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 that they 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 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 that 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 mechanical methods or anticoagulant medication 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 (either during the hospital stay or within a short time after discharge).
- Without thromboprophylaxis, ~20% of hospital patients will develop asymptomatic DVT.
- VTE is the most common preventable cause of hospital 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.
- More than 400 randomized trials demonstrate that 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. [Geerts, 2008]
- TP has repeatedly been shown to be cost-saving.
- The use of TP has been ranked as the number one patient safety practice for hospitals. [Shojania, 2001]
- Therefore, routine evaluation of hospital patients for VTE risk and provision of TP are standards of care.

Principles Guiding the Sunnybrook Thromboprophylaxis Guidelines
1. Appropriate defined by an appropriate:
   a. modality for the patient’s risks of VTE and bleeding
   b. dose (if an anticoagulant)
Sunnybrook Health Sciences Centre

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 to be used (ThromboEmbolic Deterrent stockings [T.E.D.s]) 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 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 should 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 – of the specifics of this policy 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 48 hours, TP is generally not needed.
- 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 CONTRAINDICATED?

- For patients who are actively bleeding or have a high risk of bleeding, anticoagulant prophylaxis is not given. In this situation, bilateral, properly measured and fitted, calf-length T.E.D.s 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.
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STEP 3: PROVIDE THROMBOPROPHYLAXIS (see Appendix 1)

- For most patients, the recommended TP is enoxaparin 40 mg once daily, either “once daily at 1000 h = QAM” or “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 considered.
- In general, for weight greater than 100 kg, it is recommended that a dose increase to enoxaparin 40 mg SC BID be considered. For weight >120 kg, even higher doses should be considered.
- 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.
- Depending on the time of admission or surgery, the 1st dose is given at 2200 hours on the day of admission or the surgical day or at 1000 hours that day or the following day.
- For almost all trauma and critical care patients, the LMWH dose is provided at 2200 h (“QHS”) so that no doses will be held for procedures the following day.
- For arthroplasty patients, the 1st dose of anticoagulant prophylaxis is generally given at 1000 h starting the day after surgery.
- For patients admitted overnight, the 1st dose of anticoagulant prophylaxis should generally be started at 1000 h or at 2200 h starting the day of admission.
- For patients with epidural catheters, the LMWH dose is given at 1000 h (“QAM”) to facilitate catheter removal in the morning and to allow for at least 18 hours after the previous LMWH dose before catheter removal. For patients who have had an epidural catheter removed, the next dose of LMWH should be delayed for at least 2 hours after removal.

REFERENCES


Additional Resources
1. The Sunnybrook intranet has a number of more detailed documents describing thromboprophylaxis in specific patient groups. The Thromboembolism site can be found by using the Search function and entering << TEAMs >>.
   Examples of relevant reviews available on the Sunnybrook intranet include:
   - Periprocedure Anticoagulant Management
   - Regional Anesthesia and Antithrombotic Therapy
   - Thromboprophylaxis in Oncology
   - Thromboprophylaxis in Orthopedic Surgery
   - Thromboprophylaxis in Trauma
2. The Sunnybrook Thromboembolism Service (“TE”) can be accessed for further information or advice – pager 8170 or call through Locating.
3. Proper subcutaneous injection technique can be found at: http://mysb.ca/departments/pharmacy/htdocs/misc/SC_injection_heparin_LMWH.pdf
## Appendix 1: Specific Thromboprophylaxis Recommendations

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP options</th>
<th>Initiation</th>
<th>Duration</th>
</tr>
</thead>
</table>
| High bleeding risk                         | • Properly-fitted, bilateral calf-length T.E.D.s used continuously (except for bathing) | • ASAP after emergency admission  
• Just prior to surgery for elective surgical procedures | • Until bleeding risk allows the use of enoxaparin |
| Heparin-induced thrombocytopenia (HIT)     | • Suggest TE consult  
• No heparin or LMWH  
• fondaparinux 2.5 mg SC once daily | • As soon as the diagnosis of HIT considered | • Discharge and platelet count >120x10^9/L |
| Burn unit patients                         | • Use Burn Unit order sets  
• enoxaparin 40 mg SC QHS | • When there is evidence of primary hemostasis | • Until discharge |
| Cardiovascular surgery                     | • See CVS Antithrombotic Management Guideline  
• Use CVS order sets  
• In most cases, the prophylaxis is enoxaparin 30 mg SC QHS | • See CVS order sets | • Until discharge |
| Critical care                              | • Use Critical Care order sets  
• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started | • 1st dosing time after admission, if possible  
• See Critical Care order sets | • Until discharge  
• Include TP in transfer orders |
| General surgery (major)                    | • Use General Surgery order sets [in progress]  
• In most cases, the prophylaxis is enoxaparin 40 mg SC QAM  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started | • 0-1 hour preop (if no epidural) or 2-4 hours after insertion of epidural | • Until discharge |
| Gynecology                                 | • Use Gynecology order sets  
• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS or QAM  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started | • 1st dosing time after ER admission or postop or the following morning if there are bleeding concerns | • Until discharge |
<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP options$^{2,3,4}$</th>
<th>Initiation</th>
<th>Duration$^5$</th>
</tr>
</thead>
</table>
| Hip & knee arthroplasty               | • Use Arthroplasty order sets  
• In most cases, the prophylaxis is rivaroxaban 10 mg PO QAM  
• An alternative is enoxaparin 30 mg SC BID  
• For patients with an indwelling epidural catheter, enoxaparin 40 mg SC QAM is given until the epidural is removed  
• For patients with severe renal dysfunction, do NOT use rivaroxaban; use enoxaparin 30 mg SC QAM | • Morning after surgery                  | • 15 days  
• 28 days if high risk (previous VTE after TJR) |
| Hip fracture                          | • Use Hip Fracture admission and postop order sets  
• Enoxaparin 40 mg SC once daily  
• 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 |
| Internal medicine (and medical subspecialties) | • Use Internal Medicine admission order sets  
• 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 T.E.D.s until enoxaparin can be started | • 1st dosing time after admission | • Until discharge |
| Neurosurgery                          | Three options:  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s  
• Enoxaparin 40 mg SC daily  
• Start with bilateral calf-length T.E.D.s and switch to LMWH when risk of bleeding decreases | • For T.E.D.s, start just prior to surgery for elective surgical procedure and ASAP after admission for major neurotrauma or nontraumatic intracranial hemorrhage  
• For enoxaparin, no sooner than day after surgery | • Until discharge |
| Oncology (medical and radiation)      | • See Oncology Thromboprophylaxis guideline  
• Use Oncology order sets  
• Enoxaparin 40 mg SC QHS  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started | • 1st dosing time after admission | • Until discharge  
• Consider benefits vs. risk of post-discharge TP |
## Sunnybrook Health Sciences Centre

