VENOUS THROMBOEMBOLISM PREVENTION

Getting Started Kit

Section 8: Appendices
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Abbreviations

ACCP  American College of Chest Physicians
AHRQ  Agency for Healthcare Research and Quality
CMPA  Canadian Medical Protective Association
CoP   Communities of Practice
CPOE  Computerized Prescriber Order Entry
CPSI  Canadian Patient Safety Institute
CQUIN Commissioning for Quality and Innovation Payment Framework
CRS   Computerized Reminder System
DVT   Deep Vein Thrombosis
ED    Emergency Department
GCS   Graduated Compression (“Antiembolic”) Stockings
HA-VTE Hospital-Associated Venous Thromboembolism
INR   International Normalized Ratio
IPC   Intermittent Pneumatic Compression
       (also referred to as SCDs or Sequential Compression Devices)
LDUH  Low-Dose Unfractionated Heparin
LMWH  Low-Molecular-Weight Heparin
MAR   Medication Administration Record
PE    Pulmonary Embolism
QI    Quality Improvement
RAM   Risk Assessment Model
ROP   Required Organizational Practice
SHN   Safer Healthcare Now!
SSCL  Surgical Safety Checklist
TfC   Test for Compliance
VFP   Venous Foot Pump
VTE   Venous Thromboembolism (DVT and/or PE)
APPENDIX A: Possible Barriers to Optimal Use of Thromboprophylaxis

Knowledge and Awareness Factors

1. Lack of awareness that VTE is an important clinical problem:
   - Lack of awareness of the VTE literature (VTE risk factors, patients at risk of VTE, magnitude of VTE risks).
   - Most hospital-acquired VTE are clinically silent (asymptomatic).
   - In many cases, a patient’s leg or chest symptoms are attributed to the surgical procedure or the underlying disease and, therefore, VTE will not be diagnosed even if symptomatic.
   - Belief that the risks of VTE have fallen substantially over the years because of improvements in patient care.
   - Belief that VTE risk stops at hospital discharge.
   - Catastrophic VTE is not very common.
   - Catastrophic VTE is spread across the spectrum of hospital physicians and, therefore, each individual physician will not encounter catastrophic VTE very often.
   - Denominator issue: if the fatal PE rate is 1/500 hip arthroplasties and the surgeon does an average of 100 THAs/year, that would be one fatal PE in five years plus the cause of death would have to be established by autopsy and the surgeon would have to know about the autopsy result.
   - Reliance on personal experience (“My patients have had very few thromboembolic complications over the years.” “I can’t remember the last time one of my patients developed VTE.”).
   - Few autopsies are currently being done both in hospital patients and especially in patients in the community - therefore, even when patients die of PE, the cause is often ascribed to another condition (MI, arrhythmia, pneumonia, multi-system organ failure).
   - Most hospital-acquired VTE are diagnosed after discharge - this makes it even more difficult to determine the nature of the event and to attribute it to the preceding hospitalization.
   - Since most symptomatic VTE are diagnosed after discharge, since many fatal PE will not be diagnosed, since symptomatic VTE is often managed by a physician other than the original attending, the attending physician may not be aware that their patient developed VTE in association with the hospital stay.
• Lack of awareness of long-term consequences of VTE - complications of therapeutic anticoagulation, chronic venous insufficiency, thromboembolic pulmonary hypertension, chronic patient anxiety, possible exclusion from certain surgical procedures.

2. Belief that VTE is an accepted complication of care.

3. Lack of awareness that VTE is preventable.
   • Lack of awareness of the thromboprophylaxis literature, the benefits, safety and cost-effectiveness of thromboprophylaxis.
   • Belief that thromboprophylaxis is effective in some patient groups but does not apply to the particular patient group or to the particular patient.
   • Belief that preventing fatal PE is the only important outcome and not aware that fatal PE can be reduced.
   • Belief that asymptomatic DVT reduction does not translate into reduction in clinically-important VTE.

4. Belief that VTE may be preventable by encouraging mobilization alone.

5. Belief that the risks of thromboprophylaxis are too high:
   • Personal experience with bleeding (and attributing it to the thromboprophylaxis).
   • Concerns about increased risk of wound infection associated with prophylaxis use.
   • Co-morbid conditions may raise concerns about prophylaxis (recent bleeding, renal failure, thrombocytopenia, advanced age).

6. Belief that the costs of thromboprophylaxis are too high.

   • Disagreement with guidelines in general (“too cookbook”, “too rigid”, biased synthesis, challenge to autonomy, not practical).
   • Disagreement with the specific thromboprophylaxis guideline (interpretation of the evidence, applicability to the patient, net cost-benefit, local approach not included).
   • Perceived lack of clarity within guidelines (e.g. unclear definitions of mobility/mobilization).
   • Discrepancies in approach and/or in specific recommendations among various guidelines.
Individual Implementation Factors

(Assumes that there is awareness that VTE is an important, preventable complication of hospital stay)

1. Lack of time.
   - Physician too busy to think about this.

2. Too many options.
   - Which agent, when to start, what dose, how long?

3. Other patient priorities are more immediate.
   (e.g. ICU, acute surgical or medical illness.)

4. Patients are too heterogeneous/risk stratification is too complex/patient is too old/cancer/ DNR/patient is too young/ likely to mobilize quickly.

5. Regional anesthesia concerns.

6. Forget to prescribe.

7. Lack of national body recommendation (CMPA, Royal College).
   - Lack of specialty organization recommendations/guidelines.

8. Lack of local hospital priority.

System/Organizational Implementation Factors

(Assumes that there is awareness that VTE is an important, preventable complication of hospital stay)

1. Lack of education about VTE and thromboprophylaxis.
   - Medical school, postgraduate training, CME, hospital policies.

2. Individual physicians prescribing for individual patients.

3. Lack of physician buy-in.

4. Organization not aware that thromboprophylaxis isn’t being used.

5. No local champion.

6. Perception that implementation is complex.
   - Which option(s), which dose, when to start, how long?

7. Perception that thromboprophylaxis is too expensive.
   - There may be resistance from Pharmacy, administration.
   - Another priority may not be implemented.
   - Whose budget will implementation come from?
8. No implementation system in place.
   - Thromboprophylaxis not embedded in order sets or CPOE.

9. No monitoring of thromboprophylaxis use.
   - No audits, feedback, M&M rounds, etc.
APPENDIX B: Strategies to Increase Appropriate Use of Thromboprophylaxis

