### Venous Thromboembolism Risk Assessment: General Patient Population

- Assess risk at admission, post-op, and transfer.
  - **Note:** This is considered a guidance document only. Clinical decisions should be made based on each patient's unique circumstance.
- See page 2 for venous thromboembolism (VTE) risk assessment among obstetrical patients, and page 3 for orthopedic patients undergoing Total Hip Arthroplasty (THA) or Total Knee Arthroplasty (TKA).

<table>
<thead>
<tr>
<th>LOW RISK</th>
<th>HIGH RISK</th>
<th>VERY HIGH RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Must meet <strong>all</strong> three:</td>
<td>• All other patients who are <strong>NOT</strong> in the LOW, or VERY HIGH groups or are <strong>NOT</strong> receiving FULL anticoagulation</td>
<td></td>
</tr>
<tr>
<td>• Ambulatory patient</td>
<td>• Most medical and surgical inpatients</td>
<td>• Bariatric Surgery and BMI ≥ 40 kg/m²</td>
</tr>
<tr>
<td>• NO additional VTE risk factors (see page 4)</td>
<td>• Expected LOS &lt; 48 hours</td>
<td>• Hip, pelvic, or severe lower extremity fractures</td>
</tr>
<tr>
<td>• Expected LOS &lt; 48 hours</td>
<td>Also consider:</td>
<td>• Acute spinal cord injury (SCI)</td>
</tr>
<tr>
<td>Also consider:</td>
<td>• Minor surgery in patient (same day surgery or OR time &lt; 30 minutes)</td>
<td>• Multiple major trauma (e.g., multiple fractures due to a fall or motor vehicle accident)</td>
</tr>
<tr>
<td>• NO additional VTE risk factors</td>
<td>• NO additional VTE risk factors</td>
<td>• Abdominal or pelvic surgery for cancer, robotic and non-robotic surgery</td>
</tr>
<tr>
<td>• On FULL anticoagulation</td>
<td>• On FULL anticoagulation</td>
<td>• Neurosurgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stroke (within the last month)</td>
</tr>
</tbody>
</table>

### Pharmacologic Prophylaxis

<table>
<thead>
<tr>
<th>BMI &lt; 40 kg/m²</th>
<th>BMI ≥ 40 kg/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHARMACOLOGIC PROPHYLAXIS</strong></td>
<td><strong>PHARMACOLOGIC PROPHYLAXIS</strong></td>
</tr>
<tr>
<td><strong>CrCl ≥ 30 mL/min</strong></td>
<td><strong>CrCl &lt; 30 mL/min</strong></td>
</tr>
</tbody>
</table>

#### BMI < 40 kg/m²
- No pharmacologic prophylaxis
- Heparin 5,000 units SQ Q8H
- Enoxaparin 40 mg SQ Q24H
  - Neurosurgery
  - Stroke
  - Abdominal/pelvic surgery for cancer
- Enoxaparin 30 mg SQ Q12H
  - Major trauma
  - Hip, pelvic, or severe lower extremity fractures
  - Acute spinal cord injury
- Heparin 5,000 units SQ Q8H
- Enoxaparin 40 mg SQ Q12H
- Heparin 7,500 units SQ Q8H

#### BMI ≥ 40 kg/m²
- Heparin 7,500 units SQ Q8H
- Enoxaparin 40 mg SQ Q12H
- Heparin 7,500 units SQ Q8H

### Mechanical Prophylaxis

<table>
<thead>
<tr>
<th><strong>MECHANICAL PROPHYLAXIS</strong></th>
<th><strong>MECHANICAL PROPHYLAXIS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambulation</strong></td>
<td><strong>Ambulation</strong></td>
</tr>
<tr>
<td>• Ambulation</td>
<td>• Ambulation when patient is able</td>
</tr>
<tr>
<td>• Use Sequential Compression Device (SCD) if drug therapy contraindication is documented</td>
<td>• Use Sequential Compression Device (SCD) in <strong>addition</strong> to drug therapy or if drug therapy contraindication is documented</td>
</tr>
</tbody>
</table>

