

IMPLEMENTING A VTE PROTOCOL:

Best practices for reducing preventable, hospital-acquired blood clots to near-zero as a healthcare community



**SMART
COMPRESSION**
EDUCATES

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Our goal, as a healthcare community, is to support VTE prevention champions with program best practices, and to spread the word that we can impact:

... Patients, one at a time
... Nurse huddles, one at a time
... And hospitals, one at a time

Sign up to get news about what your top peers are doing to prevent VTE.

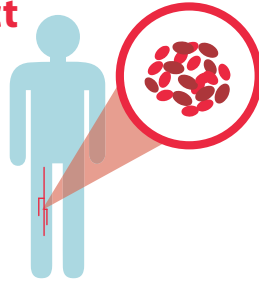
[CardinalHealth.KnowVTE.com](https://www.CardinalHealth.KnowVTE.com)

Hospital-acquired venous thromboembolism (HA-VTE) is a common, costly and preventable hospital complication.

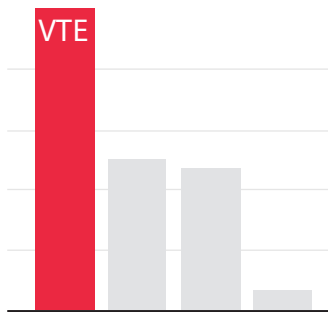
Each year, VTE is estimated to affect 350,000 to 600,000 Americans.



= 100 thousand people



In many cases this suffering can be prevented through interventions such as intermittent pneumatic compression devices (IPCs).



An estimated 100,000 Americans die each year from VTE.



In comparison, mortality rates in 2016 (according to the CDC):

- Influenza & pneumonia: 51,137
- Breast cancer: 41,952
- HIV: 6,160



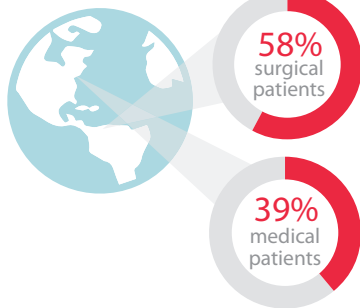
As a healthcare community, our goal is to reduce preventable, hospital-acquired VTEs, together, to near-zero, as well as to educate patients and loved ones on prevention after discharge.

\$15,000

estimated cost per hospital-acquired VTE.



globally




received appropriate prophylaxis

among 70,000 patients at risk for VTE in 358 hospitals, globally.

Risk Assessment

Assessing a patient’s risk of developing HA-VTE is critical to better prevent these events. Three approaches to risk models are outlined below, from the Agency for Healthcare Research and Quality:

1 Qualitative/ Grouping Risk Assessment Models



Patients are treated based on their level of VTE risk — low, medium, or high. Each risk group has prophylactic measures that can be assigned without additional considerations.

Easy to use
Any provider who knows a patient’s risk group will know what prophylactic measure to use.

Demonstrated success
At UC, implementing this model improved protocol-defined adequate prophylaxis from 58% to 98% and reduced HA-VTE by 40%.

Tools:

- **University of California (UC) San Diego model (Surgical)**

2 Expert-Derived Quantitative Risk Assessment Models



Rather than being treated by a grouped approach, patients are assessed individually. Patients are assigned points based on a number of weighted risk factors, and their total score determines prophylactic measures used.

Strong evidence
The Caprini model has been externally validated as predictive of VTE risk in surgery and oncology.

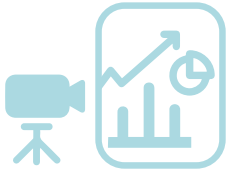
Cultural competence
This method, by individualizing risk factors, helps account for nuances within cultural groups — particularly the Caprini model.

Automated
Each weighted risk factor in Caprini can be entered into a computerized order entry (CPOE) which does the work of assigning cumulative score.

Tools:

- **Caprini**
- **The Padua prediction score**

3 Empirically-Derived Quantitative Models



This point-based protocol combines predicted VTE incidence rates with observed rates. The goal is to enhance the utility of weighted risk factors, by adding active surveillance. Note: This method has not been thoroughly studied in actual clinical practice.