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Examples*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System-wide (national) strategies</strong></td>
<td></td>
</tr>
<tr>
<td>Excellent quality, evidence-based guidelines</td>
<td>ACCP Guidelines on the Prevention of VTE</td>
</tr>
<tr>
<td></td>
<td>International Consensus Statement</td>
</tr>
<tr>
<td></td>
<td>The Joint Commission/National Quality Forum (USA)</td>
</tr>
<tr>
<td></td>
<td>National Institute for Health and Clinical Excellence - NICE (UK)</td>
</tr>
<tr>
<td></td>
<td>Specialty Guidelines</td>
</tr>
<tr>
<td><strong>Endorsement by national bodies</strong></td>
<td>US Surgeon General “Call to Action”</td>
</tr>
<tr>
<td></td>
<td>Society of Hospital Medicine (SHM)</td>
</tr>
<tr>
<td></td>
<td>American Society of Clinical Oncology (ASCO)</td>
</tr>
<tr>
<td></td>
<td>National Comprehensive Cancer Network (NCCN)</td>
</tr>
<tr>
<td></td>
<td>American College of Obstetricians and Gynecologists (ACOG)</td>
</tr>
<tr>
<td></td>
<td>Royal College of Obstetricians and Gynaecologists of England (RCOG)</td>
</tr>
<tr>
<td></td>
<td>Eastern Association for the Surgery of Trauma (EAST)</td>
</tr>
<tr>
<td><strong>Hospital accreditation</strong></td>
<td>Accreditation Canada</td>
</tr>
<tr>
<td></td>
<td>The Joint Commission (USA)</td>
</tr>
<tr>
<td></td>
<td>Healthcare Commission (UK)</td>
</tr>
<tr>
<td><strong>National or international quality improvement campaigns</strong></td>
<td><em>Safer Healthcare Now!</em></td>
</tr>
<tr>
<td></td>
<td>Surgical Care Improvement Project (SCIP) - USA</td>
</tr>
<tr>
<td></td>
<td>IHI 5 Million Lives Campaign - USA</td>
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<td></td>
<td>WHO Surgical Safety Checklist</td>
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<tr>
<td></td>
<td>OHA Surgical Safety Checklist</td>
</tr>
<tr>
<td></td>
<td>National Institute for Health and Clinical Excellence (NICE) implementation support program - UK</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategies</th>
<th>Examples*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public reporting of thromboprophylaxis adherence</td>
<td><a href="http://www.hospitalcompare.hhs.gov">www.hospitalcompare.hhs.gov</a></td>
</tr>
<tr>
<td></td>
<td>Premier</td>
</tr>
<tr>
<td></td>
<td>Leapfrog</td>
</tr>
<tr>
<td>Pay-for-reporting and pay-for-performance</td>
<td>Centers for Medicare and Medicaid Services (CMS) - USA</td>
</tr>
<tr>
<td></td>
<td>Surgical Care Improvement Project (SCIP)</td>
</tr>
<tr>
<td></td>
<td>Physician Quality Reporting Initiative (PQRI)</td>
</tr>
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<td></td>
<td>Blue Cross</td>
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<tr>
<td></td>
<td>Commissioning for Quality and Innovation Project Framework (CQUIN) - England</td>
</tr>
<tr>
<td>“No pay”’ for complications</td>
<td>Centers for Medicare and Medicaid Services (CMS)-USA</td>
</tr>
<tr>
<td>Medical-legal influences</td>
<td>Concerns about litigation</td>
</tr>
</tbody>
</table>

### Local Strategies

<p>| Provider education/awareness raising           | Commitment to support evidence-based standardization of care               |
|                                                | Senior leadership - CEO, program heads, department heads                  |
|                                                | Hospital boards                                                           |
|                                                | Interdisciplinary QI team                                                 |
|                                                | Clinical champions, opinion leaders                                       |
| Implement written policy/care pathway/decision support | Of physicians, pharmacists, nurses                                       |
| Wide-spread dissemination                      | During undergraduate education                                            |
|                                                | During postgraduate training                                              |
|                                                | Grand rounds, newsletters                                                  |
|                                                | Dissemination of guidelines or other educational materials                |
|                                                | Involve hospital media relations department                              |
|                                                | Interactive education sessions/educational outreach                       |
|                                                | Hospital-wide preferred                                                   |
|                                                | Clinical program or specific patient care unit involvement of front-line staff |
|                                                | Bring the policy to the bedside                                           |</p>
<table>
<thead>
<tr>
<th>Strategies</th>
<th>Examples*</th>
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</thead>
<tbody>
<tr>
<td>Routine VTE risk assessment and protocol-driven thromboprophylaxis</td>
<td>Done by admitting physician using a simple paper or electronic risk assessment model</td>
</tr>
<tr>
<td></td>
<td>Embedded in the hospital computerized patient information system</td>
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<td></td>
<td>Done by other health professionals after admission (pharmacists, nurses)</td>
</tr>
<tr>
<td>Hospital patient safety initiatives</td>
<td>Safer Healthcare Now! Getting Started Kit, AHRQ VTE Prevention Quality Improvement Guide</td>
</tr>
<tr>
<td></td>
<td>Society of Hospital Medicine Guide for Effective Quality Improvement</td>
</tr>
<tr>
<td>Audit and feedback</td>
<td>Individual provider feedback</td>
</tr>
<tr>
<td></td>
<td>Small scale - local unit</td>
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<tr>
<td></td>
<td>Hospital wide</td>
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<tr>
<td></td>
<td>Local public reporting</td>
</tr>
<tr>
<td>Provider reminder systems</td>
<td>Pocket cards, posters, computer screensavers</td>
</tr>
<tr>
<td></td>
<td>Daily pharmacist review of patients</td>
</tr>
<tr>
<td></td>
<td>Daily nursing review of patients</td>
</tr>
<tr>
<td></td>
<td>Targeted computer alerts</td>
</tr>
<tr>
<td>Order sets</td>
<td>Paper pre-printed order sets</td>
</tr>
<tr>
<td></td>
<td>Mandated by the hospital</td>
</tr>
<tr>
<td></td>
<td>Computerized provider order entry (CPOE)</td>
</tr>
<tr>
<td>Default policy</td>
<td>Opt-out for prophylaxis orders</td>
</tr>
<tr>
<td>Financial and other incentives</td>
<td>Patient safety measures linked to remuneration</td>
</tr>
<tr>
<td>Involve patients</td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td>Encourage questioning of staff about safety practices</td>
</tr>
<tr>
<td>Sentinel event investigation, reporting</td>
<td>System review for fatal and symptomatic events</td>
</tr>
</tbody>
</table>

*The examples are not intended to be comprehensive - there are other national and local strategies to improve thromboprophylaxis use*
# Appendix C: VTE Prevention Change Package

*Although each of these steps are important, those indicated by ** are considered to be the key strategies*

