

# Venous Thrombosis Risk in Medical Inpatients

Neil A. Zakai, MD  
Assistant Professor of Medicine  
University of Vermont  
Thrombosis and Hemostasis Program



## Outline

- Background
- Epidemiology
- Prevention
- Quality Measures
- Future Directions



# Outline

- **Background**
- Epidemiology
- Prevention
- Quality Measures
- Future Directions



# Background

- Problem
  - VTE not well studied in general medical patients
- VTE is a problem Sandler, DA, Royal Soc Med; 82:4/89
  - PE primary cause of death in 10% of hospital autopsies
  - 76% had no recent surgery
  - 94% no suspected PE prior to death
- VTE is preventable Mesmetti, Thromb & Haemostasis; 83:2000
  - 60% reduction in VTE with heparin prophylaxis
- VTE is worth preventing
  - Pulmonary emboli kill people
  - Treatment is expensive



# Outline

- Background
- **Epidemiology**
- Prevention
- Quality Measures
- Future Directions



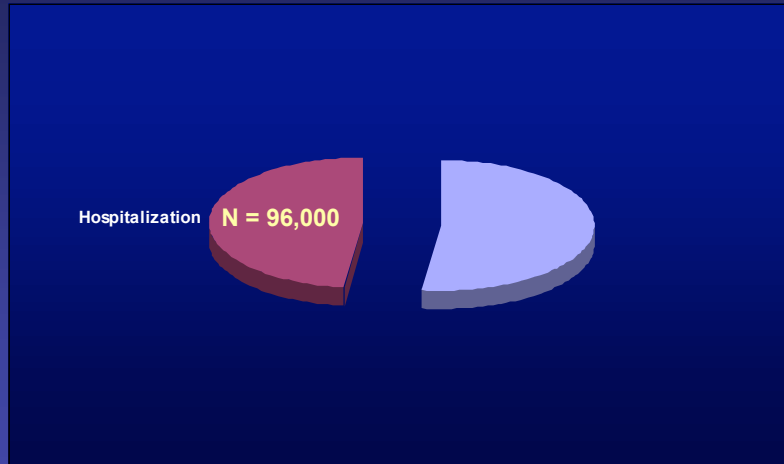
# Epidemiology of VTE

Heit et al. Arch Int Med 102; 2002



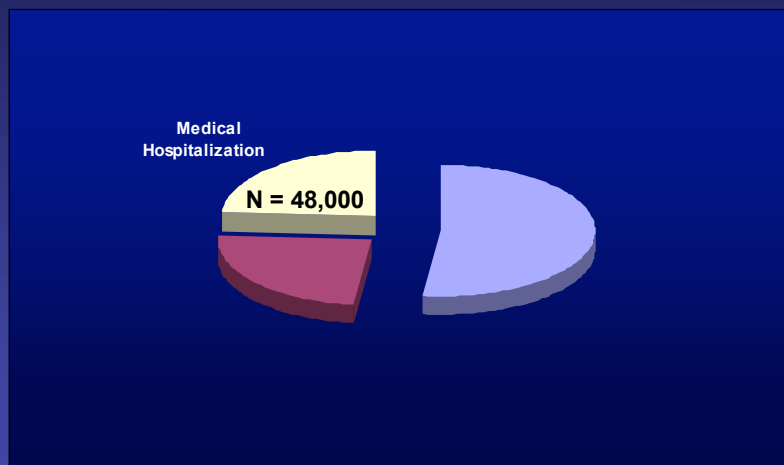
# Epidemiology of VTE

Heit et al. Arch Int Med 102; 2002



# Epidemiology of VTE

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## Epidemiology Attributable Risk Estimate

Adjusted Population Attributable Risk (AR) Associated With Independent Risk Factors for First Lifetime Definite Venous Thromboembolism Among Olmsted County, Minnesota, Residents (1976-1990)\*

Risk Factor	Adjusted for			
	Age, Sex, and Year (Matching Variables)		Age, Sex, Year, and Terms in Final Model	
	AR	95% CI	AR	95% CI
Hospitalization or nursing home	61.2	56.9-65.6	58.8	53.4-64.2
Hospitalization with surgery	24.2	20.8-27.6	23.8	20.3-27.3
Hospitalization without surgery	22.5	19.0-26.0	21.5	17.3-25.6
Nursing home	14.4	11.3-17.4	13.3	9.9-16.6
Active malignant neoplasm	19.8	16.2-23.3	18.0	13.4-22.6
Malignant neoplasm with chemotherapy	6.8	4.7-8.9	6.4	3.9-9.0
Malignant neoplasm without chemotherapy	13.0	9.9-16.0	11.6	7.6-15.5
Trauma	12.5	9.8-15.2	12.0	9.0-14.9
Congestive heart failure	11.8	8.0-15.7	9.5	3.3-15.8
Prior central venous catheter or pacemaker	10.5	7.9-13.0	9.1	5.7-12.6
Neurological disease with extremity paresis	9.2	5.5-10.8	6.9	3.5-10.2
Prior superficial vein thrombosis	4.3	1.9-6.7	5.4	3.0-7.7
Varicose veins/vein stripping	6.0	0.7-11.2	0.0	0.0-10.2

