Public Health Importance of Venous Thromboembolism

CDR Althea M. Grant, PhD

Chief, Epidemiology and Surveillance Branch,

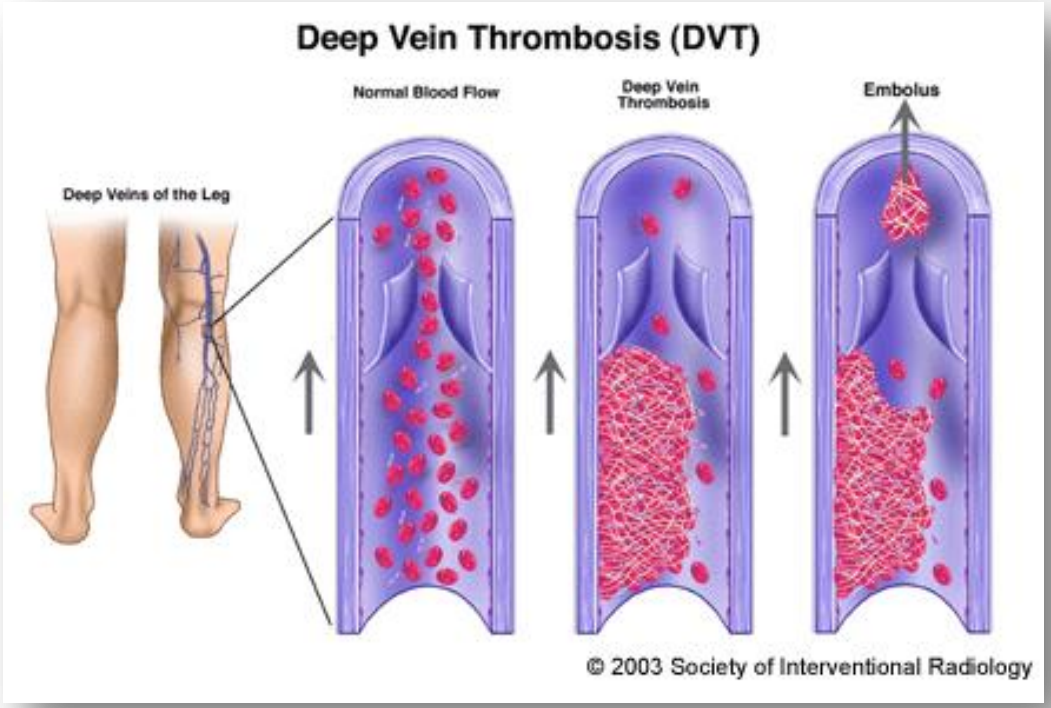
Division of Blood Disorders

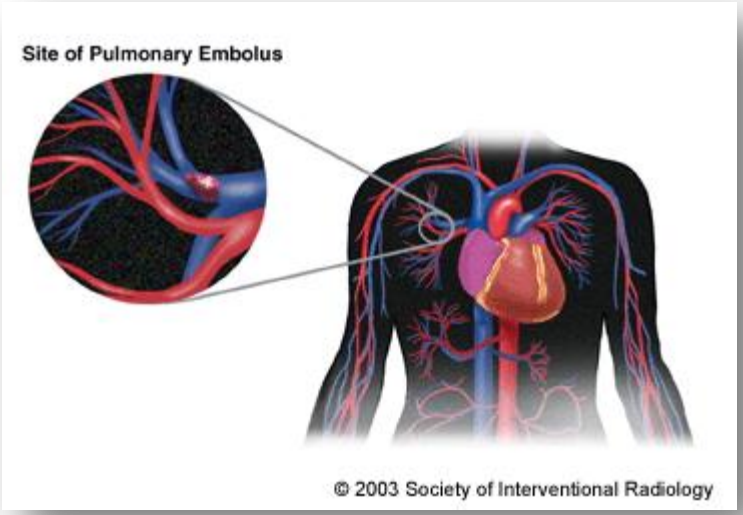
National Center on Birth Defects and Developmental Disabilities

CDC

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

What is Venous Thromboembolism (VTE)?

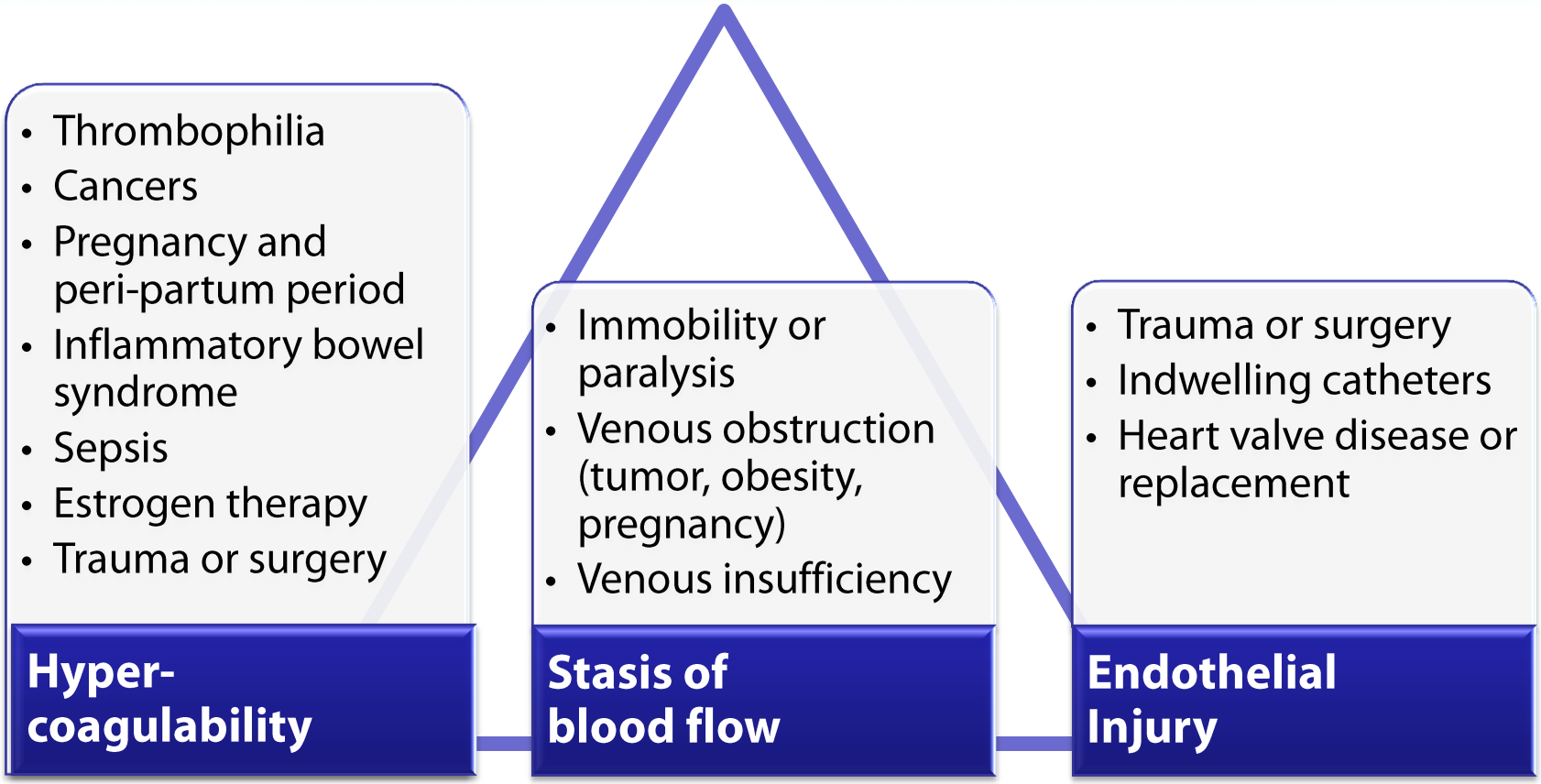




- **DVT, Deep vein thrombosis**
  - Blood clot in a deep vein

- **PE, Pulmonary embolism**
  - Blood clot that has traveled to and is blocking an artery supplying lung

Virchow's Triangle: Causes of Venous Thromboembolism



VTE in the United States in Numbers

Incidence

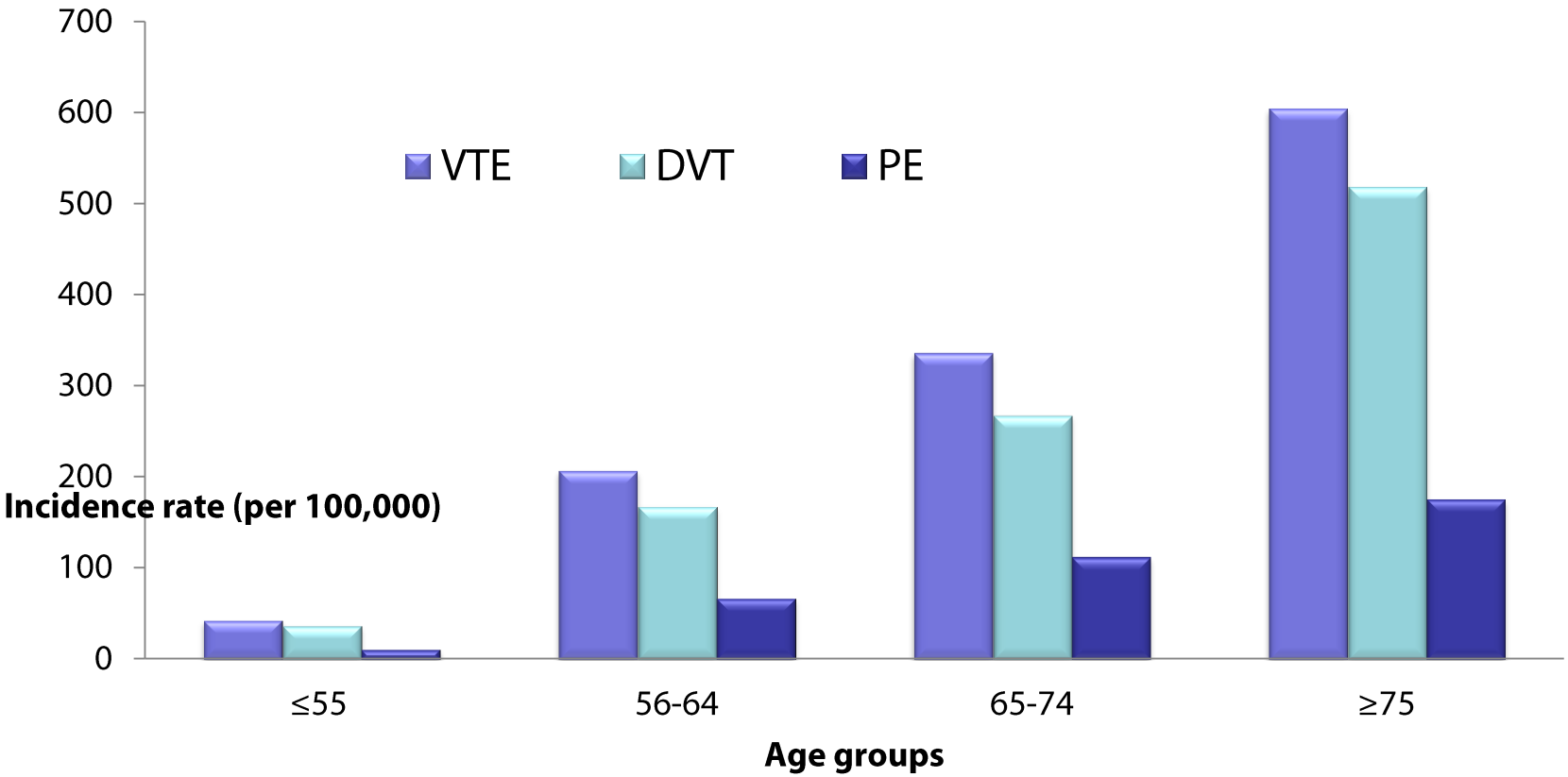
- 100–120 per 100,000 adults/year
  - 140 per 100,000 African Americans
  - 100 per 100,000 non-Hispanic Whites
  - 60 per 100,000 Hispanics
  - 30 per 100,000 Asians
- Estimated 300,000–900,000 cases/year
  - 2/3 DVT: 200,000–600,000 cases/year
  - 1/3 PE: 100,000–300,000 cases/year

Recurrence

- 10–30% of people with a new VTE develop another VTE within 5 years

Silverstein MD, et al. Arch Intern Med 1998; 158:585–93
Beckman M, et al. Am J Prev Med 2010; 38:S495–501
Prandoni P, et al. Ann Intern Med 1996;125:1–7
Heit JA, et al. Arch Intern Med 2000;160:761–8
Spencer FA, et al. J Gen Intern Med 2006; 21:722–7
White RH, et al. Thromb Haemost 2005;93:298–305
Spencer FA, et al. J Thromb Thrombolysis 2009;28:401–9

VTE Incidence Rates Increase with Age



Spencer FA, et al. J Thromb Thrombolysis 2009;28(4):401–9
DVT, Deep vein thrombosis
PE, Pulmonary embolus

Health Consequences of VTE

- **Mortality**
  - If not treated, 10-30% of PEs are fatal
    - 30,000-100,000 deaths per year
  - If treated, 2-8% PEs are fatal
  - Many deaths from PE are undiagnosed
- **Post thrombotic syndrome (PTS)**
  - 20-50% of people with DVT develop PTS
    - Swelling, pain, discoloration, and scaling in the affected limb
  - PTS reduces quality of life and functioning and may cause disability

DVT, deep vein thrombosis

Heit JA. J Thromb Haemost 2005;3(8):1611–7
Goldhaber SZ, et al. for ICOPER. Lancet 1999;353:1386–9
Carson JL, et al: NEJM 1992;326(19):1240–5

Risk Factors for VTE

Strong risk factors	Moderate risk factors	Weak risk factors
Fracture (hip or leg)	Arthroscopic knee surgery	Prolonged bed rest
Hip or knee replacement	Central venous lines	Immobility
Major general surgery	Chemotherapy/Cancer	Age >40 years
Major trauma	Congestive heart or respiratory failure	Laparoscopic surgery
Spinal cord injury	Estrogen	Obesity
	Age >65 years	Pregnancy
	Paralytic stroke	Varicose veins
	Postpartum period	
	Previous VTE	
	Thrombophilia	

