11 variables assigned point values
- Point values range from 1 to 3
- Score < 4: Low risk for VTE
- Score \geq 4: High risk for VTE
- High results in a recommendation for prophylaxis

Padua Prediction Score



Padua Prediction Score

Table 1 Risk assessment model (high risk of VTE: ≥ 4)

Baseline features	Score
Active cancer*	3
Previous VTE (with the exclusion of superficial vein thrombosis)	3
Reduced mobility [†]	3
Already known thrombophilic condition [‡]	3
Recent (≤ 1 month) trauma and/or surgery	2
Elderly age (≥ 70 years)	1
Heart and/or respiratory failure	1
Acute myocardial infarction or ischemic stroke	1
Acute infection and/or rheumatologic disorder	1
Obesity (BMI ≥ 30)	1
Ongoing hormonal treatment	1

Padua Prediction Score



- The Padua Prediction Score study was published in 2010 for use in medical inpatients

A risk assessment model for the identification of hospitalized medical patients at risk for venous thromboembolism: the Padua Prediction Score

S. BARBAR,* F. NOVENTA,† V. ROSSETTO,* A. FERRARI,* B. BRANDOLIN,* M. PERLATI,*
E. DE BON,* D. TORMENE,* A. PAGNAN* and P. PRANDONI*

**Department of Cardiothoracic and Vascular Sciences, Second Division of Internal Medicine; and †Department of Clinical and Experimental Medicine, Clinical Epidemiology Group, University of Padua, Padova, Italy*

Padua Study



- Design: prospective cohort with independent and blinded assessment of outcomes. 90 day follow-up
- Number of patients: 1 180 included. 469 high risk (186 prophylaxed 283 not)
- Date: 2008
- Location: Italy
- Treatment: was deemed adequate if
 - implemented within 48 h of hospital admission
 - included the daily administration
 - covered at least 80% of the hospital stay
- Results:
 - VTE:
 - 37/1180 patients (3.1%): 35/469 high-risk patients (7.5%), and 2/711 low-risk patients (0.3%).
 - 4/186 (2.2%) patients who received prophylaxis, and in 31/283 (11.8%) who did not
 - Bleeding:
 - 3/186 (1.6%; 95% CI, 0.5–4.6) high risk patients who received prophylaxis
 - 1/283 (0.4%; 95% CI, 0.0–2.0) high risk patients who had not received prophylaxis



IMPROVE Risk Assessment Tool

- New tool
- Validated risk assessment tool for VTE among hospitalized medical patients.
- 7 variables assigned point values
- Point values range from 1 to 3
- Score < 3: Low risk for VTE
- Score \geq 3: at risk for VTE
- At risk patients should receive prophylaxis
- Has a sister validated tool for bleeding risk

IMPROVE Risk Assessment Tool



The IMPROVE risk-assessment model

Risk factor	Points
Prior venous thromboembolism	3
Diagnosed thrombophilia	2
Current lower-limb paralysis	2
Current cancer	2
Immobilized for at least 7 days	1
Stay in the ICU or coronary care unit	1
More than 60 years old	1

IMPROVE Risk Assessment Tool



- The IMPROVE study was published in 2014 for use in medical inpatients

External Validation of the Risk Assessment Model of the International Medical Prevention Registry on Venous Thromboembolism (IMPROVE) for Medical Patients in a Tertiary Health System

David Rosenberg, MD, MPH; Ann Eichorn, MS; Mauricio Alarcon; Lauren McCullagh, MPH; Thomas McGinn, MD, MPH; Alex C. Spyropoulos, MD

IMPROVE Validation



- Design: retrospective case control. 90 day follow-up
- Number of patients: 19 217 patients, including 1 35 cases with a hospital-acquired VTE event and 404 matched controls
- Date: December 2009 to April 2013
- Location: US
- Identifying: VTE via ICD-9 codes not present on the index admission in patients 18 years or older, hospital stay of at least 3 days and discharged alive
- Results:
 - Of the 7 risk factors identified in tool, 3 were found to be statistically associated with the risk of VTE: aged >60 yrs, dx of cancer, and prior VTE
 - The derivation and validation cohorts revealed good discrimination and calibration for both the overall VTE risk model and the identification of at-risk patient groups.
 - A score of <3, which accounted for more than two thirds of the cohort, identified a group at low risk of VTE that would likely not benefit from pharmacological prophylaxis.