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP options</th>
<th>Initiation</th>
<th>Duration^5</th>
</tr>
</thead>
</table>
| Spinal cord injury  | • TE service should manage the TP for these patients  
• enoxaparin 30 mg SC BID  
• After approx. 5 days, the dose of enoxaparin is increased to 40 mg BID  
• After 7-14 days, most patients transition to warfarin (INR 2-3) | • ASAP after admission (once hemostasis is evident) | • Until discharge from rehab |
| Spine surgery       | • 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 sets  
• 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 T.E.D.s until enoxaparin can be started | • 1st dosing time after admission | • Until discharge |
| Stroke – hemorrhagic| • Use Stroke admission order sets  
• Bilateral, properly-fitted, calf-length T.E.D.s  
• 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 T.E.D.s until enoxaparin can be started  
• Usual risk patients: enoxaparin 40 mg SC QHS  
• High risk patients (lower extr fracture): enoxaparin 30 mg SC BID  
• 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 |
| Urology             | • Use Urology order sets [in progress]  
• In most cases, the prophylaxis is enoxaparin 40 mg SC once daily  
• For patients at high risk of bleeding, properly fitted, bilateral, calf-length T.E.D.s until enoxaparin can be started | Options:  
• 1-0 hour preop  
• 1st dosing time after surgery  
• Morning after surgery if there are bleeding concerns  
• 1st dosing time after ER admission or postop | • Until discharge |

**Abbreviations:**  
ASAP = as soon as possible
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ER = Emergency
LMWH = low-molecular-weight heparin
Daily* = once daily (i.e., either QAM or QHS); QAM = 1000 hours; QHS = 2200 hours;
T.E.D.s = ThromboEmbolic Deterrent stockings
TJR = total joint replacement
TP = thromboprophylaxis
VTE = venous thromboembolism

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 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 (i.e., from enoxaparin 40 mg to 30 mg SC once daily). In general, for weight greater than 100 kg, consider doubling the LMWH dose (i.e., from enoxaparin 40 mg once daily to 40 mg SC BID). At weights >120 kg, even higher doses should be considered.
5. The duration of TP is not based on mobility status alone.
6. Absolute contraindications to anticoagulant TP are: active, clinically-important bleeding, platelets less than $30 \times 10^9$/L, major bleeding disorder, heparin-induced thrombocytopenia (a contraindication to heparin and LMWH). Relative contraindications to anticoagulant TP are: recent intracranial hemorrhage, recent perispinal bleeding, recent high-risk bleeding surgery.
Sunnybrook Health Sciences Centre

Venous Thromboprophylaxis Policy and Guidelines
[Version Date: 2010Nov18]

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 that they 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 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 that 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 mechanical methods or anticoagulant medication 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 (either during the hospital stay or within a short time after discharge).
- Without thromboprophylaxis, ~20% of hospital patients will develop asymptomatic DVT.
- VTE is the most common preventable cause of hospital 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.
- More than 400 randomized trials demonstrate that 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. [Geerts, 2008]
- TP has repeatedly been shown to be cost-saving.
- The use of TP has been ranked as the number one patient safety practice for hospitals. [Shojania, 2001]
- Therefore, routine evaluation of hospital patients for VTE risk and provision of TP are standards of care.

Principles Guiding the Sunnybrook Thromboprophylaxis Guidelines
1. Appropriate defined by an appropriate:
   a. modality for the patient’s risks of VTE and bleeding
   b. dose (if an anticoagulant)
Sunnybrook Health Sciences Centre

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 to be used (ThromboEmbolic Deterrent stockings [T.E.D.s]) 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 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 should 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 – of the specifics of this policy 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 48 hours, TP is generally not needed.
- 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 prophylaxis is not given. In this situation, bilateral, properly measured and fitted, calf-length T.E.D.s 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, either “once daily at 1000 h = QAM” or “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 considered.
- In general, for **weight greater than 100 kg**, it is recommended that a dose increase to enoxaparin 40 mg SC BID be considered. For weight >120 kg, even higher doses should be considered.
- 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.
- Depending on the time of admission or surgery, the 1st dose is given at 2200 hours on the day of admission or the surgical day or at 1000 hours that day or the following day.
- For almost all trauma and critical care patients, the LMWH dose is provided at 2200 h (“QHS”) so that no doses will be held for procedures the following day.
- For arthroplasty patients, the 1st dose of anticoagulant prophylaxis is generally given at 1000 h starting the day after surgery.
- For patients admitted overnight, the 1st dose of anticoagulant prophylaxis should generally be started at 1000 h or at 2200 h starting the day of admission.
- For patients with **epidural catheters**, the LMWH dose is given at 1000 h (“QAM”) to facilitate catheter removal in the morning and to allow for at least 18 hours after the previous LMWH dose before catheter removal. For patients who have had an epidural catheter removed, the next dose of LMWH should be delayed for at least 2 hours after removal.