Anderson FA, et al. Circulation 2003;107:I-9-I-16

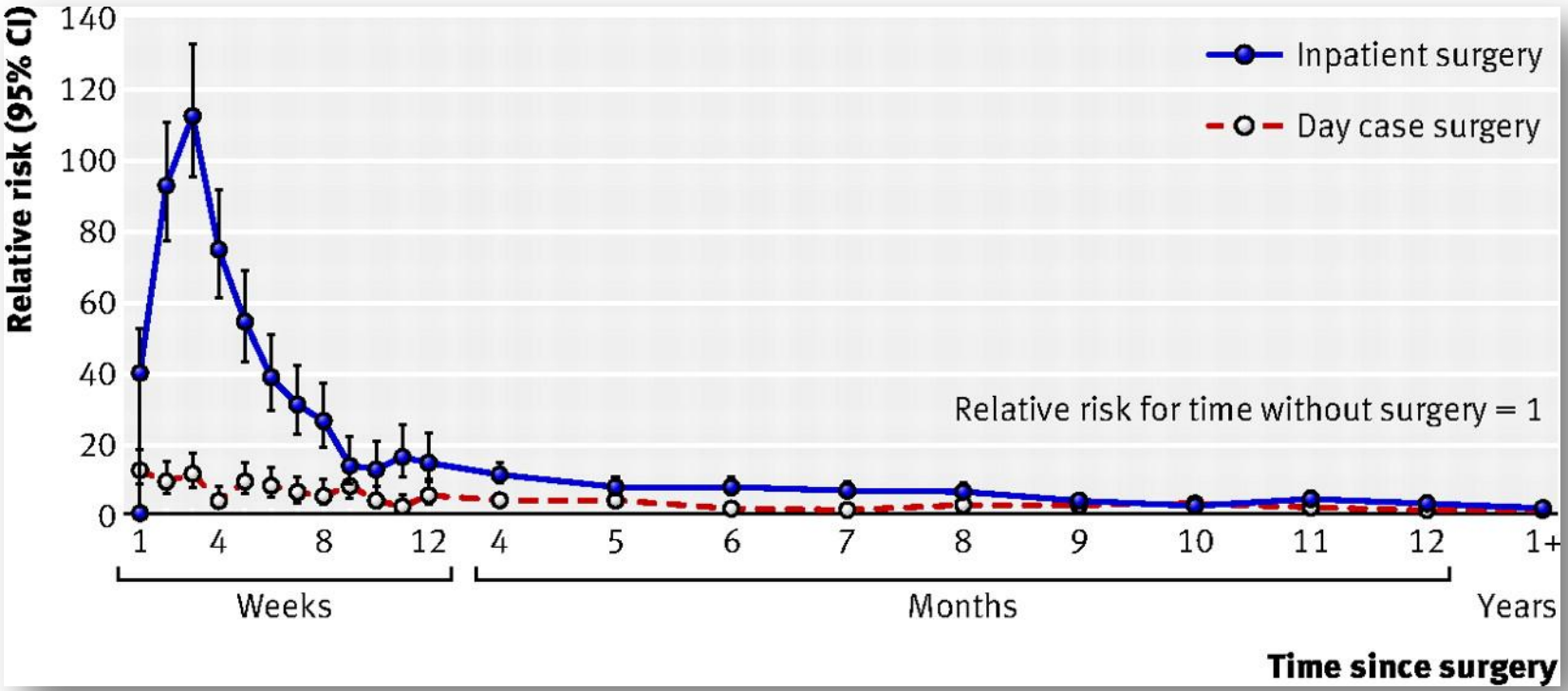
Half of VTE Are Hospital-associated

- **46% of new VTE are recognized within 90 days of a hospital stay**
  - 24%: Hospitalization with surgery
  - 22%: Hospitalization without surgery
- **VTE is a preventable patient safety concern**
  - According to one study, VTE is the 4th most frequent cause of serious hospital patient harm, 1 of 8 preventable deaths
- **74% of VTE are identified outside of the hospital inpatient setting or during the first 24 hours after inpatient admission**

Heit JA. Arch Intern Med 2002;162(11):1245–8
Classen DC, et al. Health Affairs 2011;30(4):581–9
Spencer FA, et.al. Arch Intern Med 2007;23:167(14):1471–5

Most HA-VTE Occur Within 3 Months of Hospital Encounter

Relative risk of venous thromboembolism by time since inpatient surgery and since day case surgery



Sweetland S, et al. BMJ 2009;339:bmj.b4583

HA-VTE, Hospital-associated venous thromboembolism

What Can Be Done to Prevent VTE?

- **There is knowledge and evidence available**
  - How to prevent and/or minimize the health impact of VTE especially among patients at elevated risk
- **The key to implementing successful prevention**
  - Identify and target these prevention efforts to people at elevated risk of VTE
- **A large proportion of VTEs are healthcare-associated**
  - There is a clear role that clinicians and hospitals can play in prevention of VTE

Role of CDC and Public Health

1. Support and conduct epidemiologic and health services research on the causes, prevention, and treatment of VTE
2. Clarify and promote use of evidence-based practices for screening, preventing, diagnosing, and treating VTE
3. Increase public and provider knowledge and awareness
4. Implement surveillance to track VTE rates and monitor use and effectiveness of interventions over time

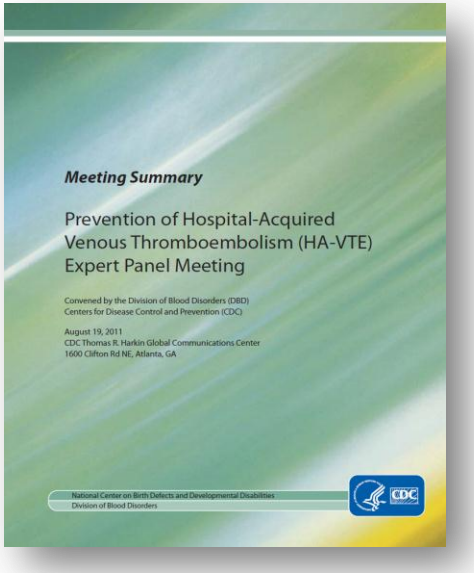
1. Support Epidemiologic and Health Services Research

- **CDC-supported projects**
  - Thrombosis and Hemostasis Centers Research and Prevention Network
  - Genetic Attributes and Thrombosis Epidemiology Study
- **Key findings**
  - Sickle cell trait is an important risk factor for VTE in African Americans
  - Traditional risk factors, presentation, and morbidity may differ among races, ages, and sexes
  - Thrombophilia is not only a risk factor for VTE but also a risk factor for adverse pregnancy outcomes

2. Promote Evidence-based Prevention Practices

- **Goal: Develop recommendations to improve HA-VTE prevention**
- **Outcome: Identified opportunities to improve prevention of HA-VTE**
  - Strategies to address VTE prophylaxis underutilization among medical populations
  - Adherence to clinician-prescribed VTE prophylaxis among hospitalized patients
  - Track burden through identification of medical patients at risk for VTE after discharge
- **Next steps**
  - Summarize existing hospital prevention guidelines and risk assessment models and evaluate risk-stratified prevention protocols

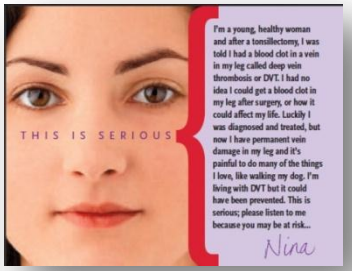
August 2011
Expert Panel Meeting



3. Increase Knowledge and Awareness

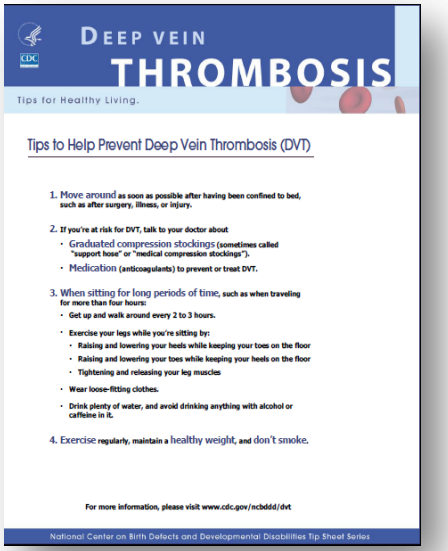
- **Funding organizations to develop health promotion initiatives and provider training**

Vascular Disease Foundation (VDF)



National Blood Clot Alliance (NBCA)

CDC fact sheets and videos



http://www.cdc.gov/ncbddd/dvt/documents/DVT-panel-card_Final1210.pdf
http://stoptheclot.org

4. Implement Surveillance to Track VTE Rates and Monitor Use and Effectiveness of Interventions

- **Currently, there is no population-based surveillance of VTE in the United States**
- **VTE surveillance challenges**
  - Identifying those at risk
  - Distinguishing new vs. recurrent VTE
  - Collecting the data

VTE Surveillance Challenges

- **Identifying those at risk**
  - Risk factors: Genetic or acquired
    - A trigger: Hospitalization, surgery, injury, immobility, cancer, etc.
    - Unknown: Spontaneous
    - Multiple risk factors
- **Distinguishing new vs. recurrent VTE**
- **Collecting the data**
  - From diverse populations
    - Events occur at all stages of the lifespan, all races/ethnicities, both sexes
  - From multiple sources
    - Patients are diagnosed and treated in multiple settings
    - Events can result in sudden death

CDC Is Developing Population-based Surveillance Systems

- **2012: Funded 2 pilot programs**
  - Durham County, NC and Oklahoma County, OK
  - Goals
    - Establish population-based estimates of VTE burden and characteristics by age, race, and sex
    - Monitor and describe associated morbidity and mortality
    - Monitor trends over time and evaluate outcomes, recurrence, and the effect of prevention measures
- **2014: Funding pilot projects**
  - Goals
    - Monitor rates of hospital-associated VTE
    - Monitor VTE prevention practices in hospitals

Prevention of Venous Thromboembolism (VTE)
The Johns Hopkins Medical Institutions (JHMI)
VTE Collaborative

Michael B. Streiff, MD, FACP

Associate Professor of Medicine

Medical Director, Johns Hopkins Anticoagulation Management Service

Johns Hopkins Medical Institutions

DISCLOSURE: Dr. Streiff serves as a consultant and a CME lecturer for Eisai and Sanofi-aventis

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Prevention of Venous Thromboembolism

- **Antithrombotic prophylaxis**
  - Heparin
  - Low molecular weight heparin
  - Fondaparinux
  - Warfarin
  - New oral anticoagulants
  - Aspirin
- **Mechanical prophylaxis**
  - Graduated compression (TED) stockings
  - Intermittent pneumatic compression devices

American College of Chest Physicians (ACCP) Guidelines for VTE Prophylaxis

- **VTE guidelines recommend prevention strategies based on balance of predicted risk of clotting and bleeding**
- **Most hospital prevention protocols use qualitative risk stratification approaches based on the 2004 and 2008 ACCP guidelines**
- **The 2012 ACCP guidelines, unlike the 2004 and 2008 ACCP guidelines**
  - Endorse quantitative risk stratification models
  - Suggest pharmacological prophylaxis may not be appropriate for all patients

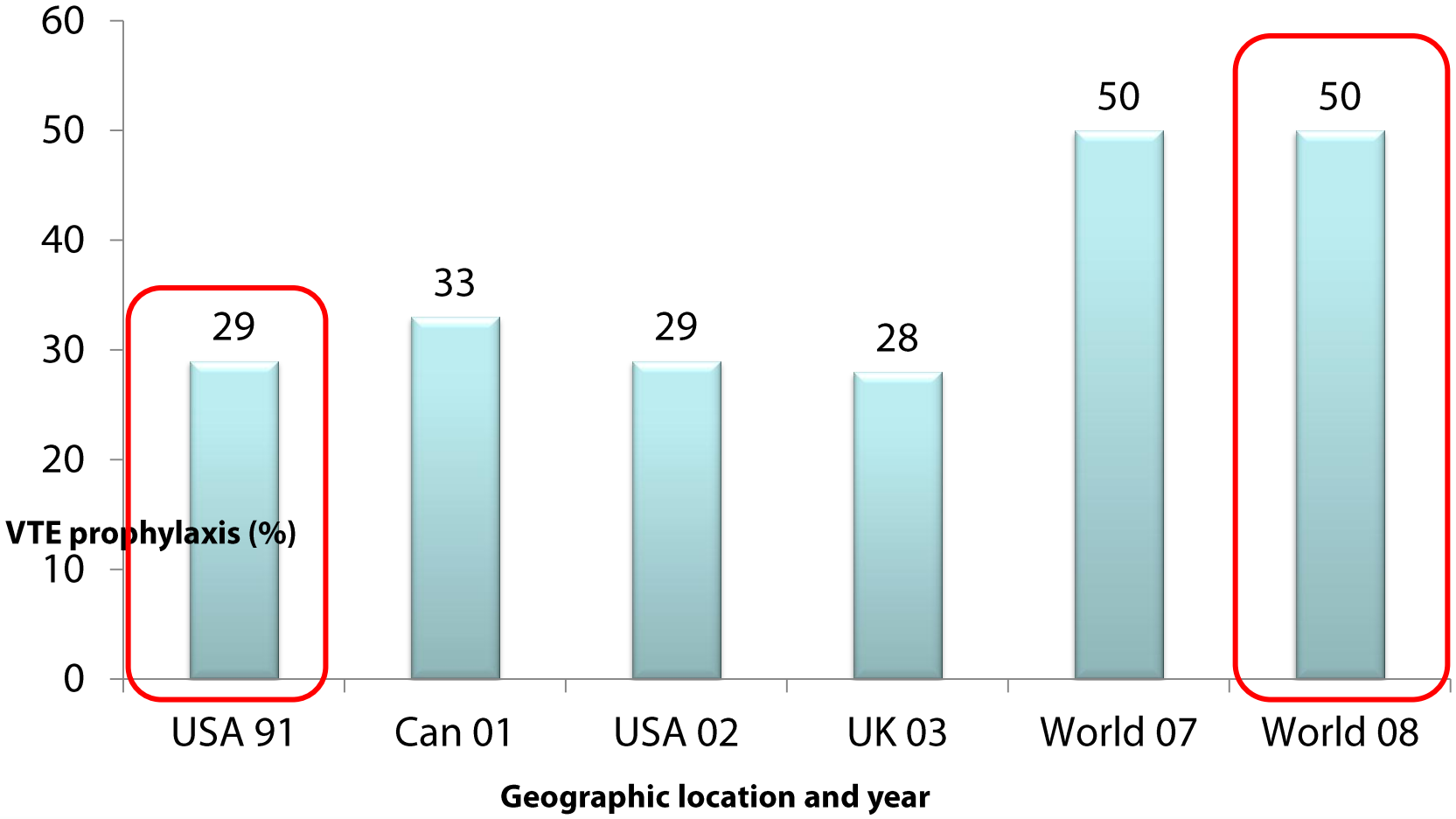
http://www.chestnet.org/accp

Risk Stratification Models

- **VTE risk assessment**
  - Identify patients at high or low risk for VTE
  - VTE risk stratification models
    - Padua Prediction Score
    - Caprini Risk Assessment
  - VTE risk factors include previous VTE, cancer, surgery, and age
- **Bleeding risk assessment**
  - Identify patients at high or low risk for bleeding
  - Bleeding risk assessment model
    - IMPROVE Bleeding Score
  - Bleeding risk factors include recent bleed, and low platelets
- **Limitations of current models: Incomplete validation and limited evidence of improved outcomes**

Barbar S, et al. JTH 2010;8:2450–7
Bahl V, et al. Ann Surg 2010; 251:344–50
Decousus H, et al. Chest 2011;139;69–79

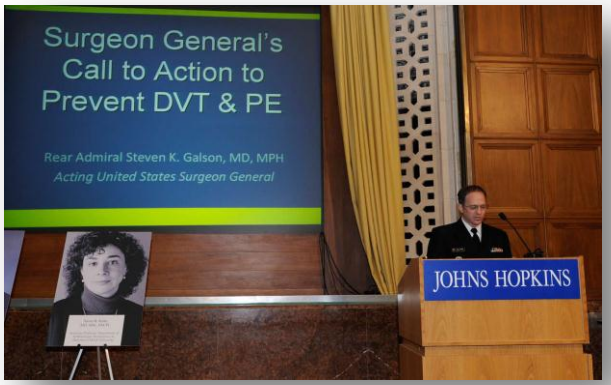
VTE Prevention
We Have Been Failing Our Patients!



