VTE Prophylaxis: Best Practices at the Provider and System Levels

New York State Partnership For Patients
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New York, NY
• Understand the rationale for VTE prophylaxis for medical and surgical patients

• Highlight new requirements for the CMS / TJC and key recommendations from the 2012 ACCP Anticoagulation guidelines

• Apply best practices at the clinician level and at the hospital level to prevent VTE
CASE

The patient is a 72 year-old female, with history of htn, CHF, RA, admitted for CHF exacerbation. Labs reveal Hb 10.1, Plt 112,000, and normal renal fxn.

What prophylaxis regimen, if any, would you choose?

1. Encourage ambulation
2. Mechanical: GCS or IPC device
3. SC heparin
4. LMWH
Did Jesus Christ die of pulmonary embolism?

B. BRENNER

Director, Thrombosis and Hemostasis Unit, Rambam Medical Center, and Prof. of Hematology, Bruce Rappaport Faculty of Medicine, Technion, Haifa, Israel

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The life and teachings of Jesus Christ have attracted enormous attention throughout the past 2 millennia. His agony and death was the subject for numerous religious scholar and artistic creations. While the common views describe the death of Jesus on the cross as a result of bleeding, the following thesis will present another, yet unreported cause for his death.

A number of medical articles dealt with Jesus’ suffering and death [1–3]. In an elaborate medical paper on the physical death of Jesus Christ published almost 20 years ago in JAMA [4], the authors carefully evaluated potential causes of Jesus’ death. After analyzing detailed descriptions from the New Testament [5] and contemporary Christian, Jewish and Roman sources, Edwards et al. [4] give the following description of events.

Before crucifixion Jesus remained for at least 12 h without food and water since the last supper. During that time, from Thursday 9 PM to Friday 9 AM, Jesus was under great emotional stress, endured heating and had to walk 4 km to and from the sites of various Jewish and Roman trials [6]. It is therefore clear that even before scourging and crucifixion, Jesus was in a state of dehydration.

Before crucifixion Jesus underwent scourging, which was a legal preliminary to every Roman execution. Scourging of the back, buttocks and legs leads to significant tissue damage and actually represents multi-trauma. This procedure caused pain and blood loss leading to a shock state. However, the amount of blood loss by itself could not result in circulatory failure [4]. It is now clear that multiple trauma is associated with significant activation of the coagulation system, mainly by tissue factor [7, 8].

After scourging, Jesus was forced to carry on his shoulders the crossbein of the cross, which weighted 34–57 kg for 600 m to the site of crucifixion [6]. This led to further dehydration and exhaustion.

A crucifixion, nailing of the wrists and ankles to the cross led to further release of tissue factor and increased procoagulant activity [9, 10]. A crucified individual could not move his ankles of Jesus Christ published almost 20 years ago in JAMA [4], the authors carefully evaluated potential causes of Jesus’ death. After analyzing detailed descriptions from the New Testament [5] and contemporary Christian, Jewish and Roman sources, Edwards et al. [4] give the following description of events.

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A crucifixion, nailing of the wrists and ankles to the cross led to further release of tissue factor and increased procoagulant activity [9, 10]. A crucified individual could not move his ankles and this prolonged immobilization in the upright position resulted in increase of the prothrombotic risk. While on the cross, a victim experienced severe stress, prolonged sun exposure and developed rapid shallow breathing, which dramatically intensified dehydration [11]. Moreover, Jesus was also given wine for pain relief, probably causing increased diuresis.

It is mentioned that crucified victims could survive on the cross between 3–4 h and 3–4 days [4]. Jesus was put on the cross on Friday before noontime and died at 3 PM, i.e. only 3–6 h after the start of crucifixion. It is clear that his death was sudden [5] and that a Roman soldier made the stabbing in his right chest after his death [5].

Edwards et al. [4] discuss the sudden death of Jesus and suggest a number of potential causes, including coronary thrombosis from thrombotic vegetations found on the aortic or mitral valves. While the medical evidence for this hypothesis is elusive, it is known that the common cause of death in the setting of multiple trauma, immobilization and dehydration is pulmonary embolism.