**REFERENCES**


**Additional Resources**

1. The **Sunnybrook intranet** has a number of more detailed documents describing thromboprophylaxis in specific patient groups. The Thromboembolism site can be found by using the Search function and entering <<TEAMS>>.
   Examples of relevant reviews available on the Sunnybrook intranet include:
   - Perioperative Anticoagulant Management
   - Regional Anesthesia and Antithrombotic Therapy
   - Thromboprophylaxis in Oncology
   - Thromboprophylaxis in Orthopedic Surgery
   - Thromboprophylaxis in Trauma
2. The Sunnybrook **Thromboembolism Service (“TE”)** can be accessed for further information or advice – pager 8170 or call through Locating.
3. **Proper subcutaneous injection technique** can be found at: [http://mysb.ca/departments/pharmacy/htdocs/misc/SC_injection_heparin_LMWH.pdf](http://mysb.ca/departments/pharmacy/htdocs/misc/SC_injection_heparin_LMWH.pdf)
## Appendix 1: Specific Thromboprophylaxis Recommendations

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP 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>High bleeding risk&lt;sup&gt;6&lt;/sup&gt;</td>
<td>• Properly-fitted, bilateral calf-length T.E.D.s 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></td>
<td></td>
<td></td>
<td></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;120x10&lt;sup&gt;9&lt;/sup&gt;/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 cases, the prophylaxis is enoxaparin 40 mg SC QHS&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 1&lt;sup&gt;st&lt;/sup&gt; dosing time after admission, if possible&lt;br&gt;• See Critical Care order sets</td>
<td>• Until discharge&lt;br&gt;• Include TP in transfer orders</td>
</tr>
<tr>
<td>General surgery (major)</td>
<td>• Use General Surgery order sets [in progress]&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC QAM&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 0-1 hour preop (if no epidural) <strong>or</strong>&lt;br&gt;• 2-4 hours after insertion of epidural</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Gynecology</td>
<td>• Use Gynecology order sets&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS or QAM&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 1&lt;sup&gt;st&lt;/sup&gt; dosing time after ER admission or postop <strong>or</strong>&lt;br&gt;• the following morning if there are bleeding concerns</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Patient group</td>
<td>Recommended TP options</td>
<td>Initiation</td>
<td>Duration</td>
</tr>
<tr>
<td>-------------------------------------</td>
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</tr>
</tbody>
</table>
| **Hip & knee arthroplasty**         | • Use Arthroplasty order sets  
• In most cases, the prophylaxis is rivaroxaban 10 mg PO QAM  
• An alternative is enoxaparin 30 mg SC BID  
• For patients with an indwelling epidural catheter, enoxaparin 40 mg SC QAM is given until the epidural is removed  
• For patients with severe renal dysfunction, do NOT use rivaroxaban; use enoxaparin 30 mg SC QAM | • Morning after surgery | • 15 days  
• 28 days if high risk (previous VTE after TJR) |
| **Hip fracture**                    | • Use Hip Fracture admission and postop order sets  
• enoxaparin 40 mg SC once daily  
• 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 QH on admission | • At least 10 days |
| **Internal medicine (and medical subspecialties)** | • Use Internal Medicine admission order sets  
• 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 T.E.D.s until enoxaparin can be started | • 1st dosing time after admission | • Until discharge |
| **Neurosurgery**                    | Three options:  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s  
• enoxaparin 40 mg SC daily  
• Start with bilateral calf-length T.E.D.s and switch to LMWH when risk of bleeding decreases | • For T.E.D.s, start just prior to surgery for elective surgical procedure and ASAP after admission for major neurotrauma or nontraumatic intracranial hemorrhage  
• For enoxaparin, no sooner than day after surgery | • Until discharge |
| **Oncology (medical and radiation)** | • See Oncology Thromboprophylaxis guideline  
• Use Oncology order sets  
• enoxaparin 40 mg SC QHS  
• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started | • 1st dosing time after admission | • Until discharge  
• Consider benefits vs. risk of post-discharge TP |
<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP options</th>
<th>Initiation</th>
<th>Duration</th>
</tr>
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| Spinal cord injury   | • TE service should manage the TP for these patients  
• enoxaparin 30 mg SC BID  
• After approx. 5 days, the dose of enoxaparin is increased to 40 mg BID  
• After 7-14 days, most patients transition to warfarin (INR 2-3) | • ASAP after admission (once hemostasis is evident) | • Until discharge from rehab |
| Spine surgery        | • 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 sets  
• 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 T.E.D.s until enoxaparin can be started | • 1st dosing time after admission               | • Until discharge          |
| Stroke – hemorrhagic | • Use Stroke admission order sets  
• Bilateral, properly-fitted, calf-length T.E.D.s  
• 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 T.E.D.s until enoxaparin can be started  
• Usual risk patients: enoxaparin 40 mg SC QHS  
High risk patients (lower extr fracture): enoxaparin 30 mg SC BID  
• 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 |
| Urology              | • Use Urology order sets [in progress]  
• In most cases, the prophylaxis is enoxaparin 40 mg SC once daily  
• For patients at high risk of bleeding, properly fitted, bilateral, calf-length T.E.D.s until enoxaparin can be started | Options:  
• 1-0 hour preop  
• 1st dosing time after surgery  
Morning after surgery if there are bleeding concerns  
• 1st dosing time after ER admission or postop | • Until discharge |