Tools to Assess Risk Factors



Surgical Patient Tools

- Thrombosis Canada = Caprini Risk Assessment
- CHEST = Caprini Risk Assessment

Caprini VTE Risk Assessment Model



- Validated in many surgical patients (not medical patients as of yet)
- 31 variables assigned point values
- Variables awarded points 1,2, 3, or 5

Risk Category	Caprini Score
Very Low	0
Low	1-2
Moderate	3-4
High	5+

- Moderate - high results in a recommendation for prophylaxis

Caprini VTE Risk Assessment Model



Caprini VTE patient risk assessment model in surgical patients

1 Point	2 Points	3 Points	5 Points
Age 41-60 y	Age 61-74 y	Age ≥75 y	Stroke (<1 mo)
Minor surgery	Arthroscopic surgery	History of VTE	Elective arthroplasty
BMI >25 kg/m ²	Major open surgery (≥45 min)	Family history of VTE	Hip, pelvis, or leg fracture
History of major surgery (<1 mo)	Laparoscopic surgery (>45 min)	Positive factor V Leiden	Multiple trauma (<1 mo)
Varicose veins	Cancer (past or present)	Positive prothrombin 20210A	Acute spinal cord injury (<1 mo)
Swollen legs	Patient confined to bed (>72 h)	Elevated serum homocysteine	
Acute myocardial infarction	Immobilizing plaster cast (<1 mo)	Positive lupus anticoagulant	
Congestive heart failure (<1 mo)	Central venous access	Elevated anticardiolipin antibodies	
Sepsis (<1 mo)		Heparin-induced thrombocytopenia	
Serious lung disease, such as pneumonia (<1 mo)		Other congenital or acquired thrombophilia	
Chronic obstructive pulmonary disease			
Medical patient on bed rest			

Caprini VTE Risk Assessment Model



- The Caprini Risk Assessment Model has been validated in a variety of surgical populations in several studies

A Validation Study of a Retrospective Venous Thromboembolism Risk Scoring Method

Vinita Bahl, DMD, MPP, Hsou Mei Hu, PhD,* Peter K. Henke, MD,† Thomas W. Wakefield, MD,†
Darrell A. Campbell, Jr., MD,‡ and Joseph A. Caprini, MD§*

Caprini Validation



- Design: retrospective chart review. 30 day follow-up
- Number of patients: 8216
- Date: July 2001 and January 2008
- Location: US
- Identifying: general, vascular, and urologic surgery inpatients VTE outcomes using ICD-9 codes
- Results:
 - pregnancy or postpartum (OR 8.3, P 0.05), sepsis (4.0, P 0.01), malignancy (2.3, P 0.01), history of VTE (2.1, P 0.05), and central venous access (1.8, P 0.05) as significantly associated with VTE
 - Age, varicose veins, and positive Factor V Leiden were marginally significant (P 0.1)
 - The majority (52.1%) of the study population was classified to the highest risk level; 36.5% were classified as high-risk, 10.4% as moderate risk, and 0.9% as low risk
 - The retrospective risk scoring method is valid and supports use of individual patient assessment of risk for VTE within 30 days after surgery

Patient Populations



Non-Surgical



Surgical



Orthopedic

Case 1: Dee P. Vane

- D.V. is a 72 year old female who has been admitted for suspected pneumonia.
- BMI: 35 CrCl = 30 mL/min
- Current Medications:
 - Lisinopril 2.5mg daily - Hypertension
 - Rosuvastatin 10mg daily – Dyslipidemia
 - Premarin 0.3mg PV daily – Recurrent UTIs





Padua Prediction Score

Padua Prediction Score

Table 1 Risk assessment model (high risk of VTE: ≥ 4)