<table>
<thead>
<tr>
<th>Change Concepts</th>
<th>Change Ideas*</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide leadership</td>
<td>• **Establish hospital executive leadership commitment to VTE prophylaxis as a key patient safety initiative</td>
<td>• Confirmation of commitment (letter, e-mail, funding, etc.) from senior leadership</td>
</tr>
<tr>
<td>Develop alliances and cooperative relationships</td>
<td>• Involve the key departments (surgery, medicine, pharmacy, nursing, quality and risk management)</td>
<td>• List of individuals involved in the process along with titles and departmental affiliations</td>
</tr>
</tbody>
</table>
| Consider people as in the same system   | • Establish a multidisciplinary team that meets regularly to discuss successes and gaps in performance related to VTE prophylaxis as well as priorities, strategies, and progress in improvement | • Composition of team  
• Frequency of meetings per year |
| Emphasize natural and logical consequences | • Gain consensus among physicians on VTE risk assessment and prophylaxis  
• **Establish an organization-wide written thromboprophylaxis policy or guideline | • Product: written policy or guideline |
| Improving predictions                  | • **Develop an approach to risk assessment where most hospitalized patients are considered at risk of VTE and focus assessment efforts on identifying patients that are not at risk and do not require prophylaxis /OR  
• Include a VTE risk assessment checklist or tool in the pre-printed order sets for hospitalized patients | • Documentation of the VTE risk assessment approach (in policy or protocol) |
| Reach agreement on expectations        | • **Identify goals for VTE prophylaxis and measure progress towards goals | • Product: target rates of appropriate prophylaxis  
• Plan for measuring achievement of target (audit strategy) |
<table>
<thead>
<tr>
<th>Change Concepts</th>
<th>Change Ideas*</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use a coordinator</td>
<td>• Identify person(s) responsible for implementing and monitoring processes for improvement</td>
<td>• Name of individual who will be coordinator</td>
</tr>
</tbody>
</table>
| Conduct training             | • Provide education and training to all key stakeholders on the risks of VTE and VTE prophylaxis  
                                o Educate and train medical, surgical, nursing, pharmacy and other allied health staff on VTE risk assessment and prophylaxis  
                                o Grand Rounds  
                                o Newsletters/ Bulletins  
                                o Key references, guidelines  
                                • Workshops  
                                • Information /education with feedback from audits, etc. | • Dates, content and target audience of any educational sessions  
                                • Product: any educational materials circulated to staff with indication of intended audience  
                                • Documentation of any other educational efforts being made |
| Use reminders                 | • Provide healthcare professionals with reminders of VTE risk and prophylaxis (e.g. chart reminders, pocket cards, information sheets placed in nursing communication binders, posters in staff lounges, etc.) | • Product: copy of the reminder tool being used |
| Coach target group to use a product or service | • Design and implement a VTE awareness campaign for healthcare professionals, patients, and families  
                                • Market VTE as a key patient safety concern in the hospital (through posters, patient education sheets, patient directed messages on hospital TV, etc.)  
                                o Provide patient information sheets on VTE in admission and pre-op packages as appropriate | • Copy of any AV or written material that has been prepared for patients  
                                • Dissemination strategy - when and how information is being disseminated to patients and/or their families |
<table>
<thead>
<tr>
<th>Change Concepts</th>
<th>Change Ideas*</th>
<th>Measures</th>
</tr>
</thead>
</table>
| **Standardization**                    | • Establish guidelines for identifying patients at risk of VTE and providing appropriate, evidence-based VTE prophylaxis  
   (create formal process)             | • Documentation of how patients will be assessed for risk of VTE          |
|                                        |   o Develop local clinical guidelines for pre- and postoperative VTE risk  
   assessment                                                             |                                                                          |
|                                        |   o Develop local clinical guidelines for VTE risk assessment in non-surgical hospitalized patients (e.g. medicine, oncology, nephrology, etc.) |                                                                          |
|                                        | • Develop clinical guidelines for pre-and postoperative VTE prophylaxis    |                                                                          |
|                                        |   o Develop clinical guidelines for VTE prophylaxis in all non-surgical hospitalized patients (e.g. medicine, oncology, nephrology, etc.) |                                                                          |
| **Reduce classifications**             | • Incorporate evidence-based VTE prophylaxis options into the pre-printed  
                                        | • Product: provide copies of all order sets where VTE prophylaxis has been  
                                        |   order sets for hospitalized patients providing a place for physicians to indicate if thromboprophylaxis is contraindicated or not warranted | incorporated |
|                                        | **Make the use of pre-printed order sets with embedded VTE prophylaxis a mandatory part of routine patient care** |                                                                          |
| **Use constraints**                    | • Identify patients who have undergone major orthopedic surgery and require post-discharge prophylaxis  
                                        | • Product: documentation of the strategy utilized for capturing these patients  
                                        |                                                                             |
|                                        |   o Establish a process to ensure that patients receive at least 10 days of VTE prophylaxis after major orthopedic surgery (during hospitalization or post-discharge) |                                                                             |
| **Exploit variation**                  |                                                                             | • Product: audit of how frequently pre-printed order sets are used  
<p>| |
|                                                                             |
|                                        |                                                                             | • Proof of incorporating the use of order sets into patient care policies or protocols |
|                                        |                                                                             | • Copy of letter or discharge prescription that accompanies patients on discharge |</p>
<table>
<thead>
<tr>
<th>Change Concepts</th>
<th>Change Ideas*</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploit variation (contd.)</td>
<td>o For patients who are discharged prior to 10 days, ensure a process for prescribing and/or communicating the need to prescribe thromboprophylaxis post-discharge</td>
<td>• Baseline audit results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3-6 month audit results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Regular audits (monthly) results</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Copy of audit form</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Summary of reasons for not receiving appropriate prophylaxis</td>
</tr>
</tbody>
</table>
| Use proper measurements         | • **Measure the rates of appropriate thromboprophylaxis use:  
  o Prior to implementation of interventions to establish a baseline rate of appropriate thromboprophylaxis  
  o Shortly after implementation (e.g. 3-6 months) to measure the effects of the interventions  
  o On a regular basis to ensure sustainability of improvement efforts and drive further improvement  
  • Use a standardized audit form that includes measures of:  
  o When prophylaxis was initiated (within 24 hrs of admission or post-op)  
  o What type of prophylaxis was prescribed  
  o Duration of the prophylaxis (until discharge or post-discharge for orthopedic patients) | • Baseline audit results                                                                                                                                 |
|                                 |                                                                                                                                                                                                             | • 3-6 month audit results                                                                                                                                      |
|                                 |                                                                                                                                                                                                             | • Regular audits (monthly) results                                                                                                                                   |
|                                 |                                                                                                                                                                                                             | • Copy of audit form                                                                                                                                 |
|                                 |                                                                                                                                                                                                             | • Summary of reasons for not receiving appropriate prophylaxis                                                                                             |
| Give people access to information| • Feedback the results of the audit to all key stakeholders and front line healthcare professionals  
  o Provide audit results to prescribing physicians and healthcare teams (RN, pharmacist, etc.)  
  o Provide results to senior leadership  
  o Publicly report results of quality improvement initiatives through national programs and hospital website  
  • Report results on a regular basis to VTE Prophylaxis improvement team | • Copy of feedback letter and/or communication tool                                                                                                           |
|                                 |                                                                                                                                                                                                             | • Documentation of communication to various stakeholder groups (to whom and when)                                                                         |
APPENDIX D: Plan-Do-Study-Act Cycle
Using the Model for Improvement to Accelerate Change

The Model for Improvement, developed by Associates in Process Improvement, is a simple yet effective tool not meant to replace change models that organizations may already be using, but rather to accelerate improvement. This model has been used very successfully by hundreds of healthcare organizations in many countries to improve many different healthcare processes and outcomes.

The Improvement Model has two parts:

- Three fundamental questions, which can be addressed in any order.
  1. What are we trying to accomplish?
  2. How will we know that a change is an improvement?
  3. What changes can we make that will result in improvement?

- The Plan-Do-Act-Study (PDSA) cycle to test and implement changes in real work settings. The PDSA cycle guides the test of a change to determine if the change is an improvement.
**Set Aims**

Improvement requires setting aims. The aim should be time specific and measurable; it should also define the specific population of patients that will be affected.

**Establish Measures**

Teams use quantitative measures to determine if a specific change actually leads to an improvement.

**Select Changes**

All improvement requires making changes, but not all changes result in improvement. Organizations therefore must identify the changes that are most likely to result in improvement.

**Test Changes**

The Plan-Do-Study-Act (PDSA) cycle is shorthand for testing a change in the real work setting — by planning it, trying it, observing the results, and acting on what is learned. This is the scientific method used for action-oriented learning.

---

**A. Set Aims (Goals and Objectives)**

Improvement requires setting aims. An organization will not improve without a clear and firm intention to do so. The aim should be time specific and measurable; it should also define the specific population of patients that will be affected. Agreeing on the aim is crucial; so is allocating the people and resources necessary to accomplish the aim.

Setting an aim can assist teams to focus on what they are hoping to achieve when implementing strategies to reduce venous thromboembolism (VTE). The aim should be time-specific, measurable and define the specific population who will be affected.