**Abbreviations:**  
ASAP = as soon as possible
Sunnybrook Health Sciences Centre

**ER** = Emergency
**LMWH** = low-molecular-weight heparin
**Daily** = once daily (i.e., either QAM or QHS); **QAM** = 1000 hours; **QHS** = 2200 hours;
**T.E.D.s** = ThromboEmbolic Deterrent stockings
**TJR** = total joint replacement
**TP** = thromboprophylaxis
**VTE** = venous thromboembolism

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 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 (i.e., from enoxaparin 40 mg to 30 mg SC once daily). In general, for weight greater than 100 kg, consider doubling the LMWH dose (i.e., from enoxaparin 40 mg once daily to 40 mg SC BID). At weights >120 kg, even higher doses should be considered.
5. The duration of TP is not based on mobility status alone.
6. Absolute contraindications to anticoagulant TP are: active, clinically-important bleeding, platelets less than $30 \times 10^9$/L, major bleeding disorder, heparin-induced thrombocytopenia (a contraindication to heparin and LMWH). Relative contraindications to anticoagulant TP are: recent intracranial hemorrhage, recent perispinal bleeding, recent high-risk bleeding surgery.
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 that they 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 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 that 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 mechanical methods or anticoagulant medication 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 (either during the hospital stay or within a short time after discharge).
• Without thromboprophylaxis, ~20% of hospital patients will develop asymptomatic DVT.
• VTE is the most common preventable cause of hospital 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.
• More than 400 randomized trials demonstrate that 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. [Geerts, 2008]
• TP has repeatedly been shown to be cost-saving.
• The use of TP has been ranked as the number one patient safety practice for hospitals. [Shojania, 2001]
• Therefore, routine evaluation of hospital patients for VTE risk and provision of TP are standards of care.

Principles Guiding the Sunnybrook Thromboprophylaxis Guidelines
1. **Appropriate** defined by an appropriate:
   a. *modality* for the patient’s risks of VTE and bleeding
   b. *dose* (if an anticoagulant)
Sunnybrook Health Sciences Centre

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 to be used (ThromboEmolic Deterrent stockings [T.E.D.s]) 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 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 should 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 – of the specifics of this policy 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 48 hours, TP is generally not needed.
- 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 prophylaxis is not given. In this situation, bilateral, properly measured and fitted, calf-length T.E.D.s 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, either “once daily at 1000 h = QAM” or “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 considered.
- In general, for weight greater than 100 kg, it is recommended that a dose increase to enoxaparin 40 mg SC BID be considered. For weight >120 kg, even higher doses should be considered.
- 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.
- Depending on the time of admission or surgery, the 1st dose is given at 2200 hours on the day of admission or the surgical day or at 1000 hours that day or the following day.
- For almost all trauma and critical care patients, the LMWH dose is provided at 2200 h (“QHS”) so that no doses will be held for procedures the following day.
- For arthroplasty patients, the 1st dose of anticoagulant prophylaxis is generally given at 1000 h starting the day after surgery.
- For patients admitted overnight, the 1st dose of anticoagulant prophylaxis should generally be started at 1000 h or at 2200 h starting the day of admission.
- For patients with epidural catheters, the LMWH dose is given at 1000 h (“QAM”) to facilitate catheter removal in the morning and to allow for at least 18 hours after the previous LMWH dose before catheter removal. For patients who have had an epidural catheter removed, the next dose of LMWH should be delayed for at least 2 hours after removal.

REFERENCES

Additional Resources
1. The Sunnybrook intranet has a number of more detailed documents describing thromboprophylaxis in specific patient groups. The Thromboembolism site can be found by using the Search function and entering << TEAMS >>. Examples of relevant reviews available on the Sunnybrook intranet include:
   - Periprocedure Anticoagulant Management
   - Regional Anesthesia and Antithrombotic Therapy
   - Thromboprophylaxis in Oncology
   - Thromboprophylaxis in Orthopedic Surgery
   - Thromboprophylaxis in Trauma
2. The Sunnybrook Thromboembolism Service (“TE”) can be accessed for further information or advice – pager 8170 or call through Locating.
3. Proper subcutaneous injection technique can be found at:
### Appendix 1: Specific Thromboprophylaxis Recommendations