Baseline features	Score
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Reduced mobility [†]	3
Already known thrombophilic condition [‡]	3
Recent (≤ 1 month) trauma and/or surgery	2
Elderly age (≥ 70 years)	1
Heart and/or respiratory failure	1
Acute myocardial infarction or ischemic stroke	1
Acute infection and/or rheumatologic disorder	1
Obesity (BMI ≥ 30)	1
Ongoing hormonal treatment	1

IMPROVE Risk Assessment Tool



The IMPROVE risk-assessment model

Risk factor	Points
Prior venous thromboembolism	3
Diagnosed thrombophilia	2
Current lower-limb paralysis	2
Current cancer	2
Immobilized for at least 7 days	1
Stay in the ICU or coronary care unit	1
More than 60 years old	1

Case 1: Dee P. Vane

- Padua Risk Score: 4 = High Risk
- IMPROVE Risk Score: 1-2 = Low Risk

- Prophylaxis?



Case 2: Paul Munnary

- P.M. is a 40 year old male admitted for a hernia repair.
- BMI: 35
- Current Medications:
 - Ramipril 10mg daily – Hypertension
 - Amlodipine 5mg daily – Hypertension
 - Atorvastatin 80mg daily – Dyslipidemia
 - Nicotine Gum – Smoking Cessation



Caprini VTE Risk Assessment Model



Caprini VTE patient risk assessment model in surgical patients

1 Point	2 Points	3 Points	5 Points
Age 41-60 y	Age 61-74 y	Age \geq 75 y	Stroke (<1 mo)
Minor surgery	Arthroscopic surgery	History of VTE	Elective arthroplasty
BMI >25 kg/m ²	Major open surgery (>45 min)	Family history of VTE	Hip, pelvis, or leg fracture
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Sepsis (<1 mo)		Heparin-induced thrombocytopenia	
Serious lung disease, such as pneumonia (<1 mo)		Other congenital or acquired thrombophilia	
Chronic obstructive pulmonary disease			
Medical patient on bed rest			

Case 2: Paul Munnary

- Caprini Risk Score: 3 = Moderate Risk
- Prophylaxis?



Case 3: Arthur Plastie

- A.P. is a 58 year old male admitted for a left knee arthroplasty
- BMI: 27
- Current Medications:
 - ASA 81mg daily – Cardioprotective from MI
 - Metformin 500mg BID – Diabetes Type II
 - Ramipril 10mg daily – Hypertension
 - Rosuvastatin 20mg daily – Dyslipidemia
 - Metoprolol 50mg BID - Hypertension



Caprini VTE Risk Assessment Model



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Sepsis (<1 mo)		Heparin-induced thrombocytopenia	
Serious lung disease, such as pneumonia (<1 mo)		Other congenital or acquired thrombophilia	
Chronic obstructive pulmonary disease			
Medical patient on bed rest			

Case 3: Arthur Plastie

- Both Thrombosis Canada and the CHEST guidelines recommend prophylaxis in patients undergoing a knee arthroplasty
- Prophylaxis?

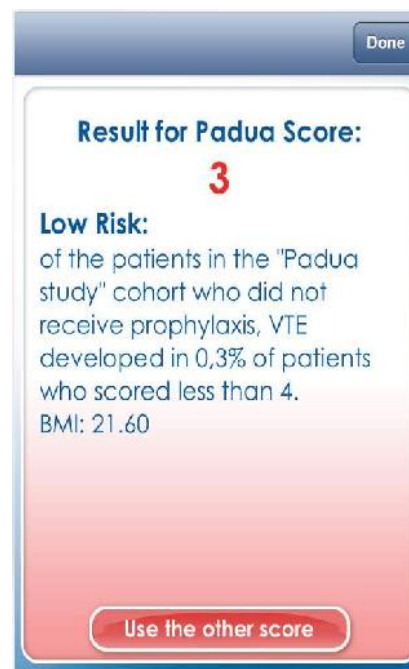
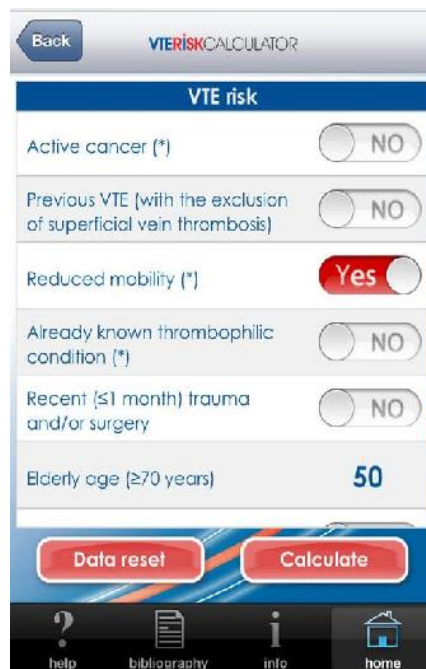