The following is an example of an aim at organizational level:

---

*Langley G, Nolan KM, Nolan TW, Norman CL, Provost LP. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance*
Increase the percentage of all adult hospitalized patients who are receiving appropriate VTE prophylaxis, if indicated, to 90 per cent by September 2017. Prophylaxis will be in accordance with American College of Chest Physicians 2012 evidence based clinical practice guidelines and will meet the tests for compliance set out in Accreditation Canada’s VTE Required Organizational Practice (ROP).

As teams work on different ideas, the aims should be specific to what it is they are hoping to achieve at that point.

B. Establish Measures

Measurement is a critical part of testing and implementing changes; measures tell a team whether the changes they are making actually lead to improvement. Measurement for improvement should not be confused with measurement for research. This difference is outlined in the chart below:

<table>
<thead>
<tr>
<th></th>
<th>Measurement for Research</th>
<th>Measurement for Learning and Process Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective</strong></td>
<td>To discover new knowledge</td>
<td>To bring new knowledge into daily practice</td>
</tr>
<tr>
<td><strong>Tests</strong></td>
<td>One large “blind” test</td>
<td>Many sequential, observable tests</td>
</tr>
<tr>
<td><strong>Biases</strong></td>
<td>Control for as many biases as possible</td>
<td>Stabilize the biases from test to test</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td>Gather as much data as possible, “just in case”</td>
<td>Gather “just enough” data to learn and complete another cycle</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>Can take long periods of time to obtain results</td>
<td>“Small tests of significant changes” accelerates the rate of improvement</td>
</tr>
</tbody>
</table>

Three Types of Measures

Use a balanced set of measures for all improvement efforts:

1. **Outcome Measures**
   How is the system performing? What is the result?

   - **Appropriate Venous Thromboembolism Prophylaxis rate** - The percentage of eligible patients receiving appropriate thromboprophylaxis for a target patient group.

2. **Process Measures**
   Are the parts/steps in the system performing as planned?

   - **Order Set Use** - The percentage of patients in the sample group who had an order set used for admission or post-surgical procedure.
3. Balancing Measures

Are changes designed to improve one part of the system causing new problems in other parts of the system? This measure often addresses staff satisfaction and workload issues.

- Does increased anticoagulant thromboprophylaxis increase the rate of bleeding, heparin-induced thrombocytopenia (HIT)?
- Provider satisfaction - The rating in a monthly survey of provider satisfaction with respect to efforts for the prevention of VTE.

Measuring for improvement starts with collecting baseline data to determine the seriousness of the problem and to help motivate stakeholders. Then, collect data regularly to track the effectiveness of change over time.

C. Select Changes

While all changes do not lead to improvement, all improvement requires change. The ability to develop, test, and implement changes is essential for any individual, group, or organization that wants to continuously improve. There are many kinds of changes that will lead to improvement, but these specific changes are developed from a limited number of change concepts.

A change concept is a general notion or approach to change that has been found to be useful in developing specific ideas for changes that lead to improvement. Creatively combining these change concepts with knowledge about specific subjects can help generate ideas for tests of change. After generating ideas, run Plan-Do-Study-Act (PDSA) cycles to test a change or group of changes on a small scale to see if they result in improvement. If they do, expand the tests and gradually incorporate larger and larger samples until you are confident that the changes should be adopted more widely.

D. Test Changes

Once a team has set an aim, established its membership, and developed measures to determine whether an intervention leads to an improvement, the next step is to test the proposed change in the real work setting. The Plan-Do-Study-Act (PDSA) cycle is shorthand for testing an intervention—by planning it, trying it, observing the results, and acting on what is learned. This is the scientific method used for action-oriented learning.
Reasons to Test Changes

- To see if the change will result in improvement.
- To decide which of several proposed changes can lead to the desired improvement.
- To evaluate how much improvement might be expected from the change.
- To decide whether the proposed change is likely to work in the actual environment of interest.
- To decide which combinations of changes are likely to have the desired effects on the important measures of quality.
- To evaluate costs, social impact, and side effects from a proposed change.
- To minimize resistance upon implementation.

Steps in the PDSA Cycle

Step 1: Plan

Plan the intervention and assessment, including a plan for collecting data:

- State the objective of the initiative.
- Make predictions about what will happen and why.
- Develop a plan to test the change (Who? What? When? Where? What data need to be collected?).

Step 2: Do

Try out the intervention on a small scale:

- Carry out the intervention.
- Measure the selected outcome(s) of interest.
- Document problems and unexpected observations.

Step 3: Study

Set aside time to analyze the data and study the results:

- Analyze the data.
- Compare the findings to your predictions.
- Summarize and reflect on what was learned.

Step 4: Act

Refine the intervention, based on what was learned from the test:

- Determine what modifications should be made.
- Prepare a plan for the next test.
Example of a Test of Change (Plan-Do-Study-Act Cycle)

Depending on the aim, teams choose promising changes (interventions) and use Plan-Do-Study-Act (PDSA) cycles to test a change quickly on a small scale, see how it works, and refine the change as necessary before implementing it on a broader scale. The following example shows how a team started with a small-scale test.

Implementing Venous Thromboembolism Prevention interventions:

| PLAN: | Question for this cycle: How might the use of a Hospitalist admission order used by General Practitioners help improve the number of patients receiving appropriate VTE prevention?  
Theory: The admission order will serve as both a reminder and provide some structure for making appropriate clinical choices which should result in more patients receiving appropriate prophylaxis.  
Detailed plan: On Tuesday, two GP Hospitalists will test the order with five consecutive patients they admit or for a period of up to three days, whichever occurs first. The Hospitalist will review cases for appropriate prophylaxis and compare this to the rate for the preceding three days (or 10 patients). |
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>DO:</td>
<td>The GPs both admitted five patients within three days using the admission order. They found the form easy to use and helpful, but suggested some modifications to the layout to make it clearer. For one admission, the form was not used as the patient had clinical conditions not addressed on the form. The Hospitalist reviewed the admissions and recorded appropriateness.</td>
</tr>
<tr>
<td>STUDY:</td>
<td>The team reviewed the information and determined the rates of appropriateness had increased from four out of eight patients to four out of five patients with the use of the admission order. The GPs believed that the major benefit of the order was having details available to show the appropriate clinical practice for patients presenting with different conditions and as a reminder of the hospital’s recommended prophylaxis options.</td>
</tr>
</tbody>
</table>
| ACT: | They revised the form and added a section to address additional clinical conditions.  
Future cycles: Confirm the new form is an improvement (with the two GPs) and then expand the test to include additional GPs admitting patients to this site. |
Implement Changes

After testing a change on a small scale, learning from each test, and refining the change through several PDSA cycles, the change is ready for implementation on a broader scale, for example, for an entire pilot population or on an entire unit. Implementation is a permanent change to the way work is done and, as such, involves building the change into the organization. It may affect documentation, written policies, training, and other aspects of the organization's infrastructure that are not heavily engaged in the testing phase. Implementation also may benefit from the use of the PDSA cycle.

Example: Hospitalist Admission Order

Testing the change: Multiple cycles were completed to refine the order set and to increase the belief by the team that the admission order would work appropriately in the future. The tests included multiple patients on different days admitted by different Hospitalists.

Implementing a change: Once the team was reasonably sure the admission order would work, they decided to make it permanent. The first cycle was to test the training approach to be used for new GPs joining the organization. This was followed by tests of a revised prophylaxis policy, IT support for the electronic version of the form and by tests of how to best communicate the new practice to patients and families. As the team learned and made adjustments, the form became embedded in common practice within the organization. Data of appropriate VTE prophylaxis continued to be collected (but less frequently) to assure the new practices and use of the form continued.