Aiming for accuracy
Empirical models bring in additional data with the aim of more accurately determining appropriate courses of action.

Useful for re-evaluating risk during hospital stay
Points are collected before, during and after a patient’s stay. Risk factors that arise after admission are weighted into the overall score.

Tools:

- **Rogers**
- **Intermountain**
- **IMPROVE**
- **Premier**

5 Keys to a Successful VTE Protocol

There are five key points to enacting an effective VTE protocol, according to the Agency for Healthcare Research and Quality:



1. PILOT THE PROGRAM ON A SMALL SCALE

- Design order sets based on input from physicians and nurses with obstacles in mind.
- Consider potential conflicts between a proposed protocol order and current standing orders in wide use.
- Have the pilot group test order sets to identify glitches.



2. MAKE THE PROCESS AS SIMPLE AS POSSIBLE

- Tailor order sets to patient populations with considerable special needs, e.g. OB-GYN and neurosurgery.
- Auto-populate relevant patient information from electronic medical record (EMR).
- Highlight prophylaxis recommendations based on assigned risk category to reduce manual calculations.



3. DEFINE THE METRICS

- Design data points in the EMR as discrete elements for ease of use and for later analysis.
- Work with the IT department to capture specific data points.
- Review metrics with the aim of improving adherence:
 - Patient VTE risk level at admission
 - Chemoprophylaxis contradictions
 - IPC usage
 - Patient ambulation status

Considerations for Continuous Improvement

- When and why the order set has not been used.
- How many patients inadvertently bypass or don't fit the protocol.
- Which providers frequently opt out.
- Why providers opt out.
- Whether the protocol can be made easier to use or more fully integrated into the workflow.

Key performance indicator

Hospital acquired potentially preventable venous thromboembolism rate (VTE-6)

Patients diagnosed with confirmed VTE during hospitalization (not present at admission) who did not receive VTE prophylaxis between hospital admission and the day before date of the first positive VTE diagnostic test.



4. INTEGRATE VTE PROTOCOL INTO THE EXISTING WORKFLOW

- Integrate the VTE module into existing order sets — like those used for admission and transfer.
- Pull relevant patient data into the module, such as an automatically calculated medicine dosage based on patient's weight.



5. MAKE THE RIGHT DESIGN CHOICES TO INCREASE RELIABILITY

- The VTE protocol will be implemented by default unless a physician takes action to opt out of it.
- VTE prophylaxis order sets must be completed before the entire order set can be submitted.
- All clinicians caring for patients in the VTE protocol receive a daily reminder to assess, certify or re-certify relevant aspects of prophylaxis.
- Standardized order sets require no or minimal modifications, and only need to be signed by the physician to be put into use.
- VTE prophylaxis tasks are integrated into larger clinical checklists performed at regular intervals, such as patient safety assessments, to ensure they are completed.
- All clinicians use the same VTE protocol and receive the same reminders to create multiple layers of accountability and adherence.



How to get started?

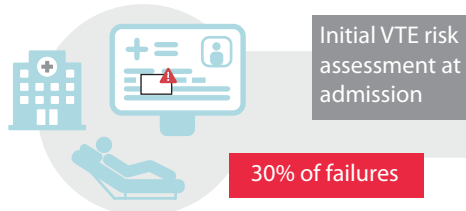
Reach out to find a nurse at a peer hospital to get advice.

Common Pitfalls

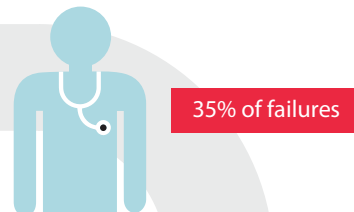
Common areas of failures in VTE prevention, according to the Agency for Healthcare Research and Quality:

50-60% of patients receive appropriate VTE prophylaxis in the hospital in the US.