Heit et al. Arch Int Med 102; 2002

## Epidemiology Incidence of VTE on Medical Services

- Literature is difficult to interpret with differing definitions and endpoints
- Screen detected versus symptomatic
  - DVT will vary greatly
  - Screening usually not done for PE
- Proximal versus distal

## Epidemiology Incidence of VTE on Medical Services

- **Meta-analysis** Mismetti et al. Thromb Haemost 2000;83(1)
  - Incidence of screen detected DVT 19%
    - 5 trials, 845 patients
  - Incidence of symptomatic PE 1%
    - 6 trials, 14,843 patients
- **MEDENOX** Samama et al. NEJM 1999;341(11)
  - 288 patients on placebo
    - Total VTE 14.9% (DVT alone 13.9%, PE 1%)
    - Symptomatic DVT 0.7%



## Epidemiology Incidence of VTE

Medical Service	Number of VTE (%)	Number of Admissions (%)	VTE per 1000 Admissions (95% CI)
All	65 (100)	8529 (100)	7.6 (5.8-9.5)
Medicine	52 (80.0)	3985 (46.7)	13.0 (9.5-16.6)
Nephrology	3 (4.6)	316 (3.8)	9.5 (0-20.2)
Oncology	2 (3.1)	750 (8.8)	2.7 (0-6.4)
Cardiology	8 (12.3)	3478 (40.7)	2.3 (0.7-3.9)

Zakai et al. J Thromb Haemost 2004;2(12):2156-61



## Epidemiology

### VTE in Medical Inpatients

- Incidence of screen-detected VTE may be as high as 15%-20%
- Incidence of symptomatic VTE between 0.5% - 1.5%
- Appropriate endpoints for clinical trials not defined
  - Symptomatic VTE
  - Asymptomatic proximal DVT
  - Asymptomatic distal DVT?

## Outline

- Background
- Epidemiology
- **Prevention**
- Quality Measures
- Future Directions

# Call to Action

The Surgeon General's Call to Action  
to Prevent Deep Vein Thrombosis  
and Pulmonary Embolism

2008



U.S. Department of Health and Human Services

- “The Institute of Medicine has classified the failure to provide appropriate screening and preventive treatment to hospitalized, at-risk patients as a medical error” . . .
- “The Agency for Healthcare Research and Quality has ranked the provision of such preventive treatment as one of the most important things that can be done to improve patient safety.”



# Prevention Joint Commission National Consensus Standards

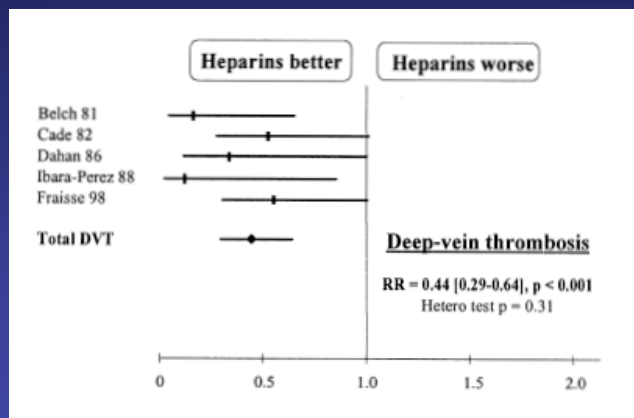
The following six Venous VTE measures were endorsed by NQF

- VTE Prophylaxis
- ICU VTE Prophylaxis
- VTE Patients with Anticoagulation Overlap Therapy
- VTE Patients Receiving UFH with Dosages / Platelet Count Monitoring by Protocol or Nomogram
- VTE Discharge Instructions
- Incidence of Potentially-Preventable VTE

<http://www.jointcommission.org/PerformanceMeasurement/PerformanceMeasurement/VTE.htm>



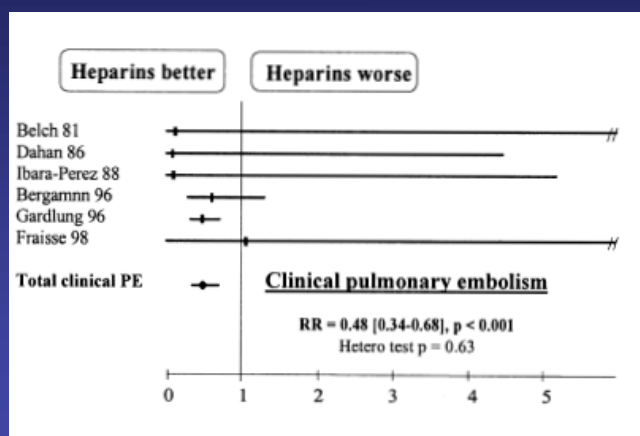
## Prevention – Is VTE Preventable?