Spread Changes

Spread is the process of taking a successful implementation process from a pilot unit or pilot population and replicating that change or package of changes in other parts of the organization or other organizations. During implementation, teams learn valuable lessons necessary for successful spread, including key infrastructure issues, optimal sequencing of tasks, and working with others to help them adopt and adapt a change.

Spread efforts may benefit from the use of the PDSA cycle. Units adopting the change need to plan how best to adapt the change to their unit and to determine if the change resulted in the predicted improvement.

As experience develops and measurement of the success of your VTE reduction strategies represents sustained improvement, the process can be implemented for more patients in more areas. Evaluate at each new step before adding more units to the process. Retest the pilot process on new units in order to identify any revisions that may be needed. The roll-out across an organization requires careful planning to move through each of the major implementation phases.
The IHI’s ‘A Framework of Spread: From Local Improvements to System-Wide Change’ (www.ihi.org/IHI/Results/WhitePapers/AFrameworkforSpreadWhitePaper.htm) will assist teams to develop, test and implement a system for accelerating improvement by spreading change ideas within and between organizations. This paper will assist teams to “prepare for a spread; establish an aim for spread; and develop, execute, and refine a spread plan.” Some issues to address in planning for spread include training and new skill development, supporting people in new behaviours that reinforce the new practices, problem solving, current culture regarding change, degree of buy-in by staff, and assignment of responsibility.

Further information on sustaining and spreading improvements can be accessed by using the following link: www.ihi.org/IHI/Results/WhitePapers/AFrameworkforSpreadWhitePaper.htm
APPENDIX E: Accreditation Canada’s VTE ROP

Accreditation Canada supports the efforts of Safer Healthcare Now! to increase the use of optimal thromboprophylaxis in Canadian hospitals and, since January, 2011, VTE Prophylaxis has been added as a Required Organizational Practice (ROP) that is included in hospital accreditation reviews. The main goal of this ROP is that “the team identifies medical and surgical clients at risk of venous thromboembolism (DVT and PE) and provides appropriate thromboprophylaxis.”

Meeting five specific Tests for Compliance are required to establish full compliance with the ROP. Following the SHN recommended approaches to prevention of VTE will satisfy Accreditation Canada’s VTE ROP.

Note: The ROP only applies to patients ≥18 years of age in acute care hospitals.

The VTE Tests for Compliance are:

1. The organization develops and implements an organization-wide, written thromboprophylaxis policy or guideline.
2. The organization identifies clients at risk for VTE and provides appropriate evidence-based, VTE prophylaxis.
3. The organization establishes a measurement and audit process to track the use of appropriate thromboprophylaxis and uses this information to guide quality improvement.
4. The organization implements strategies to ensure that major orthopedic surgery clients (hip and knee replacements, hip fracture surgery) who require post-discharge prophylaxis are provided it.
5. The organization provides information to health professionals and clients about the risks of VTE and its prevention.

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APPENDIX F: Example of Thromboprophylaxis Policy/Guideline

VENOUS THROMBOPROPHYLAXIS POLICY AND GUIDELINES

[Version Date: 2015Dec01]

I. POLICY STATEMENT
Venous thromboembolism (VTE) is one of the most common complications of hospitalization and the most common preventable cause of hospital death. It is Sunnybrook policy that best practices be followed to ensure that hospitalized patients are assessed for their risk of VTE and receive appropriate thromboprophylaxis, if indicated.

SUNNYBROOK THROMBOPROPHYLAXIS POLICY
1. Every hospitalized patient should be assessed for VTE risk at the time of admission to hospital, at the time of a significant change in clinical status, at the time of transfer from one type of care unit to another, and at discharge; AND
2. Optimal, evidence-based thromboprophylaxis should be provided to every hospitalized patient in whom it is indicated based on their risk of thrombosis, their risk of bleeding, and available options at Sunnybrook.

II. THROMBOPROPHYLAXIS GUIDELINES

DEFINITIONS:

Venous thromboembolism (VTE) is a thromboembolic event (“blood clot”) that develops within the venous system and includes both deep vein thrombosis and pulmonary embolism.

Deep vein thrombosis (DVT) is a thrombus (“blood clot”) occurring in one or more deep veins, especially in the legs, where it may produce leg swelling and/or pain.

Pulmonary embolism (PE) is a thrombus that arises in a deep vein and embolizes to one or more of the pulmonary arteries where it may result in breathlessness, chest pain, hemoptysis, syncope, or death.

Thromboprophylaxis (TP) refers to the use of anticoagulant medication or mechanical methods to prevent VTE from developing in patients who are at risk.

BACKGROUND AND RATIONALE FOR THROMBOPROPHYLAXIS POLICY:

- Approximately 60% of the entire population burden of VTE is related to hospitalization (i.e., the VTE occurs either during the hospital stay or within a relatively short time after discharge).
- Without thromboprophylaxis, ~20% of hospital patients will develop asymptomatic DVT (with a range of up to 80%).
- DVT and PE produce unpleasant symptoms and considerable anxiety for patients, and may lead to death.
The investigation and management of patients with suspected and proven VTE consumes considerable resources: VTE doubles hospital length of stay and costs of hospital care. VTE is the most common preventable cause of hospital death. More than 450 randomized trials demonstrate that the rates of DVT, symptomatic VTE, fatal PE, and all-cause mortality are reduced by the use of TP. Evidence-based guidelines have recommended the routine use of TP for most hospitalized patients since 1986.

TP has been shown to reduce hospital-acquired VTE and is cost-saving. The use of TP has been ranked as the number one patient safety practice for hospitals. Since 2011, Accreditation Canada has made the provision of TP a Required Organizational Practice for Canadian hospitals. Therefore, routine evaluation of hospital patients for VTE risk and provision of TP are standards of care.

**Principles Guiding the Sunnybrook Thromboprophylaxis Guidelines**

1. **Appropriateness** defined by an appropriate:
   a. **modality** for the patient’s risks of VTE and bleeding
   b. **dose** (if an anticoagulant)
   c. **timing** after admission, after surgery or after transfer within the institution
   d. **compliance**
   e. **duration**

2. **Simplicity** - limit the available options consistent with patient safety and costs. For example, only one non-pharmacologic method of TP is used (ThromboEmbolic Deterrent stockings [TEDs]) and only one low molecular weight heparin (LMWH) is to be used for TP (enoxaparin).

3. **Standardization** - keep the number of TP options to a minimum both within and between patient groups.

4. **Routine** - since the overwhelming majority of hospital patients require TP, routine TP will be ordered unless there is an appropriate active decision to not provide it (“opt out”).

5. **Continuous** - doses of LMWH are not held unless there is evidence of active bleeding or there is a substantial increase in bleeding risk. In particular, there is no need to withhold the QHS administration of LMWH for patients who are anticipated to have an invasive procedure the following day AND there is no need to withhold the AM administration of LMWH for most patients who are anticipated to have an invasive procedure that day.
6. **Embedded in order sets** - the use of routine pre-printed (and eventually computer) order sets is the most effective strategy to ensure that best practices are followed. As new order sets are developed at Sunnybrook, the appropriateness of a TP modality and its consistency with the official TP policy and guidelines is to be addressed.

7. **Reassessment** - at transitions of care within the hospital (post-operative, transfer to or from the ICU, transfer to another service), a reassessment of TP should be made. At the time of transfer to another acute care hospital, rehabilitation centre, long-term care facility, nursing home, or discharge home, a decision should be made to discontinue TP (as in most situations) or to recommend and, in some cases to arrange for, TP to continue after the transition.

