Hospital-Associated Venous Thromboembolism

A Journey through Guidelines, Implementation, and Policy

Presentation for ACHPE, Quito, Ecuador

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Director, UCSD Center for Innovation and Improvement Science

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Where discoveries are delivered.SM
Venous Thromboembolism (VTE):
A Major Source of Mortality and Morbidity

- 350,000 to 650,000 with VTE per year
- 100,000 to > 200,000 deaths per year
- Most are hospital related.
- VTE is primary cause of fatality in half-
  - More than HIV, MVAs, Breast CA combined
  - Equals 1 jumbo jet crash / day
- 10% of hospital deaths
  - May be the #1 preventable cause
- Huge costs and morbidity (recurrence, post-thrombotic syndrome, chronic PAH)

Surgeon General’s Call to Action to Prevent DVT and PE 2008 DHHS
Economic Burden of VTE

- Costs in the U.S. >$1.5 billion/year
  - Managing initial episode of DVT estimated at $7700 to $10,800
  - Initial PE costs $9500-16,600
  - Acute VTE in patients with cancer >$20,000

- Significant costs associated with long-term complications (recurrent VTE, chronic venous stasis / ulceration, and PE)

VTE Prophylaxis

Effective, Safe, and Cost-Effective

- Pharmacologic prophylaxis substantially reduces the risk for VTE
  - Symptomatic and asymptomatic VTE reduced
- Bleeding complications are rare
- HIT: a serious but relatively rare complication
  - 2.37% with prolonged UFH in ill perioperative patients
  - 0.06% with LMWH
  - Monitoring for HIT is warranted
- Cost-effectiveness of VTE prophylaxis well documented

Shojania KG et al. Making health care safer. URL in ref list.

HIT = heparin-induced thrombocytopenia
LMWH = low molecular weight heparin
UFH = unfractionated heparin
The VTE Population: Who gets clots?

Cases per 10,000 person-years

- Recently hospitalized patients
- Community

Which inpatient group has the highest VTE burden (and the largest opportunity to make an impact)?

1. Surgical inpatients
2. OB-GYN inpatients
3. Medical inpatients
4. Orthopedic inpatients
5. Administrators (because they are at their desk too much)
VTE Prophylaxis is Underutilized: *ENDORSE* Results

- Out of ~70,000 patients in 358 hospitals, appropriate prophylaxis was administered in:
  - 58.5% of surgical patients
  - 39.5% of medical patients

UCSD - Decrease in Patients with Preventable HA VTE

Results by Service


HA = hospital-acquired
Which inpatient group has the highest VTE burden (and the largest opportunity to make an impact)?

1. Surgical inpatients
2. OB-GYN inpatients
3. Medical inpatients
4. Orthopedic inpatients
5. Administrators (because they are at their desk too much)
Why is VTE Prophylaxis Under-Used?
Why don’t we do better?

- Competing Priorities
- National Policies / Incentives / Initiatives / Accreditation not all in place
- Lack of awareness or buy in of guidelines
- Underestimation of clot risk, overestimation of bleeding risk
- Lack of validated risk assessment model (until recently)
- Measurement Issues
- Translating complicated guidelines into everyday practice is difficult
- Medical training failures (QI and systems re-design)
- Failure to use a good QI framework
• 2005 – AHRQ grant to:
  – Design and implement VTE prevention protocol
  – Monitor impact on VTE prophylaxis and VTE
  – Eliminate Preventable Hospital-Acquired VTE (HA VTE)
  – Validate a VTE risk assessment model / protocol
Attempt to use portable methodology, build toolkit to allow others to accomplish the same thing
Percent of Randomly Sampled Inpatients with Adequate VTE Prophylaxis


Baseline

Consensus building

Order Set Implementation & Adjustment

Real time ID & intervention

Q 1 '05  Q2 '05  Q3 '05  Q4 '05  Q1 '06  Q2 '06  Q3 '06  Q4 '06  Q1 '07  Q2 '07  Q3 '07  Q4 '07
UCSD - Decrease in Patients with Preventable HA VTE