Anderson FA, et al. Ann Intern Med. 1991;115:591–5
Goldhaber SZ, et al. Am J Cardiol. 2004;93:259–62
Rahim SA, et al. Thromb Res. 2003;111:215–9
Rashid J. Royal Soc Med 2005;98:507–12
Tapson VF, et al. Chest 2007;132:936–45
Cohen AT, et al. Lancet 2008;371;387–94

JHMI VTE Collaborative's Strategy for Achieving Optimal VTE Prophylaxis

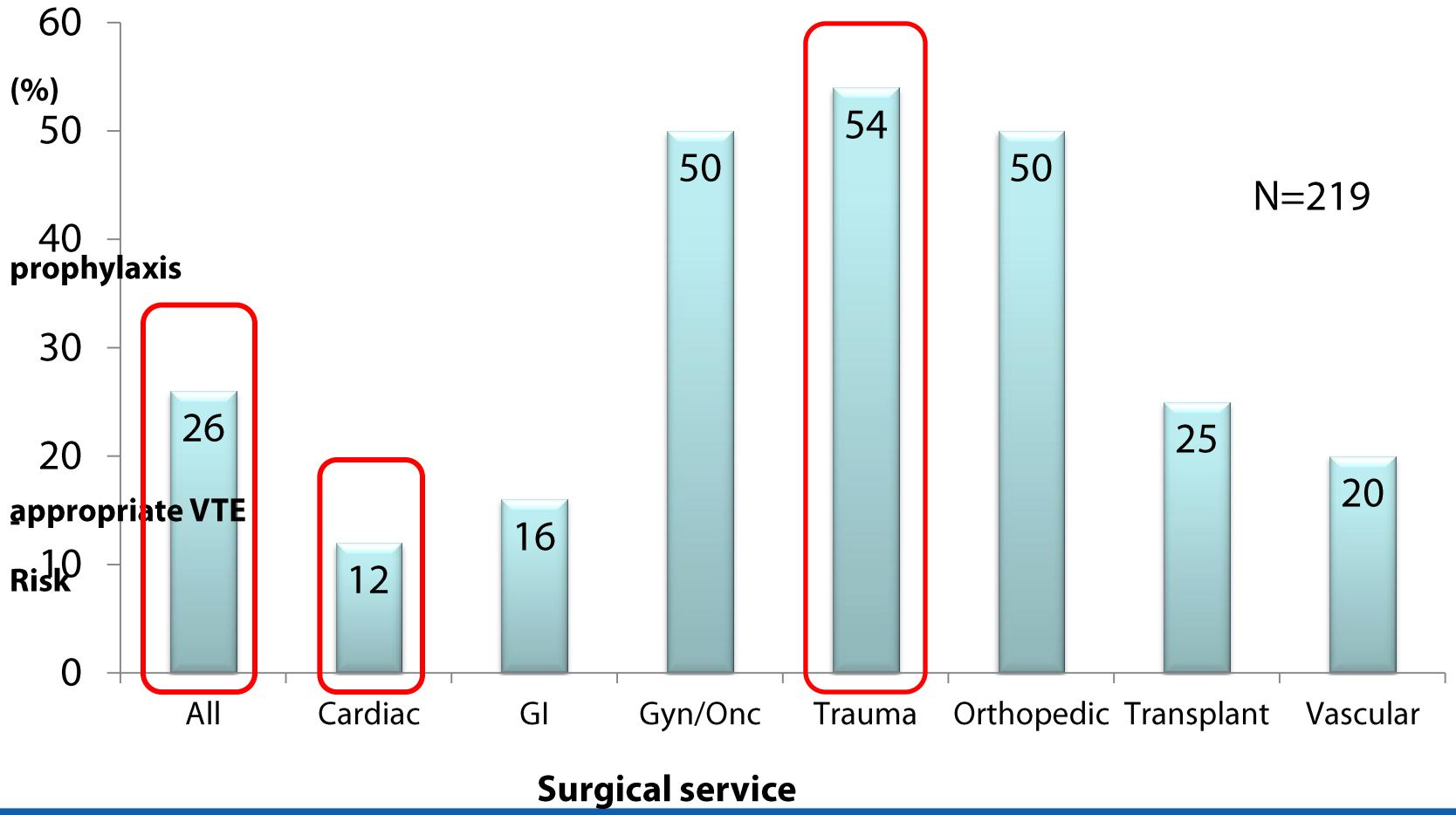
- **Established in 2004 and led by the Center for Innovation in Patient Safety and Quality Care**
- **Key components**
  - Multidisciplinary VTE prevention team
  - Education of providers
  - Collaboration to develop risk-appropriate VTE prophylaxis
  - Assessment of performance
    - Measure baseline performance
    - Monitor performance
    - Review performance with staff
    - Adapt to improve performance



Acting Surgeon General Steven Galston speaking at the 2009 Symposium

JHMI, Johns Hopkins Medical Institutions

JHMI Surgical Services
VTE Prophylaxis: Baseline Performance, 2005



JHMI, Johns Hopkins Medical Institutions

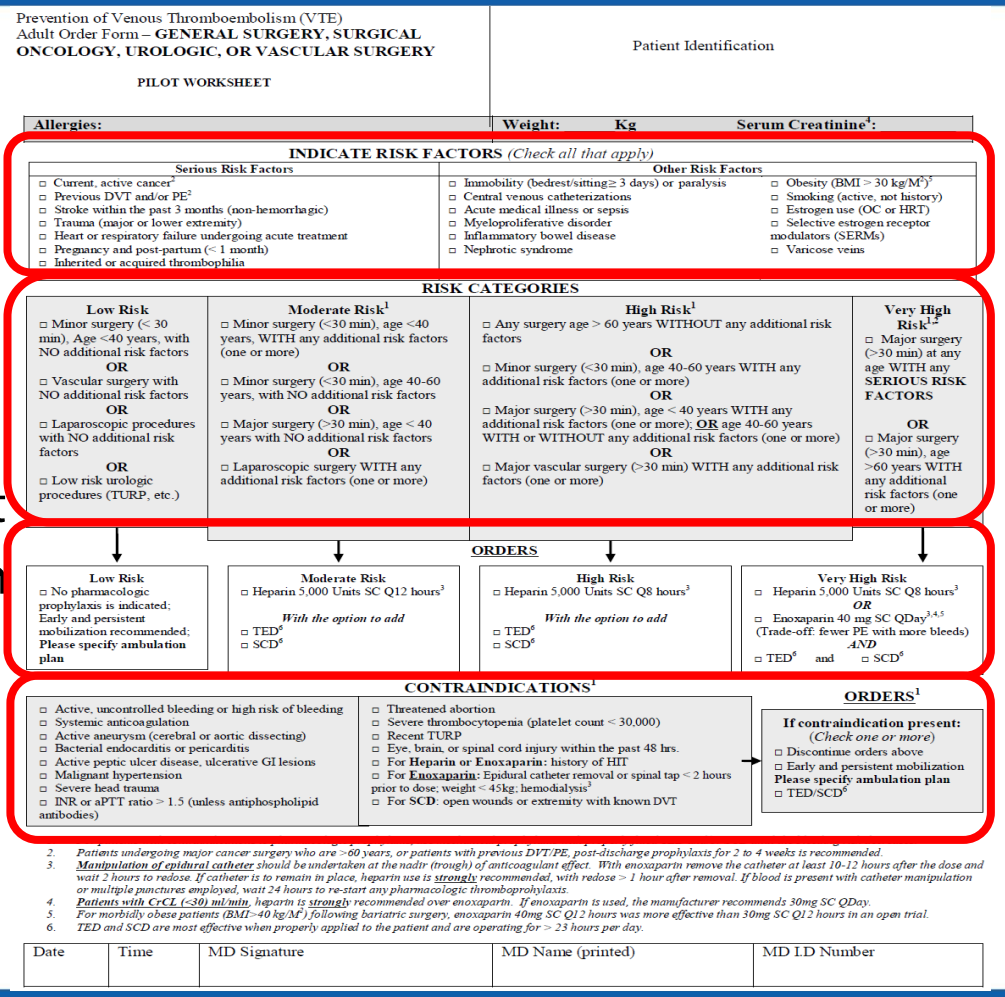
Data courtesy Deb Hobson RN, Johns Hopkins Medical Institutions

Essential Features of Optimal VTE Prevention Strategy

- Use of risk order sets for VTE prevention must be mandatory
- Identify VTE risk factors on admission
- Identify contraindications to prophylaxis
- Order **risk-appropriate** VTE prophylaxis
- Reassess VTE risk factors and contraindications during hospital stay
- Save patient and provider data
- Monitor hospital-acquired VTE and bleeding
- Measure performance regularly to promote continuous improvement

JHMI VTE Prophylaxis: Strategy 1.0

- **Paper order sets**
- **Advantage**
  - Easy to create
- **Challenges**
  - Complex
  - Labor-intensive data collect
  - Labor-intensive performan monitoring



Prevention of Venous Thromboembolism (VTE)
Adult Order Form – **GENERAL SURGERY, SURGICAL ONCOLOGY, UROLOGIC, OR VASCULAR SURGERY**

PILOT WORKSHEET

Patient Identification

Allergies: **Weight:** Kg **Serum Creatinine[1]:**

INDICATE RISK FACTORS *(Check all that apply)*

Serious Risk Factors	Other Risk Factors	
□ Current, active cancer[2]	□ Immobility (bedrest/sitting≥ 3 days) or paralysis	□ Obesity (BMI > 30 kg/M²)[3]
□ Previous DVT and/or PE[2]	□ Central venous catheterizations	□ Smoking (active, not history)
□ Stroke within the past 3 months (non-hemorrhagic)	□ Acute medical illness or sepsis	□ Estrogen use (OC or HRT)
□ Trauma (major or lower extremity)	□ Myeloproliferative disorder	□ Selective estrogen receptor modulators (SERMs)
□ Heart or respiratory failure undergoing acute treatment	□ Inflammatory bowel disease	
□ Pregnancy and post-partum (< 1 month)	□ Nephrotic syndrome	□ Varicose veins
□ Inherited or acquired thrombophilia		

RISK CATEGORIES

Low Risk	Moderate Risk[1]	High Risk[1]	Very High Risk[1,2]
□ Minor surgery (< 30 min), Age <40 years, with NO additional risk factors **OR** □ Vascular surgery with NO additional risk factors **OR** □ Laparoscopic procedures with NO additional risk factors **OR** □ Low risk urologic procedures (TURP, etc.)	□ Minor surgery (<30 min), age <40 years, WITH any additional risk factors (one or more) **OR** □ Minor surgery (<30 min), age 40-60 years, with NO additional risk factors **OR** □ Major surgery (>30 min), age < 40 years with NO additional risk factors **OR** □ Laparoscopic surgery WITH any additional risk factors (one or more)	□ Any surgery age > 60 years WITHOUT any additional risk factors **OR** □ Minor surgery (<30 min), age 40-60 years WITH any additional risk factors (one or more) **OR** □ Major surgery (>30 min), age < 40 years WITH any additional risk factors (one or more); **OR** age 40-60 years WITH or WITHOUT any additional risk factors (one or more) **OR** □ Major vascular surgery (>30 min) WITH any additional risk factors (one or more)	□ Major surgery (>30 min) at any age WITH any **SERIOUS RISK FACTORS** **OR** □ Major surgery (>30 min), age >60 years WITH any additional risk factors (one or more)

ORDERS

Low Risk	Moderate Risk	High Risk	Very High Risk
□ No pharmacologic prophylaxis is indicated; Early and persistent mobilization recommended; **Please specify ambulation plan**	□ Heparin 5,000 Units SC Q12 hours[3] ***With the option to add*** □ TED[6] □ SCD[6]	□ Heparin 5,000 Units SC Q8 hours[3] ***With the option to add*** □ TED[6] □ SCD[6]	□ Heparin 5,000 Units SC Q8 hours[3] ***OR*** □ Enoxaparin 40 mg SC QDay[3,4,5] (Trade-off: fewer PE with more bleeds) ***AND*** □ TED[6] and □ SCD[6]

CONTRAINDICATIONS[4]

- □ Active, uncontrolled bleeding or high risk of bleeding
- □ Systemic anticoagulation
- □ Active aneurysm (cerebral or aortic dissecting)
- □ Bacterial endocarditis or pericarditis
- □ Active peptic ulcer disease, ulcerative GI lesions
- □ Malignant hypertension
- □ Severe head trauma
- □ INR or aPTT ratio > 1.5 (unless antiphospholipid antibodies)
- □ Threatened abortion
- □ Severe thrombocytopenia (platelet count < 30,000)
- □ Recent TURP
- □ Eye, brain, or spinal cord injury within the past 48 hrs.
- □ For **Heparin or Enoxaparin:** history of HIT
- □ For **Enoxaparin:** Epidural catheter removal or spinal tap < 2 hours prior to dose; weight < 45kg; hemodialysis[3]
- □ For **SCD:** open wounds or extremity with known DVT

ORDERS[1]

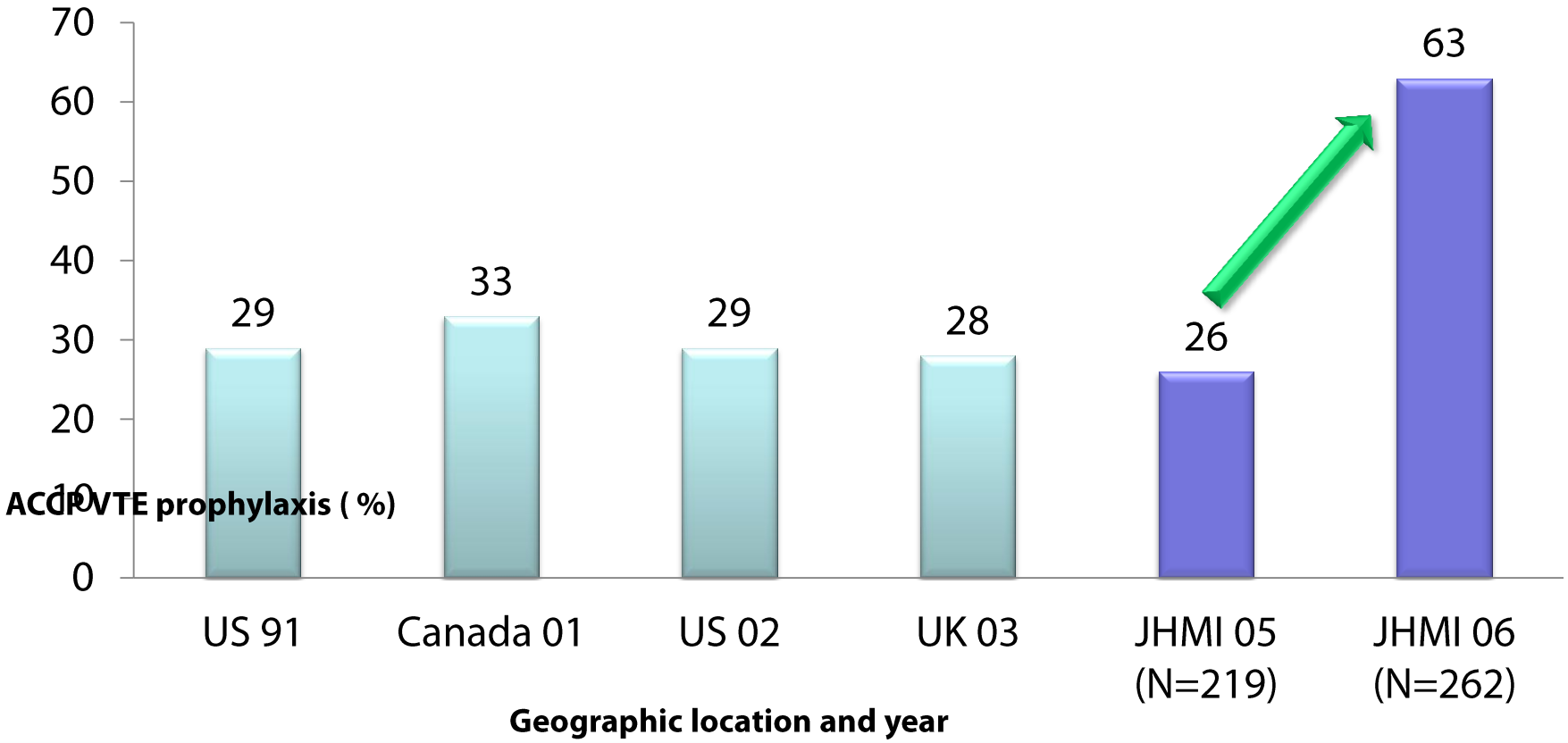
If contraindication present: *(Check one or more)*
□ Discontinue orders above
□ Early and persistent mobilization **Please specify ambulation plan**
□ TED/SCD[6]