Mismetti et al. Thromb Haemost 2000;83(1)



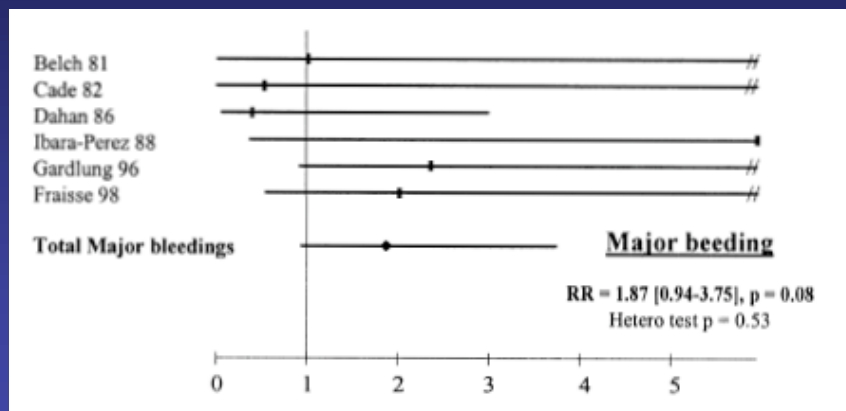
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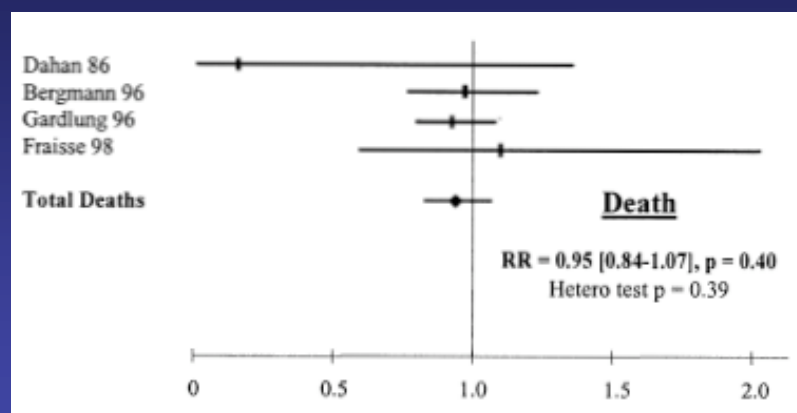
## Prevention – Is VTE Preventable?



Mismetti et al. Thromb Haemost 2000;83(1)



## Prevention – Is VTE Preventable?



Mismetti et al. Thromb Haemost 2000;83(1)



# Prevention – Is VTE Preventable? MEDENOX Trial

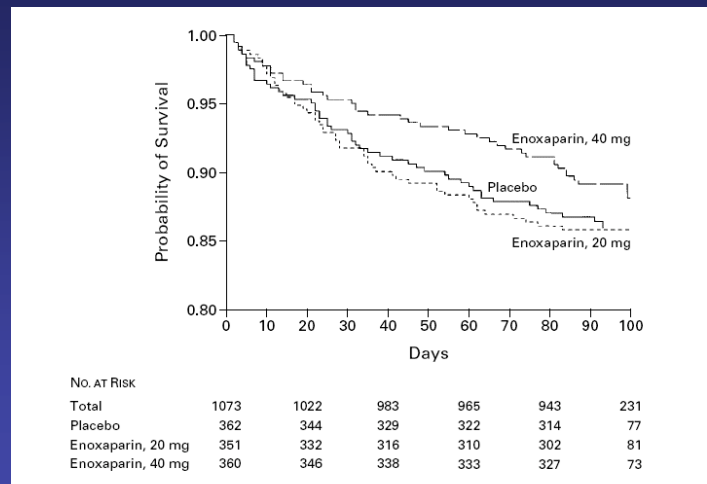
**TABLE 4. RELATIVE RISKS OF PRIMARY AND SECONDARY OUTCOMES FOR EACH ENOXAPARIN REGIMEN AS COMPARED WITH PLACEBO.\***

OUTCOME	20 mg of ENOXAPARIN		40 mg of ENOXAPARIN	
	RELATIVE RISK (95% CI)	P VALUE	RELATIVE RISK (95% CI)	P VALUE
<b>Primary outcome</b>				
Venous thromboembolic events†‡	1.02 (0.70–1.51)	0.90	0.37 (0.22–0.63)	<0.001
Deep-vein thrombosis alone§	1.05 (0.71–1.57)	0.81	0.40 (0.23–0.69)	<0.001
Proximal deep-vein thrombosis§	0.93 (0.45–1.94)	1.00	0.35 (0.13–0.97)	0.04
Distal deep-vein thrombosis§	1.11 (0.68–1.83)	0.68	0.40 (0.20–0.80)	0.01
<b>Secondary outcome</b>				
Venous thromboembolic events¶	1.02 (0.70–1.49)	0.91	0.41 (0.25–0.68)	<0.001
Deep-vein thrombosis alone§	1.07 (0.73–1.58)	0.81	0.40 (0.23–0.69)	<0.001
Proximal deep-vein thrombosis§	0.83 (0.42–1.64)	0.71	0.34 (0.14–0.86)	0.02
Distal deep-vein thrombosis§	1.15 (0.71–1.88)	0.58	0.43 (0.22–0.84)	0.01