Oversights identified and addressed in real time

95+%
### Hospital Acquired VTE by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Patients at Risk</th>
<th>Cases w/ any VTE</th>
<th>Risk for HA VTE</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>Cases with PE</th>
<th>Risk for PE</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>Cases with DVT (and no PE)</th>
<th>Risk for DVT</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
<th>Cases w/ Preventable VTE</th>
<th>Risk for Preventable VTE</th>
<th>Odds Ratio</th>
<th>(95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>9,720</td>
<td>131</td>
<td>1 in 76</td>
<td>1.0</td>
<td>(0.81, 1.32)</td>
<td>21</td>
<td>1 in 463</td>
<td>1.0</td>
<td>(0.54, 1.96)</td>
<td>110</td>
<td>1 in 88</td>
<td>1.0</td>
<td>(0.79, 1.96)</td>
<td>44</td>
<td>1 in 221</td>
<td>1.0</td>
<td>(0.26, 0.80)</td>
</tr>
<tr>
<td>2006</td>
<td>9,923</td>
<td>138</td>
<td>1 in 73</td>
<td>1.03</td>
<td>(0.46, 0.80)</td>
<td>22</td>
<td>1 in 451</td>
<td>1.02</td>
<td>(0.30, 1.26)</td>
<td>116</td>
<td>1 in 85</td>
<td>1.03</td>
<td>(0.45, 0.82)</td>
<td>21</td>
<td>1 in 473</td>
<td>0.47#</td>
<td>(0.05, 0.31)</td>
</tr>
<tr>
<td>2007</td>
<td>11,207</td>
<td>92</td>
<td>1 in 122</td>
<td>0.61#</td>
<td></td>
<td>15</td>
<td>1 in 747</td>
<td>0.62</td>
<td></td>
<td>77</td>
<td>1 in 146</td>
<td>0.61*</td>
<td></td>
<td>7</td>
<td>1 in 1,601</td>
<td>0.14*</td>
<td></td>
</tr>
</tbody>
</table>

*p < 0.01 *p < 0.001

Preventing Hospital-Acquired Venous Thromboembolism

A Guide for Effective Quality Improvement

Version 3.0

Society of Hospital Medicine

Greg Maynard MD, MSe
UCSD

Jason Stein, MD
Emory University Hospitals
Framework for Accelerated Improvement

- Align with institutional interests: Get support
  - Will to standardize and assistance with metrics are key!
- Interdisciplinary team with physician leadership
  - Do things *with* or *for* practitioners, not *to* them
- Review past efforts / current process
- Define best practice
- Integrate best practice guidance in multiple ways
  - Order set with protocol driven clinical decision support
  - Many others, order sets the beginning, rather than the end point.
- Measures and Goals
- Monitor / Refine
- **Real time** measurement and feedback
Common failures in process

- No protocol / standardized order sets
- Order sets / prompts for VTE P in place, but no guidance
- Order sets with guidance in place but bypassed
- Order sets with guidance in place and used, but used incorrectly
- Patient gets placed on right prophylaxis, but VTE / bleeding risk changes and adjustment not made.
- Prophylaxis gets missed / changed on transfer / peri-op setting
- Correct prophylaxis ordered, but not administered, or patient refuses.
- Patient not mobilized optimally
- Preventable risk factors (central line) not optimally managed
VTE Prevention Collaboratives Using UCSD Model

Over 300 Hospitals

- Society of Hospital Medicine (SHM)
- AHRQ and Quality Improvement Organizations
- Institute for Healthcare Improvement (IHI) Expedition
- British Columbia Hospital Medicine, Dignity Health
- American Society of Healthsystems Pharmacists (ASHP)
- UHC, multiple Partnerships for Patients efforts - HENS
- International Influence

- Awards to UCSD, Emory, UNM, Washington DC VA, Blessing (Quincy IL), Banner Health, and British Columbia based on these strategies (all members of mentored implementation)

- Effective across variety of settings
  - Paper and Computerized / Electronic
  - Small and large institutions
  - Academic and community
Good Samaritan - Dr. Lori Porter, team lead

40% reduction in VTE
Collaborative Improvement Efforts

- Learning goes both ways
- Accelerates improvement
  - But collaborative infrastructure matters
- Builds networks that transcend the problem at hand
- Builds visibility of SHM / UCSD improvement efforts
  - Adds to voices calling for action
- Raises awareness about common issues
  - VTE Risk assessment models, protocols, and order sets
  - Measures, administrative ICD-9 coding challenges
  - EMR and CPOE
  - Other issues that have an impact on VTE
  - Controversies and new guidelines
  - Spectrum of environments to support QI
The Essential First Intervention