8. **Periodic review** - the specifics of this policy are to be reviewed yearly (or more frequently if new evidence becomes available).

**GENERAL APPROACH TO THROMBOPROPHYLAXIS AT SUNNYBROOK**

The underlying principle guiding the use of thromboprophylaxis at Sunnybrook is that all patients at risk receive it. The general approach to TP at Sunnybrook involves three steps:

**STEP 1: Is thromboprophylaxis NOT INDICATED?**

- For patients who are fully mobile and expected to have a length of stay less than two calendar days, TP is generally not needed. Most patients who undergo out-patient or overnight-stay surgery do not require active TP.
- If no specific TP is provided, patients should be encouraged to be as mobile as possible.
- If a patient’s clinical status changes significantly, a decision about TP should be reassessed at that time.

**STEP 2: Is anticoagulant thromboprophylaxis CONTRAINDIATED?**

- For patients who are actively bleeding or have a high risk of bleeding, anticoagulant TP is not given. In this situation, bilateral, properly measured and fitted, calf-length TEDs are placed.
- These patients should be reassessed daily for proper use of the stockings and bleeding risk. When the high bleeding risk decreases, LMWH should be started.
- For patients with heparin-induced thrombocytopenia (HIT), either currently or in the past, LMWH is contraindicated. In this setting, the TE Service should be contacted for advice - the most appropriate TP is generally fondaparinux 2.5 mg SC once daily.
**STEP 3: PROVIDE THROMBOPROPHYLAXIS (see Appendix 1)**

- **For most patients**, the recommended TP is enoxaparin 40 mg once daily, generally “once daily at 2200 h = QHS.”

- In general, for **weight less than 40 kg**, it is recommended that a dose reduction to enoxaparin 30 mg SC once daily be used.

- In general, for **weight greater than 100 kg**, it is recommended that a dose increase to enoxaparin 40 mg SC BID be used. For weight >120 kg, even higher doses should be considered (e.g. enoxaparin 0.4 mg/kg SC BID).

- A dosage reduction is recommended for prophylactic doses of enoxaparin for patients with **severe renal impairment (creatinine clearance <30 ml/min)**. For most patients with severe renal impairment, the dose reduction is to enoxaparin 30 mg SC once daily.

- For patients greater than 100 kg **and** with severe renal impairment (creat clear <30 ml/min), the recommended enoxaparin dose is generally 30 mg SC Q12H.

- The 1st dose of enoxaparin is generally given at 2200 hours (“QHS”) on the day of admission or the surgical day (occasionally started at 1000 hours that day or the following day).

**References:**


## Appendix 1: Specific Thromboprophylaxis Recommendations

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended Thromboprophylaxis options</th>
<th>Initiation</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>High bleeding risk</td>
<td>• Properly-fitted, bilateral calf-length TEDs used continuously (except for bathing)</td>
<td>• ASAP after emergency admission&lt;br&gt;• Just prior to surgery for elective surgical procedures</td>
<td>• Until bleeding risk allows the use of enoxaparin</td>
</tr>
<tr>
<td>Heparin-induced thrombocytopenia (HIT) (current or previous)</td>
<td>• Suggest TE consult&lt;br&gt;• No heparin or LMWH&lt;br&gt;• fondaparinux 2.5 mg SC once daily</td>
<td>• As soon as the diagnosis of HIT considered</td>
<td>• Discharge and platelet count &gt;120x10⁹/L</td>
</tr>
<tr>
<td>Burn unit patients</td>
<td>• Use Burn Unit order sets&lt;br&gt;• enoxaparin 40 mg SC QHS</td>
<td>• When there is evidence of primary hemostasis</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Cardiovascular surgery</td>
<td>• See CVS Antithrombotic Management Guideline&lt;br&gt;• Use CVS order sets&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 30 mg SC QHS</td>
<td>• See CVS order sets</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Critical care</td>
<td>• Use Critical Care order sets&lt;br&gt;• In most general critical care patients, the prophylaxis is enoxaparin 40 mg SC QHS&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length TEDs until enoxaparin can be started</td>
<td>• 1ˢᵗ dosing time after admission, if appropriate&lt;br&gt;• See Critical Care order sets</td>
<td>• Until discharge&lt;br&gt;• Include thromboprophylaxis in transfer orders</td>
</tr>
<tr>
<td>General surgery</td>
<td>• Use one of three General Surgery order sets (Hepatopancreaticobiliary, Colorectal surgery, Access)&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS&lt;br&gt;• For patients undergoing hepatobiliary/pancreatic/gastric cancer surgery, TEDs are started preop and used continuously along with enoxaparin&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length TEDs until enoxaparin can be started</td>
<td>• 0-1 hour preop (if no epidural or HPB surgery) or&lt;br&gt;• 4 hours after insertion of epidural or&lt;br&gt;• For HPB surgery, start at 2200 hours on day of surgery or next AM</td>
<td>• Until discharge&lt;br&gt;• For selected, high risk cancer patients → continue enoxaparin 40 mg SC or rivaroxaban 10mg once daily for ~30 days</td>
</tr>
<tr>
<td>Patient group</td>
<td>Recommended Thromboprophylaxis options(^2,3,4)</td>
<td>Initiation</td>
<td>Duration(^5)</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Gynecology                           | • Use Gynecology order set  
• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length TEDs until enoxaparin can be started  
• 1st dosing time after ER admission or postop or  
• The following morning if there are bleeding concerns  
• Until discharge                                                                 |                                                                                                       |                                                                                                    |
| Hip & knee arthroplasty              | • Use Arthroplasty order set  
• In most cases, the prophylaxis is rivaroxaban 10 mg PO QAM  
• For patients with an indwelling epidural catheter, enoxaparin 40 mg SC QAM is given until the epidural is removed and then the patient is switched to rivaroxaban 10 mg PO once daily  
• For patients with severe renal dysfunction (CrCl < 30 mL/min), do NOT use rivaroxaban; use enoxaparin 30 mg SC QAM or warfarin or heparin U SC TID  
• Morning after surgery  
• 15 days  
• 28 days if high risk (e.g. previous VTE after TJR)                                                                 |                                                                                                       |                                                                                                    |
| Hip fracture                         | • Use Hip Fracture admission and postop order sets  
• enoxaparin 40 mg SC once daily starting postop  
• enoxaparin 30 mg SC once daily if weight less than 40 kg or CrCl < 30 mL/min  
• If surgery is delayed, start enoxaparin 30 mg SC QHS on admission  
• At least 10 days (generally 2-3 weeks)                                                                 |                                                                                                       |                                                                                                    |
| Internal medicine (and medical subspecialties) | • Use Internal Medicine admission order set  
• For most patients, enoxaparin 40 mg SC QHS  
• enoxaparin 30 mg SC once daily if weight less than 40 kg or CrCl < 30 mL/min  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length TEDs until enoxaparin can be started  
• 1st dosing time after admission  
• Until discharge                                                                 |                                                                                                       |                                                                                                    |
| Lower extremity amputation           | • enoxaparin 40 mg SC QHS  
• 1st dosing time after surgery  
• Until discharge from rehab                                                                                                                                  |                                                                                                       |                                                                                                    |
<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended Thromboprophylaxis options&lt;sup&gt;2,3,4&lt;/sup&gt;</th>
<th>Initiation</th>
<th>Duration&lt;sup&gt;5&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurosurgery</td>
<td>Three options:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For patients at high risk of bleeding → properly-fitted, bilateral calf-length TEDs</td>
<td>• For TEDs, start just prior to surgery for elective surgical procedure and ASAP after admission for</td>
<td>Until discharge</td>
</tr>
<tr>
<td></td>
<td>• enoxaparin 40 mg SC once daily</td>
<td>major neurotrauma or nontraumatic intracranial hemorrhage</td>
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</tr>
<tr>
<td></td>
<td>• Start with bilateral calf-length TEDs and switch to LMWH when risk of bleeding decreases</td>
<td>• For enoxaparin, no sooner than day after surgery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Until discharge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oncology (medical and radiation)</td>
<td>• See Oncology Thromboprophylaxis Guideline</td>
<td>• 1&lt;sup&gt;st&lt;/sup&gt; dosing time after admission</td>
<td>Until discharge</td>
</tr>
<tr>
<td></td>
<td>• Use Oncology admission order set</td>
<td>• Consider benefits vs risk of post-discharge thromboprophylaxis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• enoxaparin 40 mg SC QHS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For patients at high risk of bleeding, properly-fitted, bilateral calf-length TEDs until enoxaparin can be started</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>• TE service should manage the thromboprophylaxis for these patients</td>
<td>• ASAP after admission (once hemostasis is evident)</td>
<td>Until discharge from rehab</td>
</tr>
<tr>
<td></td>
<td>• enoxaparin 40 mg SC QHS once there is evidence of primary hemostasis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• After approx. 1-5 days, the dose of enoxaparin is generally increased to 40 mg BID</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• After 7-14 days, most patients transition to rivaroxaban 15 mg PO once daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient group</td>
<td>Recommended Thromboprophylaxis options(^2,3,4)</td>
<td>Initiation</td>
<td>Duration(^5)</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
</tbody>
</table>
| Spine surgery       | a) Uncomplicated  
• Mobilization alone  
b) Complicated (combined ant/post procedure, cancer, leg weakness)  
• enoxaparin 40 mg SC daily  
• Consider TE consult if active cancer or neurologic deficit | • Evening or morning after surgery                             | • Until discharge         |
| Stroke - ischemic   | • Use Stroke admission order set  
• For most patients, enoxaparin 40 mg SC QHS  
• enoxaparin 30 mg SC daily if weight less than 40 kg or CrCl <30 mL/min  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length TEDs until enoxaparin can be started | • 1\(^{st}\) dosing time after admission                      | • Until discharge         |
| Stroke - hemorrhagic| • Use Stroke admission order set  
• Bilateral, properly-fitted, calf-length TEDs  
• After approx. 5-7 days, consider switch to enoxaparin as for ischemic stroke | • On admission                                                  | • Until discharge         |
| Trauma              | • For patients at high risk of bleeding, properly-fitted, bilateral calf-length TEDs until enoxaparin can be started  
• Usual risk patients: enoxaparin 40 mg SC QHS  
High risk patients (complex lower extr fracture): enoxaparin 40 mg SC BID  
• For selected, high risk patients (e.g. spinal cord injury, major lower extremity fracture) who will require rehab, enoxaparin is often replaced by rivaroxaban 15 mg PO once daily to be continued until discharge from rehab  
• TE service will assess all trauma admissions and will follow selected trauma patients as needed | • ASAP after admission (once hemostasis is evident)             | • Until discharge from rehab                                    |
<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended Thromboprophylaxis options(^2,^3,^4)</th>
<th>Initiation</th>
<th>Duration(^5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urology</td>
<td>• Use Urology order sets&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC once daily&lt;br&gt;• For patients at high risk of bleeding, properly fitted, bilateral, calf-length TEDs until enoxaparin can be started</td>
<td>Options:&lt;br&gt;• 1-0 hour preop&lt;br&gt;• 1(^{st}) dosing time after surgery&lt;br&gt;• Morning after surgery if there are bleeding concerns&lt;br&gt;• 1(^{st}) dosing time after ER admission or postop</td>
<td>• Until discharge</td>
</tr>
</tbody>
</table>