### Deep Venous Thrombosis (DVT): Prevention

**PHARMACOLOGIC PROPHYLAXIS**

- BMI < 40 kg/m²
  - Heparin 5,000 units SQ Q8H
  - Enoxaparin 40 mg SQ Q24H
  - Enoxaparin 30 mg SQ Q12H
- BMI ≥ 40 kg/m²
  - Heparin 7,500 units SQ Q8H
  - Enoxaparin 40 mg SQ Q12H
  - Heparin 7,500 units SQ Q8H

**MECHANICAL PROPHYLAXIS**

- Ambulation
- Use Sequential Compression Device (SCD) if drug therapy contraindication is documented

**PHARMACOLOGIC PROPHYLAXIS**

- BMI < 40 kg/m²
  - Heparin 5,000 units SQ Q8H
  - Enoxaparin 40 mg SQ Q24H
  - Enoxaparin 30 mg SQ Q12H
- BMI ≥ 40 kg/m²
  - Heparin 7,500 units SQ Q8H
  - Enoxaparin 40 mg SQ Q12H
  - Heparin 7,500 units SQ Q8H

**MECHANICAL PROPHYLAXIS**

- Ambulation
- Use Sequential Compression Device (SCD) if drug therapy contraindication is documented

**PHARMACOLOGIC PROPHYLAXIS**

- BMI < 40 kg/m²
  - Heparin 5,000 units SQ Q8H
  - Enoxaparin 40 mg SQ Q24H
  - Enoxaparin 30 mg SQ Q12H
- BMI ≥ 40 kg/m²
  - Heparin 7,500 units SQ Q8H
  - Enoxaparin 40 mg SQ Q12H
  - Heparin 7,500 units SQ Q8H

**MECHANICAL PROPHYLAXIS**

- Ambulation
- Use Sequential Compression Device (SCD) if drug therapy contraindication is documented
**Venous Thromboembolism Risk Assessment: Obstetrical Patients**

- Assess risk at admission, post-op, and transfer.
  - **Note:** This is considered a guidance document only. Clinical decisions should be made based on each patient’s unique circumstance.

<table>
<thead>
<tr>
<th>LOW RISK</th>
<th>HIGH RISK</th>
<th>VERY HIGH RISK</th>
</tr>
</thead>
</table>
| Must meet all three:  
  - Vaginal delivery  
  - NO additional VTE risk factors (see page 4)  
  - Expected LOS < 48 hours | All other patients who are **NOT** in the LOW, VERY HIGH risk categories, or are **NOT** receiving FULL anticoagulation  
  - Cesarean section  
  - Chorioamnionitis and/or endomyometritis  
  - Immobility > 4 days prior to delivery  
  - Smokes or uses nicotine products | Cesarean hysterectomy  
  - Previous DVT  
  - Known thrombophilia |

### PHARMACOLOGIC PROPHYLAXIS

<table>
<thead>
<tr>
<th>BMI &lt; 40 kg/m²</th>
<th>BMI ≥ 40 kg/m²</th>
<th>CrCl ≥ 30 mL/min</th>
<th>CrCl &lt; 30 mL/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heparin 5,000 units SQ Q8H</td>
<td>Heparin 7,500 units SQ Q8H</td>
<td>Enoxaparin 40 mg SQ Q24H</td>
<td>Enoxaparin 40 mg SQ Q12H</td>
</tr>
<tr>
<td>Heparin 5,000 units SQ Q8H</td>
<td>Heparin 7,500 units SQ Q8H</td>
<td>Heparin 5,000 units SQ Q8H</td>
<td>Heparin 7,500 units SQ Q8H</td>
</tr>
</tbody>
</table>