Samama et al. NEJM 1999;341:793-800



# Prevention – Is VTE Preventable? MEDENOX Trial



**Figure 1.** Kaplan–Meier Estimate of the Probability of Survival.  
The risk of death was lower in the group assigned to 40 mg of enoxaparin than in the group assigned to placebo (relative risk, 0.83; 95 percent confidence interval, 0.56 to 1.21; P=0.31).

Samama et al. NEJM 1999;341:793-800



# Prevention – Is VTE Preventable?

**Table 12—Thromboprophylaxis Trials of LDUH, LMWH, or Fondaparinux vs No Thromboprophylaxis in General Medical Patients: Clinical Descriptions and Results (Section 6.0)\***

Study/Year	Patients (Mean Age, yr/ Cancer Rate, %)	Method of DVT Screening	Intervention		DVT†	
			Control	Experimental	Control	Experimental
Gallus et al <sup>587</sup> /1973	CHF (NR/NR)	FUT × 11 d	No thromboprophylaxis	LDUH tid	7/15 (46.7)	1/11 (9.1)
Belch et al <sup>588</sup> /1981	CHF, pneumonia (66/NR)	FUT up to 14 d	No thromboprophylaxis	LDUH tid	13/50 (26.0)	2/50 (4.0)
Cade <sup>589</sup> /1982	Medical patients plus second risk factor (NR/ NR)	FUT × 4–10 d	Placebo	LDUH bid	7/67 (10.4)	1/64 (1.6)
Dahan et al <sup>590</sup> /1986	Age > 65 yr (80/13)	FUT × 10 d	Placebo	Enoxaparin, 60 mg/d	12/131 (9.2)	4/132 (3.0)
Samama et al <sup>575</sup> /1999	Age > 40 yr plus second risk factor (73/14)	Venography or DUS day 6–14	Placebo	Enoxaparin, 20 mg/d Enoxaparin, 40 mg/d	43/288 (14.9)	43/287 (15.0) 16/291 (5.5)
Leizorovicz et al <sup>579</sup> /2004	Age ≥ 40 yr plus acutely ill medical patients (69/5)	DUS day 21	Placebo	Dalteparin, 5,000 U/d	73/1473 (5.0)‡	42/1518 (2.8)‡
Cohen et al <sup>579</sup> /2006	Acutely ill medical patients plus age > 60 yr (75/15)	Venography day 6–15	Placebo	Fondaparinux, 2.5 mg/d	34/323 (10.5)	18/321 (5.6)

\*Includes randomized clinical trials in which routine screening with an objective diagnostic test for DVT was used. CHF = congestive heart failure; see Table 11 for expansion of abbreviation.

†Values given as No. of patients with DVT/total No. of patients (%).

‡Clinically important VTE (composite of objectively verified symptomatic DVT or PE, sudden death, and asymptomatic proximal DVT).

8th ACCP



# Prevention – Best Anticoagulant?

**Table 13—Thromboprophylaxis Trials of LDUH vs LMWH in General Medical Patients: Clinical Descriptions and Results (Section 6.0)\***

Study/ Year	Patients (Mean Age, yr/Cancer Rate, %)	Method of DVT Screening	Intervention		DVT†	
			LDUH	LMWH	LDUH	LMWH
Bergmann et al <sup>593</sup> / 1996	Bedridden, age ≥ 65 yr (83/7)	FUT × 10 d	5,000 U bid	Enoxaparin, 20 mg/d	10/216 (4.6)	10/207 (4.8)
Harenberg et al <sup>594</sup> / 1996	Bedridden, age 50–50 yr plus second risk factor (70/8)	Proximal DUS days 8–11	5,000 U tid	Nadroparin, 3,400 AXa U/d	4/780 (0.5)	6/810 (0.7)
Lechler et al <sup>595</sup> / 1996	Immobile ≥ 7 d plus second risk factor (74/14)	DUS day 7	5,000 U tid	Enoxaparin, 40 mg/d	6/377 (1.6)	1/393 (0.3)
Kleber et al <sup>596</sup> / 2003	Severe respiratory disease or congestive heart failure (70/6)	Venography if d-dimer or fibrin monomer positive days 8–12	5,000 U tid	Enoxaparin, 40 mg/d	22/212 (10.4)	20/239 (8.4)

\*Includes randomized clinical trials in which LDUH and LMWH were compared and routine screening with an objective diagnostic test for DVT was used. AXa = anti-Factor Xa.

†Values given as No. of patients with DVT/total No. of patients (%).