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP options$^{2,3,4}$</th>
<th>Initiation</th>
<th>Duration$^5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>High bleeding risk$^6$</td>
<td>• Properly-fitted, bilateral calf-length T.E.D.s 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 $&gt;120 \times 10^9/L$</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 cases, the prophylaxis is enoxaparin 40 mg SC QHS&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 1st dosing time after admission, if possible&lt;br&gt;• See Critical Care order sets</td>
<td>• Until discharge&lt;br&gt;• Include TP in transfer orders</td>
</tr>
<tr>
<td>General surgery (major)</td>
<td>• Use General Surgery order sets [in progress]&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC QAM&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 0-1 hour preop (if no epidural) or&lt;br&gt;• 2-4 hours after insertion of epidural</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Gynecology</td>
<td>• Use Gynecology order sets&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS or QAM&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 1st dosing time after ER admission or postop or&lt;br&gt;• the following morning if there are bleeding concerns</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Patient group</td>
<td>Recommended TP options</td>
<td>Initiation</td>
<td>Duration</td>
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<tr>
<td>-------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
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<td>---------------------------</td>
</tr>
<tr>
<td><strong>Hip &amp; knee arthroplasty</strong></td>
<td>• Use Arthroplasty order sets</td>
<td>• Morning after surgery</td>
<td>• 15 days</td>
</tr>
<tr>
<td></td>
<td>• In most cases, the prophylaxis is rivaroxaban 10 mg PO QAM</td>
<td></td>
<td>• 28 days if high risk</td>
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<tr>
<td></td>
<td>• An alternative is enoxaparin 30 mg SC BID</td>
<td></td>
<td>(previous VTE after TJR)</td>
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<tr>
<td></td>
<td>• For patients with an indwelling epidural catheter, enoxaparin 40 mg SC QAM is given until the epidural is removed</td>
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<tr>
<td></td>
<td>• For patients with severe renal dysfunction, do NOT use rivaroxaban; use enoxaparin 30 mg SC QAM</td>
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<tr>
<td><strong>Hip fracture</strong></td>
<td>• Use Hip Fracture admission and postop order sets</td>
<td>• If surgery is delayed, start enoxaparin 30 mg SC QHS on admission</td>
<td>• At least 10 days</td>
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<td></td>
<td>• enoxaparin 40 mg SC once daily</td>
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<tr>
<td></td>
<td>• enoxaparin 30 mg SC once daily if weight less than 40 kg or CrCl &lt;30 mL/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal medicine (and medical subspecialties)</strong></td>
<td>• Use Internal Medicine admission order sets</td>
<td>• 1st dosing time after admission</td>
<td>• Until discharge</td>
</tr>
<tr>
<td></td>
<td>• For most patients, enoxaparin 40 mg SC QHS</td>
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<td>• enoxaparin 30 mg SC daily if weight less than 40 kg or CrCl &lt;30 mL/min</td>
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<td><strong>Neurosurgery</strong></td>
<td>Three options:</td>
<td></td>
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<tr>
<td></td>
<td>• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s</td>
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<tr>
<td></td>
<td>• enoxaparin 40 mg SC daily</td>
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<tr>
<td></td>
<td>• Start with bilateral calf-length T.E.D.s and switch to LMWH when risk of bleeding decreases</td>
<td></td>
<td></td>
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<tr>
<td><strong>Oncology (medical and radiation)</strong></td>
<td>• See Oncology Thromboprophylaxis guideline</td>
<td>• 1st dosing time after admission</td>
<td>• Until discharge</td>
</tr>
<tr>
<td></td>
<td>• Use Oncology order sets</td>
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<td></td>
<td>• enoxaparin 40 mg SC QHS</td>
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### Sunnybrook Health Sciences Centre

<table>
<thead>
<tr>
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<th>Initiation</th>
<th>Duration&lt;sup&gt;5&lt;/sup&gt;</th>
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                      • enoxaparin 30 mg SC BID  
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| Spine surgery         | • enoxaparin 40 mg SC daily  
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| Stroke – ischemic     | • Use Stroke admission order sets  
                      • For most patients, enoxaparin 40 mg SC QHS  
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                      • For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started | • 1<sup>st</sup> dosing time after admission                     | • Until discharge                     |
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                      • Bilateral, properly-fitted, calf-length T.E.D.s  
                      • 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 T.E.D.s until enoxaparin can be started  
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                      • High risk patients (lower extr fracture): enoxaparin 30 mg SC BID  
                      • 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          |
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**Abbreviations:**  
ASAP = as soon as possible


Sunnybrook Health Sciences Centre

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- Approximately 60% of the entire population burden of VTE is related to hospitalization (either during the hospital stay or within a short time after discharge).
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1. Appropriate defined by an appropriate:
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Sunnybrook Health Sciences Centre

c. timing after admission, after surgery or after transfer within the institution
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2. Simplicity – limit the available options consistent with patient safety and costs. For example, only one non-pharmacologic method of TP is to be used (ThromboEmbolc Deterrent stockings [T.E.D.s]) and only one low molecular weight heparin (LMWH) is to be used for TP (enoxaparin).

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

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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 48 hours, TP is generally not needed.
- 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 prophylaxis is not given. In this situation, bilateral, properly measured and fitted, calf-length T.E.D.s 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, either “once daily at 1000 h = QAM” or “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 considered.
- In general, for weight greater than 100 kg, it is recommended that a dose increase to enoxaparin 40 mg SC BID be considered. For weight >120 kg, even higher doses should be considered.
- 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.
- Depending on the time of admission or surgery, the 1st dose is given at 2200 hours on the day of admission or the surgical day or at 1000 hours that day or the following day.
- For almost all trauma and critical care patients, the LMWH dose is provided at 2200 h (“QHS”) so that no doses will be held for procedures the following day.
- For arthroplasty patients, the 1st dose of anticoagulant prophylaxis is generally given at 1000 h starting the day after surgery.
- For patients admitted overnight, the 1st dose of anticoagulant prophylaxis should generally be started at 1000 h or at 2200 h starting the day of admission.
- For patients with epidural catheters, the LMWH dose is given at 1000 h (“QAM”) to facilitate catheter removal in the morning and to allow for at least 18 hours after the previous LMWH dose before catheter removal. For patients who have had an epidural catheter removed, the next dose of LMWH should be delayed for at least 2 hours after removal.