2. *Patients undergoing major cancer surgery who are >60 years, or patients with previous DVT/PE, post-discharge prophylaxis for 2 to 4 weeks is recommended.*
3. ***Manipulation of epidural catheter*** *should be undertaken at the nadir (trough) of anticoagulant effect. With enoxaparin remove the catheter at least 10-12 hours after the dose and wait 2 hours to redose. If catheter is to remain in place, heparin use is* ***strongly*** *recommended, with redose > 1 hour after removal. If blood is present with catheter manipulation or multiple punctures employed, wait 24 hours to re-start any pharmacologic thromboprohylaxis.*
4. ***Patients with CrCL (<30) ml/min****, heparin is* ***strongly*** *recommended over enoxaparin. If enoxaparin is used, the manufacturer recommends 30mg SC QDay.*
5. *For morbidly obese patients (BMI>40 kg/M²) following bariatric surgery, enoxaparin 40mg SC Q12 hours was more effective than 30mg SC Q12 hours in an open trial.*
6. *TED and SCD are most effective when properly applied to the patient and are operating for > 23 hours per day.*

Date	Time	MD Signature	MD Name (printed)	MD I.D Number

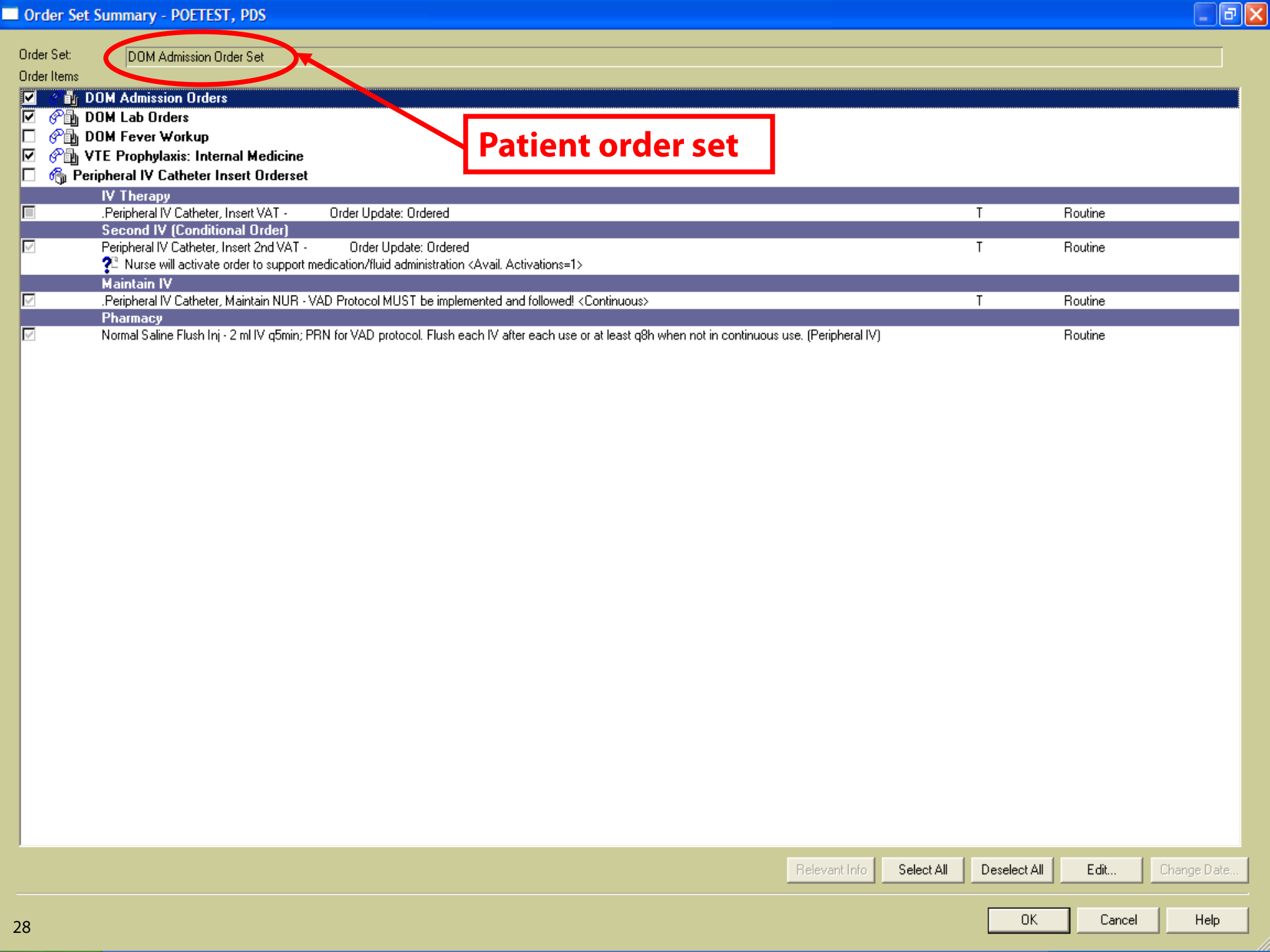
JHMI, Johns Hopkins Medical Institutions

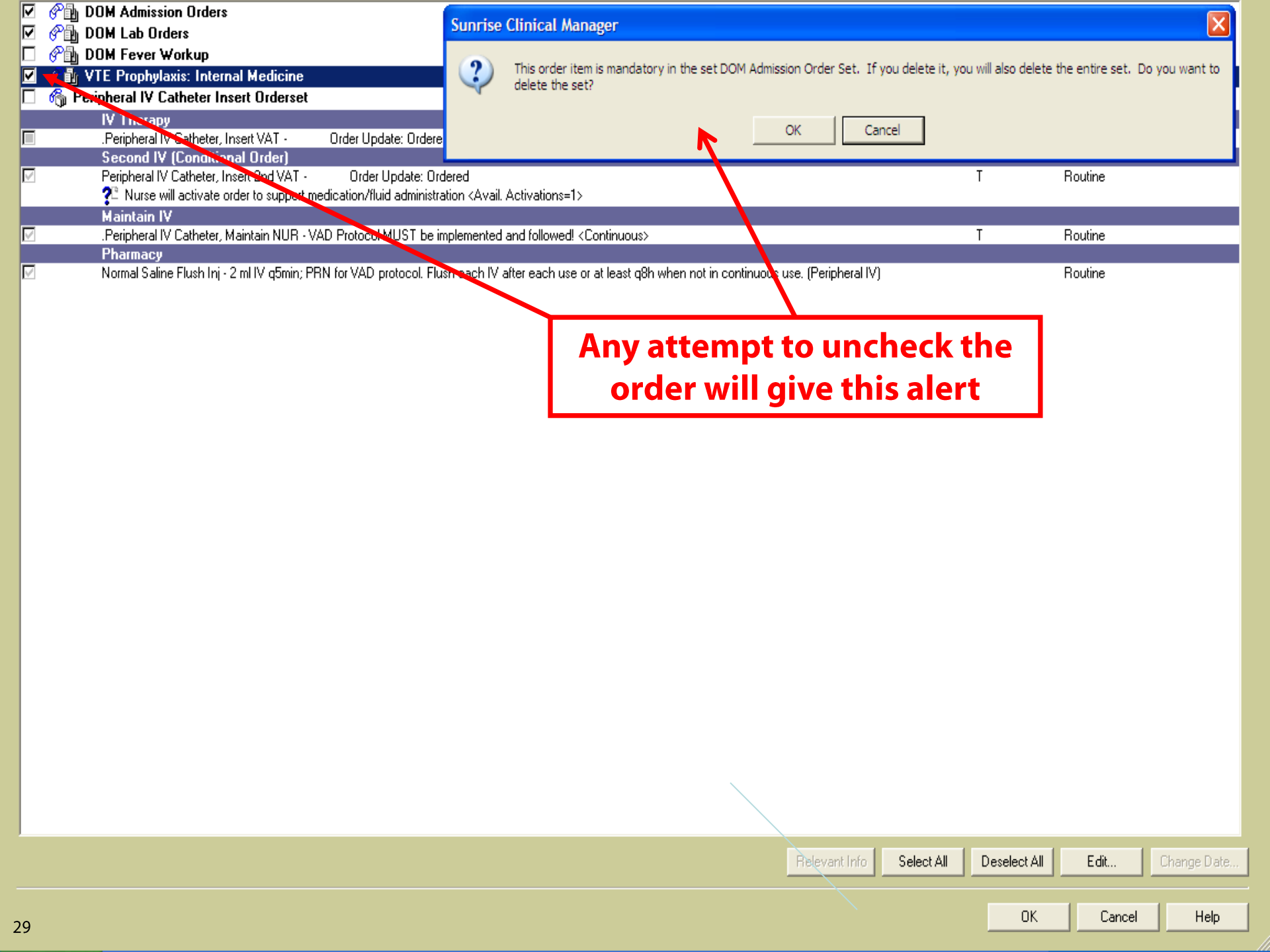
JHMI VTE Prevention Performance Evaluation in 2006 Was Better, but Not Optimal