Available Apps

Tools for Assessment

- The tools we focused on in this presentation are available as Apps for aiding in risk assessment of patients
- All the apps are free

Padua Risk Score App



IMPROVE Predictive Risk Score App

IMPROVE VTE Predictive Risk Model

IMPROVE Info

IMPROVE is an international observational database of outcomes for patients who are hospitalized for an acute medical illness. IMPROVE includes 52 hospitals in 12 countries that enrolled a total of 15,156 patients.

Visit www.outcomes.org for complete information.

Calculator Instructions **VTE Info** References Disclaimer

IMPROVE VTE Predictive Risk Model

Instructions

This tool implements IMPROVE risk nomograms for clinically evident acute venous thromboembolism:

The **IMPROVE Predictive VTE Risk Model**: Provides an estimate of the probability of clinically evident acute venous thromboembolism from the time of hospital admission to discharge, based on risk factors recognized at the time of hospital admission.

The cumulative VTE incidence from admission to 3-month

Calculator Instructions **VTE Info** References Disclaimer

IMPROVE VTE Predictive Risk Model

Yes No **Previous VTE**

Yes No **Thrombophilia**

Yes No **Current cancer**

Yes No **Age > 60 years**

Probability of symptomatic VTE from the time of hospital admission to 90 days post hospital discharge in patients admitted with acute medical illness.

0.5%

Calculator Instructions **VTE Info** References Disclaimer

IMPROVE VTE Predictive Risk Model

Yes No **Previous VTE**

Yes No **Thrombophilia**

Yes No **Current cancer**

Yes No **Age > 60 years**

Probability of symptomatic VTE from the time of hospital admission to 90 days post hospital discharge in patients admitted with acute medical illness.

5.4%

Calculator Instructions **VTE Info** References Disclaimer

IMPROVE Associative Risk Score App



IMPROVE Info

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Visit www.outcomes.org for complete information.



Instructions

This tool implements IMPROVE risk nomograms for clinically evident acute venous thromboembolism:

The **IMPROVE Associative* VTE Risk Model**: Provides an estimate of the associated rate of clinically evident acute venous thromboembolism from the time of hospital admission to discharge, based on risk factors recognized both prior to and during the course of hospitalization.

The cumulative VTE incidence



<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Previous VTE
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Thrombophilia
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Lower limb paralysis
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Current cancer
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Immobilization ≥ 7 days
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	ICU/CCU stay
<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Age > 60 years



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<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Age > 60 years



Caprini Risk Score App



NorthShore
University HealthSystem

Caprini DVT Risk Score

The Caprini deep vein thrombosis (DVT) risk score has been validated in clinical trials in more than 17,000 patients and can be used to predict the clinical incidence of DVT. It is endorsed by the CHEST consensus guidelines (2012).