1 PATIENT ADMITTED TO HOSPITAL



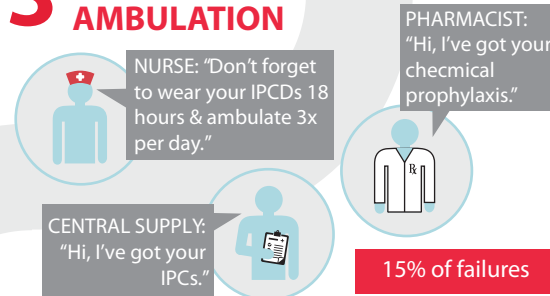
2 PROVIDER ORDERS APPROPRIATE VTE PROPHYLAXIS



4 EDUCATE PATIENT



3 USAGE, COMPLIANCE & AMBULATION



5 VTE RISK RE-ASSESSMENT



6 PATIENT DISCHARGED



Have you analyzed the pain points of your hospital's VTE prevention program? Areas to investigate:

- A thromboembolic event.
- Duplicate efforts.
- Lack of consensus.
- Lack of acknowledgement of hidden complexities.
- Missed opportunities to streamline or simplify the preventative process.
- Too many order sets.
- Inadequate guidance from existing order sets and prompts.
- Order sets used incorrectly.
- Protocol is too time-consuming or difficult.

Barriers to Improvement:

- Lack of standardization.
- Difficulty putting complicated guidelines into practice.
- Providers overwhelmed by too much information.

Case Studies

Several studies have demonstrated the effectiveness of different VTE protocol methods:

- **Boston Medical Center**
Expert-derived quantitative risk assessment (*Caprini*)
- **Banner Good Samaritan**
Qualitative/group risk assessment method
- **University of Michigan Health System**
Expert-derived quantitative risk assessment (*Caprini*)
- **Johns Hopkins**
Expert-derived quantitative risk assessment



Boston Medical Center

IMPLEMENTING HARD STOPS BASED ON THE DISEASE STATE

Model: Expert-derived quantitative risk assessment (Caprini)

Situation

Boston Medical Center saw that VTE was a nationwide issue, according to Pamela Rosenkranz, Director of Clinical Quality and Patient Safety at Boston Medical Center.

- **An estimated 100,000 VTE deaths** per year in the US.
- Nearly **1 in 5 patients** with VTE in the US were **readmitted** within 30 days, according to a recent study.
- **\$15,000 cost per patient for VTE** diagnosis and treatment... up to \$82,000 with recurrence in the US. (1)

Using the American College of Surgical Quality Improvement Program (ACS NSQIP) database, the hospital tracked the occurrence of VTE in its patients who underwent general surgery or vascular surgery procedures during the two calendar years before and after implementing the electronic prevention program in February 2011.

Best Practices

According to Rosenkranz:



1. Identify the problem

- Create hard stops in the EMR system.
- Integrate in order sets.
- IPCs checked by risk level automatically.
- Chemoprophylaxis dosage options pre-populated based on risk and other factors.



2. Choose a VTE prophylaxis program

- Use a program to develop a risk stratification program with appropriate interventions (the Caprini model).



3. Build electronic order sets

- Require VTE scoring for doctors to sign their orders.
- Provide an opt-out for valid medical reasons stated by the physician.

1. Estimated total all-cause health care costs for patients with VTE were \$33,200, \$31,270, \$38,300 for DVT, PE, and DVT+PE, respectively; total all-cause cost for patients with PTS increased to \$47,600, according to [ClinicoEconomics and Outcomes Research](#). Estimated total cost for patients with VTE was \$36,900; for VTE with recurrence only, total cost was \$82,000, according to the Journal of Managed Care Pharmacy.

Boston Medical Center

(Continued)



4. Customize the interventions

- Based on clinical or other special requirements, allow surgeons to hold off on prophylaxis for a time.
- Electronic chart has a notification that pops up 24 hours post-procedure, asking surgeons to consider prophylaxis at that time.



5. Track and measure compliance

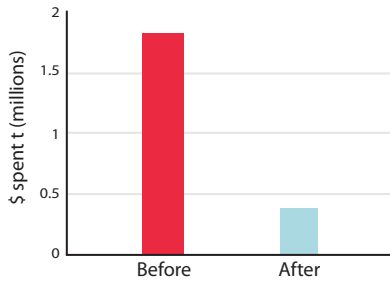
- Because the order sets contain hard stops, compliance should be near perfect.