REFERENCES

Additional Resources
1. The Sunnybrook intranet has a number of more detailed documents describing thromboprophylaxis in specific patient groups. The Thromboembolism site can be found by using the Search function and entering << TEAMS >>.
   Examples of relevant reviews available on the Sunnybrook intranet include:
   - Periprocedure Anticoagulant Management
   - Regional Anesthesia and Antithrombotic Therapy
   - Thromboprophylaxis in Oncology
   - Thromboprophylaxis in Orthopedic Surgery
   - Thromboprophylaxis in Trauma
2. The Sunnybrook Thromboembolism Service (“TE”) can be accessed for further information or advice – pager 8170 or call through Locating.
3. Proper subcutaneous injection technique can be found at: http://mysb.ca/departments/pharmacy/htdocs/misc/SC_injection_heparin_LMWH.pdf
# Appendix 1: Specific Thromboprophylaxis Recommendations

<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP options(^{2,3,4})</th>
<th>Initiation</th>
<th>Duration(^{5})</th>
</tr>
</thead>
<tbody>
<tr>
<td>High bleeding risk(^{6})</td>
<td>• Properly-fitted, bilateral calf-length T.E.D.s used continuously (except for bathing)</td>
<td>• ASAP after emergency admission</td>
<td>• Until bleeding risk allows the use of enoxaparin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Just prior to surgery for elective surgical procedures</td>
<td></td>
</tr>
<tr>
<td>Heparin-induced thrombocytopenia (HIT)</td>
<td>• Suggest TE consult</td>
<td>• As soon as the diagnosis of HIT considered</td>
<td>• Discharge and platelet count &gt;120x10^9/L</td>
</tr>
<tr>
<td>(current or previous)</td>
<td>• No heparin or LMWH</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• fondaparinux 2.5 mg SC once daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burn unit patients</td>
<td>• Use Burn Unit order sets</td>
<td>• When there is evidence of primary hemostasis</td>
<td>• Until discharge</td>
</tr>
<tr>
<td></td>
<td>• enoxaparin 40 mg SC QHS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular surgery</td>
<td>• See CVS Antithrombotic Management Guideline</td>
<td>• See CVS order sets</td>
<td>• Until discharge</td>
</tr>
<tr>
<td></td>
<td>• Use CVS order sets</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• In most cases, the prophylaxis is enoxaparin 30 mg SC QHS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical care</td>
<td>• Use Critical Care order sets</td>
<td>• 1(^{st}) dosing time after admission, if possible</td>
<td>• Until discharge</td>
</tr>
<tr>
<td></td>
<td>• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS</td>
<td>• See Critical Care order sets</td>
<td>• Include TP in transfer orders</td>
</tr>
<tr>
<td></td>
<td>• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General surgery (major)</td>
<td>• Use General Surgery order sets [in progress]</td>
<td>• 0-1 hour preop (if no epidural) (^{or})</td>
<td>• Until discharge</td>
</tr>
<tr>
<td></td>
<td>• In most cases, the prophylaxis is enoxaparin 40 mg SC QAM</td>
<td>• 2-4 hours after insertion of epidural (^{or})</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gynecology</td>
<td>• Use Gynecology order sets</td>
<td>• 1(^{st}) dosing time after ER admission or postop (^{or})</td>
<td>• Until discharge</td>
</tr>
<tr>
<td></td>
<td>• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS or QAM</td>
<td>• the following morning if there are bleeding concerns</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient group</td>
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<td>Initiation</td>
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</tr>
</tbody>
</table>
| **Hip & knee arthroplasty**        | • Use Arthroplasty order sets  
   • In most cases, the prophylaxis is rivaroxaban 10 mg PO QAM  
   • An alternative is enoxaparin 30 mg SC BID  
   • For patients with an indwelling epidural catheter, enoxaparin 40 mg SC QAM is given until the epidural is removed  
   • For patients with severe renal dysfunction, do NOT use rivaroxaban; use enoxaparin 30 mg SC QAM | • Morning after surgery | • 15 days  
   • 28 days if high risk (previous VTE after TJR) |
| **Hip fracture**                  | • Use Hip Fracture admission and postop order sets  
   • enoxaparin 40 mg SC once daily  
   • 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 |
| **Internal medicine (and medical subspecialties)** | • Use Internal Medicine admission order sets  
   • 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 T.E.D.s until enoxaparin can be started | • 1st dosing time after admission | • Until discharge |
| **Neurosurgery**                  | Three options:  
   • For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s  
   • enoxaparin 40 mg SC daily  
   • Start with bilateral calf-length T.E.D.s and switch to LMWH when risk of bleeding decreases | • For T.E.D.s, start just prior to surgery for elective surgical procedure and ASAP after admission for major neurotrauma or nontraumatic intracranial hemorrhage  
   • For enoxaparin, no sooner than day after surgery | • Until discharge |
| **Oncology (medical and radiation)** | • See Oncology Thromboprophylaxis guideline  
   • Use Oncology order sets  
   • enoxaparin 40 mg SC QHS  
   • For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started | • 1st dosing time after admission | • Until discharge  
   • Consider benefits vs. risk of post-discharge TP |
<table>
<thead>
<tr>
<th>Patient group</th>
<th>Recommended TP options(^{2,3,4})</th>
<th>Initiation</th>
<th>Duration(^5)</th>
</tr>
</thead>
</table>
| Spinal cord injury    | • TE service should manage the TP for these patients  
• enoxaparin 30 mg SC BID  
• After approx. 5 days, the dose of enoxaparin is increased to 40 mg BID  
• After 7-14 days, most patients transition to warfarin (INR 2-3) | - ASAP after admission (once hemostasis is evident) | - Until discharge from rehab                  |
| Spine surgery         | • 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 sets  
• 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 T.E.D.s until enoxaparin can be started | - 1\(^{st}\) dosing time after admission          | - Until discharge                            |
| Stroke – hemorrhagic  | • Use Stroke admission order sets  
• Bilateral, properly-fitted, calf-length T.E.D.s  
• 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 T.E.D.s until enoxaparin can be started  
• Usual risk patients: enoxaparin 40 mg SC QHS  
• High risk patients (lower extr fracture): enoxaparin 30 mg SC BID  
• 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                  |
| Urology               | • Use Urology order sets [in progress]  
• In most cases, the prophylaxis is enoxaparin 40 mg SC once daily  
• For patients at high risk of bleeding, properly fitted, bilateral, calf-length T.E.D.s until enoxaparin can be started | Options:  
• 1-0 hour preop  
• 1\(^{st}\) dosing time after surgery  
• Morning after surgery if there are bleeding concerns  
• 1\(^{st}\) dosing time after ER admission or postop | - Until discharge                  |