Start Survey

Welcome Survey Disclaimer About DVT References



NorthShore
University HealthSystem

DVT Risk Assessment Survey

Section 1
Select your age group and gender:

Select Age Group:

Age 1-40 years

Age 41-60 years

Age 61-74 years

Age 75 or over

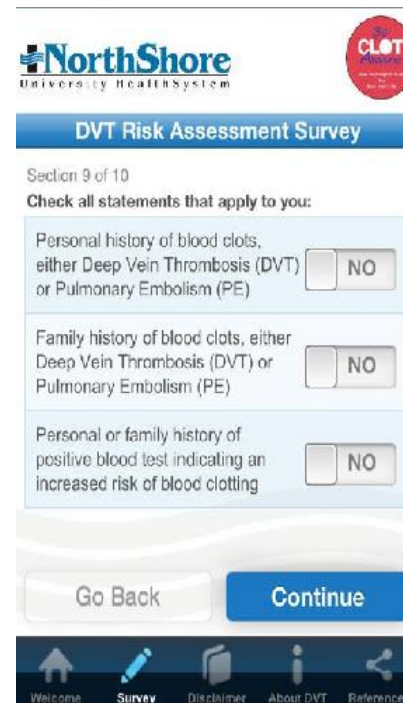
Select Gender:

Female

Male

Continue

Welcome Survey Disclaimer About DVT References



NorthShore
University HealthSystem

DVT Risk Assessment Survey

Section 9 of 10
Check all statements that apply to you:

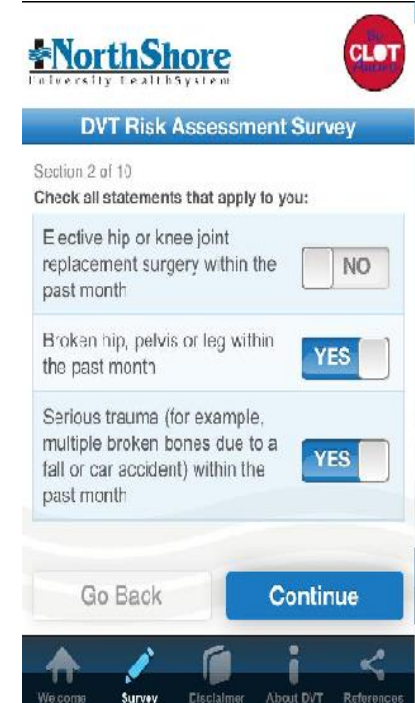
Personal history of blood clots, either Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE) NO

Family history of blood clots, either Deep Vein Thrombosis (DVT) or Pulmonary Embolism (PE) NO

Personal or family history of positive blood test indicating an increased risk of blood clotting NO

Go Back **Continue**

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NorthShore
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DVT Risk Assessment Survey

Section 2 of 10
Check all statements that apply to you:

Ectopic hip or knee joint replacement surgery within the past month NO

Broken hip, pelvis or leg within the past month YES

Serious trauma (for example, multiple broken bones due to a fall or car accident) within the past month YES

Go Back **Continue**

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Final Recommendations

Recommendations

- One shoe doesn't fit all
- Assessing is key to ensuring quality health care
- Assess patients on admission and regularly through their stay in hospital
- Ensure duration of therapy is correct
- Don't forget to assess bleed risk as well