8th ACCP



## Prevention – Best Anticoagulant?

- Evidence does not support use of one anticoagulant over another
  - (LMWH versus LDUH versus fondaparinux)
- Choices should be individualized based on patient characteristics
  - Renal failure, history of HIT etc
- TID UFH has more evidence than BID UFH

8th ACCP



## Prevention Survival Benefit of VTE Prophylaxis

- Assume
  - the prevalence of PE is 1%
  - prophylaxis reduces the incidence by 60%
  - 20% of PE are fatal
- Then
  - VTE prophylaxis would reduce mortality from PE from 0.2% to 0.08%
  - For a RCT: 15,000 individuals in each arm!



## Prevention – Risk Stratification

- Identify a group at risk
  - Inherent risk factors
  - Factors present at the time of admission
  - Factors occurring during hospitalization
- Apply a systematic strategy to ensure prophylaxis is used
- Assess compliance and outcomes



## Prevention – Risk Stratification Inherent Risk Factors

- Age
- Thrombophilia
- Gender



## Prevention – Risk Stratification Admission Risk Factors

- Central venous catheters
- Immobility
- Infection
- Medications
- Co-morbid conditions
- Acute medical illness



## Prevention – Risk Stratification Hospital-Acquired Risk Factors

- Immobility
- Central Venous Catheters
- Hospital-acquired infections
- Medications / Interventions
- Prophylactic measures
- Ambulation



## Prevention Risk Stratification

- No prospectively validated risk stratification models for medical patients
- Existing models depend on expert opinion and extrapolation of risk factors from other patient populations
- Models don't address risk factors occurring as a result of hospitalizations



## Prevention Factors not Associated with VTE

Factor	Cases (65)	Controls (123)	p
Age	65.4 ± 4.3*	63.0 ± 3.3*	0.61
BMI <sup>1</sup>	28.8 ± 2.2	27.6 ± 1.6	0.75
HCT	36.1 ± 0.7	35.6 ± 0.6	0.19
ALB	2.95 ± 0.08	3.10 ± 0.07	0.34
WBC	11.5 ± 0.7	12.8 ± 2.7	0.32

Zakai et al. J Thromb Haemost 2004;2(12):2156-61

\* ± SD

<sup>1</sup> BMI obtained in 47 Cases, 105 Controls

## Prevention Factors not Associated with VTE

Factor	Cases (65)	Controls (123)	P
Female	58%	53%	0.46
History of VTE	6%	7.3%	0.77
Malignancy	23%	21%	0.76
MI	11%	8.9%	0.69
CHF	25%	29%	0.50
Lung Disease	42%	33%	0.22
Obese <sup>1</sup>	34%	31%	0.75

Zakai et al. J Thromb Haemost 2004;2(12):2156-61

<sup>1</sup> Obtainable in 47 cases, 105 controls

## Prevention – VTE Risk Factors

Factor	Cases	Controls	OR (CI)
Trauma Last 3 Months	7.7%	1.6%	5.0 (0.9 – 26.8)
Specific Cancer <sup>1</sup>	12.3%	6.5%	2.0 (0.7 – 5.7)
Admission Temp ≥ 38°C	27.7%	13.8%	2.4 (1.1 – 5.0)
Leg Edema on Admission	33.8%	13.8%	3.2 (1.5 – 6.6)
Immobility ≥ 72 hours	52.3%	30.1%	2.5 (1.4 – 4.7)
Cellulitis	10.8%	3.3%	3.6 (1.0 – 12.8)
Pneumonia	40.0%	21.1%	2.5 (1.3 – 4.8)
Sepsis	10.8%	5.7%	2.0 (0.7 – 6.0)
Platelet Count ≥ 350	32.3%	16.3%	2.5 (1.3 – 4.8)
HRT Use <sup>2</sup>	12.5%	4.1%	2.9 (0.8 – 10.9)

Zakai et al. J Thromb Haemost 2004;2(12):2156-61

<sup>1</sup> Primary Brain, breast, GI, or GU

<sup>2</sup> Women only (32 cases, 61 controls)

## Prevention – Risk Factors

Risk Factor	Univariate	Multivariate
Trauma Last 3 Months	5.0 (0.9 – 26.8)	7.9 (1.1 – 54.9)
Brain, Breast, GI, GU Cancer	2.0 (0.7 – 5.7)	2.8 (0.8 – 9.5)
Admission Temperature $\geq 38^{\circ}\text{C}$	2.4 (1.1 – 5.0)	1.9 (0.8 – 4.5)
Leg Edema on Admission	3.2 (1.5 – 6.6)	3.0 (1.2 – 7.3)
Immobility $\geq 72$ hours	2.5 (1.4 – 4.7)	2.0 (0.8 – 4.6)
Cellulitis	3.6 (1.0 – 12.8)	2.5 (0.6 – 11.3)
Pneumonia	2.5 (1.3 – 4.8)	2.7 (1.2 – 5.8)
Sepsis	2.0 (0.7 – 6.0)	1.3 (0.3 – 4.7)
Platelet Count $\geq 350$	2.5 (1.3 – 4.8)	3.1 (1.4 – 7.0)
Use of VT PPX		
< 1/3 days	1.0 (Reference)	1.0 (Reference)
1/3 – 2/3 days	1.0 (0.5 – 2.0)	1.1 (0.3 – 3.4)
> 2/3 days	2.1 (0.8 – 5.8)	0.4 (0.2 – 0.9)