Results

According to Rosenkranz and the Journal of the American College of Surgeons:

\$1 million in savings:

Before and after implementation, the cost of two years of treating post-surgical VTE and PE decreased from \$1.8 million to \$400 thousand.



Fewer VTE complications:

Between calendar year 2009 and the NSQIP reporting period of July 2011 to June 2012:



Reduced PE complications by 55%



Reduced DVT complications by 84%

WATCH

Pam Rosenkranz, the nurse who spearheaded the program, shares her insights:



[CardinalHealth.KnowVTE.com](https://www.cardinalhealth.com/learn/clinical/vascular/venous-thromboembolism)

Banner Good Samaritan

HOW BANNER GOOD SAMARITAN REDUCED VTE RATES BY HALF

Model: Qualitative/grouping risk assessment

Situation

According to Banner Health's Clinical Performance 2013 Report, a review of all 2008 discharges by ICD-9 code and of 2009 live events assessed by positive radiology studies established conclusive evidence that **a minimum of one VTE event was occurring every other day.**

A computerized "VTE Prophylaxis Dashboard" was established, which tracked live-time provider utilization of both mechanical and pharmacologic VTE prophylaxis. This revealed a 20% "No Prophylaxis" rate.

Best Practices



A "three-bucket" model for assigning patient risk: high, medium and low

- Define patient risk levels based on a variety of factors, including history of DVT/PE, morbid obesity, and current therapeutic anticoagulative therapy.
- Auto-populate key data, including weight and to streamline decision-making process.
- Prompt clinicians to choose risk level before continuing with the rest of the order set.



A simple process for end users

- Provide radio button choices for selecting risk level.
- Auto-populate default choice of IPC for mechanical prophylaxis.
- Minimize or eliminate the need for manual data entry or calculations.
- Present VTE protocol within existing workflow, not in external pane.



Design reliability into the process

- Use "forced function" principle to require submission of VTE prophylaxis orders to submit entire order set.
- Provide default actions that require no input from the clinician.



Define data points to measure adherence and outcomes

- Create a task force to define data elements to be captured.
- Employ radio buttons, checkboxes and drop-down menus.
- Capture ongoing charting of protocol to identify usage trends.



Charting success

- Measure and communicate patient outcomes using new protocol to improve clinician adherence and foster feedback.
- Validate the protocol.

Banner Good Samaritan

(Continued)

Results

Banner Good Samaritan's implementation of a qualitative/grouping risk assessment protocol resulted in:



59% reduction in all VTE events



65% reduction in pulmonary embolism (PE)



57% reduction in deep vein thrombosis (DVT)

University of Michigan Health System

A CASE FOR COMPLEXITY

Model: Expert-derived quantitative risk assessment (Caprini)

Situation

University of Michigan overcame the inherent complexities of the Caprini VTE risk assessment model after earlier attempts failed to achieve the desired results.

Key strategies for success included targeting all adult inpatients, adding forcing functions with hard stops to guarantee a risk assessment was done, using algorithmic logic, grouping risk factors for the convenience of providers, and auto-populating some risk factors.

Best Practices



Simplify complex risk assessment models

- Organize risks into groups based on age, gender, hematology, surgery type and other factors.
- Offer checkboxes for clinicians to quickly select individual relevant risk factors per patient.
- Use a point-scoring system for each risk factor.
- Auto-calculate the total score, assigned risk category and recommended prophylaxis.



Build in hard stops

- Mandate VTE assessment for all adult inpatients.
- Require input of contraindications to decline chemoprophylaxis and proceed with order set.



Capture relevant data and feedback

- Review every subsequent VTE event for preventability.
- Include VTE prophylaxis as a peer review indicator for services.
- Provide services with VTE data relevant to their practice
- Solicit feedback from clinicians to improve the protocol or the workflow.