**Abbreviations:**  
ASAP = as soon as possible
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ER = Emergency
LMWH = low-molecular-weight heparin
Daily* = once daily (i.e., either QAM or QHS); QAM = 1000 hours; QHS = 2200 hours;
T.E.D.s = ThromboEmbolic Deterrent stockings
TJR = total joint replacement
TP = thromboprophylaxis
VTE = venous thromboembolism

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 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 (i.e., from enoxaparin 40 mg to 30 mg SC once daily). In general, for weight greater than 100 kg, consider doubling the LMWH dose (i.e., from enoxaparin 40 mg once daily to 40 mg SC BID). At weights >120 kg, even higher doses should be considered.
5. The duration of TP is not based on mobility status alone.
6. Absolute contraindications to anticoagulant TP are: active, clinically-important bleeding, platelets less than $30 \times 10^9$/L, major bleeding disorder, heparin-induced thrombocytopenia (a contraindication to heparin and LMWH). Relative contraindications to anticoagulant TP are: recent intracranial hemorrhage, recent perispinal bleeding, recent high-risk bleeding surgery.
Venous Thromboprophylaxis Policy and Guidelines
[Version Date: 2010Nov18]

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 that they 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 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 that 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 mechanical methods or anticoagulant medication 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 (either during the hospital stay or within a short time after discharge).
- Without thromboprophylaxis, ~20% of hospital patients will develop asymptomatic DVT.
- VTE is the most common preventable cause of hospital 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.
- More than 400 randomized trials demonstrate that 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. [Geerts, 2008]
- TP has repeatedly been shown to be cost-saving.
- The use of TP has been ranked as the number one patient safety practice for hospitals. [Shojania, 2001]
- Therefore, routine evaluation of hospital patients for VTE risk and provision of TP are standards of care.

Principles Guiding the Sunnybrook Thromboprophylaxis Guidelines
1. Appropriate defined by an appropriate:
   a. modality for the patient’s risks of VTE and bleeding
   b. dose (if an anticoagulant)
Sunnybrook Health Sciences Centre

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 to be used (ThromboEmolic Deterrent stockings [T.E.D.s]) 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 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 should 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** – of the specifics of this policy 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 48 hours, TP is generally not needed.
- 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 prophylaxis is not given. In this situation, bilateral, properly measured and fitted, calf-length T.E.D.s 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, either “once daily at 1000 h = QAM” or “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 considered.
- In general, for weight greater than 100 kg, it is recommended that a dose increase to enoxaparin 40 mg SC BID be considered. For weight >120 kg, even higher doses should be considered.
- 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.
- Depending on the time of admission or surgery, the 1st dose is given at 2200 hours on the day of admission or the surgical day or at 1000 hours that day or the following day.
- For almost all trauma and critical care patients, the LMWH dose is provided at 2200 h (“QHS”) so that no doses will be held for procedures the following day.
- For arthroplasty patients, the 1st dose of anticoagulant prophylaxis is generally given at 1000 h starting the day after surgery.
- For patients admitted overnight, the 1st dose of anticoagulant prophylaxis should generally be started at 1000 h or at 2200 h starting the day of admission.
- For patients with epidural catheters, the LMWH dose is given at 1000 h (“QAM”) to facilitate catheter removal in the morning and to allow for at least 18 hours after the previous LMWH dose before catheter removal. For patients who have had an epidural catheter removed, the next dose of LMWH should be delayed for at least 2 hours after removal.

REFERENCES


Additional Resources

1. The Sunnybrook intranet has a number of more detailed documents describing thromboprophylaxis in specific patient groups. The Thromboembolism site can be found by using the Search function and entering << TEAMSS >>. Examples of relevant reviews available on the Sunnybrook intranet include:
   - Periprocedure Anticoagulant Management
   - Regional Anesthesia and Antithrombotic Therapy
   - Thromboprophylaxis in Oncology
   - Thromboprophylaxis in Orthopedic Surgery
   - Thromboprophylaxis in Trauma

2. The Sunnybrook Thromboembolism Service (“TE”) can be accessed for further information or advice – pager 8170 or call through Locating.