VTE Protocol

1) a standardized VTE risk assessment, linked to…
2) a menu of appropriate prophylaxis options, plus…
3) a list of contraindications to pharmacologic VTE prophylaxis

Challenges:

Make it easy to use ("automatic")
Make sure it captures almost all patients
Trade-off between guidance and ease of use / efficiency
Options for Risk Assessment

1. Default is prophylaxis, or prove why not
2. Prompt with list of options, leave to physician judgment
3. Individualized point-based scoring systems
4. Describe groups at risk, or place patients in “buckets” of risk
69-yr-old male admitted from ED to ward with SOB x 3-4 days
- subjective fever and cough
- Hx compensated CHF, COPD, HTN, and HL
- Still smokes
- CXR c/w RLL pneumonia

PEx reveals RR=22, HR=106, BP= 120 / 70 mm Hg

Obese, mildly dyspneic at rest, not ambulating,
PICC line in place

Dull at R base Cor – RRR no S3

2+ pedal edema and acute / chronic stasis and varicose veins

Ht: 67 in. Wt: 91 kg
Protocol 1 - Prompt - Not a protocol

DVT PROPHYLAXIS ORDERS

- Anti thromboembolism Stockings
- Sequential Compression Devices
- UFH 5000 units SubQ q 12 hours
- UFH 5000 units SubQ q 8 hours
- LMWH (Enoxaparin) 40 mg SubQ q day
- LMWH (Enoxaparin) 30 mg SubQ q 12 hours
- No Prophylaxis, Ambulate
Protocol 2

### Protocol 2: Anticoagulant Guidelines

**Contraindications to Anticoagulants:**

- Relative:
  - Cerebral hemorrhage at any time
  - GI, GU bleed or stroke in last 6 months
  - Thrombocytopenia (platelets < 100,000)
  - Coagulopathy
  - Active intracranial lesions/neoplasms
  - Proliferative retinopathy
  - Vascular access/biopsy sites inaccessible to hemostatic control
  - Low Molecular Weight Heparin in dialysis patients or those with creatinine clearance < 30

- Absolute:
  - Active hemorrhage from wounds, drains, lesions
  - Unfractionated or Low Molecular weight Heparin use in Heparin Induced Thrombocytopenia
  - Severe trauma to head, spinal cord, abdomen with spleen or liver laceration or hemorrhage in last 4 weeks
  - Spinal or epidural anesthesia planned or performed, discuss with anesthesiologist
  - Warfarin use in pregnancy

**Contraindication(s) to Pharmacological Prophylaxis with Anticoagulants?**

- Yes: If yes explain and choose non-pharmacological method unless also contraindicated (Peripheral vascular disease or wounds)

**Step 2: Risk Factors Associated with Clinical Setting:**

<table>
<thead>
<tr>
<th>Score 1 point</th>
<th>Score 2 points</th>
<th>Score 3 points</th>
<th>Score 5 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Surgery</td>
<td>Major surgery (&lt; 45 min)</td>
<td>Major surgery with myocardial infarction</td>
<td>Elective lower extremity arthroplasty</td>
</tr>
<tr>
<td>Trauma</td>
<td>Laparoscopic surgery (&lt; 45 min)</td>
<td>Congestive heart failure</td>
<td>Hip, pelvis or leg fracture</td>
</tr>
<tr>
<td>Observation</td>
<td>Patients confined to bed &gt; 24 hr</td>
<td>Severe sepsis/infection</td>
<td>Stroke new onset</td>
</tr>
<tr>
<td>Bed rest &gt; 12 hours</td>
<td>Immobilizing plaster cast</td>
<td>Medical patient with additional risk factors (MI, CHF, Sepsis, Immobility)</td>
<td>Multiple trauma</td>
</tr>
<tr>
<td>Central Venous Access</td>
<td></td>
<td></td>
<td>Acute spinal cord injury (paralysis)</td>
</tr>
</tbody>
</table>

**Baseline Risk Score (if score = 5, go to Step 4)**

**Step 3: Risk Factors Associated with the Patient:**

**Clinical** (1 point each unless otherwise indicated)

- Age 41 to 60 years
- Age over 60 years (2 points)
- History of DVT/PE (3 points)
- Pregnancy or postpartum < 1 month
- Obesity (BMI > 30)
- Varicose veins
- Inflammatory Bowel disease
- Oral contraceptives or hormone replacement
- Active Malignancy (2 points)
- Hypercoagulable states (3 points)
- Current tobacco use