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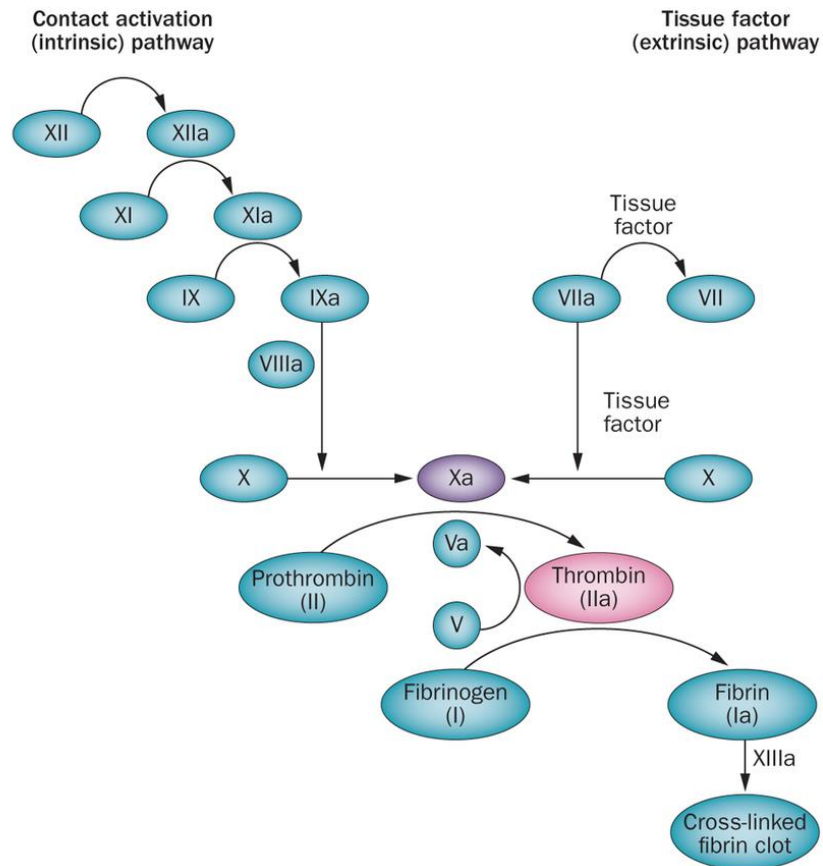
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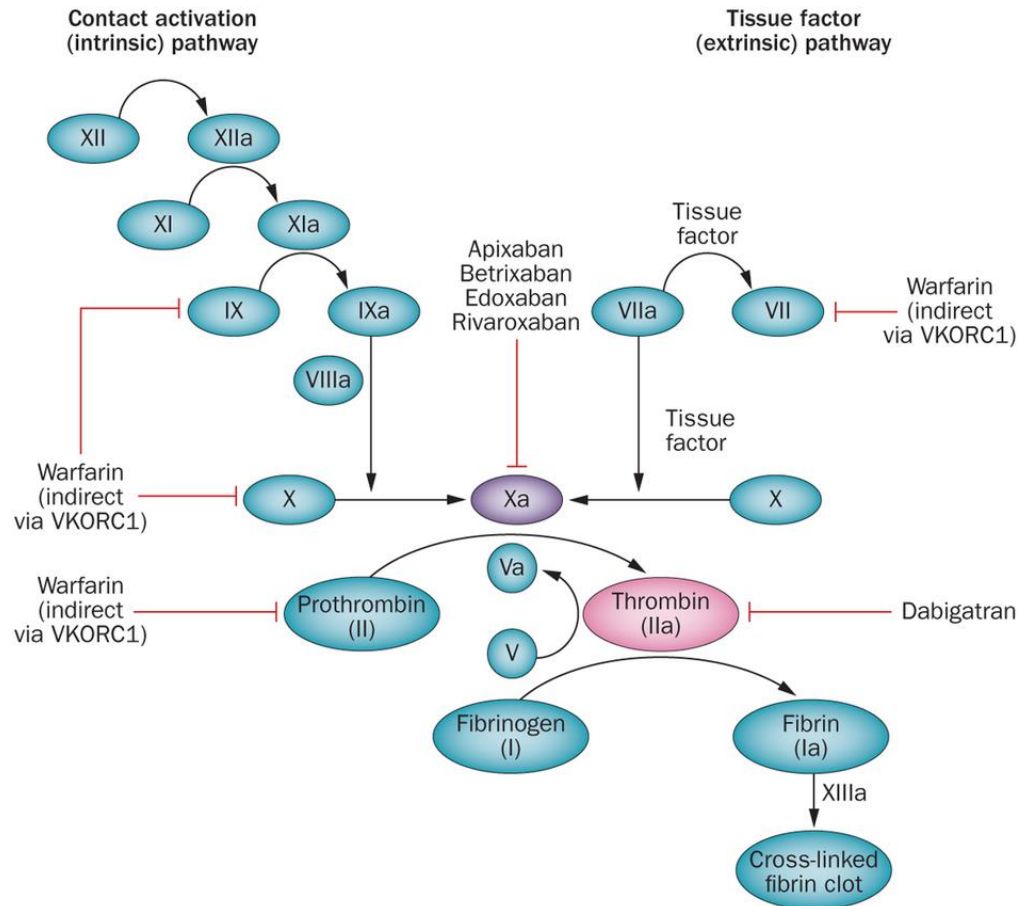
Questions?