Zakai et al. J Thromb Haemost 2004;2(12):2156-61

## Prevention – Risk Factors MEDENOX Trial

**Table 7. Multivariate Logistic Regression Model for Definite Venous Thromboembolism (VTE)**

Risk Factor	Odds Ratio (95% Confidence Interval)	$\chi^2$
Age >75 y	1.03 (1.00-1.06)	0.0001
Cancer	1.62 (0.93-2.75)	0.08
Previous VTE	2.06 (1.10-3.69)	0.02
Acute infectious disease	1.74 (1.12-2.75)	0.02
Chronic respiratory disease	0.60 (0.38-0.92)	0.02

Alikhan et al. Archives Int Med 2004; 164



## Prevention – Risk Factors 8<sup>th</sup> ACCP

- Heart Failure
- Respiratory Disease
- Immobility
- Active Cancer
- Previous VTE
- Sepsis
- Acute Neurologic Disease
- Inflammatory Bowel Disease



## Prevention - Risk Factors

- **Age**
  - Age clearly a risk factor for VTE
  - Medical inpatients have a high average age
  - Younger patients sicker diluting associations
- **Obesity**
  - Medical patients likely have a high BMI
  - Acute increase in risk of hospitalization overwhelms general increased risk



## Epidemiology - Risk Factors

- **Malignancy – Clear Risk Factor for VTE**
  - Perhaps more Oncology patients were admitted with VTE rather than developed as an inpatient
  - Differences in prophylaxis could affect risk
- **Heart Disease**
  - Many older studies show increased VTE
    - Treatment of myocardial infarctions has changed
    - Early mobilization, use of anticoagulants and thrombolytics



## Epidemiology – Risk Factors

- **Trauma in last 3 months**
  - Well recognized as a risk factor
  - Dependent on accurate H&P
  - Role likely underestimated in this analysis
- **Leg Edema**
  - May have a variety of causes (heart failure, venous insufficiency, infection) which promote VTE
  - Can cause decreased mobility which promotes VTE
- **Pneumonia**
  - Multiple risk factors for thrombosis including immobility, inflammation, and infection



## Platelet Count – A Novel Risk Factor?

Table 3. Predictive model for chemotherapy-associated VTE

Patient characteristic	Risk score
<b>Site of cancer</b>	
Very high risk (stomach, pancreas)	2
High risk (lung, lymphoma, gynecologic, bladder, testicular)	1
Prechemotherapy platelet count $350 \times 10^9/L$ or more	1
Hemoglobin level less than 100 g/L or use of red cell growth factors	1
Prechemotherapy leukocyte count more than $11 \times 10^9/L$	1
BMI $35 \text{ kg/m}^2$ or more	1

Khorana et al. Blood 2008; 111(10)



## Platelet Count – A Novel Risk Factor?

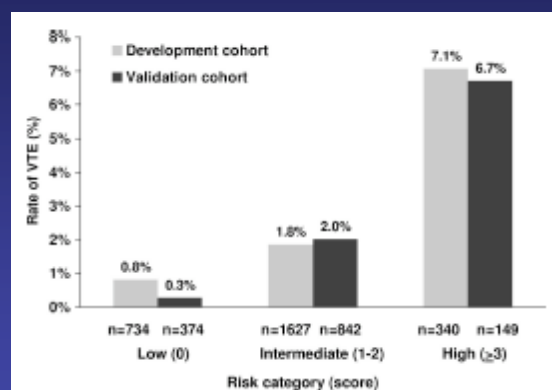


Figure 1. Rates of VTE according to scores from the risk model in the derivation and validation cohorts.

Khorana et al. Blood 2008; 111(10)



## Epidemiology - Risk Factors

- Independent risk factors are not necessarily causal
  - Endpoints for the same causal pathway
  - Surrogates for causal factors
- Some variables are more easily assessed than others
  - Factors present before admission are more difficult to measure (immobility, trauma, etc.)
  - Factors present during admission are easier to measure (leg edema, elevated platelet count)