**Total Additional Risk Points**

**Step 4: DVT/PE Prophylaxis Orders**

- **Score of 1 or less (Low Risk):**
  - **Low Risk:** Early ambulation
  - **Subcut:** Heparin 5000 units q 12 hrs

- **Score of 2 (Moderate Risk):**
  - **Sequential compression device and/or:**
  - **Subcut:** Heparin 5000 units q 12 hrs

- **Score of 3-4 (High Risk):**
  - **Sequential compression device and/or:**
  - **Heparin 5000 units q 8 hrs subcut**
  - **Enoxaparin 40 mg subcut daily**
  - **Enoxaparin 30 mg subcut q 12 hrs**
  - **Warfarin daily with goal INR 2-3 (see warfarin orders) along with Heparin or Enoxaparin as above due to concerns for Hypercoagulable states and Warfarin Alone**

*Physician Signature* ___________________________  *Date/Time* ___________________________
**Thrombosis Risk Factor Assessment**

(Choose all that apply)

### Each Risk Factor Represents 1 Point
- Age 41-60 years
- Swollen legs (current)
- Varicose veins
- Obesity (BMI >25)
- Minor surgery planned
- History of unexplained stillborn infant
- Premature birth with toxemia or growth-restricted infant
- Other risk factors

### Each Risk Factor Represents 2 Points
- Age 61-74 years
- Arthroscopic surgery
- Malignancy (present or previous)
- Laparoscopic surgery (>45 minutes)
- Patient confined to bed (>72 hours)
- Immobilizing plaster cast (>1 month)

### Each Risk Factor Represents 3 Points
- Age 75 years or older
- History of DVT/PE
- Positive Prothrombin 20210A
- Positive Factor V Leiden
- Positive Lupus anticoagulant
- Elevated serum homocysteine
- Heparin-induced thrombocytopenia
- Other congenital or acquired thrombophilia

### Each Risk Factor Represents 5 Points
- Stroke (>1 month)
- Multiple trauma (>1 month)
- Elective major lower extremity arterioplasty
- Hip, pelvis or leg fracture (>1 month)
- Acute spinal cord injury (paralysis) (>1 month)

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**Factors Associated with Increased Bleeding**

- 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 SCDs & alternative prophylactic measures should be considered.

<table>
<thead>
<tr>
<th>Total Risk Factor Score</th>
<th>Risk Level</th>
<th>Incidence of DVT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>Low Risk</td>
<td>2%</td>
</tr>
<tr>
<td>2</td>
<td>Moderate Risk</td>
<td>10-20%</td>
</tr>
<tr>
<td>3-4</td>
<td>Higher Risk</td>
<td>20-40%</td>
</tr>
<tr>
<td>5 or more</td>
<td>Highest Risk</td>
<td>40-80%</td>
</tr>
</tbody>
</table>

**Prophylaxis Regimen**

- **Early ambulation**
- **Sequential Compression Device (SCD)**
- **Heparin 5000 units SQ BID**

**Ambulatory Surgery - No orders for venous thromboembolic prophylaxis required**

- VTE Prophylaxis Contraindicated, Reason:

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**UC San Diego Health Sciences**

**Ann Surg 2009 Bahl et al**

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
<td>0.9%</td>
</tr>
<tr>
<td>Moderate Risk</td>
<td>10.4%</td>
</tr>
<tr>
<td>High Risk</td>
<td>36.5%</td>
</tr>
<tr>
<td>Highest Risk</td>
<td>52.1%</td>
</tr>
</tbody>
</table>
**Protocol 3**