This fits well with Jesus’ condition and actually was in all likelihood the major cause of death by crucifixion. It is stated that in order to expedite the death of crucified victims, the Romans fractured their legs and this resulted in death from asphyxia within minutes, probably due to embolization of thrombi or fat. This procedure was performed to the two thieves but not to Jesus.
<table>
<thead>
<tr>
<th>Patient Safety Indicators</th>
<th>No. of Events</th>
<th>Risk Pool</th>
<th>Rate per 1000 Discharges at Risk</th>
<th>Match Rate, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accidental puncture or laceration</td>
<td>11,810</td>
<td>5,628,112</td>
<td>3.32</td>
<td>75</td>
</tr>
<tr>
<td>Birth trauma, injury to neonate</td>
<td>4,740</td>
<td>720,021</td>
<td>6.53</td>
<td>96</td>
</tr>
<tr>
<td>Complications of anesthesia</td>
<td>1,369</td>
<td>1,933,085</td>
<td>0.71</td>
<td>74</td>
</tr>
<tr>
<td>Decubitus ulcer</td>
<td>4,140</td>
<td>1,932,676</td>
<td>21.51</td>
<td>56</td>
</tr>
<tr>
<td>Foreign body left during procedure</td>
<td>536</td>
<td>6,572,845</td>
<td>0.09</td>
<td>69</td>
</tr>
<tr>
<td>Iatrogenic pneumothorax</td>
<td>3,919</td>
<td>5,861,689</td>
<td>0.67</td>
<td>66</td>
</tr>
<tr>
<td>Obstetric trauma, cesarean birth</td>
<td>1,138</td>
<td>191,227</td>
<td>6.97</td>
<td>99</td>
</tr>
<tr>
<td>Obstetric trauma, vaginal birth with instrumentation</td>
<td>12,518</td>
<td>51,225</td>
<td>224.21</td>
<td>95</td>
</tr>
<tr>
<td>Obstetric trauma, vaginal birth without instrumentation</td>
<td>51,223</td>
<td>591,752</td>
<td>86.61</td>
<td>99</td>
</tr>
<tr>
<td>Postoperative hemorrhage or hematoma</td>
<td>3,494</td>
<td>1,695,495</td>
<td>2.06</td>
<td>69</td>
</tr>
<tr>
<td>Postoperative hip fracture</td>
<td>1,068</td>
<td>1,397,698</td>
<td>0.77</td>
<td>51</td>
</tr>
<tr>
<td>Postoperative physiologic and metabolic derangement</td>
<td>799</td>
<td>801,702</td>
<td>1.00</td>
<td>44</td>
</tr>
<tr>
<td>Postoperative pulmonary embolism or deep vein thrombosis</td>
<td>15,704</td>
<td>1,689,662</td>
<td>9.34</td>
<td>61</td>
</tr>
<tr>
<td>Postoperative respiratory failure</td>
<td>2,275</td>
<td>633,855</td>
<td>3.58</td>
<td>37</td>
</tr>
<tr>
<td>Postoperative sepsis</td>
<td>2,592</td>
<td>229,853</td>
<td>11.25</td>
<td>33</td>
</tr>
<tr>
<td>Postoperative wound dehiscence</td>
<td>843</td>
<td>411,099</td>
<td>2.05</td>
<td>55</td>
</tr>
<tr>
<td>Selected infection due to medical care</td>
<td>11,449</td>
<td>5,752,102</td>
<td>1.99</td>
<td>63</td>
</tr>
<tr>
<td>Transfusion reaction</td>
<td>30</td>
<td>6,572,845</td>
<td>0.004</td>
<td>80</td>
</tr>
</tbody>
</table>

*Number of events and denominators are defined by the Agency for Healthcare Research and Quality Patient Safety Indicator (PSI) algorithm. Four matching controls were sought for each PSI case following the predefined matching rules: same hospital, diagnosis related group, and sex; white vs nonwhite race; within 10 years of difference in age; no comorbidity; and risk of death due to comorbidities less than 1% among those with comorbidities. Matching rates are the percentages of PSI cases that were matched with at least 1 control.
Risk Factors

- Age
- Surgery, trauma, SC injury
- History of VTE
- Cancer
- Thrombophilia
- Pregnancy, estrogen use, HRT
- Prolonged immobility
- CHF
- CVA
- Obesity
Risk Factors

- Age
- Surgery, trauma, SC injury
- History of VTE
- Cancer
- Thrombophilia
- Pregnancy, estrogen use, HRT
- Prolonged immobility
- CHF
- CVA
- Obesity
How Are We Entertaining Ourselves On This Long Flight?

- Flirting with homely stewardess to confuse and confound sexy one (14%)
- Taking deep, refreshing draughts of pure plane air (15%)
- Trying to break up blood clot (23%)
- Wailing, peering over seat-back at businessman, wailing some more (12%)
- Strip Sudoku (26%)
- Seeing how far we can dip the nose before warning lights flare up (10%)
Underuse of Prophylaxis Medical/Surgical Patients

- ENDORSE Registry
- 68,103 patients at 358 hospitals

<table>
<thead>
<tr>
<th></th>
<th>Appropriate Prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical patients</td>
<td>58%</td>
</tr>
<tr>
<td>Medical patients</td>
<td>39%</td>
</tr>
</tbody>
</table>