**Abbreviations:** ASAP = as soon as possible; ER = Emergency; TEDs = ThromboEmbolic Deterrent stockings

**Footnotes to the Table:**

1. Not every patient group is included here - use the recommendations for the group on the list that is most similar or individualize TP consistent with the Sunnybrook policy.
2. Although the recommended options apply to most patients in each risk group, individual patient factors may suggest an alternate approach.
3. For all patients in whom it is possible and appropriate, early and frequent mobilization and ambulation are essential.
4. In general, for weight less than 40 kg or creatinine clearance <30 mL/min, it is suggested that the prophylactic LMWH dose be reduced to the next lower pre-filled syringe dose (e.g., from enoxaparin 40 mg to 30 mg SC once daily). In general, for weight greater than 100 kg, it is suggested that the LMWH dose be doubled (e.g., from enoxaparin 40 mg once daily to 40 mg SC BID).
5. The duration of thromboprophylaxis is not based on mobility status alone.
6. Contraindications to anticoagulant TP are: active, clinically-important bleeding, platelets less than 30 \(\times\) 10\(^9\)/L, major bleeding disorder, current or previous heparin-induced thrombocytopenia (a contraindication to heparin and LMWH). Relative contraindications to anticoagulant TP are: recent intracranial hemorrhage, recent perispinal bleeding, recent high bleeding risk surgery.
## APPENDIX G: Example of a Standardized Order Set
- General Internal Medicine with Thromboprophylaxis Module

### SUNNYBROOK HEALTH SCIENCES CENTER

#### PHYSICIAN'S ORDERS

**General Internal Medicine**
**Standard Admission Orders**

<table>
<thead>
<tr>
<th>Date: YYYY/MM/DD</th>
<th>Time (h):</th>
<th>Patient Identification</th>
<th>Signature of Nurse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Doctor Must Check Off Appropriate Orders**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

**Admitting Team and Diagnosis**

1. Admit to General Internal Medicine
2. Team: □Blue □Green □Red □Yellow □Orange
3. Attending Physician: ______________________ (Print Name)
4. Admission Diagnosis: ____________________________

**Monitoring and General Care**

5. Monitor vital signs every _____ hours
6. Monitor fluid intake and output every _____ hours
7. Measure patient’s weight □on admission □daily □Other _____
8. Glucose point of care testing □every ______ hours for 48 hours then reassess
9. Discontinue foley catheter when patient arrives to ward
10. Foley catheter for straight drainage; insert catheter if not already inserted

**Respiratory**

11. Maintain oxygen saturation at:
   □greater than 92% □between 88% to 92%
12. Administer oxygen by Venturi mask ONLY, do not use nasal cannula

**Fluids**

13. Saline lock
14. Intravenous fluid _________ at _________ mL/h with
   □No potassium □Potassium chloride at □20 mmol/L □40 mmol/L

**Diet and Activity**

15. Diet: □regular □healthy heart □no added salt
    □diabetic _______ kcal
    □Dysphagia diet □NPO □NPO may give oral medications
    □NPO, may give oral medications crushed and mixed in applesauce
    □Other diet order: ______________________
16. Activity: □as tolerated □Other ______________________

**Doctor's Signature: ________________________**

**PRINT NAME:** ____________________________

**Page:** ____________________________

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PR 00979 (2010/08/18)
Venous Thromboembolism Prevention GSK

Sunnybrook

HEALTH SCIENCES CENTRE

PHYSICIAN’S ORDERS

General Internal Medicine
Standard Admission Orders

DATE: YYYY. J.M. J.DD.  TIME (h): __________________  PATIENT IDENTIFICATION

YES  NO  Doctor Must Check Off Appropriate Orders  SIGNATURE OF NURSE

17  Choose ONE of the following:
    □ enoxaparin 40 mg sc daily at bedtime
    □ enoxaparin 30 mg sc daily at bedtime for patients weighing less than 40 kg OR
        with CrCl less than 30 mL/min
    □ Properly measured, bilateral, below-the-knee TED stockings because of:
        □ active bleeding
        □ hemorrhagic stroke in past 7 days
        □ Reassess daily for conversion from TED stockings to enoxaparin
    □ NO prophylaxis – REASON:
        □ Reassess daily for conversion to enoxaparin.