## Prevention – Risk Models

- 
- |   |   |
|---|---|
| <input type="checkbox"/> Age (41 – 60 Score 1)      | <input type="checkbox"/> Expected Bed-rest (>72h)       |
| <input type="checkbox"/> (61 – 70 Score 2)          | <input type="checkbox"/> Travel (> 4h past week)        |
| <input type="checkbox"/> (> 71 Score 3)             | <input type="checkbox"/> History of pelvic/long bone fx |
| <input type="checkbox"/> Prior bed-rest > 72h       | <input type="checkbox"/> Leg edema, ulcers, stasis      |
| <input type="checkbox"/> History of VTE (3)         | <input type="checkbox"/> Malignancy                     |
| <input type="checkbox"/> Varicose Veins             | <input type="checkbox"/> Pregnancy or postpartum        |
| <input type="checkbox"/> Obesity (> 20% Ideal)      | <input type="checkbox"/> Inflammatory bowel disease     |
| <input type="checkbox"/> History of Surgery         | <input type="checkbox"/> Severe Infection               |
| <input type="checkbox"/> Past immobilization (>72h) | <input type="checkbox"/> Hormone Use                    |
| <input type="checkbox"/> MI                         | <input type="checkbox"/> Hypercoagulable States         |
| <input type="checkbox"/> CHF                        | <input type="checkbox"/> Crystalloid infusion (>5L/24h) |
| <input type="checkbox"/> Stroke                     | <input type="checkbox"/> Trauma                         |
| <input type="checkbox"/> Severe COPD                |   |
- 

Score: 1 – Low, 2 – 4 Moderate, > 4 High

Arcelus. Sem Thromb Hemo Vol 17, suppl 3 1991



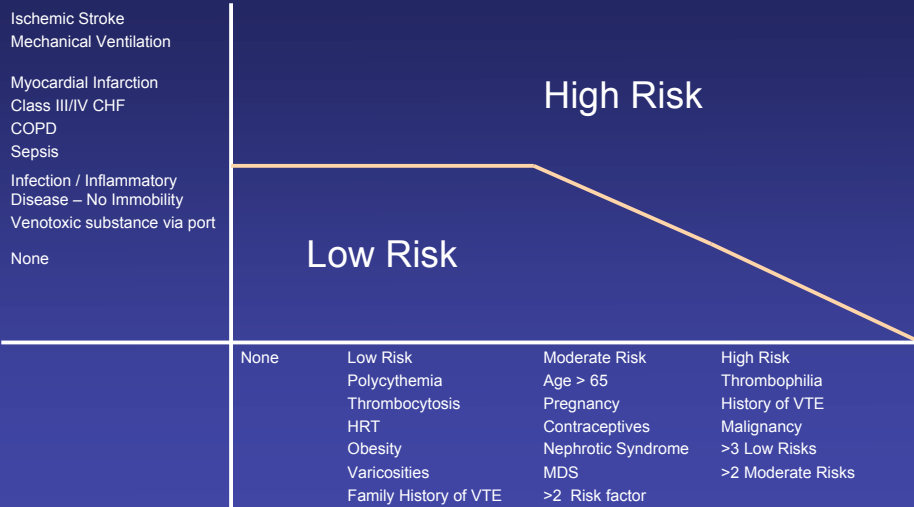
# Prevention – Risk Models

Arcelus. Sem Thromb Hemo Vol 17, suppl 3 1991

- Advantages
  - Scoring System
  - Combination of Inherent and risk factors on admission
  - Designed for medical inpatients
- Disadvantages
  - Need to “predict” risk factors
  - Not validated
  - Strong reliance on age, does not use platelet count



# Prevention – Risk Models



Lutz Die Medizinische Welt Vol 53 2002



# Prevention – Risk Models

Lutz Die Medizinische Welt Vol 53 2002

- Advantages
  - Takes into account inherent and acquired risk
  - Graphical design
- Disadvantages
  - Not prospectively validated
  - Indeterminate classifications



# Prevention – Risk Models

Risk Level	Definition
<b>Low</b>	*Minor Surgery (<30 minutes); no risk factors other than age *Major surgery (>30 minutes); age < 40; no other risk factors *Minor trauma or medical illness
<b>Medium</b>	*Major general, urological, gynaecological, cardiothoracic, vascular, or neurological surgery; age > 40y or other risk factor *Major medical illness: heart or lung disease, cancer, IBD *Major trauma or burns *Minor surgery, trauma, or illness in patients with previous DVT, PE, or thrombophilia
<b>High</b>	*Fracture of major orthopaedic surgery of pelvis, hip, or lower limb *Major pelvic or abdominal surgery for cancer *Major surgery, trauma, or illness in patients with previous DVT, PE, or thrombophilia *Lower limb paralysis *Major lower limb amputation

Thrift BMJ Vol. 305 1992



## Prevention – Risk Models

Thrift BMJ Vol. 305 1992

- Advantages
  - High, medium and low risk categories
- Disadvantages
  - Mostly for surgical patients



## Prevention - Risk Models Do they work?

**Table 2.** Association of Published VTE Risk Scores with Risk of VTE

Risk Tool	Percent of Cases at High Risk (%)	Percent of Controls at High Risk (%)	Adjusted* Odds Ratio of VTE
Arcelus <sup>23</sup>	70%	56%	2.6 (1.3, 5.5)
Lutz <sup>25</sup>	58%	54%	0.9 (0.5, 2.0)
THRIFT <sup>24</sup>	20%	12%	1.3 (0.6, 3.2)

\*Adjusted for VTE prophylaxis use

Zakai et al. J Thromb Haemost 2004;2(12):2156-61



## Prevention - Risk Models

- Existing models are limited in that
  - Novel risk factors are not included
  - Traditional risk factors may not have the same impact in all populations
  - Risk in younger patients may be underestimated
  - Risk assessment should be ongoing as factors after admission could affect VTE risk



## Prevention – 8<sup>th</sup> ACCP Guidelines

- **For every general hospital, we recommend that a formal, active strategy that addresses the prevention of VTE be developed (Grade 1A).**
- **We recommend that the local thromboprophylaxis strategy be in the form of a written, institution-wide thromboprophylaxis policy (Grade 1C).**



## Prevention – 8<sup>th</sup> ACCP Guideleines

“For acutely ill medical patients admitted to hospital with congestive heart failure or severe respiratory disease, or who are confined to bed and have one or more additional risk factors, including active cancer, previous VTE, sepsis, acute neurologic disease, or inflammatory bowel disease, we recommend thromboprophylaxis with LMWH (Grade 1A), LDUH (Grade 1A), or fondaparinux (Grade 1A).”



## Outline

- Background
- Epidemiology
- Prevention
- **Quality Measures**
- Future Directions



## Quality Measures VTE Prophylaxis Use

**Table 2** Study population and thromboprophylaxis rates

Discharge group	No. of patients	Any prophylaxis (%)	Appropriate prophylaxis (%)
Total medical patients	196 104	61.8	33.9
Acute myocardial infarction	22 563	95.4	43.0
Heart failure	36 861	72.0	40.1
Ischemic stroke	8962	70.8	49.2
Trauma (without surgery)	9999	64.2	20.3
Cancer	30 708	56.4	27.6
Severe lung disease	86 891	49.8	31.0
Acute spinal cord injury (without surgery)	120	40.8	20.8

Amin JTH 2007; 5: 1610–6



## Quality Measures VTE Prophylaxis Use

- No VTE Prophylaxis in 41% cases, 53% controls
- Factors associated with use of VTE prophylaxis
  - History of VTE, CHF, or immobility
  - Leg edema on admission, or ICU admission
  - Mentioning VTE prophylaxis in admission note

Zakai et al. J Thromb Haemost 2004;2(12):2156-61



## Quality Measures Increase VTE Prophylaxis Use

- CME activities Anderson Arch Intern Med 1994;154(6):669-77
  - VTE prophylaxis use increased 28% in intervention versus 11% in control hospitals
- Pharmacy Reminders Gladding N Z Med J 2007;120(1251)
  - VTE prophylaxis increased from 11% to 47%
- Risk tool with audit feedback Cohn J Hosp Med 2006;1(6)
  - Prophylaxis rates increased from 46% to 86%
- Computer reminders Kucher NEJM 2005;352(10):969-77
  - Prophylaxis rates increased from 13% to 23%



## Quality Measures

- Many measures required a sustained commitment from institutions, providers and other medical staff
- The impact of these tools on outcomes is difficult to assess
  - Important components difficult to assess
  - Difficult to blind or rely on a historical control period



## Quality Measures 8<sup>th</sup> ACCP Guidelines

- **We recommend the use of strategies shown to increase thromboprophylaxis adherence, including**
  - the use of computer decision support systems (Grade 1A),
  - preprinted orders (Grade 1B),
  - and periodic audit and feedback (Grade 1C).
  - **Passive methods such as distribution of educational materials or educational meetings are not recommended as sole strategies to increase adherence to thromboprophylaxis (Grade 1B).**



## Outline

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## Future Directions

- More research into the risk factors for VTE in medical inpatients
- Develop a validated risk stratification tool
- Identify a patient population who would benefit from VTE prophylaxis
- Determine the best QC methods to ensure compliance with guidelines



## Bottom Line

- VTE occurs relatively frequently in medical inpatients
- There are no validated risk stratification tools
  - LMWH and fondaparinux are relatively safe
  - VTE can be a devastating outcome
- My personal opinion
  - Most medical patients should get VTE prophylaxis
  - Heparins or fondaparinux should be used unless contra-indicated
  - Patients who cannot tolerate anticoagulants are often at the highest risk for VTE

## Upcoming NATF Programs

- Conference on DVT and PE: A Discussion with the Surgeon General, *January 30, 2009, Boston, MA*
- Proactive Thrombosis Prevention: Patient and Health Professional Forum, *April 4, 2009, Boston, MA*
- Educational Dinner at ISTH, *July 11, 2009, Boston, MA*
- Thrombosis Summit 2009, *September 26, 2009, Boston, MA*
- NATF Traveling Fellowship, *Application Deadline: July 30, 2009*

*More Information at [www.NATFonline.org](http://www.NATFonline.org)*