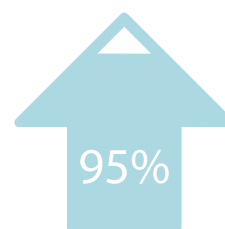
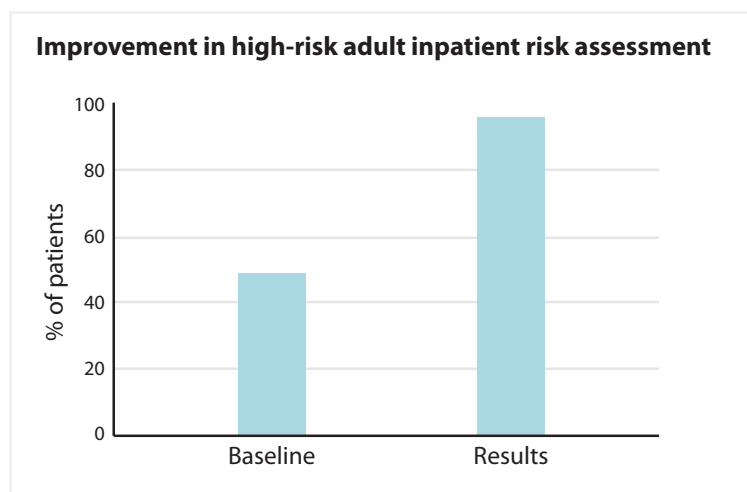
University of Michigan Health System

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Results

According to the [Agency for Healthcare Research and Quality](#):

Mean decline in both, hospital-acquired and post-discharge VTE, events after protocol implementation



95% high-risk inpatient risk assessment, up from about 50% previously

Johns Hopkins

IMPLEMENTING PROTOCOLS BASED ON VTE RESEARCH

Model: Expert-derived quantitative risk assessment

Situation

Johns Hopkins organized a VTE collaborative: 2 physicians, 1 nurse and 1 pharmacist dedicated to VTE quality improvement. Since then, the group has grown dramatically, adding a clinical informatics expert and numerous other members, according to [ResearchGate](#).

16 original algorithms (medicine, general surgery, trauma, and so forth) integrated into “smart” order sets for VTE prevention, using a “Translating Research Into Practice” (TRIP) model, according to the [CDC](#).

- Collect and summarize evidence on best practices for VTE prophylaxis across services.
- Create flowchart-style decision-making algorithms that capture risk factors, contraindications and recommended prophylaxis for each service.
- Translate the algorithms to the electronic medical record.

Best Practices



Pilot the program on a small scale

- Obtain feedback regarding obstacles to adoption.



Measure adherence and solicit feedback



Make the process as simple as possible

- Nest VTE protocol within larger order-sets, such as admission and transfer.
- Auto-populate relevant patient information, including age, weight, creatinine clearance.
- Integrate the protocol into the existing workflow.
- Auto-fill suggested prophylaxis based on data input.

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Design reliability into process

- Attempting to remove VTE prophylaxis protocol from larger order sets deletes entire set.
- Require mandatory selections to assign risk factors and contraindications before proceeding.

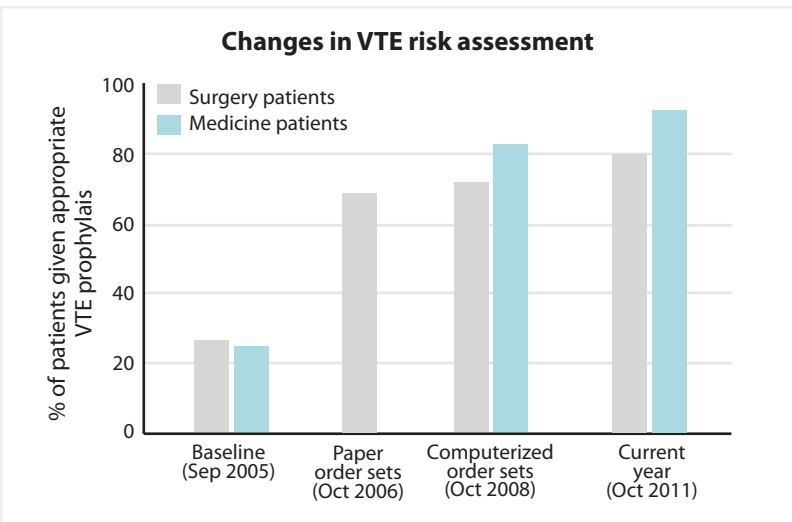
According to the British Medical Journal:

- A computerized clinical decision support tool can increase VTE risk stratification and risk-appropriate VTE prophylaxis among hospitalized adult patients admitted to a large urban academic medical center.
- It is important to ensure the tool is part of the clinician’s normal workflow, is mandatory (computerized forcing function), and offers the requisite modules needed for every clinical specialty.

Results

Currently, three-year project that seeks to use patient-centered communication strategies to improve VTE prophylaxis administration rates in the hospital, engaging former patients to help develop educational materials for other patients, including a video, according to Johns Hopkins.

Risk-appropriate VTE prophylaxis increased from 26% to 80% for surgical patients and from 25% to 92% for medical patients in 2011, according to the British Medical Journal.



In many cases the suffering of patients can be prevented through interventions such as intermittent pneumatic compression devices, early ambulation, chemoprophylaxis or a combination.



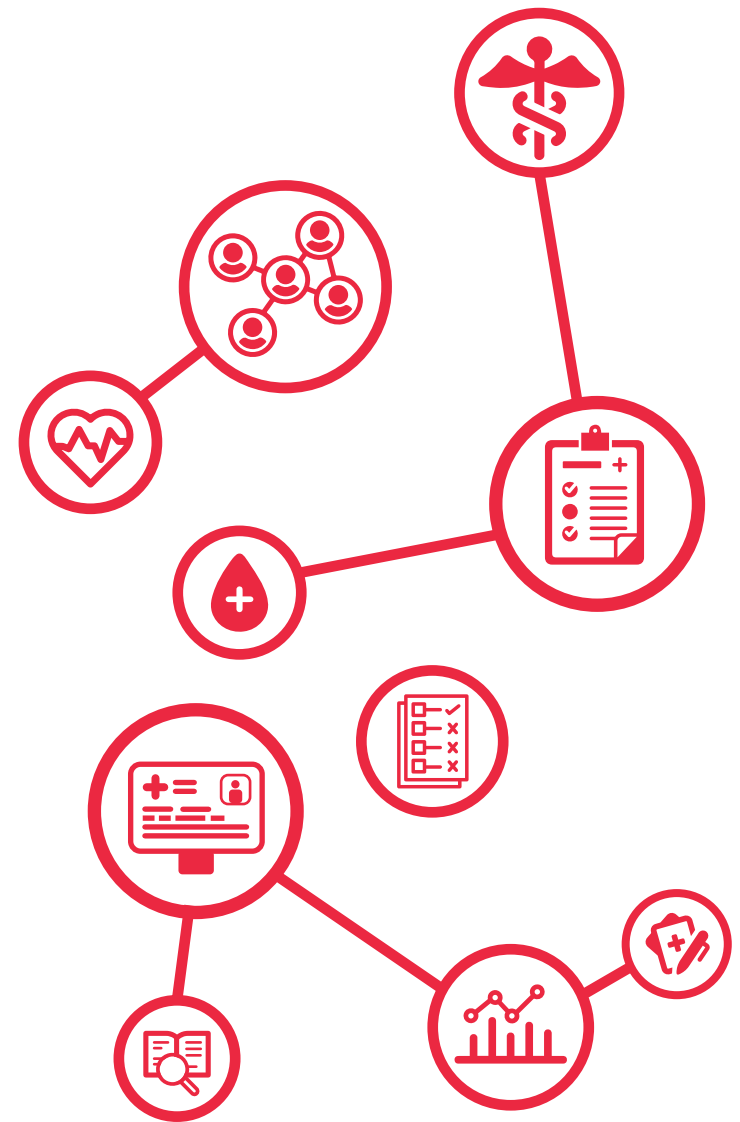
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