Consultations

18  □ Physiotherapy  □ Social Work  □ Occupational Therapy  □ Dietitian
    □ Speech Language Pathology
    □ Wound care for: □ pressure sore  □ other: ________________________

Additional Orders


Doctor’s Signature:  PRINT NAME:  Pager:

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APPENDIX H: Audit Tool and Instructions

Thromboprophylaxis One-Day Audit

January 26, 2017

Instructions for Pharmacists:

1. On the day of the audit, you will receive three reports:
   a. An Active Patient Census for your unit for that day.
   b. An Audit Data Collection Table with the names and MRNs of all the patients on the unit with boxes for checking the appropriate anticoagulant.
   c. Drug Usage Evaluation Reports summarizing the patients on your unit who have been ordered anticoagulants (e.g. Fragmin, warfarin, etc) and have an order entered in the pharmacy system as of 7:30am on Jan. 26, 2017

2. Please complete your Audit Data Collection Table checking the most appropriate boxes. Patients can have more than one box checked off if they are on multiple anticoagulants (e.g. someone on Fragmin being transitioned to warfarin). Please also include your name and pager number on the form in case there is a need to clarify any data.

3. For any patients who do not appear to be on anticoagulants (either therapeutic or prophylactic), please complete a Supplemental Data Collection Sheet. A separate sheet needs to be filled out for each patient not on anticoagulants.

4. For the Supplemental Data Collection Sheet:
   a. begin by completing the unit, the patient’s MRN, and your name.
   b. for Part A, using the patient’s chart, please choose the most appropriate reason for the patient not receiving anticoagulation.
   c. for Part B, using the patient’s chart, please check off whether a pre-printed order form was used that included an option for thromboprophylaxis.

5. Once you have gone through the patients on your unit, please ensure that your Audit Data Collection Table is complete. Every patient should have at least one checkmark in the row beside their name.

6. Please also try to keep track of the amount of time that it took you to complete the audit per unit and record that on the coloured sheet in your package.


NOTE: All data must be collected on January 26, 2017.

If at any time you have any questions, need assistance, or feel unable to complete data collection on your unit due to time restrictions, please page.

Thank you very much for your participation in this audit.
Audit tool (Example for patients with an indication for thromboprophylaxis):

<table>
<thead>
<tr>
<th>Eligible patient</th>
<th>Is there a formal pre-printed order set that contains one or more orders for thromboprophylaxis used on admission or after surgery?</th>
<th>Type of Thromboprophylaxis Delivered</th>
<th>Receiving appropriate Thromboprophylaxis</th>
<th>*Reason Recommended Thromboprophylaxis Was Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient identifier</td>
<td>YES ☐ NO ☑</td>
<td>☐ Mechanical prophylaxis</td>
<td>☐ YES ☑</td>
<td>☐ No thromboprophylaxis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ heparin</td>
<td>☐ Wrong DRUG was used</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ dalteparin (Fragmin™)</td>
<td>☐ Wrong DOSE was used</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ enoxaparin (Lovenox™)</td>
<td>☐ Delay in starting &gt; 24 hours after the end of surgery OR &gt; 24 hrs after admission to hospital</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ nadoparin (Fraxiparine™)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ tinzaprin (Innohep™)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ fondaparinux (Arixtra™)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>☐ warfarin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ dabigatran (Pradaax™)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>☐ rivaroxaban (Xarelto™)</td>
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<tr>
<td></td>
<td></td>
<td>☐ apixaban (Eliquis™)</td>
<td></td>
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</tr>
</tbody>
</table>
## Supplemental Data Collection Sheet for Patients NOT on Therapeutic or Prophylactic Anticoagulants

**Unit:** ____________________  **Data Collected By:** ________________  
**MRN:** ____________________

### Part A:

Please check off the most appropriate reason for patient not receiving anticoagulation:

- [ ] **Thromboprophylaxis WAS ORDERED** but the order was not pulled or was not in WORx  
  Order For: ________________________________________________
- [ ] **Therapeutic anticoagulation WAS ORDERED** but did not appear in WORx  
  Order For: ________________________________________________
- [ ] Thromboprophylaxis is **NOT INDICATED**
  Why?
    - [ ] Patient is fully mobile
    - [ ] Patient was admitted yesterday and being discharged today
    - [ ] ACS (patient currently on clopidogrel and ASA)
    - [ ] Other (please specify): ______________________________________
- [ ] There is a documented **CONTRAINDICATION** to thromboprophylaxis
  Why?
    - [ ] Active bleeding
    - [ ] High risk of bleeding (e.g. potential GI bleed, platelets <50 x10⁹/L, Hb <70)
    - [ ] Other (please specify): ______________________________________

Is there an order for TED stockings?

- [ ] Yes
- [ ] No
- [ ] No, not an option due to amputation/injury/severe peripheral vascular disease

### Part B:

Was there an admission or pre-operative pre-printed order set used for this patient that included DVT prophylaxis?

- [ ] Yes
- [ ] No

If yes, was the DVT prophylaxis section filled out?

- [ ] Yes
- [ ] No
APPENDIX I: Example of Thromboprophylaxis Discharge Letter

CLINICAL THROMBOEMBOLISM DISCHARGE LETTER

To: St. John’s Rehab
Re: Mr. John Smith Date: Aug 30, 2016

Dear Doctor:

This patient is being discharged from Sunnybrook Health Sciences Centre on anticoagulants as:

VTE prophylaxis post-hip fracture

I recommend that the patient remain on enoxaparin 40mg subcutaneously daily for 2 more weeks (until Sept 13, 2016)

☐ Please aim to keep the Prothrombin Time (INR) in the target range of _____ to _____.
☐ I have / have not arranged follow-up of this patient.

<table>
<thead>
<tr>
<th>Date</th>
<th>INR</th>
<th>Warfarin dose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

If you have questions, please call at one of the numbers below:

☐ William Geerts, MD, FRCPC
Consultant physician
(416) 480-5953 or (416) 480-4244

☐ Anne McLeod, MD, FRCPC
Consultant physician
(416) 480-5376 or (416) 480-4244

☐ Richard Jay, MD, FRCPC
Consultant physician
(416) 480-5161 or (416) 480-4244

☐ Rita Selby, MD, FRCPC
Consultant physician
(416) 480-5105 or (416) 480-4244

Version: 2013 Jul 16
This Getting Started Kit has been written to help engage your inter-professional/interdisciplinary teams in a dynamic approach for improving quality and safety while providing a basis for getting started. The Getting Started Kit represents the most current evidence, knowledge and practice, as of the date of publication and includes what has been learned since the first kits were released in 2005. We remain open to working consultatively to update the content as more evidence emerges, as together we make healthcare safer in Canada.

The Getting Started Kits for all Safer Healthcare Now! interventions are available in both French and English.

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To view the Venous Thromboembolism Prevention Getting Started Kit in its entirety, visit www.patientsafetyinstitute.ca

For more information, e-mail: info@cpsi-icsp.ca

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