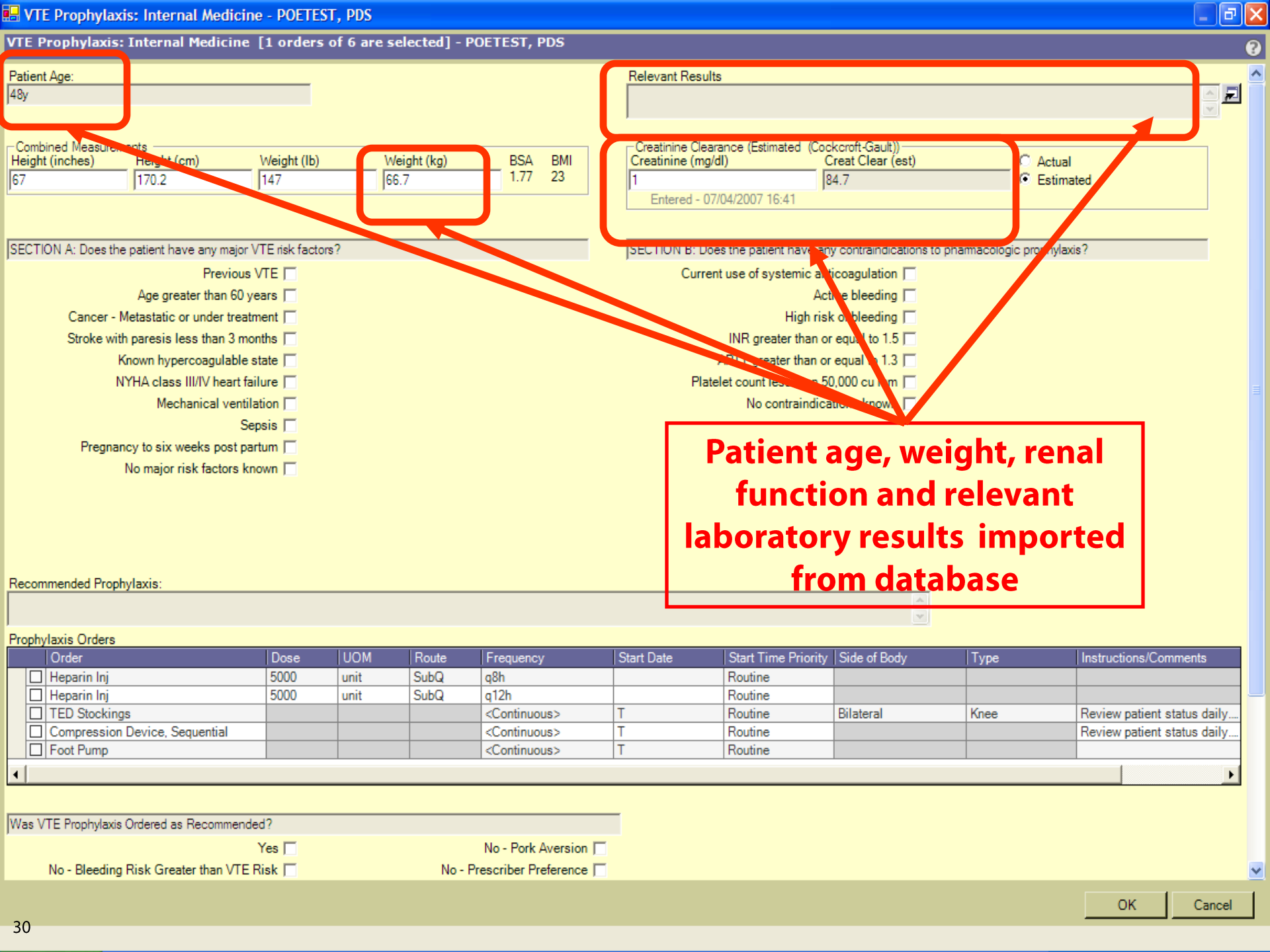


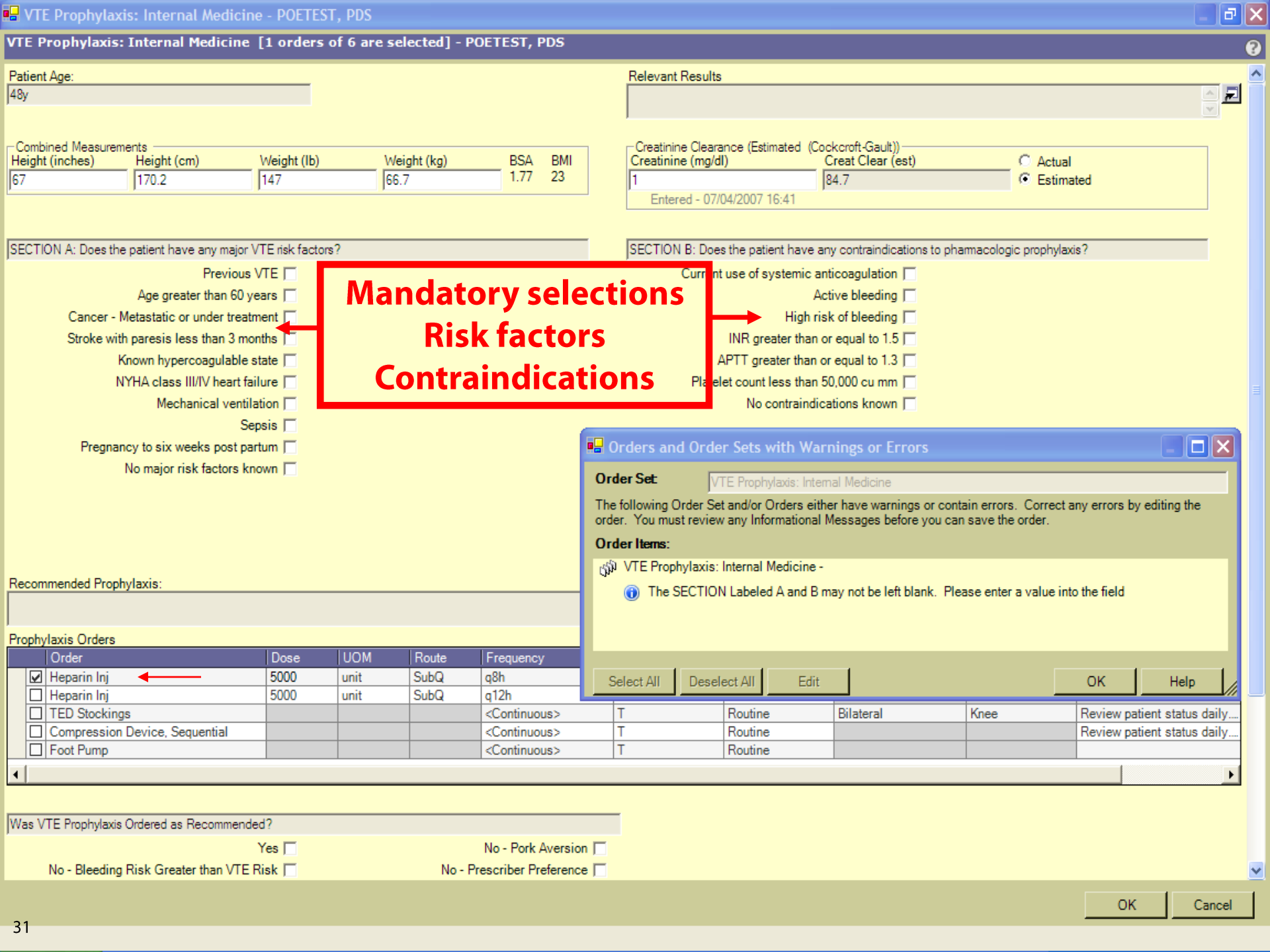
JHMI, Johns Hopkins Medical Institutions
Anderson FA, et al. Ann Intern Med 1991;115:591–595
Goldhaber SZ, et al. Am J Cardiol 2004;93:259–262
Rahim SA, et al. Thromb Res 2003;111:215–219

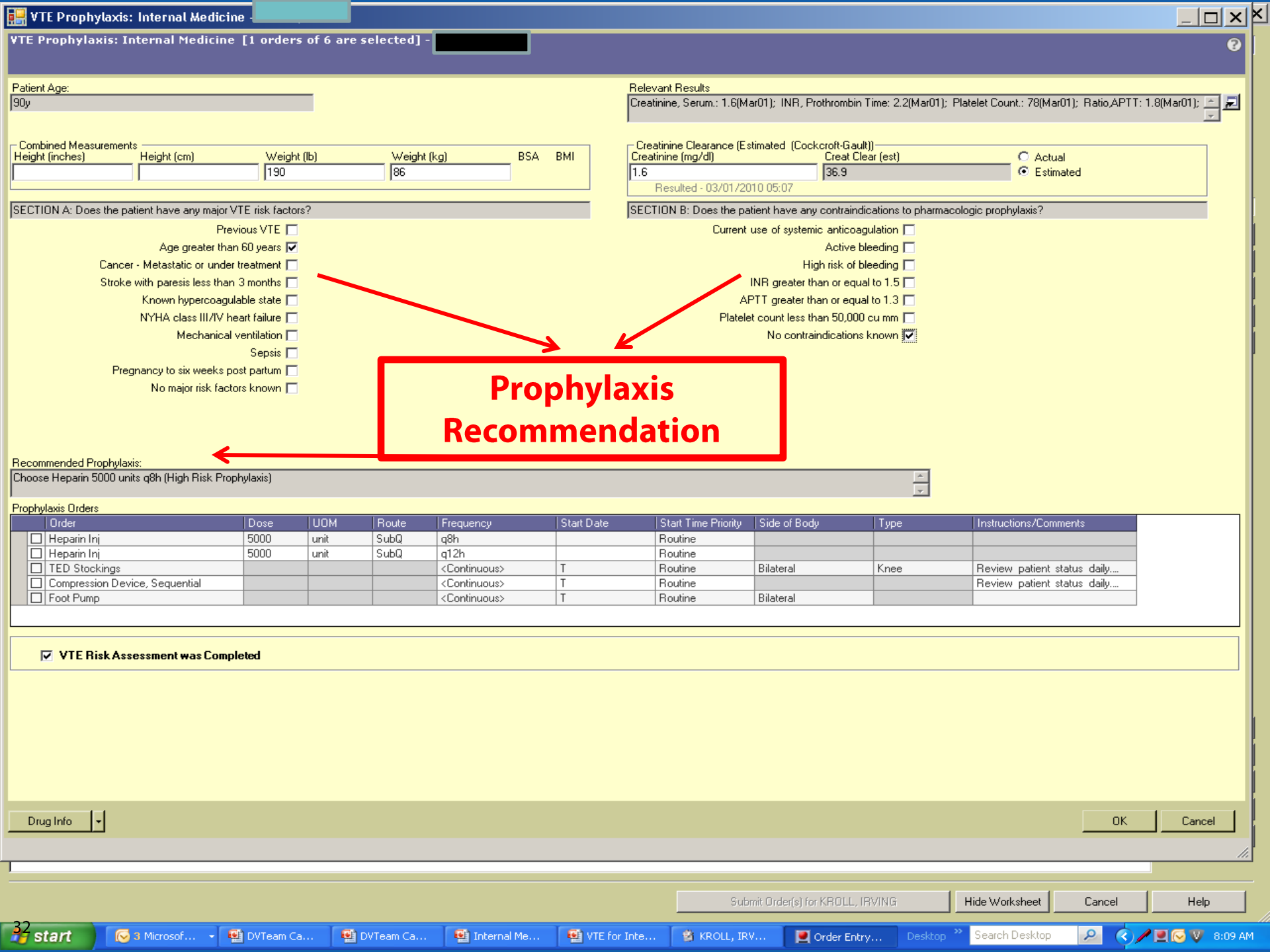
Rashid J.Royal Soc Med 2005;98:507–12
Data courtesy of Deb Hobson, BSN, JHMI
ACCP, American College of Chest Physicians


Order Set Summary - POETEST, PDS
Order Set:
DOM Admission Order Set
Order Items
DOM Admission Orders
DOM Lab Orders
DOM Fever Workup
VTE Prophylaxis: Internal Medicine
Peripheral IV Catheter Insert Orderset
IV Therapy
.Peripheral IV Catheter, Insert VAT - Order Update: Ordered T Routine
Second IV (Conditional Order)
Peripheral IV Catheter, Insert 2nd VAT - Order Update: Ordered T Routine
Nurse will activate order to support medication/fluid administration <Avail. Activations=1>
Maintain IV
.Peripheral IV Catheter, Maintain NUR - VAD Protocol MUST be implemented and followed! <Continuous> T Routine
Pharmacy
Normal Saline Flush Inj - 2 ml IV q5min; PRN for VAD protocol. Flush each IV after each use or at least q8h when not in continuous use. (Peripheral IV) Routine
Patient order set
Relevant Info
Select All
Deselect All
Edit...
Change Date...
OK
Cancel
Help


DOM Admission Orders
DOM Lab Orders
DOM Fever Workup
VTE Prophylaxis: Internal Medicine
Peripheral IV Catheter Insert Orderset
IV Therapy
.Peripheral IV Catheter, Insert VAT - Order Update: Ordere
Second IV (Conditional Order)
Peripheral IV Catheter, Insert 2nd VAT - Order Update: Ordered T Routine
Nurse will activate order to support medication/fluid administration <Avail. Activations=1>
Maintain IV
.Peripheral IV Catheter, Maintain NUR - VAD Protocol MUST be implemented and followed! <Continuous> T Routine
Pharmacy
Normal Saline Flush Inj - 2 ml IV q5min; PRN for VAD protocol. Flush each IV after each use or at least q8h when not in continuous use. (Peripheral IV) Routine
Sunrise Clinical Manager
This order item is mandatory in the set DOM Admission Order Set. If you delete it, you will also delete the entire set. Do you want to delete the set?
OK
Cancel
Any attempt to uncheck the order will give this alert
Relevant Info
Select All
Deselect All
Edit...
Change Date...
OK
Cancel
Help


VTE Prophylaxis: Internal Medicine - POETEST, PDS
VTE Prophylaxis: Internal Medicine [1 orders of 6 are selected] - POETEST, PDS
Patient Age:
48y
Relevant Results
Combined Measurements
Height (inches)
Height (cm)
Weight (lb)
Weight (kg)
BSA
BMI
67
170.2
147
66.7
1.77
23
Creatinine Clearance (Estimated (Cockcroft-Gault))
Creatinine (mg/dl)
Creat Clear (est)
Actual
Estimated
1
84.7
Entered - 07/04/2007 16:41
SECTION A: Does the patient have any major VTE risk factors?
Previous VTE
Age greater than 60 years
Cancer - Metastatic or under treatment
Stroke with paresis less than 3 months
Known hypercoagulable state
NYHA class III/IV heart failure
Mechanical ventilation
Sepsis
Pregnancy to six weeks post partum
No major risk factors known
SECTION B: Does the patient have any contraindications to pharmacologic prophylaxis?
Current use of systemic anticoagulation
Active bleeding
High risk of bleeding
INR greater than or equal to 1.5
Platelet count less than 50,000 cu mm
Patient age, weight, renal function and relevant laboratory results imported from database
Recommended Prophylaxis:
Prophylaxis Orders
Order
Dose
UOM
Route
Frequency
Start Date
Start Time Priority
Side of Body
Type
Instructions/Comments
Heparin Inj
5000
unit
SubQ
q8h
Routine
Heparin Inj
5000
unit
SubQ
q12h
Routine
TED Stockings
<Continuous>
T
Routine
Bilateral
Knee
Review patient status daily....
Compression Device, Sequential
<Continuous>
T
Routine
Review patient status daily....
Foot Pump
<Continuous>
T
Routine
Was VTE Prophylaxis Ordered as Recommended?
Yes
No - Pork Aversion
No - Bleeding Risk Greater than VTE Risk
No - Prescriber Preference
OK
Cancel


VTE Prophylaxis: Internal Medicine - POETEST, PDS
VTE Prophylaxis: Internal Medicine [1 orders of 6 are selected] - POETEST, PDS
Patient Age:
48y
Relevant Results
Combined Measurements
Height (inches)
Height (cm)
Weight (lb)
Weight (kg)
BSA
BMI
67
170.2
147
66.7
1.77
23
Creatinine Clearance (Estimated (Cockcroft-Gault))
Creatinine (mg/dl)
Creat Clear (est)
Actual
Estimated
1
84.7
Entered - 07/04/2007 16:41
SECTION A: Does the patient have any major VTE risk factors?
Previous VTE
Age greater than 60 years
Cancer - Metastatic or under treatment
Stroke with paresis less than 3 months
Known hypercoagulable state
NYHA class III/IV heart failure
Mechanical ventilation
Sepsis
Pregnancy to six weeks post partum
No major risk factors known
Mandatory selections
Risk factors
Contraindications
SECTION B: Does the patient have any contraindications to pharmacologic prophylaxis?
Current use of systemic anticoagulation
Active bleeding
High risk of bleeding
INR greater than or equal to 1.5
APTT greater than or equal to 1.3
Platelet count less than 50,000 cu mm
No contraindications known
Orders and Order Sets with Warnings or Errors
Order Set:
VTE Prophylaxis: Internal Medicine
The following Order Set and/or Orders either have warnings or contain errors. Correct any errors by editing the order. You must review any Informational Messages before you can save the order.
Order Items:
VTE Prophylaxis: Internal Medicine -
The SECTION Labeled A and B may not be left blank. Please enter a value into the field
Select All
Deselect All
Edit
OK
Help
Recommended Prophylaxis:
Prophylaxis Orders
Order
Dose
UOM
Route
Frequency
Heparin Inj
5000
unit
SubQ
q8h
Heparin Inj
5000
unit
SubQ
q12h
TED Stockings
<Continuous>
T
Routine
Bilateral
Knee
Review patient status daily...
Compression Device, Sequential
<Continuous>
T
Routine
Review patient status daily...
Foot Pump
<Continuous>
T
Routine
Was VTE Prophylaxis Ordered as Recommended?
Yes
No - Pork Aversion
No - Bleeding Risk Greater than VTE Risk
No - Prescriber Preference
OK
Cancel


VTE Prophylaxis: Internal Medicine
VTE Prophylaxis: Internal Medicine [1 orders of 6 are selected] -
Patient Age:
90y
Relevant Results
Creatinine, Serum.: 1.6(Mar01); INR, Prothrombin Time: 2.2(Mar01); Platelet Count.: 78(Mar01); Ratio,APTT: 1.8(Mar01);
Combined Measurements
Height (inches)
Height (cm)
Weight (lb)
190
Weight (kg)
86
BSA
BMI
Creatinine Clearance (Estimated (Cockcroft-Gault))
Creatinine (mg/dl)
1.6
Creat Clear (est)
36.9
Actual
Estimated
Resulted - 03/01/2010 05:07
SECTION A: Does the patient have any major VTE risk factors?
Previous VTE
Age greater than 60 years
Cancer - Metastatic or under treatment
Stroke with paresis less than 3 months
Known hypercoagulable state
NYHA class III/IV heart failure
Mechanical ventilation
Sepsis
Pregnancy to six weeks post partum
No major risk factors known
SECTION B: Does the patient have any contraindications to pharmacologic prophylaxis?
Current use of systemic anticoagulation
Active bleeding
High risk of bleeding
INR greater than or equal to 1.5
APTT greater than or equal to 1.3
Platelet count less than 50,000 cu mm
No contraindications known
Prophylaxis Recommendation
Recommended Prophylaxis:
Choose Heparin 5000 units q8h (High Risk Prophylaxis)
Prophylaxis Orders
Order
Dose
UOM
Route
Frequency
Start Date
Start Time Priority
Side of Body
Type
Instructions/Comments
Heparin Inj
5000
unit
SubQ
q8h
Routine
Heparin Inj
5000
unit
SubQ
q12h
Routine
TED Stockings
<Continuous>
T
Routine
Bilateral
Knee
Review patient status daily....
Compression Device, Sequential
<Continuous>
T
Routine
Review patient status daily....
Foot Pump
<Continuous>
T
Routine
Bilateral
VTE Risk Assessment was Completed
Drug Info
OK
Cancel
Submit Order(s) for KROLL, IRVING
Hide Worksheet
Cancel
Help
32
start
3 Microsof...
DVTeam Ca...
DVTeam Ca...
Internal Me...
VTE for Inte...
KROLL, IRV...
Order Entry...
Desktop
Search Desktop
8:09 AM

VTE Prophylaxis: General Surgery - LABPOE, CHARLES

VTE Prophylaxis: General Surgery [4 orders of 9 are selected] - LABPOE, CHARLES

No contraindications known ☑

Recommended Prophlaxis:

Choose Heparin 5000 units Q8H plus Mechanical Orders. (VERY HIGH Risk WITH Renal Impairment)

Prophylaxis Orders

	Order	Dose	UOM	Route	Frequency	Start Date	Start Time Priority	Pharmacy Instructions	Side of Body
☐	Enoxaparin Inj	40	mg	SubQ	q24h		Time Critical	First dose 2 hours Pre-Op and...	
☑	**Heparin Inj**	5000	unit	SubQ	q8h		18:00	Give first dose 2 hours Pre-...	
☐	Heparin Inj	5000	unit	SubQ	q12h		Time Critical	Give first dose 2 hours Pre-...	
☐	Ambulate with Assistance				tid	T	Routine		
☐	Ambulate without Assistance				tid	T	Routine		
☑	**TED Stockings**				<Continuous>	08/13/2007	Routine		Bilateral
☑	**Compression Device, Sequential**				<Continuous>	08/13/2007	Routine		
☐	Foot Pump				<Continuous>	T	Routine		

Was VTE Prophylaxis Ordered as Recommended?