**Complete Assessment at ADMISSION, POST-OP, AND TRANSFER**

<table>
<thead>
<tr>
<th>DVT/PE RISK LEVEL &amp; PROPHYLAXIS ORDERS</th>
<th>CHOOSE ONE PHARMACOLOGIC option</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Low Risk</td>
<td>□ Early ambulation, education</td>
</tr>
<tr>
<td>Observation patients, expected LOS &lt;48 hrs: Minor/ Ambulatory surgery or Age &lt; 50 and NO other risk factors, or Already on therapeutic anticoagulation</td>
<td>□ Education</td>
</tr>
<tr>
<td>□ Moderate Risk</td>
<td>□ Enoxaparin 40 mg SC q 24 hrs</td>
</tr>
<tr>
<td>Most medical/surgical patients</td>
<td>□ Enoxaparin 30 mg SC q 24 hrs</td>
</tr>
<tr>
<td>CHF, pneumonia, active inflammation, advanced age, dehydration, varicose veins, less than fully and independently ambulatory, many other factors. All patients not in the Low or Highest Risk Categories (see reverse for more risk factors)</td>
<td>□ Heparin 5000 units SC q 8 hrs</td>
</tr>
<tr>
<td>□ Highest Risk</td>
<td>□ Heparin 5000 units SC every 12hrs (if weight &lt;50kg or age &gt; 75)</td>
</tr>
<tr>
<td>Elective hip or knee arthroplasty</td>
<td>Also (OPTIONAL)</td>
</tr>
<tr>
<td>Acute spinal cord injury with paresis</td>
<td>□ Sequential compression device</td>
</tr>
<tr>
<td>Multiple major trauma</td>
<td></td>
</tr>
<tr>
<td>Abdominal or pelvic surgery for cancer</td>
<td></td>
</tr>
</tbody>
</table>

**The risk of adverse effects of pharmacologic prophylaxis outweighs the risk of DVT / PE**

Contraindication to pharmacologic prophylaxis (see reverse):

- □ Mechanical prophylaxis with sequential compression device OR
- □ Contraindicated (peripheral vascular disease or wounds)

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**SIGNATURE / PROVIDER ID**

**DATE / TIME**
Bleeding Risk and Leeway times:

Suggest list, rather than another scoring system

<table>
<thead>
<tr>
<th>CONTRAINDICATIONS OR OTHER CONDITIONS TO CONSIDER WITH PHARMACOLOGIC VTE PROPHYLAXIS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABSOLUTE</strong></td>
</tr>
<tr>
<td>Active hemorrhage</td>
</tr>
<tr>
<td>Severe trauma to head or spinal cord with hemorrhage in the last 4 weeks</td>
</tr>
<tr>
<td>Other ________________</td>
</tr>
<tr>
<td><strong>RELATIVE</strong></td>
</tr>
<tr>
<td>Intracranial hemorrhage within last year</td>
</tr>
<tr>
<td>Craniotomy within 2 weeks</td>
</tr>
<tr>
<td>Intraocular surgery within 2 weeks</td>
</tr>
<tr>
<td>GI, GU hemorrhage within the last month</td>
</tr>
<tr>
<td>Thrombocytopenia (&lt;50K) or coagulopathy (PT &gt; 18 seconds)</td>
</tr>
<tr>
<td>End stage liver disease</td>
</tr>
<tr>
<td>Active intracranial lesions/neoplasms</td>
</tr>
<tr>
<td>Hypertensive urgency/emergency</td>
</tr>
<tr>
<td>Post-operative bleeding concerns*</td>
</tr>
</tbody>
</table>

*Scheduled return to OR within the next 24 hours  *Major Ortho, general surgery: 24 hours leeway
*Spinal cord or Ortho Spine: 7 days leeway  s/p transplant, s/p Trauma admission: 48 hours leeway
Table 2—Risk Factors for VTE in Hospitalized Medical Patients

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active cancer&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>Previous VTE (with the exclusion of superficial vein thrombosis)</td>
<td>3</td>
</tr>
<tr>
<td>Reduced mobility&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>Already known thrombophilic condition&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>Recent (≤ 1 mo) trauma and/or surgery</td>
<td>2</td>
</tr>
<tr>
<td>Elderly age (≥ 70 y)</td>
<td>1</td>
</tr>
<tr>
<td>Heart and/or respiratory failure</td>
<td>1</td>
</tr>
<tr>
<td>Acute myocardial infarction or ischemic stroke</td>
<td>1</td>
</tr>
<tr>
<td>Acute infection and/or rheumatologic disorder</td>
<td>1</td>
</tr>
<tr>
<td>Obesity (BMI ≥ 30)</td>
<td>1</td>
</tr>
<tr>
<td>Ongoing hormonal treatment</td>
<td>1</td>
</tr>
</tbody>
</table>

- A Patients with local or distant metastases and/or in whom chemotherapy or radiotherapy had been performed in the previous 6 mo.
- B Anticipated bed rest with bathroom privileges (either because of patient’s limitations or on physician’s order) for at least 3 d.
- C Carriage of defects of antithrombin, protein C or S, factor V Leiden, G20210A prothrombin mutation, antiphospholipid syndrome.

ACCP 9 used Padua to estimate risk in medical inpatient population:

For medical inpatients, they infer:

60% of inpatients are low risk

Padua is preferred VTE RAM

Patients fall off a VTE Risk Cliff:

- 4 or above - 11% risk!
- Below 4 - very low risk!
- No medium risk patients!

We disagree on all 3 counts
Closer Look at Padua

Eligible Patients
n = 2208

Excluded patients (n = 1028)
- Need for anticoagulation 964
- Contraindications 54
- Refused consent 10

Recruited patients
N = 1180

RAM < 3
N = 519
- No VTE Events

RAM = 3
N = 192
- 2 PE (1.04%)

RAM ≥ 4
n = 469
- Prophylaxis n = 186
- 3 DVT (1.6%)
  - 1 non-fatal PE (0.5%)
  - 4 total VTE (2.2%)
- No prophylaxis n = 283
  - 19 DVT (6.7%)
  - 11 non-fatal PE (3.9%)
  - 1 fatal PE (0.4%)
  - 31 Total VTE (11.0%)

Combined RAM < 4, n = 711
2 PE (0.3%)
Padua – Caveats      Medical Inpatients

• 964 of 2208 excluded because they are on ther. AC
• RAM < 4 patients - Mean LOS 7.9 days
  • 12% had acute infxn / rheum
  • 6% with CA
  • 6% Obese
  • < 1% immobile

• Does this sound like 60% of your inpatients?
• Score of 3 = > 1% chance of PE – use 3 and up as criteria
• Never tested in order set
• Mobility definition not practical
# Sample - New 3 Bucket Model for Medical Inpatients

<table>
<thead>
<tr>
<th>High Risk:</th>
<th>LMWH or UFH AND Mechanical Prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Acutely ill in critical care unit.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Moderate Risk:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not regularly ambulating independently and any other illness, exacerbation of chronic condition, or VTE risk factors</td>
<td>LMWH or UFH</td>
</tr>
<tr>
<td>• Active cancer</td>
<td></td>
</tr>
<tr>
<td>• Previous VTE</td>
<td></td>
</tr>
<tr>
<td>o (with exclusion of previous superficial vein thrombosis)</td>
<td></td>
</tr>
<tr>
<td>• Known thrombophilia</td>
<td></td>
</tr>
<tr>
<td>• Recent trauma / surgery (prior 30 days) and any other risk factor</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>• 3 or more other risk factors</td>
<td></td>
</tr>
<tr>
<td>o age &gt; 70, CHF, COPD exacerbation, varicose veins /venous stasis, respiratory failure, acute infection, acute rheumatologic disorder, ongoing hormonal treatment, obesity (BMI ≥ 30)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low Risk:</th>
<th>Ambulation, reassess</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Expected hospital stay &lt; 3 days.</td>
<td></td>
</tr>
<tr>
<td>• Same day surgery patients</td>
<td></td>
</tr>
<tr>
<td>• Fully ambulatory without multiple VTE risk factors</td>
<td></td>
</tr>
<tr>
<td>• Patients no longer / never acutely ill, awaiting disposition</td>
<td></td>
</tr>
<tr>
<td>• <strong>Patients not meeting criteria for high or moderate risk</strong></td>
<td></td>
</tr>
</tbody>
</table>
When do most HA VTE get diagnosed?