SCIP - VTE

• Guideline jointly developed by CMS and the Joint Commission

surgery patients who received appropriate venous thromboembolism prophylaxis within 24 hours prior to surgery to 24 hours after surgery

all surgical patients
No Pay for Performance

- Mandated revision of the IPPS by DRA of 2005
- Hospital-acquired conditions for which CMS will not reimburse hospitals
- Oct 2008

- Object inadvertently left in after surgery
- Air embolism
- Blood incompatibility
- Catheter associated urinary tract infection
- Pressure ulcer
- Vascular catheter associated infection
- Mediastinitis after CABG
- Falls
No Pay for Performance

HACs 2009

✔ Surgical site infections following elective procedures
✔ Legionnaires’ disease
✔ DKA
✔ Iatrogenic pneumothorax
✔ Delirium
✔ Ventilator-associated pneumonia
✔ **DVT / PE**
✔ *Staphylococcus aureus* septicemia
✔ *Clostridium difficile*
Surgery patients whose doctors ordered treatments to prevent blood clots after certain types of surgeries

Why is this important?

Children’s Asthma Care

Asthma is a chronic lung condition that causes problems getting air in and out of the lungs. Children with asthma may experience wheezing, coughing, chest tightness and trouble breathing.

- More information about timely and effective care measures.

Why children’s asthma care measures are important.

Current data collection period.
<table>
<thead>
<tr>
<th>VTE-1</th>
<th>Venous thromboembolism prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTE-2</td>
<td>Intensive care unit venous thromboembolism prophylaxis</td>
</tr>
<tr>
<td>VTE-3</td>
<td>Venous thromboembolism patients with anticoagulation overlap therapy</td>
</tr>
<tr>
<td>VTE-4</td>
<td>Venous thromboembolism patients receiving Unfractionated Heparin with dosages/platelet count monitoring by protocol</td>
</tr>
<tr>
<td>VTE-5</td>
<td>Venous thromboembolism discharge instructions</td>
</tr>
<tr>
<td>VTE-6</td>
<td>Incidence of potentially-preventable venous thromboembolism</td>
</tr>
</tbody>
</table>
Uhhh....nevermind?

November 2011
ACP Review and Clinical Practice Guideline
SYSTEMATIC REVIEW
Anticoagulants in Medical Patients

Meta-analysis:
10 trials Medical (n=20,717) and 8 trials Stroke (n=15,405)

*Primary outcome*
✓ mortality

*Secondary outcomes*
✓ sx DVT
✓ all PE
✓ fatal PE
✓ major bleeding
RESULTS

MEDICINE PATIENTS

MORTALITY - no difference (RR 0.94)

PE - reduced (RR 0.69)

MAJOR BLEEDING - increased (RR 1.34)

STROKE PATIENTS

MORTALITY - no difference

PE – trend towards reduced (RR 0.72, 0.50 - 1.04)

MAJOR BLEEDING - increased (RR 1.66)

Low-Molecular-Weight Heparin and Mortality in Acutely Ill Medical Patients

Ajay K. Kakkar, M.B., B.S., Ph.D., Claudio Cimminiello, M.D., Samuel Z. Goldhaber, M.D., Rajiv Parakh, M.D., Chen Wang, M.D., Ph.D., and Jean-François Bergmann, M.D., for the LIFENOX Investigators

ABSTRACT

BACKGROUND
Although thromboprophylaxis reduces the incidence of venous thromboembolism in acutely ill medical patients, an associated reduction in the rate of death from any cause has not been shown.

METHODS
We conducted a double-blind, placebo-controlled, randomized trial to assess the effect of subcutaneous enoxaparin (40 mg daily) as compared with placebo — both administered for 10±4 days in patients who were wearing elastic stockings with graduated compression — on the rate of death from any cause among hospitalized, acutely ill medical patients at participating sites in China, India, Korea, Malaysia, Mexico, the Philippines, and Tunisia. Inclusion criteria were an age of at least 18 years and a moderate to high risk for venous thromboembolism determined by the consensus definitions of the International Society on Thrombosis and Haemostasis.
Figure 2. Death from Any Cause.

The percentage of patients in the intention-to-treat population who died from any cause up to day 90 after randomization is shown.