Yes ☑ — No - Religious Reasons ☐

No - Bleeding Risk Greater than VTE Risk ☐ — No - Prescriber Preference ☐

No - VTE Risk Greater than Bleeding Risk ☐ — No - Other ☐

No - Heparin Allergy/Adverse Reaction ☐

☑ **VTE Risk Assessment was Completed**

Documentation of risk assessment

VTE_Risk Assess Completed - LABPOE, CHARLES

VTE Risk Assessment was Completed - LABPOE, CHARLES

Order: VTE Risk Assessment was Completed — Order ID: 001BTB829

Requested By: Durrette, Annette — Template Name:

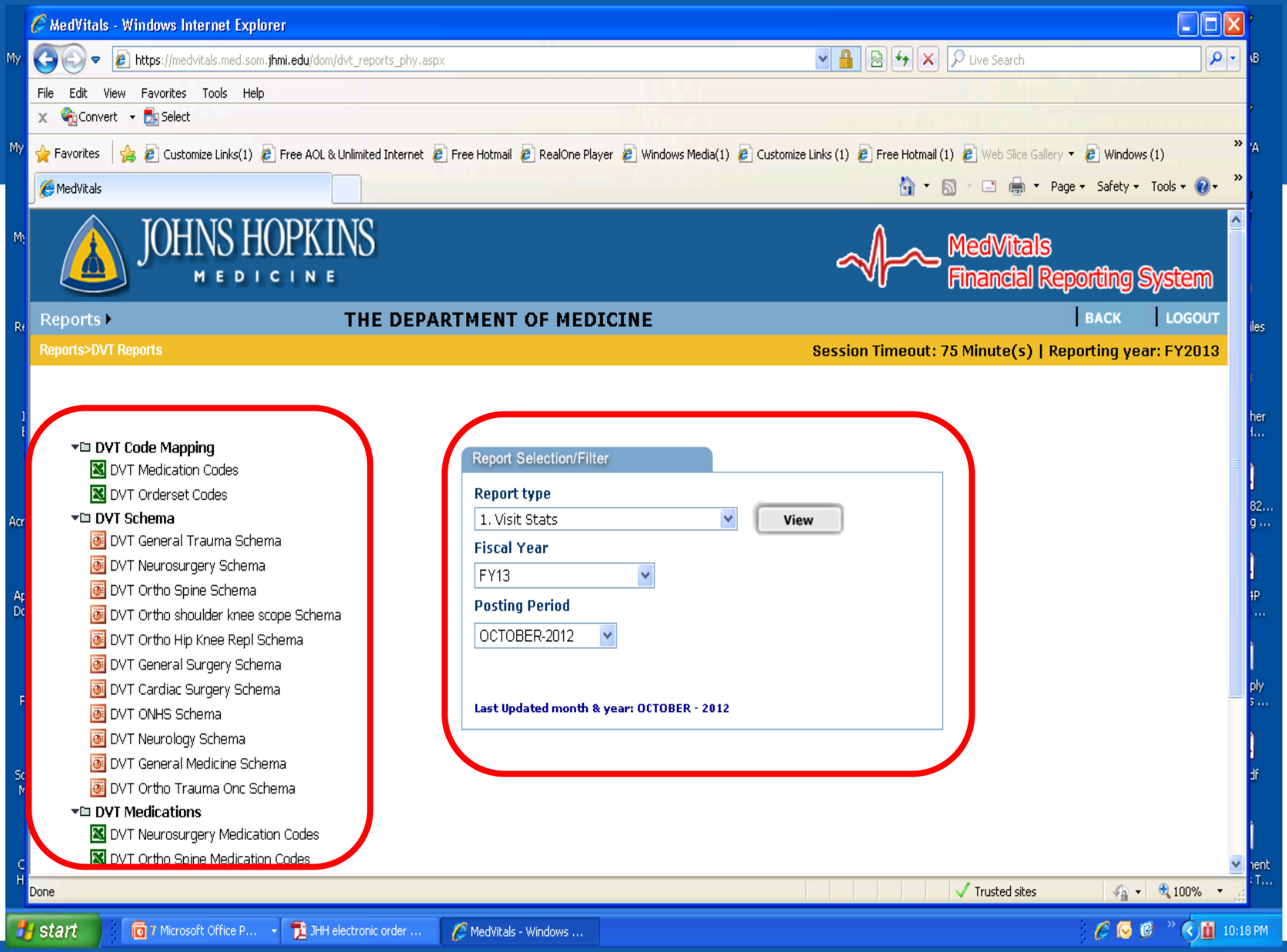
Messages:

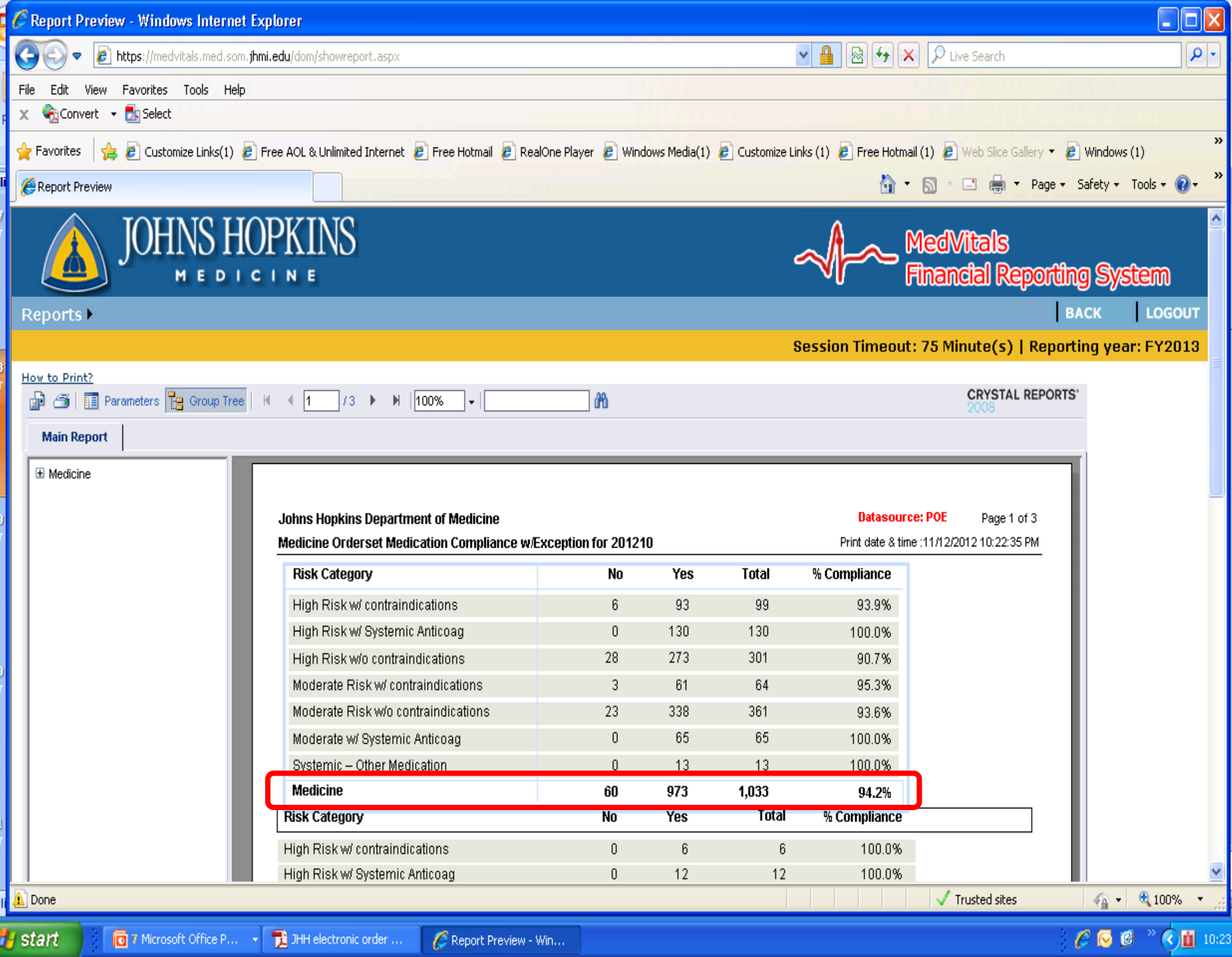
Recommended Prophylaxis was:

Very High Risk WITH Renal Impairment

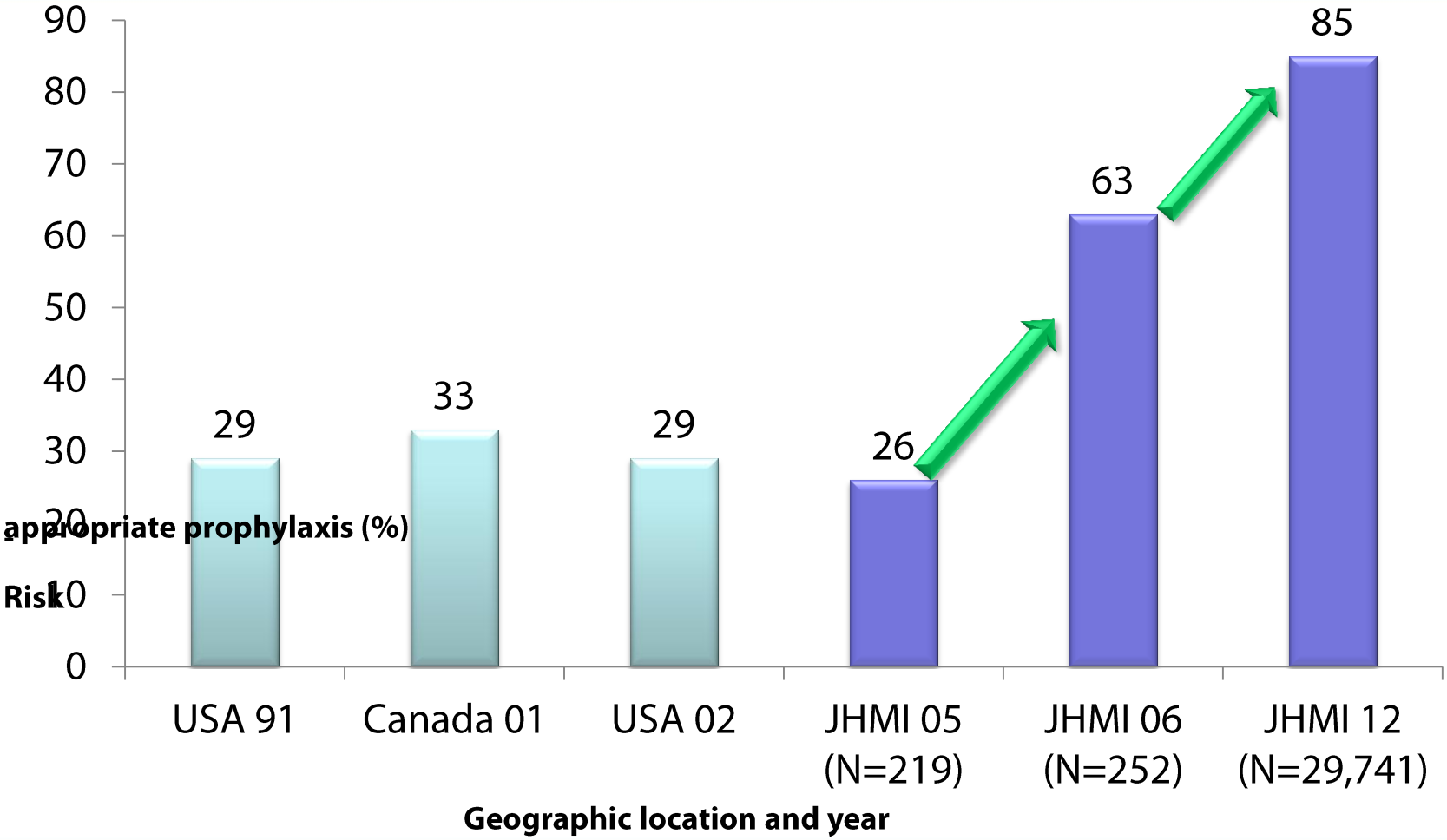
Repeat | View Document | OK | Cancel

OK | Cancel


MedVitals - Windows Internet Explorer
https://medvitals.med.som.jhmi.edu/dom/dvt_reports_phy.aspx
File Edit View Favorites Tools Help
MedVitals
JOHNS HOPKINS
MEDICINE
MedVitals
Financial Reporting System
Reports
THE DEPARTMENT OF MEDICINE
BACK
LOGOUT
Reports>DVT Reports
Session Timeout: 75 Minute(s) | Reporting year: FY2013
DVT Code Mapping
DVT Medication Codes
DVT Orderset Codes
DVT Schema
DVT General Trauma Schema
DVT Neurosurgery Schema
DVT Ortho Spine Schema
DVT Ortho shoulder knee scope Schema
DVT Ortho Hip Knee Repl Schema
DVT General Surgery Schema
DVT Cardiac Surgery Schema
DVT ONHS Schema
DVT Neurology Schema
DVT General Medicine Schema
DVT Ortho Trauma Onc Schema
DVT Medications
DVT Neurosurgery Medication Codes
DVT Ortho Spine Medication Codes
Report Selection/Filter
Report type
1. Visit Stats
View
Fiscal Year
FY13
Posting Period
OCTOBER-2012
Last Updated month & year: OCTOBER - 2012
Done
Trusted sites
100%
start
10:18 PM

