

HIMSS Story of Success

Reducing Venous Thromboembolism (VTE) using Clinical Decision Support

Texas Health Resources (THR)

Texas Health (TH) Venous Thromboembolism Performance Improvement Team:

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NPSG or NPP Priority Goals:

- Improve effectiveness of communication among caregivers
- Identify safety risks inherent in the patient population
- Care Coordination

Health Information Technology

- Electronic Health Record (EHR)
- Computerized Provider Order Entry (CPOE)
- Clinical Decision Support System (CDSS)

Meaningful Use Goals:

- Improve quality, safety, efficiency, and reduce health disparities
- Improve Care Coordination

1 Title: Reducing Venous Thromboembolism (VTE) using Clinical Decision Support interventions: order sets, risk assessment calculator and best practice advisories within the electronic record.

2 Background Knowledge: Care Problem - VTE is the most common preventable cause of hospital death (AHRQ 2008)¹ Nationwide more people die from VTE than AIDS, Breast Cancer and highway fatalities combined. Clinical trials provide irrefutable evidence that thromboprophylaxis reduces VTE. The Joint Commission has developed a VTE prophylaxis measures. They are also a part of Meaningful Use.

Organization: Texas Health Resources (THR) is one of the largest faith-based, nonprofit health care delivery systems in the United States. It includes 12 acute-care hospitals, one transitional care hospital and 3,762 licensed hospital beds. THR employs more than 18,000 people and more than 3,800 physicians practice there. Annually THR has more than 1.3 million inpatient and outpatient visits including 24,573 deliveries and 557,785 emergency visits.

3 Local problem: Hospitals had unique paper based risk assessment tools and order sets. There was a need for a standardized approach to risk assessment and ordering of VTE Prophylaxis. These multiple variances presented a significant change management challenge.

4 Intended improvement: Specific Aim - Prevention of hospital acquired VTE throughout THR facilities by early identification of patients at risk and appropriate timely intervention strategies as per national guidelines and evidence based practices.

Who, What, Why: This topic is increasingly visible within the national forefront. Given the extent of variances as well as the opportunity for improvement the Chief Quality Officers Council endorsed formation of a multidisciplinary VTE PI Committee and appointed a well respected Hospital Chief Quality Officer as Chair.

5 Planning the intervention 6 HIT Dimensions Utilized

In 2008, THR enjoyed over 50% CPOE utilization with greater than 50% of CPOE orders entered via order sets. To capitalize upon this strength, VTE Prophylaxis evidence and measures were embedded into CPOE order sets.

During 2009, the THR VTE PI Committee gained approval for “Texas Health VTE Prophylaxis Clinical Guidelines” - vital to a system-wide standardized approach.

A Modified Caprini VTE Risk Assessment Tool² was adopted and converted to an electronic patient specific risk calculator accessible from within the patient context of the electronic healthcare record³. This intervention provides recommended VTE Prophylaxis based on the patient’s risk score. Approximately 25% of risk factors auto-populate from information provided within the electronic medical record. Work is ongoing to increase the number of risk factors that auto-populate.

A VTE Prophylaxis Pilot⁴ was conducted for specific post-operative CPOE order sets which mandated selection of VTE prophylaxis or reason not ordered. The outcome was favorable with 100% compliance when pilot order sets were utilized. To mitigate risk of decreased order set utilization, the VTE PI Committee is phasing in mandatory selection for appropriate order sets.

During summer, 2010 the VTE PI Committee established physician and nurse best practice advisories (BPAs).⁵ Specifications include patients at least 18 years of age, hospitalized for 18 hours or longer where VTE Prophylaxis is not ordered or reason why not documented. Psychiatric patients are excluded as they are ambulatory. At the request of obstetricians, patients who deliver vaginally are also excluded as evidence does not support this regimen. Best practice advisories are configured to fire every 4 hours for physicians until VTE Prophylaxis is ordered or documentation given as to why not and for nurses until the physician is contacted.

Following initial BPA release, close monitoring was vital to determine response to the advisories from a quantitative and qualitative perspective. Physicians’ response was largely positive, “Love it! ... Should be a hard stop”. Obstetricians did not find value and the VTE PI Committee excluded patients with vaginal deliveries.