### MECHANICAL PROPHYLAXIS

| Ambulation | Ambulation when patient is able  
  - Use Sequential Compression Device (SCD) instead of heparin **ONLY** if drug therapy contraindication is documented | Ambulation when patient is able  
  - Use Sequential Compression Device (SCD) in **addition** to drug therapy or if drug therapy contraindication is documented |
Venous Thromboembolism Risk Assessment: Orthopedic Patients

- Assess risk at admission, post-op, and transfer.
  - Note: This is considered a guidance document only. Clinical decisions should be made based on each patient’s unique circumstance.
- Follow recommendations of specialists for the following special populations:
  - Vascular Medicine referral for:
    - Chronic venous insufficiency
    - Lymphedema
  - Hematology referral for:
    - Prior VTE (DVT or PE)
    - Hypercoagulable state
    - Sickle cell
    - Hemophilia
  - Cardiology referral for:
    - Atrial fibrillation
    - Mechanical valve replacement

### LOW RISK

<table>
<thead>
<tr>
<th>Primary THA or TKA plus ALL of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Age ≤ 65 years</td>
</tr>
<tr>
<td>- BMI ≤ 35 kg/m²</td>
</tr>
<tr>
<td>- No history of cancer or congestive heart failure</td>
</tr>
</tbody>
</table>

### VERY HIGH RISK

- Revision or radical debridement of THA or TKA or one of the following:
  - BMI > 35 kg/m²
  - Age > 65 years
  - History of cancer or congestive heart failure

### PHARMACOLOGIC PROPHYLAXIS

<table>
<thead>
<tr>
<th>CrCl ≥ 30 mL/min</th>
<th>CrCl &lt; 30 mL/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &lt; 40 kg/m²</td>
<td>BMI ≥ 40 kg/m²</td>
</tr>
</tbody>
</table>

*Note: Administer dose of pharmacologic prophylaxis within 8 to 10 hours of surgical end time.

<table>
<thead>
<tr>
<th>BMI &lt; 40 kg/m²</th>
<th>BMI ≥ 40 kg/m²</th>
<th>BMI &lt; 40 kg/m²</th>
<th>BMI ≥ 40 kg/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enoxaparin 30 mg SQ Q12H</td>
<td>Enoxaparin 40 mg SQ Q12H</td>
<td>Heparin 5,000 units SQ Q8H</td>
<td>Heparin 7,500 units SQ Q8H</td>
</tr>
</tbody>
</table>

### MECHANICAL PROPHYLAXIS

- Use Sequential Compression Device (SCD) in addition to drug therapy or if drug therapy contraindication is documented

| Use Sequential Compression Device (SCD) continuously in addition to drug therapy or if drug therapy contraindication is documented |

*Note: Administer dose of pharmacologic prophylaxis within 8 to 10 hours of surgical end time.
Key Clinical Points

- **Risk assessment** to be completed via IHIS admission, pre-op, or post-op order sets upon admission.
  - Patients should be reassessed daily to evaluate appropriateness of thromboprophylaxis.
- **In the absence of a major contraindication**, use pharmacological thromboprophylaxis starting as soon as it is considered safe.
  - If pharmacological thromboprophylaxis is contraindicated due to **active bleeding or high risk for clinically important bleeding**, use mechanical thromboprophylaxis.
    - **Note:** The Physician (APN, PA, or Pharmacist) is required to document that the patient is at a high risk for bleeding or has another contraindication to pharmacologic prophylaxis.
- SCDs should be used in all patients for whom pharmacologic prophylaxis is contraindicated and in all very high risk patients unless patient is intolerant or has contraindications to SCDs. SCD contraindications may include:
  - Severe lower extremity peripheral vascular disease
  - Recent lower extremity revascularization
- **Continue thromboprophylaxis until hospital discharge.**
- **For very high risk populations**, consider continuing thromboprophylaxis for up to 4-6 weeks.
- **For surgical patients**, DVT / PE prophylaxis must be administered within 24 hours of surgical end-time, unless documented contraindication.
- Be aware of “black box” warning for LMWH related to epidural / spinal anesthesia, or lumbar puncture.
- **Prior to an invasive/surgical procedure** consult the surgeon/ proceduralist about the need to order or hold antithrombotic medications.
- **For special populations** see recommendations.