Venous Thromboembolism



Venous Thromboembolism Prophylaxis



Guideline Recommendations

Thrombosis Canada

- Thrombosis Canada has recommendations for VTE prophylaxis concerning our three patient population groups:
 - Non-surgical Patients
 - Surgical Patients
 - Orthopedic Patients

Thrombosis Canada

Hospitalized Medical Patients

- Acutely-ill hospitalized medical patients at increased risk of VTE who are not bleeding or at high risk of bleeding should receive anticoagulant thromboprophylaxis with a LMWH or UFH
- Acutely-ill hospitalized medical patients who are bleeding or at high risk of bleeding should not receive anticoagulant thromboprophylaxis

Thrombosis Canada

Surgical Patients

- Thrombosis Canada recommends to follow their specific order set for each type of surgery
- High risk bleeding = No anticoagulant until risk is lowered
- HIT = Use Fondaparinux

Thrombosis Canada

Orthopedic Patients

- Always use VTE prophylaxis anticoagulation in hip or knee arthroplasty patients
- There is less evidence-based literature guiding thromboprophylaxis in patients who undergo spine surgery, knee arthroscopy, lower limb amputation, or have isolated lower extremity fractures. These groups generally have lower risk of VTE than patients undergoing arthroplasty or hip fracture surgery. Assess these patients individually.

CHEST

- CHEST has recommendations for VTE prophylaxis concerning our three patient population groups:
 - Non-surgical Patients
 - Surgical Patients
 - Orthopedic Patients

CHEST

Hospitalized Medical Patients

- For patients at increased risk of thrombosis, use LMWH, low-dose unfractionated heparin, or fondaparinux. CHEST does not suggest extending the duration of thromboprophylaxis beyond the period of patient immobilization or acute hospital stay
- For patients at low risk of thrombosis, do not use pharmacologic or mechanical prophylaxis
- For patients at increased risk of thrombosis who are bleeding or are at high risk for major bleeding, use mechanical thromboprophylaxis with graduated compression stockings or intermittent pneumatic compression

Surgical Patients

Table 23—Recommendations for Thromboprophylaxis in Various Risk Groups

Risk of Symptomatic VTE	Risk and Consequences of Major Bleeding Complications	
	Average Risk (~1%)	High Risk (~2%) or Severe Consequences
Very low (< 0.5%)	No specific prophylaxis	
Low (~1.5%)	Mechanical prophylaxis, preferably with IPC	
Moderate (~3.0%)	LDUH, LMWH, or mechanical prophylaxis, preferably with IPC	Mechanical prophylaxis, preferably with IPC
High (~6.0%)	LDUH or LMWH <i>plus</i> mechanical prophylaxis with ES or IPC	Mechanical prophylaxis, preferably with IPC, until risk of bleeding diminishes and pharmacologic prophylaxis can be added
High-risk cancer surgery	LDUH or LMWH <i>plus</i> mechanical prophylaxis with ES or IPC <i>and</i> extended-duration prophylaxis with LMWH postdischarge	Mechanical prophylaxis, preferably with IPC, until risk of bleeding diminishes and pharmacologic prophylaxis can be added
High risk, LDUH and LMWH contraindicated or not available	Fondaparinux or low-dose aspirin (160 mg); mechanical prophylaxis, preferably with IPC; or both	Mechanical prophylaxis, preferably with IPC, until risk of bleeding diminishes and pharmacologic prophylaxis can be added

CHEST

Orthopedic Patients

- In patients undergoing major orthopedic surgery, use of one of the following: low-molecular-weight heparin; fondaparinux; dabigatran, apixaban, rivaroxaban (total hip arthroplasty or total knee arthroplasty but not hip fracture surgery); low-dose unfractionated heparin; adjusted-dose vitamin K antagonist; aspirin; or an intermittent pneumatic compression device (IPCD)

- In patients at increased bleeding risk, use an IPCD or no prophylaxis