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

Hypercoagulability:
- Thrombophilia
- Cancers
- Pregnancy and peri-partum period
- Inflammatory bowel syndrome
- Sepsis
- Estrogen therapy
- Trauma or surgery

Stasis of blood flow:
- Immobility or paralysis
- Venous obstruction (tumor, obesity, pregnancy)
- Venous insufficiency

Endothelial injury:
- Trauma or surgery
- Indwelling catheters
- Heart valve disease or replacement
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

References:
VTE Incidence Rates Increase with Age

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
## Risk Factors for VTE

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

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
3. Increase Knowledge and Awareness

- Funding organizations to develop health promotion initiatives and provider training
  
  Vascular Disease Foundation (VDF)
  
  [Image of the Vascular Disease Foundation website]

  National Blood Clot Alliance (NBCA)
  
  [Image of the National Blood Clot Alliance website]

  CDC fact sheets and videos
  
  [Image of a CDC fact sheet]

  [Image of a CDC video]

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
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
VTE Prevention
We Have Been Failing Our Patients!

Geographic location and year

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>VTE prophylaxis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>91</td>
<td>29</td>
</tr>
<tr>
<td>Canada</td>
<td>01</td>
<td>33</td>
</tr>
<tr>
<td>USA</td>
<td>02</td>
<td>29</td>
</tr>
<tr>
<td>UK</td>
<td>03</td>
<td>28</td>
</tr>
<tr>
<td>World</td>
<td>07</td>
<td>50</td>
</tr>
<tr>
<td>World</td>
<td>08</td>
<td>50</td>
</tr>
</tbody>
</table>

References:

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
JHMI Surgical Services
VTE Prophylaxis: Baseline Performance, 2005

Surgical service

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
Paper order sets
- Paper order sets

Advantage
- Easy to create

Challenges
- Complex
- Labor-intensive data collect
- Labor-intensive performance monitoring
JHMI VTE Prevention Performance Evaluation in 2006 Was Better, but Not Optimal

ACCP VTE prophylaxis (%)

- US 91: 29%
- Canada 01: 33%
- US 02: 29%
- UK 03: 28%
- JHMI 05 (N=219): 26%
- JHMI 06 (N=262): 63%

Geographic location and year

Data courtesy of Deb Hobson, BSN, JHMI
ACCP, American College of Chest Physicians
### Patient order set

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Order Update</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral IV Catheter, Insert VAT</td>
<td>Ordered</td>
<td>Routine</td>
</tr>
<tr>
<td>Second IV (Conditional Order)</td>
<td>Ordered</td>
<td>Routine</td>
</tr>
<tr>
<td>Maintain IV</td>
<td></td>
<td>Routine</td>
</tr>
<tr>
<td>Normal Saline Flush 2 ml q5min</td>
<td></td>
<td>Routine</td>
</tr>
</tbody>
</table>
Any attempt to uncheck the order will give this alert.
Patient age, weight, renal function and relevant laboratory results imported from database
Prophylaxis Recommendation
### Recommended Prophylaxis:

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

#### Prophylaxis Orders

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

### Was VTE Prophylaxis Ordered as Recommended?

- Yes [ ]
- No - Religious Reasons [ ]
- No - Bleeding Risk Greater than VTE Risk [ ]
- No - VTE Risk Greater than Bleeding Risk [ ]
- No - Heparin Allergy/Adverse Reaction [ ]

### Documentation of risk assessment

- VTE Risk Assessment was Completed [ ]
- Requested By: Durette, Annette
- Messages:

  - Recommended Prophylaxis was...
    - Very High Risk WITH Renal Impairment [ ]
<table>
<thead>
<tr>
<th>Risk Category</th>
<th>No</th>
<th>Yes</th>
<th>Total</th>
<th>% Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk w/ contraindications</td>
<td>6</td>
<td>93</td>
<td>99</td>
<td>93.9%</td>
</tr>
<tr>
<td>High Risk w/ Systemic Anticoag</td>
<td>0</td>
<td>130</td>
<td>130</td>
<td>100.0%</td>
</tr>
<tr>
<td>High Risk w/o contraindications</td>
<td>28</td>
<td>273</td>
<td>301</td>
<td>90.7%</td>
</tr>
<tr>
<td>Moderate Risk w/ contraindications</td>
<td>3</td>
<td>61</td>
<td>64</td>
<td>95.3%</td>
</tr>
<tr>
<td>Moderate Risk w/o contraindications</td>
<td>23</td>
<td>338</td>
<td>301</td>
<td>93.8%</td>
</tr>
<tr>
<td>Moderate w/ Systemic Anticoag</td>
<td>0</td>
<td>56</td>
<td>56</td>
<td>100.0%</td>
</tr>
<tr>
<td>Systemic = Other Medication</td>
<td>0</td>
<td>13</td>
<td>13</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>Medicine</strong></td>
<td><strong>60</strong></td>
<td><strong>973</strong></td>
<td><strong>1,033</strong></td>
<td><strong>94.2%</strong></td>
</tr>
</tbody>
</table>
JHMI VTE Prophylaxis Performance, 2012

<table>
<thead>
<tr>
<th>Geographic location and year</th>
<th>Risk</th>
<th>Appropriate prophylaxis (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA 91</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Canada 01</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>USA 02</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>JHMI 05 (N=219)</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>JHMI 06 (N=252)</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>JHMI 12 (N=29,741)</td>
<td>85</td>
<td></td>
</tr>
</tbody>
</table>

JHMI, Johns Hopkins Medical Institutions
JHMI Medicine
VTE Performance, 2008-2012

Mean risk stratification 97%
Mean risk appropriate prophylaxis 89%

N=59,847
Higher Rates of VTE Prophylaxis Lead to Fewer Thrombotic Events

- VTE: Pre order set (N=1,025) - 2.4%, Post order set (N=1,057) - 0.5%
- Preventable VTE: Pre order set (N=1,025) - 1.1%, Post order set (N=1,057) - 0%
- Major bleeding: Pre order set (N=1,025) - 0.3%, Post order set (N=1,057) - 0.1%
- All-cause mortality: Pre order set (N=1,025) - 1.3%, Post order set (N=1,057) - 2.1%
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
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)
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

- Better health for the population
- Better care for individuals
- Lower cost through improvement
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.sahq.gov
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 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

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.
Patient Safety Consumer Publications

**Your Guide to Preventing and Treating Blood Clots**

Booklet helps patients learn how to prevent and treat blood clots

**Your Guide to Coumadin®/Warfarin Therapy**

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

**Staying Active and Healthy with Blood Thinners**

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/](http://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
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
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
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
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
- Obstetric adverse events – from Patient Safety Indicators
- Surgical site infections – from National Healthcare Safety Network

From MPSMS

These 9 HACs comprise about 80% of measured 2010 HACs
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**
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