<table>
<thead>
<tr>
<th>No. of Deaths/ No. at Risk</th>
<th>Placebo</th>
<th>Enoxaparin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4136</td>
<td>199/3922</td>
<td>291/3813</td>
</tr>
<tr>
<td>2/4171</td>
<td>205/3950</td>
<td>292/3846</td>
</tr>
</tbody>
</table>
ACCP RECOMMENDATIONS - 2012

1. For acutely ill hospitalized medical patients at increased risk of thrombosis, we recommend anticoagulant prophylaxis (1B)

2. Recommends LMWH, UFH 5000u BID or TID, or fondaparinux (1B)
## PADUA RISK SCORE

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active cancer</td>
<td>3</td>
</tr>
<tr>
<td>Previous VTE</td>
<td>3</td>
</tr>
<tr>
<td>Reduced mobility</td>
<td>3</td>
</tr>
<tr>
<td>Thrombophilia</td>
<td>3</td>
</tr>
<tr>
<td>Recent trauma or surgery</td>
<td>2</td>
</tr>
<tr>
<td>Age $\geq$ 70 y</td>
<td>1</td>
</tr>
<tr>
<td>CHF or respiratory failure</td>
<td>1</td>
</tr>
<tr>
<td>AMI or acute CVA</td>
<td>1</td>
</tr>
<tr>
<td>Acute infection / rheum</td>
<td>1</td>
</tr>
<tr>
<td>Obesity</td>
<td>1</td>
</tr>
<tr>
<td>Hormonal treatment</td>
<td>1</td>
</tr>
</tbody>
</table>

**SCORE <4: LOW**

**SCORE $\geq$4: HIGH**
## General Surgical Patients

Unfractionated Heparin

<table>
<thead>
<tr>
<th></th>
<th>RRR %</th>
<th>RRI %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All DVT</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Fatal PE</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Major bleed</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Wound hematoma</td>
<td>54</td>
<td></td>
</tr>
</tbody>
</table>

29 RCTs
Deep Vein Thrombosis (DVT) Prophylaxis Orders
(For use in Elective General Surgery Patients)

**Thrombosis Risk Factor Assessment** (Choose all that apply)

<table>
<thead>
<tr>
<th>Each Risk Factor Represents 1 Point</th>
<th>Each Risk Factor Represents 2 Points</th>
<th>Each Risk Factor Represents 3 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 41-60 years</td>
<td>Acute myocardial infarction</td>
<td>Age 75 years or older</td>
</tr>
<tr>
<td>Swollen legs (current)</td>
<td>Congestive heart failure (&lt;1 month)</td>
<td>Family History of thrombosis*</td>
</tr>
<tr>
<td>Varicose veins</td>
<td>Medical patient currently at bed rest</td>
<td>History of DVT/PE</td>
</tr>
<tr>
<td>Obesity (BMI &gt;25)</td>
<td>History of inflammatory bowel disease</td>
<td>Positive Prothrombin 20210A</td>
</tr>
<tr>
<td>Minor surgery planned</td>
<td>History of prior major surgery (&lt;1 month)</td>
<td>Positive Lupus anticoagulant</td>
</tr>
<tr>
<td>Sepsis (&lt;1 month)</td>
<td>Abnormal pulmonary function (COPD)</td>
<td>Elevated serum homocysteine</td>
</tr>
<tr>
<td>Serious Lung disease including pneumo (&lt;1 month)</td>
<td></td>
<td>Heparin-induced thrombocytopenia (HIT)</td>
</tr>
<tr>
<td>Oral contraceptives or hormone replacement therapy</td>
<td>Subtotal:</td>
<td>(Do not use heparin or any low molecular weight heparin)</td>
</tr>
<tr>
<td>Pregnancy or postpartum (&lt;1 month)</td>
<td>Subtotal:</td>
<td>Elevated anticardiolipin antibodies</td>
</tr>
<tr>
<td>History of unexplained stillborn infant, recurrent spontaneous abortion (&gt;3), premature birth with toxemia or growth-restricted infant</td>
<td>Subtotal:</td>
<td>Other congenital or acquired thrombophilia</td>
</tr>
<tr>
<td>Other risk factors</td>
<td></td>
<td>If yes: Type</td>
</tr>
</tbody>
</table>

**Factors Associated with Increased Bleeding**

- **Patient may not be a candidate for anticoagulant therapy & SCDs should be considered.**
- Active Bleed, Ingestion of Oral Anticoagulants, Administration of glycoprotein IIb/IIIa inhibitors, History of heparin induced thrombocytopenia

**Clinical Considerations for the Use of Sequential Compression Devices (SCD)**

- **Patient may not be a candidate for SCUs & alternative prophylactic measures should be considered.**

<table>
<thead>
<tr>
<th>Total Risk Factor Score</th>
<th>Risk Level</th>
<th>Incidence of DVT</th>
<th>Prophylaxis Regimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>Low Risk</td>
<td>2%</td>
<td>Early ambulation</td>
</tr>
</tbody>
</table>
| 2                       | Moderate Risk | 10-20%      | Choose the following medication OR compression devices:  
|                         |            |                  | □ Early ambulation   |
|                         |            |                  | □ Sequential Compression Device (SCD) |
|                         |            |                  | □ Heparin 5000 units SQ BID |
| 3-4                     | Higher Risk | 20-40%         | Choose **ONE** of the following medications + / - compression devices:  
|                         |            |                  | □ Sequential Compression Device (SCD)  
|                         |            |                  | □ Heparin 5000 units SQ TID |
|                         |            |                  | □ Enoxaparin/Lovenox: □ 40mg SQ daily (WT < 150kg, CrCl > 30mL/min)  
|                         |            |                  | □ 30mg SQ daily (WT < 150kg, CrCl = 10-29mL/min)  |
|                         |            |                  | □ 30mg SQ BID (WT > 150kg, CrCl > 30mL/min)  |
|                         |            |                  | (Please refer to Dosing Guidelines on the back of this form) |
| 5 or more               | Highest Risk | 40-80%          | Choose **ONE** of the following medications **PLUS** compression devices:  
|                         |            |                  | □ Early ambulation   |
|                         |            |                  | □ Sequential Compression Device (SCD) |
|                         |            |                  | □ Heparin 5000 units SQ TID (Preferred with Epidurals) |
|                         |            |                  | □ Enoxaparin/Lovenox (Preferred): □ 40mg SQ daily (WT < 150kg, CrCl > 30mL/min)  
|                         |            |                  | □ 30mg SQ daily (WT < 150kg, CrCl = 10-29mL/min)  |
|                         |            |                  | □ 30mg SQ BID (WT > 150kg, CrCl > 30mL/min)  |
|                         |            |                  | (Please refer to Dosing Guidelines on the back of this form) |

- **Ambulatory Surgery - No orders for venous thromboembolic prophylaxis required**  
- **VTE Prophylaxis Contraindicated, Reason:**

---

Caprini J. Dis Mon. 2005;512;70-8.
Incidence Rate by Risk Level

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>Highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence</td>
<td>0.00%</td>
<td>0.70%</td>
<td>0.97%</td>
<td>1.94%</td>
</tr>
<tr>
<td>Prevalence</td>
<td>(n = 76)</td>
<td>(858)</td>
<td>(3.001)</td>
<td>(4.281)</td>
</tr>
</tbody>
</table>

Note: CI = confidence interval

RISK SCORE PREVALENCE

VTE INCIDENCE

(1%) (10%) (36%) (52%)

(0%) (0.7%) (1.0%) (1.9%)
BEST PRACTICES
HOSPITAL / SYSTEM LEVEL

- Provider education
- Measurement
- Provider reminders
- Protocols / Order sets
- CDS – electronic
- EMR – hard stop
- Clinician accountability – Unit-based leaders/teams
- Clinical support: Real-time, real-person
VTE Prevention Interventions: 

**EMR / PMR optimization**

- Best practice alerts

- Medicine and Surgical order sets

- Clinical Decision Support
  - Populate risk assessment score
  - Identify non-prophylaxis cases
  - Prompt timely f/u (INR appt)
  - Advanced – Overlap therapy patients
VTE Prevention Interventions: *Order Sets*

- Routine VTE risk assessment - Identify low, mod, high risk patients
- Offer/promote acceptable agents, dosing
  - Other options available – select reason
- Document allowable contraindications
  - Active bleeding
  - High risk of bleeding - liver disease
  - Treatment dose anticoagulation
ORDER SETS – MEDICAL / SURGICAL PATIENTS RISK ASSESSMENT

• VERY LOW
• LOW
• MODERATE
• HIGH
• VERY HIGH

OR

• LOW
• HIGH
DVT Prophylaxis - All Patients — Required

All patients who have had a surgical procedure must be given VTE prophylaxis within 24 hours of anesthesia end time, as per CMS and Mount Sinai Hospital policy. Pharmacologic Prophylaxis Is indicated for medical patients admitted with CHF or respiratory disease, or who have decreased mobility and have one or more additional risk factors, such as age >60 years, obesity, prior CVA, active cancer, or previous VTE. Access to DVT prevention guidelines http://www.ncbi.nlm.nih.gov/pubmed/16674271

Pharmacologic Prophylaxis — Required

- heparin (porcine) injection
  5,000 Units, Subcutaneous, EVERY 8 HOURS SCHEDULED
- enoxaparin (LOVENOX) prefilled syringe
  40 mg, Subcutaneous, DAILY
- warfarin (COUMADIN) tablet
  Oral, AT BEDTIME
- DVT Pharmacologic Prophylaxis Not Indicated Or Contraindicated

Mechanical Prophylaxis — Required

- Place Sequential Compression Device
- Place Ted Hose
  Routine
- DVT Mechanical Prophylaxis Not Indicated or Contraindicated

Medications

- IV Fluids
- Acid Reducing Medications
- Analgesics - Mild
- Analgesics - Moderate to Severe
- Antiemetic Medications
- Anxiolytic/Hypnotic Medications
- Bowel Medications
- Electrolyte Replacement
Pharmacologic Prophylaxis

- Heparin (porcine) injection: 5,000 Units, Subcutaneous, EVERY 8 HOURS SCHEDULED
- Enoxaparin (LOVENOX) prefilled syringe: 40 mg, Subcutaneous, DAILY
- Warfarin (COUMADIN) tablet: Oral, AT BEDTIME

DVT Pharmacologic Prophylaxis Not Indicated Or Contraindicated

Select Reason: Not Indicated - Low Risk for VTE

- Not Indicated= Age <60 AND Ambulatory AND Non-Surgical AND No VTE Risk Factors

Mechanical Prophylaxis — Required

- Place Sequential Compression Device
- Place TED Hose

DVT Mechanical Prophylaxis Not Indicated or Contraindicated

VTE Prevention Efforts: Measurement

- Structure Measures
- Process Measures
- Outcome Measures
- Balancing Measures
VTE Prevention Efforts: Measurement

- Structure Measures
- Process Measures
- Outcome Measures
- Balancing Measures
Structural Measures
VTE

• Hospital VTE Prevention Committee (yes / no)
• Services with VTE prophylaxis in order set
• Wards with IV heparin nomogram
• Wards with daily review of VTE prophylaxis
• Wards with hourly rounding for effective IPC use
VTE Prevention Efforts: Measurement

- Structure Measures
- **Process Measures**
- Outcome Measures
- Balancing Measures
Process Measures
VTE

- Order set used
- VTE risk assessment documented
- Contraindications documented
- Anticoagulant prophylaxis ordered
- IPC device in place and turned on
Measurement – The Cold Reality

• Define the population
  – Hospitalized Medicine patients
  – Increased VTE risk
  – Patients treated for VTE with parenteral heparin and warfarin for <5 days

• Identify the population
  – Administrative data
  – Chart review
  – Up front data collection
    • Nursing intake form
    • Epic order set, Discharge navigator
Measurement – The Cold Reality

• Define the exclusions
  – Low risk for VTE
  – “Increased bleeding risk”
  – DVT proph in patients already on warfarin, ambulatory patients

• Identify the exclusions
  – Administrative data
  – Chart review
  – Up front data collection
Measurement:
Basic and Advanced

Basic

- Admin / electronic source [eg, order set use]
- Easy / quick - Big picture, Rapid information
- No drill down
  - patient populations
  - contraindications
- Data “dirty”
  - possibly incorrect, misleading
  - Helpful to validate a subset

- May be definitive; More likely leads to more detailed measurement
Measurement: Basic and Advanced

**Advanced**

- Time-consuming, difficult
- Manual or detailed electronic reports
- Can specify populations
- Drill down
  - Eg - barriers to compliance
    - Unable to document high risk for bleeding
    - Non-approved regimen preferred by clinician
- Leads to specific interventions for improvement
VTE-1: VTE Prophylaxis Rate

Pareto Chart of Contributing Factors to Failed VTE-1

<table>
<thead>
<tr>
<th>Contributing Factors</th>
<th>Total</th>
<th>Percent</th>
<th>Cum %</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOT INDICATED</td>
<td>5</td>
<td>31.3</td>
<td>31.3</td>
</tr>
<tr>
<td>No vTE risk assessment</td>
<td>4</td>
<td>25.0</td>
<td>56.3</td>
</tr>
<tr>
<td>No order to ICU</td>
<td>3</td>
<td>18.8</td>
<td>75.0</td>
</tr>
<tr>
<td>Mechanical ordered, no reasons for Pharm</td>
<td>2</td>
<td>12.5</td>
<td>87.5</td>
</tr>
<tr>
<td>Mechanical VTE ordered not doc</td>
<td>2</td>
<td>12.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Measurement

- Structure Measures
- Process Measures
- **Outcome Measures**
- Balancing Measures
# Mount Sinai Medical Center
## Apr - Jun 2011 (Q2)
### Surgical - PSI12 Post-operative PE or DVT - Adults (Rate per 1000)

### Summary Definitions

**AHRQ Definition:** Cases of deep vein thrombosis (DVT) or pulmonary embolism (PE) per 1,000 surgical discharges.

**Numerator:** Discharges with ICD-9-CM codes for deep vein thrombosis or pulmonary embolism in any secondary diagnosis field per 1,000 surgical discharges.

**Denominator:** All surgical discharges age 18 and older defined by specific DRGs or MS-DRGs and an ICD-9-CM code for an operating room procedure. Exclude cases with preexisting (principal diagnosis or secondary diagnosis POA) deep vein thrombosis or pulmonary embolism; where a procedure for interruption of vena cava is the only operating room procedure or occurs before or on the same day as the first operating room procedure; in MDC 14.

**Target:** AHRQ expected rate (O/E ratio of 1.0). Rank and Top-10 based on O/E ratios.

**See Also:** [http://www.qualityindicators.ahrq.gov/index.htm](http://www.qualityindicators.ahrq.gov/index.htm)

### Relative Performance

**Denom. (n):**

<table>
<thead>
<tr>
<th>Current Quarter</th>
<th>Relative Performance</th>
<th>Denom. (n)</th>
<th>10th</th>
<th>25th</th>
<th>50th</th>
<th>75th</th>
<th>90th</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr - Jun 2011 (Q2)</td>
<td>4,808</td>
<td>4.8</td>
<td>7.6</td>
<td>9.8</td>
<td>11.7</td>
<td>26/117</td>
<td>1</td>
<td>2,150</td>
</tr>
<tr>
<td>Jul 2010 - Jun 2011 (recent year)</td>
<td>19,251</td>
<td>6.0</td>
<td>11.4</td>
<td>41/117</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Value:**

- **10th:**
  - Apr - Jun 2011 (Q2): 4.8
  - Jul 2010 - Jun 2011 (recent year): 6.0

- **25th:**
  - Apr - Jun 2011 (Q2): 7.6
  - Jul 2010 - Jun 2011 (recent year): 11.4

- **50th:**
  - Apr - Jun 2011 (Q2): 9.8
  - Jul 2010 - Jun 2011 (recent year):

- **75th:**
  - Apr - Jun 2011 (Q2): 11.7
  - Jul 2010 - Jun 2011 (recent year):

- **90th:**
  - Apr - Jun 2011 (Q2):
  - Jul 2010 - Jun 2011 (recent year):

- **Mean:**
  - Apr - Jun 2011 (Q2): 2,150
  - Jul 2010 - Jun 2011 (recent year):

**O/E Population:**

- **10th:**
  - Apr - Jun 2011 (Q2): 0.30
  - Jul 2010 - Jun 2011 (recent year):

- **25th:**
  - Apr - Jun 2011 (Q2): 0.42
  - Jul 2010 - Jun 2011 (recent year):

- **50th:**
  - Apr - Jun 2011 (Q2): 0.61
  - Jul 2010 - Jun 2011 (recent year):

- **75th:**
  - Apr - Jun 2011 (Q2): 0.82
  - Jul 2010 - Jun 2011 (recent year):

- **90th:**
  - Apr - Jun 2011 (Q2): 1.13
  - Jul 2010 - Jun 2011 (recent year):

**Recent Year UHC Top 10 in This Metric**

- MIRIAM: 4,692
- STELIZABETH: 4,354
- USA: 2,260
- MAYOCLINICFLORIDA: 5,813
- IU_HEALTH-BALL MEM: 4,073
- UTAH: 8,454
- HARBOR-UCLA: 5,803
- ARIZONA: 6,587
- VANDERBILT: 14,962
- WISHARD: 3,133

**Cases O/E Observed**

- MIRIAM: 3.02
- STELIZABETH: 2.89
- USA: 2.67
- MAYOCLINICFLORIDA: 4.82
- IU_HEALTH-BALL MEM: 3.44
- UTAH: 4.73
- HARBOR-UCLA: 3.10
- ARIZONA: 4.55
- VANDERBILT: 4.58
- WISHARD: 4.15

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UHC, 155 North Wacker Drive, Chicago, Illinois, 60606, (312) 775-4100.
Hospital-Acquired VTE: Rates/1000 Discharges

MEDICINE includes Discharge Services CARDIOLOGY, GASTROENTEROLOGY, GERIATRICS, GYNECOLOGY, INFECTIOUS DISEASES, LIVER DISEASES, MEDICAL ONCOLOGY, MEDICINE, NEUROLOGY, NEPHROLOGY, OTOLARYNGOLOGY, PULMONARY MEDICINE, TRANSPLANT INSTITUTE, and UROLOGY.
BEST PRACTICES
HOSPITAL / SYSTEM LEVEL

- Provider education
- Measurement
- Provider reminders
- Protocols / Order sets
- CDS – electronic
- EMR – hard stop
- **Clinician accountability** – Unit-based leaders/teams
- Clinical support: Real-time, real-person
• Partner on key units

• Daily rounding report:
  ✓ clinical (diagnosis, plan)
  ✓ efficiency/utilization (LOS, telemetry)
  ✓ build in quality metrics (VTE prophylaxis, pain score)

• Review in Interdisciplinary Rounds - Real-time feedback and intervention

• Monthly unit-based scorecard
Daily Automated Reports

GREEN ZONE
receiving anticoagulation

YELLOW ZONE
receiving mechanical prophylaxis only

RED ZONE
receiving no prophylaxis

INCORPORATE INTO DAILY WORK (E.G. - INTERISCIPLINARY ROUNDS) TO IMPROVE CARE.
Yellow Patients

• Is patient low risk?

• Does patient have a contraindication to pharmacologic prophylaxis?
Red Patients

Contraindication to mechanical prophylaxis?
The Mount Sinai Hospital (MSH)
Inpatient Satisfaction Data
01/2012 through 08/2012
Discharging Unit: C4S

Sample:
Data are collected from patients throughout each month of the 12-month reporting period. The patients must have spent at least one night in the hospital as an inpatient. Per HCAHPS, the sample excludes pediatric patients, as well as those with a Psychiatric or Rehabilitation Medicine primary DRG. Data are aggregated, on a quarterly basis, to create a rolling 4-quarter data file for each hospital.

Data Collection:
Mail survey sent to a random sample of discharged patients each week.

Measurement:
The CMS VBP threshold from national data is used as the benchmark. A score in green font means that the unit is performing above the threshold and a score in red font means the unit is performing at or below the threshold. The data presented are the % of patients who responded in the most positive category (e.g., always, yes). Analyses are conducted by the Centers for Medicare and Medicaid Services.

<table>
<thead>
<tr>
<th>Month</th>
<th>n</th>
<th>Communication with Doctors % 'Always'</th>
<th>How often did doctors treat you with courtesy and respect % 'Always'</th>
<th>How often did doctors listen carefully to you? % 'Always'</th>
<th>How often did doctors explain things in a way you could understand? % 'Always'</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/2012</td>
<td>7</td>
<td>66.7 %</td>
<td>71.4 %</td>
<td>71.4 %</td>
<td>57.1 %</td>
</tr>
<tr>
<td>02/2012</td>
<td>6</td>
<td>44.4 %</td>
<td>50.0 %</td>
<td>50.0 %</td>
<td>33.3 %</td>
</tr>
<tr>
<td>03/2012</td>
<td>18</td>
<td>68.5 %</td>
<td>77.8 %</td>
<td>61.1 %</td>
<td>66.7 %</td>
</tr>
<tr>
<td>04/2012</td>
<td>13</td>
<td>76.5 %</td>
<td>90.9 %</td>
<td>72.7 %</td>
<td>66.7 %</td>
</tr>
<tr>
<td>05/2012</td>
<td>10</td>
<td>60.0 %</td>
<td>70.0 %</td>
<td>59.0 %</td>
<td>60.0 %</td>
</tr>
<tr>
<td>06/2012</td>
<td>8</td>
<td>81.0 %</td>
<td>71.4 %</td>
<td>85.7 %</td>
<td>85.7 %</td>
</tr>
<tr>
<td>07/2012</td>
<td>14</td>
<td>92.9 %</td>
<td>92.9 %</td>
<td>92.9 %</td>
<td>92.9 %</td>
</tr>
<tr>
<td>08/2012</td>
<td>11</td>
<td>93.9 %</td>
<td>90.9 %</td>
<td>90.9 %</td>
<td>100.0 %</td>
</tr>
<tr>
<td>87</td>
<td></td>
<td>75.1 %</td>
<td>79.8 %</td>
<td>72.6 %</td>
<td>72.9 %</td>
</tr>
</tbody>
</table>
BEST PRACTICES
HOSPITAL / SYSTEM LEVEL

• Provider education
• Measurement
• Provider reminders
• Protocols / Order sets
• CDS – electronic
• EMR – hard stop
• Clinician accountability – Unit-based leaders/teams
• Clinical support: Real-time, real-person
REAL-TIME ROUNDELING  
= real-time oversight and correction

Pilot: Orthopedic ward

I. Patient care associate (PCA) hourly rounding – Mechanical prophylaxis compliance. Documented – Each shift in EMR.

If not in place and in use, placed on patient. If not, RN informed and incident documented.

II. RN “rounding for prophylaxis” – Each shift. Contact and prompt clinician if no prophylaxis and no contraindication documented.
Hourly PCA Rounding to Improve IPC Compliance

1 month interval
N = 138
REAL-TIME ROUNDING

Barriers and Lessons Learned

• Workflow – Don’t get in the way

• Documentation – Important but not burdensome

• Culture – Promote and encourage. Empower!

• Fail faster – Get feedback and revise (OOB to chair)
KEY POINTS

• Hospital-acquired VTE is common and preventable

• Risk stratification is required – keep it simple

• Order sets should be used, tracked for compliance

• Optimize workflow via EMR/PMR

• Determine and measure key process metrics
  ✓ Important, necessary, feasible
  ✓ Drill down where essential
  ✓ Assess the tool and the process - rapidly

• Real-time assessment and correction is ideal
Thank You!