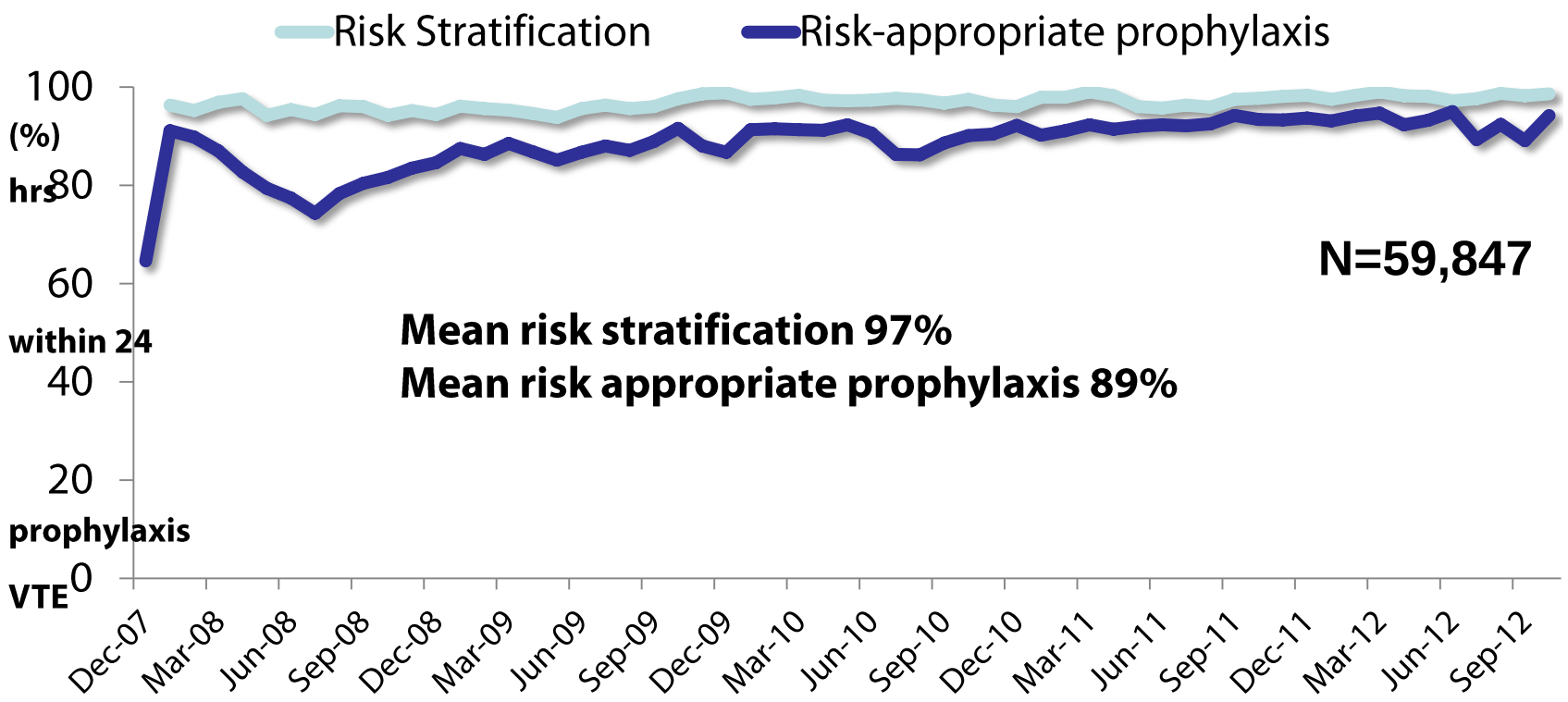

Report Preview - Windows Internet Explorer
https://medvitals.med.som.jhmi.edu/dom/showreport.aspx
Live Search
File Edit View Favorites Tools Help
Convert Select
Favorites Customize Links(1) Free AOL & Unlimited Internet Free Hotmail RealOne Player Windows Media(1) Customize Links (1) Free Hotmail (1) Web Slice Gallery Windows (1)
Report Preview
Page Safety Tools
JOHNS HOPKINS MEDICINE
MedVitals Financial Reporting System
Reports
BACK LOGOUT
Session Timeout: 75 Minute(s) | Reporting year: FY2013
How to Print?
Parameters Group Tree 1 /3 100%
CRYSTAL REPORTS 2008
Main Report
Medicine
Johns Hopkins Department of Medicine
Datasource: POE
Page 1 of 3
Medicine Orderset Medication Compliance w/Exception for 201210
Print date & time :11/12/2012 10:22:35 PM
Risk Category No Yes Total % Compliance
High Risk w/ contraindications 6 93 99 93.9%
High Risk w/ Systemic Anticoag 0 130 130 100.0%
High Risk w/o contraindications 28 273 301 90.7%
Moderate Risk w/ contraindications 3 61 64 95.3%
Moderate Risk w/o contraindications 23 338 361 93.6%
Moderate w/ Systemic Anticoag 0 65 65 100.0%
Systemic – Other Medication 0 13 13 100.0%
Medicine 60 973 1,033 94.2%
Risk Category No Yes Total % Compliance
High Risk w/ contraindications 0 6 6 100.0%
High Risk w/ Systemic Anticoag 0 12 12 100.0%
Done
Trusted sites
100%
start
7 Microsoft Office P...
JHH electronic order ...
Report Preview - Win...
10:23 PM

JHMI VTE Prophylaxis Performance, 2012



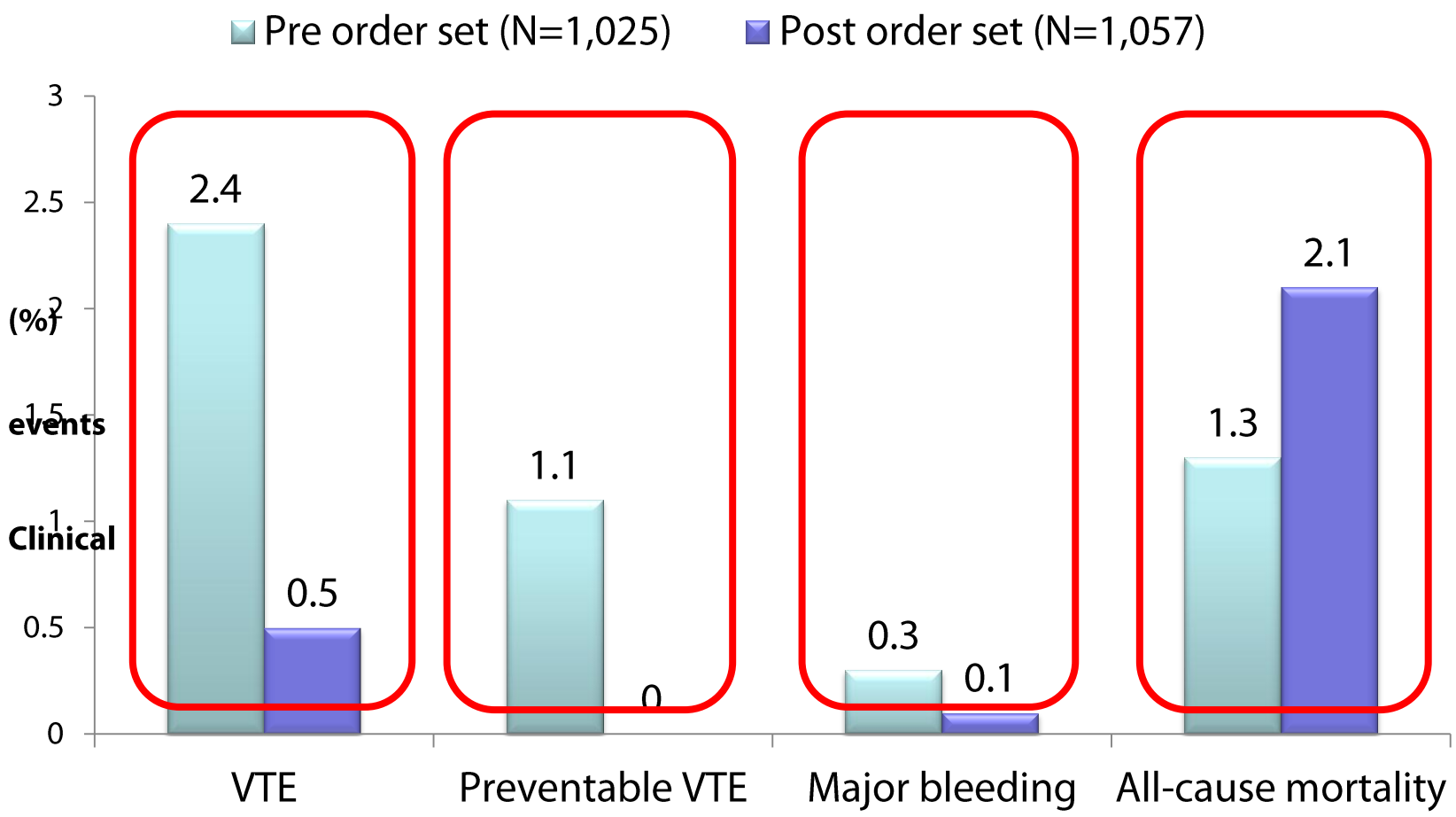
JHMI, Johns Hopkins Medical Institutions

JHMI Medicine
VTE Performance, 2008-2012



JHMI, Johns Hopkins Medical Institutions

Higher Rates of VTE Prophylaxis Lead to Fewer Thrombotic Events



Keys to Successful Implementation of a VTE Prophylaxis Program

- **Multidisciplinary team**
- **Institutional leadership**
- **Education of front-line providers**
- **Collaboration with service-specific teams**
- **Implementation of evidence-based protocols**
- **Computer-based decision support**
- **Focus on performance**
  - Measure baseline performance
  - Conduct ongoing performance evaluations
  - Obtain service and provider feedback

Johns Hopkins Medical Institutions

Patient Safety and Prevention of Hospital-associated Venous Thromboembolism

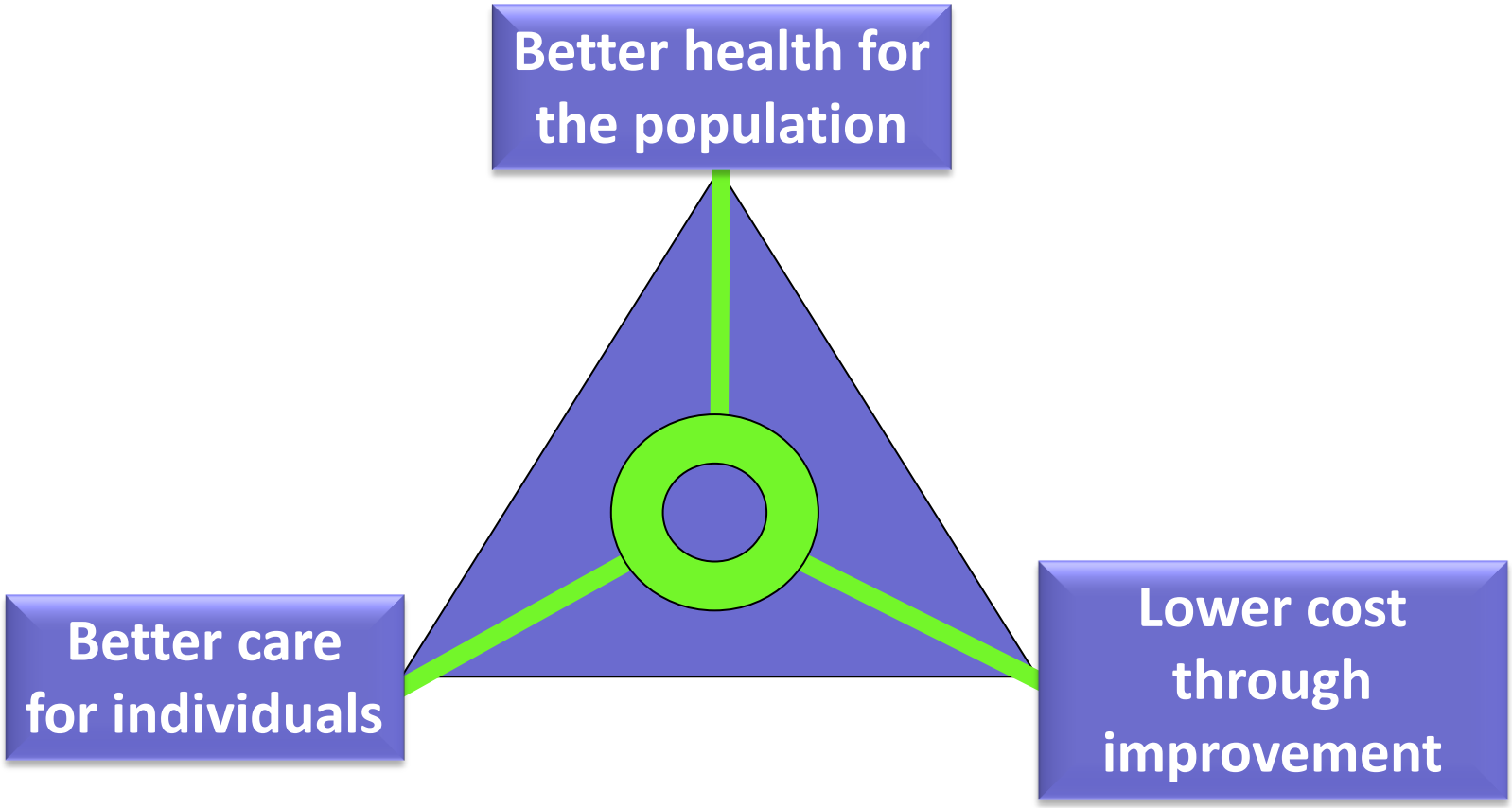
P. Jeffrey Brady, MD, MPH
Associate Director
Center for Quality Improvement and Patient Safety
Agency for Healthcare Research and Quality (AHRQ)

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Outline

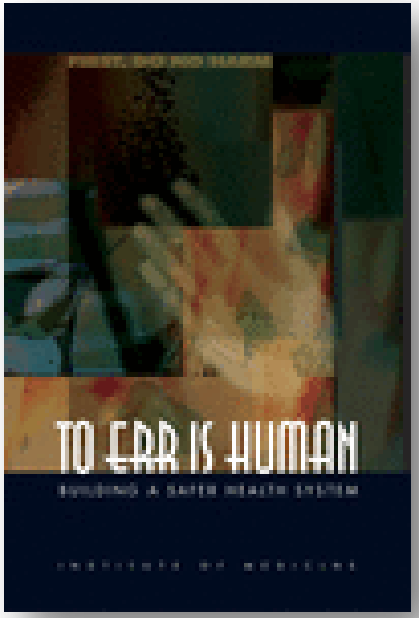
- Patient safety context for hospital VTE prevention
- Tools and resources for implementation and improvement
- Measuring the occurrence of patient safety events
- National initiative "Partnership for Patients"
- Challenges and opportunities to reduce VTE and improve patient safety

Why Patient Safety?
The Triple Aim



Patient Safety and Recent History

- To Err is Human, Institute of Medicine, 1999
- Making Health Care Safer, AHRQ, 2001
- Patient Safety and Quality Improvement Act of 2005
- Deficit Reduction Act of 2005 and reduced payments for preventable hospital-acquired conditions



AHRQ, Agency for Healthcare Research and Quality
http://www.ahrq.gov
Kohn L, et al. National Academic Press, 1999

Patient Safety Events: Examples

- **Hospital-Acquired Conditions (HACs) targeted in the Partnership for Patients safety initiative**
  - Adverse drug events
  - Catheter-associated urinary tract infections
  - Central line-associated bloodstream infections
  - Injuries from falls and immobility
  - Pressure ulcers
  - Venous thromboembolism
  - Ventilator-associated pneumonia
  - Obstetric adverse events
  - Surgical site infections

General and Specific Components of Patient Safety Improvements

- **General, foundational components affecting many types of events**
  - Patient safety culture
  - Human factors, teamwork, and communication
  - Care coordination and workflow
  - Information technology
- **Event-specific (e.g., VTE-specific)**
  - Patient variability
  - Risk-benefit assessment
  - Evidence-based practices (e.g., recommended prophylaxis)

Patient Safety Implementation Tools
Improving Safety at the Point of Care

- **Patient safety improvements rely on an understanding of health care risks and hazards**
- **Implementing patient safety improvements is challenging**
- **Implementation tools help health care institutions and clinicians provide—and consumers receive—safe, high-quality health care**
  - Summaries of relevant information
  - Training materials
  - Medication guides and sample checklists that are easily adapted to diverse institutions and care settings


AHRQ Patient Safety Tools and Resources

The Agency for Healthcare Research and Quality (AHRQ) offers tools for health care organizations, providers, and policymakers to improve patient safety in health care settings. The free tools and resources listed here are available online and in print.