1. During the index hospitalization
2. On readmission to the hospital with a clot
3. At autopsy
## UC San Diego Numbers - Included in TJC measures

### Patients Discharged with DVT/PE

10/01/2009 - 12/31/2010

<table>
<thead>
<tr>
<th>Year/Quarter</th>
<th>Total DCs</th>
<th>Total DCs LOS</th>
<th>Total Cases - DVT/PE</th>
<th>Total Cases - DVT/PE %</th>
<th>POA = Y DVT/PE</th>
<th>POA = Y + Prior Visit DVT/PE</th>
<th>POA = N DVT/PE</th>
<th>HA - DVT/PE</th>
<th>HA - DVT/PE %</th>
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</thead>
<tbody>
<tr>
<td>20094</td>
<td>6,049</td>
<td>5.3</td>
<td>145</td>
<td>2.4%</td>
<td>98</td>
<td>22</td>
<td>71</td>
<td>68</td>
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<td>71</td>
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<tr>
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<td>68</td>
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<td><strong>Grand Total</strong></td>
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<td><strong>5.2</strong></td>
<td><strong>604</strong></td>
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<td><strong>378</strong></td>
<td><strong>132</strong></td>
<td><strong>226</strong></td>
<td><strong>226</strong></td>
<td><strong>37.4%</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Year/Quarter</th>
<th>Cases</th>
<th>Readmissions</th>
<th>Readmissions %</th>
<th>DC Dead</th>
<th>DC Dead %</th>
<th>LOS</th>
<th>UE DVT</th>
<th>LE DVT</th>
<th>PE</th>
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<tbody>
<tr>
<td>20094</td>
<td>47</td>
<td>7</td>
<td>14.9%</td>
<td>6</td>
<td>12.8%</td>
<td>16.5</td>
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<tr>
<td>20101</td>
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<td>12.0</td>
<td>10</td>
<td>23</td>
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<tr>
<td>20102</td>
<td>41</td>
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<td>1</td>
<td>2.4%</td>
<td>22.0</td>
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<td>11</td>
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<tr>
<td>20103</td>
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<td>18.4%</td>
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<td>8.2%</td>
<td>12.8</td>
<td>12</td>
<td>19</td>
<td>23</td>
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<td>20104</td>
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<td>30.6%</td>
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<td>6.1%</td>
<td>13.6</td>
<td>13</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>226</strong></td>
<td><strong>51</strong></td>
<td><strong>22.6%</strong></td>
<td><strong>15</strong></td>
<td><strong>6.6%</strong></td>
<td><strong>15.3</strong></td>
<td><strong>53</strong></td>
<td><strong>113</strong></td>
<td><strong>83</strong></td>
</tr>
</tbody>
</table>

UC San Diego Numbers - Included

UC San Diego Numbers - Excluded
When do most HA VTE get diagnosed?

1. During the index hospitalization
2. On readmission to the hospital with a clot (especially for medical inpatients) (surgery patients #1 may be true in your medical center)
3. At autopsy
What is a blood clot?
- Clumps of thickened blood that blocks blood flow
- Blood clots most often form in your legs, arms, and groin but could move to your lungs, heart or brain
- Blood clots can be dangerous and deadly

Why am I at risk in the hospital?
- You are not moving around well *
- You recently had surgery or an injury
- Your disease may increase your chance of getting a clot

*If you are able to walk, this may decrease your risk. Please ask your nurse for help before getting out of bed.

To prevent a blood clot from happening during your hospital stay, your doctor may ask you to take a medication or wear a leg device.

If your doctor asks you to take a medication:
- The medication is a blood thinner
- This medication is a small injection into fatty tissue just below the skin
- It may be given more than once a day
- You will likely not need the medication once you leave the hospital

If your doctor asks you to wear a leg device:
- Sleeves will be placed on your legs that will squeeze your legs off and on during the day
- This light squeeze will increase the flow of blood in your legs to prevent clots from forming
- These sleeves should be removed before you are out of bed and walking because they can cause you to trip and fall
- Be sure you to ask for the sleeves to be put back on when you are back in bed
MEASURE-VENTION

Daily **measurement** drives concurrent intervention

(*i.e., same as Level 5 in Hierarchy of Reliability*)

- Identify patients not receiving VTE prophylaxis in **real time**
  - Ongoing assessment
  - Use for real-time intervention
28 patients: 20 on anticoagulation
4 on mechanical prophylaxis with lab contraindication
3 on Nothing (RED)
1 mechanical
Effect of Situational Awareness on Prevalence of VTE Prophylaxis by Nursing Unit

**Hospital A, 1st Nursing Unit**

Baseline | Post-Intervention
---|---
UCL: | 93% | 104%
Mean: | 73% | 99% (p < 0.01)
LCL: | 53% | 93%

**Hospital A, 2nd Nursing Unit**

Baseline | Post-Intervention
---|---
UCL: | 90% | 102%
Mean: | 68% | 87% (p < 0.01)
LCL: | 46% | 72%