Additional Risk Factors

- Age > 70 years
- Obesity (BMI > 30 kg/m²)
- Impaired mobility (bedrest with bathroom privileges)
- Prior history of VTE
- Active malignancy
- Known thrombophilic state
- Hormone replacement
- Estrogen-based contraceptives
- Acute or chronic lung disease
- Acute myocardial infarction
- Congestive heart failure
- Nephrotic syndrome

Contraindications / Other Conditions to Consider with Pharmacologic VTE Prophylaxis

<table>
<thead>
<tr>
<th>Absolute</th>
<th>Relative</th>
<th>Other Conditions</th>
</tr>
</thead>
</table>
| Active hemorrhage | • Risk of bleeding outweighs benefit of pharmacologic prophylaxis.  
  • Examples include recent:  
    o Severe trauma to head or spinal cord with hemorrhage  
    o Intraocular surgery  
    o Gastrointestinal, genitourinary hemorrhage  
    o Thrombocytopenia (< 50 K) or abnormal INR  
    o End-stage liver disease  
    o Active intracranial lesions / neoplasms  
    o Hypertensive urgency / emergency | • Heparin-induced thrombocytopenia  
  o See OSUWMC HIT guideline for Non-heparin anticoagulant selection, dosing, and monitoring.  
  • Epidural analgesia with spinal catheter (current or planned). |
## VTE Prophylaxis for Special Populations

<table>
<thead>
<tr>
<th>VTE Population</th>
<th>Additional Considerations</th>
</tr>
</thead>
</table>
| **Acute Spinal Cord Injury (SCI)** | • For SCI associated with evidence of a spinal hematoma on CT or MRI, use mechanical thromboprophylaxis instead of pharmacological thromboprophylaxis at least for the first few days after injury.  
• For patients undergoing rehabilitation following acute SCI, continue pharmacologic thromboprophylaxis.  
• Following acute SCI, do not use UFH alone.  
• Do not use an IVC filter as thromboprophylaxis.                                                                                                                                 |
| **Cancer**                     | • Routine pharmacological thromboprophylaxis for primary prevention of VTE is **not** recommended in *outpatient* cancer patients with no additional risk factors for VTE.  
• Routine thromboprophylaxis with LMWH or LDUH should be considered for *outpatients* with solid tumors who have additional risk factors for VTE and low risk of bleeding.  
• Routine pharmacological thromboprophylaxis with either LMWH or low-dose aspirin is recommended in those receiving thalidomide, lenalidomide, or pomalidomide with chemotherapy and/or dexamethasone.  
• Routine pharmacological prophylaxis is **not** recommended to prevent catheter-related thrombosis in those patients with indwelling central venous catheters.  
• Patients undergoing major cancer surgery should receive prophylaxis starting before surgery and continuing for at least 7-10 days.  
• Extending post-operative prophylaxis up to 4 weeks should be considered in those undergoing major abdominal or pelvic surgery with high risk features. |
| **Intracranial Hemorrhage/Subarachnoid Hemorrhage** | • Thromboprophylaxis should be initiated within the first 48 hours of hematoma stability or securing of the aneurysm.  
• The surgeon should determine when the patient has achieved hemostasis.  
• See OSUWMC Intracerebral Hemorrhage (ICH)/Intraparenchymal Hemorrhage (IPH) Management guideline or Aneurysmal Subarachnoid Hemorrhage (SAH) guideline for more information. |
| **Long-Distance Travel**        | • Travelers who are sitting for extended periods or taking trips > 3 hours, especially flying, should:  
  o Avoid constrictive clothing around lower extremities and waist  
  o Maintain adequate hydration  
  o Ambulate every hour or two  
  o Contract calf muscles frequently  
  o Avoid smoking  
• For those with additional risk factors for VTE consider using properly fitted, below-knee Graded Compression Stockings (GCS) that provide 15 to 30 mm Hg of pressure at the ankles.  
• Aspirin and other antiplatelet medications are **NOT** effective in this setting. |
| **Obese Patients**              | • For patients undergoing gastric bypass surgery, if they have a history of DVT or high risk, they may need IVC filter placement 24 hours prior to surgery.                                                                                     |
| **Trauma**                     | • **Do NOT** obtain Doppler Ultrasonography to screen for DVT in asymptomatic patients  
• Placement of an IVC filter **does NOT** prevent DVT formation.                                                                                                                  |
References


Order Sets

- VTE prophylaxis orders are included in admission, pre-op, post op, and specialty group order sets as “SmartGroups” in IHIS.
- These “groups” are not orderable outside of the order sets. However, mechanical and/or pharmacological VTE prophylaxis can be ordered as a single order outside of an order set.

Quality Measures

- VTE incidence
- Appropriate VTE prophylaxis received

Guideline Authors

- Danielle Blais, PharmD, BCPS
- Iahn Gonsenhauser, MD, MBA
- Carmen Quatman, MD
- Thomas Scharschmidt, MD
- Daniel Eiferman, MD
- Dustin Chase, MD
- Julianna Roddy, PharmD, BCOP
- Tzu-Fei Wang, MD
- Joe Melucci, RPh, MBA

Guideline Approved


Disclaimer: Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.

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# Appendix 1: VTE Prophylaxis for Special Populations - Recommendations

## Thromboprophylaxis Agents by Clinical Category

<table>
<thead>
<tr>
<th>Condition</th>
<th>Enoxaparin 40 mg sq q12h</th>
<th>Enoxaparin 30 mg sq q12h</th>
<th>Enoxaparin 40 mg sq daily</th>
<th>UFH 7,500 units q8h</th>
<th>UFH 5,000 units q8h</th>
<th>Aspirin 325 mg by mouth BID</th>
<th>SCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal and/or pelvic surgery for cancer, robotic and non-robotic surgery (CrCl ≥ 30 mL/min)</td>
<td>BMI ≥ 40</td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Abdominal and/or pelvic surgery for cancer, robotic and non-robotic surgery (CrCl &lt; 30 mL/min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Acute spinal cord surgery (CrCl ≥ 30 mL/min)</td>
<td>BMI ≥ 40</td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Acute spinal cord surgery (CrCl &lt; 30 mL/min)</td>
<td></td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Bariatric surgery (CrCl ≥ 30 mL/min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Bariatric surgery (CrCl &lt; 30 mL/min)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Elective hip or knee arthroplasty - Low Risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Elective hip or knee arthroplasty - High Risk (CrCl ≥ 30 mL/min)</td>
<td>BMI ≥ 40</td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Elective hip or knee arthroplasty - High Risk (CrCl &lt; 30 mL/min)</td>
<td></td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hip, pelvic, or severe lower extremity fractures (CrCl ≥ 30 mL/min)</td>
<td>BMI ≥ 40</td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hip, pelvic, or severe lower extremity fractures (CrCl &lt; 30 mL/min)</td>
<td></td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Major trauma (e.g. multiple fractures due to a fall or a car accident)</td>
<td>BMI ≥ 40</td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Major trauma (e.g. multiple fractures due to a fall or a car accident)</td>
<td></td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Neurosurgery (CrCl ≥ 30 mL/min)</td>
<td>BMI ≥ 40</td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Neurosurgery (CrCl &lt; 30 mL/min)</td>
<td></td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Stroke (within the last month) (CrCl ≥ 30 mL/min)</td>
<td>BMI ≥ 40</td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Stroke (within the last month) (CrCl &lt; 30 mL/min)</td>
<td></td>
<td>BMI ≥ 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>All other patients who are NOT in the Low, Very High, or full anticoagulation categories</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

- **Preferred agent unless contraindications**
- **Alternative agent in the presence of contraindications**