1– <http://www.ahrq.gov/qual/vtguide/>

2 – <http://www.venousdisease.com/Publications/JACaprini-HybridApproach3-10-05.pdf>

3– See screen shot of VTE Risk Assessment Calculator Tool

4– See table of VTE Prophylaxis Pilot results

5– See Best Practice Advisory Process Map

Standardization is unlikely without healthcare information technology and Clinical Decision Support tools such as order sets, best practice advisories and a VTE risk assessment calculator.

The PI Committee's role in analysis is also vital. Outcomes are determined by the pulmonary emboli / deep vein thrombosis rate. Process analysis is conducted through review of number of advisories, clinician response to advisories and timely, appropriate use of VTE prophylaxis. In addition, analysis is enhanced when administrative (charge) data is converted to clinical (electronic record) based data.

7 Outcomes (a) Nature of setting and improvement intervention

Engaged Chief Quality Officers and entity champion leadership are crucial to success. Caregivers are increasingly aware of risks and prophylaxis for venous thromboembolism. If adverse event(s) occur, the ability to determine the efficacy of CDS interventions is necessary.

7 Outcomes (b) Changes in processes of care and patient outcomes associated with the intervention

Increased utilization of VTE prophylaxis is occurring as anecdotally noted by THR's pharmaceutical representative. Desired physician ordering practices in response to best practice advisories is mixed.⁶

Most importantly, THR is noting a downward trend in venous thromboembolism⁷.

Work is ongoing to enhance analysis of calculator utilization. An ICU pilot analyzing timely & appropriate VTE prophylaxis has served as a model for expansion.

8 Barriers Encountered

Overall lack of standardization was addressed through alignment with national & organizational priorities, leadership from the VTE Multidisciplinary PI Committee and the PI Committee Chair passionate for this work as well as hospital Chief Quality Officers and RN Champions. Standardization was also achieved through review, modification and approval by appropriate bodies and stakeholders.

Initially the Nurse BPA would appear every 4 hours until the physician ordered VTE prophylaxis or documented reason why not. This plan was deemed overly burdensome by nurse leadership and the nurse BPA was re-configured to fire every 4 hours until physician notification occurred.

Volume analysis of mechanical prophylaxis equipment did not occur prior to the release of the BPAs resulting in additional work for staff. Identification of all appropriate chemoprophylaxis was initially missed.

During the ICU pilot, it was noted that patients transferred to critical care areas should be re-assessed for VTE prophylaxis. The PI VTE Committee is addressing this issue through a customized BPA and focused analysis.

Communication Challenges

A respected expert – nationally known in this field presented clinical education followed by e-learning modules. Technical instruction was available through tip sheets and "Care-Tube" online demo videos. Despite these endeavors, following release of the BPAs, some care givers voiced concern regarding lack of communication and input opportunity. Entity Chief Quality Officers answered questions regarding clinical issues and information systems staff were involved in technical issues.

Prior to the release of BPAs, this initiative had not been widely vetted to Obstetricians (OBs). Following release, OBs expressed concern regarding appropriateness for this population. The VTE PI Committee leadership collaborated with them, performed focused research and excluded patients with vaginal deliveries from VTE prophylaxis BPAs.

6- See graph

7- See graph

10 Summary

The decreasing trend of venous thromboembolism correlates with HIT interventions such as embedding VTE prophylaxis orders and evidence into order sets, VTE risk assessment and suggested prophylaxis calculator as well as physician and nurse best practice advisories.

Other contributing factors are alignment with national and local priorities; Multidisciplinary VTE committee, support from leadership and entity based Chief Medical Information Officers as well as RN entity champions.

The most important difficulties included system level consensus regarding standardization details, successful delivery of clear, concise communication and education to busy care givers and access to drill down data.

Strengths and lessons for similar projects are the need for complete and detailed testing prior to release of interventions. Successful testing determines level of intended functionality as well assures that the intervention involves the right information, person, format, channel and time.

Appropriate leadership and stakeholder involvement is critical. If push-back is encountered leaders must respond rapidly and apply modifications when appropriate.

11 Interpretation

Possible reasons for differences between observed and expected outcomes may be related to the plan for manually phasing in the enhanced VTE prophylaxis strategy into over 1000 order sets by specialty. In addition, the benefits of the best practice advisories and VTE risk assessment calculator may not yet be fully realized.

Opportunities for improvement with similar projects include improved data availability. A strategy for presenting / seeking input from potentially resistant medical staff departments is also an opportunity. With future similar projects, clinical "Talking Points" will be developed to provide a consistent approach to questions.

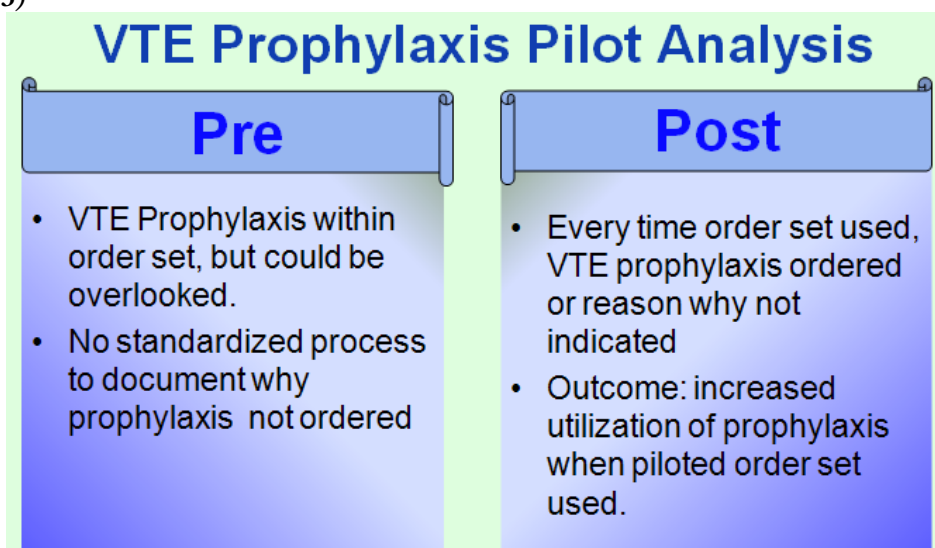
12 Conclusions

Overall practical usefulness / specific steps others can take from what was learned include strong dedicated and united leadership, representation / input from all involved stakeholders toward standardization consensus. These steps require significant time, resources and preparation.

13 Financial Considerations

Each prevented VTE event represents significant cost savings.

3)



4) VTE Risk Assessment Calculator

Modified Caprini Tool

VTE Risk Calculator

Texas Health Resources

Venous Thromboembolism Risk Factor Assessment

Note: only some risks have been pre-selected based on existing discrete data in CareConnect or a previously saved risk assessment. Please carefully review and select/unselect risk factors to reflect the patient's current status.

Patients: [Redacted]
 MRN: [Redacted]
 Sex: Female
 Birth Year: 1985 (0 points)
 BMI: 22.08 (0 points)

TOTAL RISK FACTOR SCORE: 0 - LOW

SUGGESTED REGIMEN:
 Early ambulation

Copy Score to Clipboard
 Save VTE Risk Score

Links:
[Caprini Risk Assessment Tool \(PDF\)](#)
[References \(PDF\)](#)

Views:
 THR Grouping
 Standard Grouping

PAST HISTORY (medical, surgical, family)

- Acute spinal cord injury (paralysis) (< 1 month) (5 points)
- Hip, pelvis, or leg fracture (< 1 month) (5 points)
- Multiple trauma (< 1 month) (5 points)
- Stroke (< 1 month) (5 points)
- Heparin-induced thrombocytopenia (HIT) (3 points)
- History of DVT/PE (3 points)
- History of DVT/PE (Family) (3 points)
- Other thrombophilia (3 points)
- Previous malignancy (2 points)
- Acute myocardial infarction (< 1 month) (1 point)
- Congestive heart failure (< 1 month) (1 point)
- History of prior major surgery (1 point)
- History of unexplained stillborn infant (1 point)
- Pregnancy or postpartum (< 1 month) (1 point)
- Serious lung disease including pneumonia (< 1 month) (1 point)

PLANNED SURGERY

- Elective major lower extremity arthroplasty (5 points)
- Major surgery lasting over 3 hours (5 points)
- Major surgery lasting 2-3 hours (3 points)
- Arthroscopic surgery (> 60 minutes) (2 points)
- Laparoscopic surgery (> 60 minutes) (2 points)
- Major surgery (> 45 minutes) (2 points)

The right side of the calculator contains risk factors

Patients: [Redacted]
 MRN: [Redacted]
 Sex: Female
 Birth Year: 1933 (3 points)
 BMI: (0 points)

TOTAL RISK FACTOR SCORE: 12 - HIGHEST

SUGGESTED REGIMEN:
 Choose **ONE** of the following medications **PLUS** compression device:

- Sequential Compression Device (SCD)
- Heparin 5000 units Subcutaneously TID (Preferred with Epidurals)
- Enoxaparin/Lovenox (Preferred):
 - 40mg Subcutaneously daily (WT <150kg, CrCl > 30mL/min)
 - 30mg Subcutaneously daily (WT <150kg, CrCl = 10-29mL/min)
 - 30mg Subcutaneously BID (WT > 150kg, CrCl > 30mL/min)
- Warfarin (Coumadin):
 - >50kg: 10mg PO, then 5mg PO each daily with daily INR
 - <50kg: 5mg PO, then 2.5mg PO each daily with daily INR

PAST HISTORY (medical, surgical, family)

- Acute spinal cord injury (paralysis) (< 1 month) (5 points)
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PLANNED SURGERY

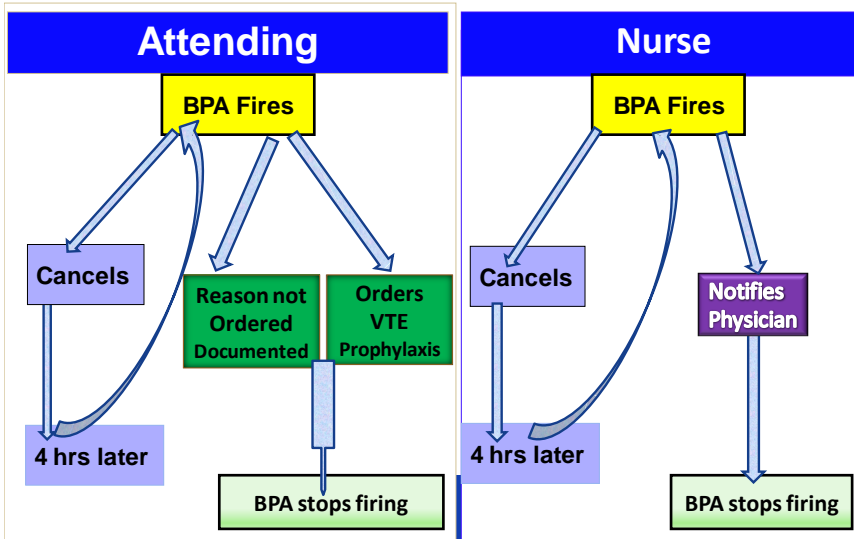
- Elective major lower extremity arthroplasty (5 points)
- Major surgery lasting over 3 hours (5 points)
- Major surgery lasting 2-3 hours (3 points)

As risk factors are selected, the patient's Total Risk Factor Score & suggested regimen populate on the left side.

5)

Patient hospitalized ≥ 18 hours

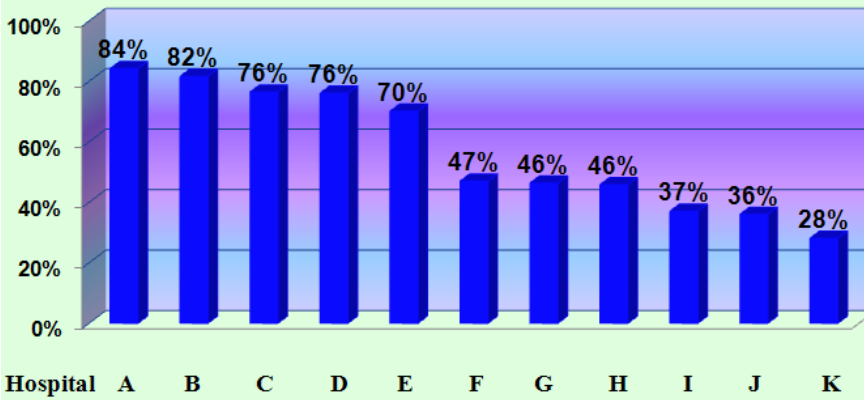
VTE Prophylaxis not ordered – No reason documented



6)

Action from VTE Prophylaxis Advisory

VTE Prophylaxis Given / Doc Why Not
July 15 – August 14, 2010



7)

Outcomes

Post-op Pulmonary Embolism (PE)
or Deep Vein Thrombosis (DVT)

2006 - 2009