**Hospital B, 1st Nursing Unit**

Baseline | Post-Intervention
---|---
UCL: | 89% | 108%
Mean: | 71% | 98% (p < 0.01)
LCL: | 53% | 88%

UCL = Upper Control Limit
LCL = Lower Control Limit
Results from MeasureVention

Telemetry Unit - Methodist Sacramento
% of Pts with Appropriate VTE Prophylaxis per Protocol

- 1st Incremental Goal - 50% by 9/30/2012
- 2nd Incremental Goal - 75% by 12/31/2012
- Final Goal - 90% by 6/30/2013
Patient Enemy #1: Bed

Complications Associated with Hospital Beds:

- Aspiration pneumonia
- Deep Vein Thrombosis
- Delirium
- Pulmonary Emboli
- Pressure Ulcers
- Ileus, Bowel Paralysis
Factors that lead to suboptimal mobilization

• Excessive sedation / opioids
• 3 point restraints (foley, IV pole, SCDs)
• Culture and tradition (patients and staff)
• Nursing defers activity until PT ‘clears’ patient
• Unclear orders
• Orders not aligned with PT / Nursing activity standards
• Difficult to capture orders vs mobility achieved at a glance

Major UCSD effort underway to address all of these:
Measure-vention reports will look for:
Ordered vs Actual Mobility Discrepancies
No prophylaxis and No Ambulation patients (under-prophylaxed?)
Prophylaxis and Ambulating outside of room (over-prophylaxed?)
Extended duration prophylaxis:

Selected Surgical Groups have best evidence

- Warfarin or LMWH prevented VTE in orthopedic procedures
- LMWH reduced risk of VTE in abdominal or pelvic surgery for malignancy
- Medical patients: individual decisions
- Cancer patients with additional risk factors
  - Patient goals and values must be taken into account!

VTE Prophylaxis in Pregnancy

ACOG 2011 Guidelines

• 4 – 5 x risk of VTE with pregnancy, 9% of maternal deaths
• Risk Post-partum > 3\textsuperscript{rd} trimester > 1\textsuperscript{st} and 2\textsuperscript{nd} trimester
• All women admitted for delivery should receive VTE prophylaxis
• C-section- independent risk factor
• If AC used, resume no sooner than 4-6 hours after vaginal delivery, 6-12 hours after c-section.
• Withhold LMWH 24 hours before / after neuraxial blockade.
• Keep VTE prophylaxis going until patient up and walking post delivery.
## Risk for VTE in Patients Undergoing Gynecologic Surgery

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>GYN Surgery</th>
<th>VTE Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Surgery &lt; 30 minutes in patients &lt; 40 years with no additional risk factors</td>
<td>Ambulate</td>
</tr>
<tr>
<td>Moderate to High</td>
<td>Everyone not in Low or Highest Risk Category</td>
<td>Mechanical or UFH or LMWH</td>
</tr>
<tr>
<td>Highest</td>
<td>Major surgery in patients &gt; 60 years plus prior VTE, cancer, or hypercoagulable state</td>
<td>Mechanical and UFH or LMWH</td>
</tr>
</tbody>
</table>

IVC filters

- Limited evidence of efficacy in any setting
- Most accepted indication: known DVT and unable to use anticoagulation

- Prophylactic use is actively discouraged by ACCP guidelines, growing evidence of harm vs benefit
Routine Ultrasound screening for DVT

• Performed routinely in some trauma centers, burn units, stroke units

• Very uneven literature

• Screening is discouraged in asymptomatic patients by ACCP guidelines
Assimilate
General
Definition of Best Practice

Guidelines
AT9, ACP, AAOS, ASCO, ACOG

Regulatory
TJC/NQF/SCIP

Local standards
Other guidance
Literature, meta-analyses

Define Local Best Practice Standards and Expectations

Policies
Protocols

Effective Implementation: Operationalize

Multi-faceted Interventions

Order sets
Education
Increase delivery of ordered prophylaxis
Checklists
Alerts
Reduced use of central venous catheters
Enhance mobility and activity
Audit and feedback
Care pathways
Measure-vention

Spread!
Questions / Answers / Comments?

Thank you!
Some designs don’t make any sense………

Even if they’ve been there a long time.