3. Proper subcutaneous injection technique can be found at: http://mysb.ca/departments/pharmacy/htdocs/misc/SC_injection_heparin_LMWH.pdf
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<th>Initiation</th>
<th>Duration</th>
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<tr>
<td>High bleeding risk</td>
<td>• Properly-fitted, bilateral calf-length T.E.D.s 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 cases, the prophylaxis is enoxaparin 40 mg SC QHS&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 1st dosing time after admission, if possible&lt;br&gt;• See Critical Care order sets</td>
<td>• Until discharge&lt;br&gt;• Include TP in transfer orders</td>
</tr>
<tr>
<td>General surgery (major)</td>
<td>• Use General Surgery order sets [in progress]&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC QAM&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 0-1 hour preop (if no epidural) or 2-4 hours after insertion of epidural</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Gynecology</td>
<td>• Use Gynecology order sets&lt;br&gt;• In most cases, the prophylaxis is enoxaparin 40 mg SC QHS or QAM&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
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<td>• Until discharge</td>
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<tr>
<td>----------------------------------</td>
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<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Hip &amp; knee arthroplasty</td>
<td>• Use Arthroplasty order sets&lt;br&gt;• In most cases, the prophylaxis is rivaroxaban 10 mg PO QAM&lt;br&gt;• An alternative is enoxaparin 30 mg SC BID&lt;br&gt;• For patients with an indwelling epidural catheter, enoxaparin 40 mg SC QAM is given until the epidural is removed&lt;br&gt;• For patients with severe renal dysfunction, do NOT use rivaroxaban; use enoxaparin 30 mg SC QAM</td>
<td>• Morning after surgery</td>
<td>• 15 days&lt;br&gt;• 28 days if high risk (previous VTE after TJR)</td>
</tr>
<tr>
<td>Hip fracture</td>
<td>• Use Hip Fracture admission and postop order sets&lt;br&gt;• enoxaparin 40 mg SC once daily&lt;br&gt;• enoxaparin 30 mg SC once daily if weight less than 40 kg or CrCl &lt;30 mL/min</td>
<td>• If surgery is delayed, start enoxaparin 30 mg SC QHS on admission</td>
<td>• At least 10 days</td>
</tr>
<tr>
<td>Internal medicine (and medical subspecialties)</td>
<td>• Use Internal Medicine admission order sets&lt;br&gt;• For most patients, enoxaparin 40 mg SC QHS&lt;br&gt;• enoxaparin 30 mg SC daily if weight less than 40 kg or CrCl &lt;30 mL/min&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 1st dosing time after admission</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>Three options:&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s&lt;br&gt;• enoxaparin 40 mg SC daily&lt;br&gt;• Start with bilateral calf-length T.E.D.s and switch to LMWH when risk of bleeding decreases</td>
<td>• For T.E.D.s, start just prior to surgery for elective surgical procedure and ASAP after admission for major neurotrauma or nontraumatic intracranial hemorrhage&lt;br&gt;• For enoxaparin, no sooner than day after surgery</td>
<td>• Until discharge</td>
</tr>
<tr>
<td>Oncology (medical and radiation)</td>
<td>• See Oncology Thromboprophylaxis guideline&lt;br&gt;• Use Oncology order sets&lt;br&gt;• enoxaparin 40 mg SC QHS&lt;br&gt;• For patients at high risk of bleeding, properly-fitted, bilateral calf-length T.E.D.s until enoxaparin can be started</td>
<td>• 1st dosing time after admission</td>
<td>• Until discharge&lt;br&gt;• Consider benefits vs. risk of post-discharge TP</td>
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<td>Initiation</td>
<td>Duration(^5)</td>
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</table>
| Spinal cord injury          | • TE service should manage the TP for these patients  
• enoxaparin 30 mg SC BID  
• After approx. 5 days, the dose of enoxaparin is increased to 40 mg BID  
• After 7-14 days, most patients transition to warfarin (INR 2-3) | • ASAP after admission (once hemostasis is evident) | • Until discharge from rehab |
| Spine surgery               | • 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 sets  
• 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 T.E.D.s until enoxaparin can be started | • 1\(^{st}\) dosing time after admission | • Until discharge |
| Stroke – hemorrhagic        | • Use Stroke admission order sets  
• Bilateral, properly-fitted, calf-length T.E.D.s  
• 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 T.E.D.s until enoxaparin can be started  
• Usual risk patients: enoxaparin 40 mg SC QHS  
High risk patients (lower extr fracture): enoxaparin 30 mg SC BID  
• 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 |
| Urology                     | • Use Urology order sets [in progress]  
• In most cases, the prophylaxis is enoxaparin 40 mg SC once daily  
• For patients at high risk of bleeding, properly fitted, bilateral, calf-length T.E.D.s until enoxaparin can be started | Options:  
• 1-0 hour preop  
• 1\(^{st}\) dosing time after surgery  
Morning after surgery if there are bleeding concerns  
• 1\(^{st}\) dosing time after ER admission or postop | • Until discharge |

**Abbreviations:**
ASAP = as soon as possible
Sunnybrook Health Sciences Centre

ER = Emergency
LMWH = low-molecular-weight heparin
Daily* = once daily (i.e., either QAM or QHS); QAM = 1000 hours; QHS = 2200 hours;
T.E.D.s = ThromboEmbolic Deterrent stockings
TJR = total joint replacement
TP = thromboprophylaxis
VTE = venous thromboembolism

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 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 (i.e., from enoxaparin 40 mg to 30 mg SC once daily). In general, for weight greater than 100 kg, consider doubling the LMWH dose (i.e., from enoxaparin 40 mg once daily to 40 mg SC BID). At weights >120 kg, even higher doses should be considered.
5. The duration of TP is not based on mobility status alone.
6. Absolute contraindications to anticoagulant TP are: active, clinically-important bleeding, platelets less than $30 \times 10^9$/L, major bleeding disorder, heparin-induced thrombocytopenia (a contraindication to heparin and LMWH). Relative contraindications to anticoagulant TP are: recent intracranial hemorrhage, recent perispinal bleeding, recent high-risk bleeding surgery.