Contents

Tools for Health Care Organizations and Providers 1
Patient Safety Measurement and Reporting Tools 1
Implementation Guides for Improving Patient Safety 3
Patient Safety Training Tools 4
Resources for Health Care Organizations, Providers, and Policymakers 5
Tools for Patients and Families 6
How To Order Resources 8

Tools for Health Care Organizations and Providers

Patient Safety Measurement and Reporting Tools

The Hospital Survey on Patient Safety Culture examines patient safety culture from a hospital staff perspective and allows hospitals to assess their safety culture and track changes over time. Hospitals that administer the patient safety culture survey can voluntarily submit their data to the Comparative Database, a resource for hospitals wishing to compare their survey results to similar types of hospitals.

Print: AHRQ Publication No. 08-0048
Web: ahrq.gov/qual/patientsafetyculture/hospsurvindex.htm

Hospital Survey on Patient Safety Culture: Comparative Database Reports give benchmark data collected voluntarily from more than 1,000 U.S. hospitals. Survey results from these hospitals are averaged over the entire sample by topical composite or individual survey item. Two appendixes report the average responses, which are broken down by hospital or respondent characteristics.

- 2012 report
  Print: AHRQ Publication No. 12-0017
  Web: ahrq.gov/qual/hospsurvey12
- 2011 report
  Print: AHRQ Publication No. 11-0030
  Web: ahrq.gov/qual/hospsurvey11
- 2010 report
  Print: AHRQ Publication No. 10-0026
  Web: ahrq.gov/qual/hospsurvey10
- 2009 report
  Print: AHRQ Publication No. 09-0030
  Web: ahrq.gov/qual/hospsurvey09
- 2008 report
  Print: AHRQ Publication No. 08-0039
  Web: ahrq.gov/qual/hospsurvey08
- 2007 report
  Print: AHRQ Publication No. 07-0025
  Web: ahrq.gov/qual/hospsurvey07

The Medical Office Survey on Patient Safety Culture measures issues relevant to patient safety in the ambulatory medical office setting. Pilot tested in approximately 100 medical offices, the survey lets providers and staff assess their safety culture, identify areas where improvement is needed, track changes in patient safety, and evaluate the effect of interventions. Researchers can also use the survey to assess patient safety culture improvement initiatives.

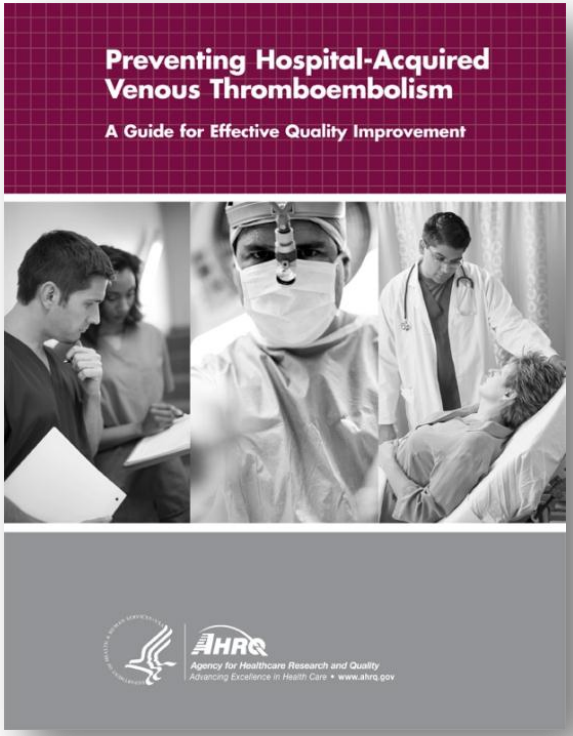
Print: AHRQ Publication No. 08(09)-0059
Web: ahrq.gov/qual/patientsafetyculture/mosurvindex.htm

AHRQ Agency for Healthcare Research and Quality
Advancing Excellence in Health Care • www.ahrq.gov
PATIENT SAFETY

http://www.ahrq.gov/qual/pstools.htm

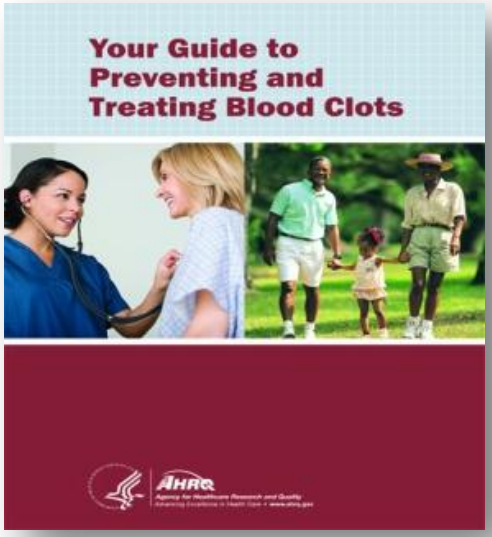
VTE Patient Safety Tool

- **Help hospitals implement processes to prevent VTE**
- **Clinician-focused tool**
  - Order sets
  - Organizational policies
  - Clinical champions
  - Executive leadership and commitment
  - Robust measurement strategy
  - Collaborative approach
- **Sample forms, protocols, etc.**

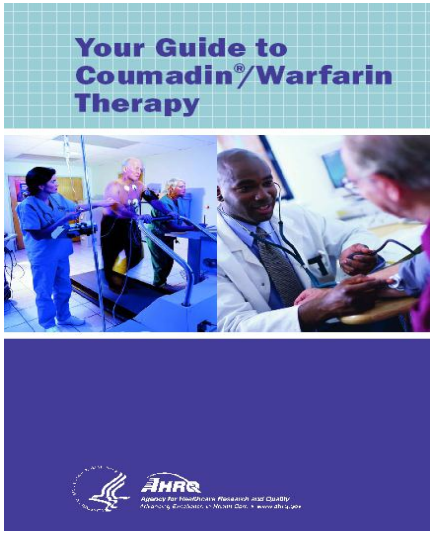


Gregg Maynard, UC San Diego and the Society of Hospital Medicine
Society of Hospital Medicine: http://www.hospitalmedicine.org/ResourceRoomRedesign/RR_VTE/VTE_Home.cfm
http://www.ahrq.gov/qual/pips/maynard.htm

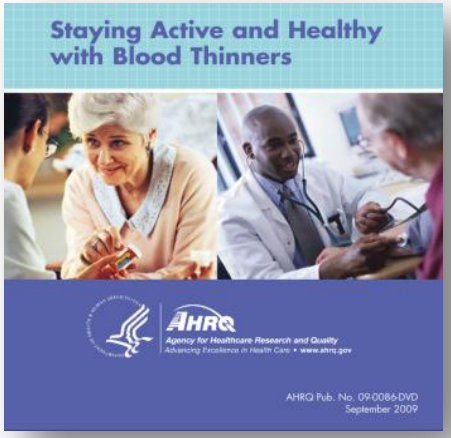
Patient Safety Consumer Publications



Booklet helps patients learn how to prevent and treat blood clots



Booklet explains what to expect and watch out for while undergoing Coumadin®/warfarin therapy



10-minute video helps educate patients about how to use blood thinners safely

All available in English/Spanish at www.ahrq.gov

Systems for Monitoring Patient Safety

- **Measurement, reporting, and surveillance occur at institutional, state, and national levels**
  - **AHRQ Common Formats**
    - Report events to identify problems and improve safety
  - **Medicare Patient Safety Monitoring System (MPSMS)**
    - National surveillance system from abstraction of medical records
  - **Quality and Safety Review System** (in development)
    - Surveillance from medical records using Common Formats-based event descriptions
  - **AHRQ Patient Safety Indicators**
    - Administrative data found in the typical discharge record
  - **National Surgical Quality Improvement Program**
    - Outcome measures for tracking quality improvement

Monitoring Hospital Use of VTE Prophylaxis

- **CMS Hospital Inpatient Quality Reporting**
  - Hospitals report to CMS to qualify for full Medicare payment
  - Measures reported @ www.medicare.gov/hospitalcompare/
- **Surgical Care Improvement Project (SCIP)**
  - Surgery patients ordered and received appropriate VTE prophylaxis within 24 hours pre/post surgery
- **National Quality Forum/the Joint Commission**
  - Reporting began January 1, 2013
  - VTE prophylaxis in hospital or ICU patients
  - Number of patients who received VTE prophylaxis or have documentation why no VTE prophylaxis was given the day of or the day after hospital admission or surgery

CMS, Centers for Medicare and Medicaid Services
http://www.cms.gov
ICU, Intensive care unit

Partnership for Patients (PfP)

- **Nationwide campaign to reduce harm to patients over 3 years: 2011-2013**
  - Launched April 2011; 2010 is the "baseline" year
  - Commitment by >7,700 partners, including >3,700 hospitals, consumer groups, and employers
- **Public-private and cross-agency collaboration**
  - Led by Center for Medicare and Medicaid Innovation (CMMI), a component of the Centers for Medicare and Medicaid Services (CMS)
- **Hospital Engagement Networks (HENs)**
  - Provide technical assistance to hospitals across the country in order to achieve PfP goals

http://www.healthcare.gov/compare/partnership-for-patients/index.html

Partnership for Patients

Partnership for Patients Baseline and Goals

- **2010 baselines measured by PfP**
  - 145 measured hospital-acquired conditions (HACs) per 1,000 discharges (4.75 million total)
  - 14.4% (30-day) readmissions
- **Goals**
  - 40% reduction in 9 preventable HACs, including VTE
  - 1.8 million fewer injuries
  - 60,000 lives saved
  - 20% reduction in 30-day readmissions
  - 1.6 million patients recovered without readmission
  - Potential to save more than $30 billion

PfP, Partnership for Patients
HAC, Hospital-acquired condition

Partnership for Patients

Partnership for Patients
Hospital-Acquired Conditions (HACs)

- **Requirements for measured HACs**
  - Available for the baseline year 2010
  - Can be collected consistently through 2013
  - Taken together, set of HACs can capture a large and varied collection of HACs (both 9 targeted and all other conditions)
- **Medicare Patient Safety Monitoring System (MPSMS)**
  - National surveillance project aimed at identifying the rates of specific adverse events in hospital patients
  - Data obtained from medical chart abstraction
  - This data has proven useful for the PfP initiative

PfP, Partnership for Patients

Nine Targeted Hospital-Acquired Conditions (HACs)

- Adverse drug events
- Catheter-associated urinary tract infections
- Central line-associated bloodstream infections
- Injuries from falls and immobility
- Pressure ulcers
- **Venous thromboembolism**
- Ventilator-associated pneumonia

From MPSMS

- Obstetric adverse events – from Patient Safety Indicators
- Surgical site infections – from National Healthcare Safety Network

These 9 HACs comprise about 80% of measured 2010 HACs

MPSMS, Medicare Patient Safety Monitoring System

VTE at the Intersection of Patient Safety and Public Health

- **VTE is a public health problem**
  - 300,000–900,000 people affected each year
  - 30,000–100,000 deaths
  - ~50% associated with recent hospitalization
- **VTE is a preventable patient safety concern**
  - Hospital patient safety interventions can reduce preventable VTE and cut health care costs
- **Public health and patient safety can work together to improve population health: The Triple Aim**
  - Better health care
  - Better population health
  - Lower health care costs

Way Forward for Prevention of HA-VTE

- **Intervention priorities**
  - Clarify balance of risk and benefit of prophylaxis
  - Validate and compare risk assessment models
  - Integrate HA-VTE prevention seamlessly with other care processes (a systems approach)
- **Monitoring and surveillance**
  - Establish optimal performance metrics for
    - Risk-appropriate VTE prophylaxis (process measure)
    - HA-VTE occurrence (outcome measure)
  - Develop population-based reporting systems for public health accountability
- **Collaboration of public and private stakeholders**

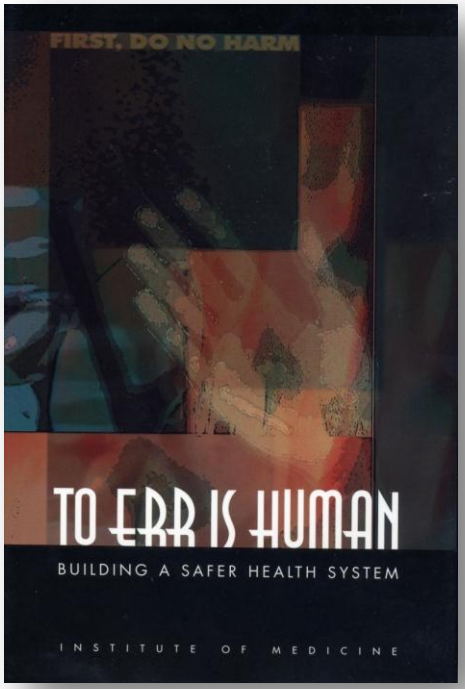
HA-VTE, Hospital-associated venous thromboembolism

Patient Safety and Opportunities for Prevention

- **The complexity of prevention strategies and their consistent application is important for successful implementation**
- **Establishing and maintaining an institutional culture conducive to patient safety is crucial for preventing harm**
- **Institutional patient safety "success stories" translate into meaningful public health impact**
- **A collaborative, team-based approach**
  - Necessary for success
  - Offers synergy and capacity to solve other patient safety problems

Culture and Safety

"The biggest challenge to moving toward a safer health system is changing the culture from one of blaming individuals for errors to one in which errors are treated not as personal failures, but opportunities to improve the system and prevent harm."



- **Organizations with a positive safety culture are characterized by**
  - Communications founded on mutual trust
  - Shared perceptions of the importance of safety
  - Shared ownership of patient safety problems and solutions

Prevention of Venous Thromboembolism

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention