Purpose: To provide guidance on preventing venous thromboembolism (VTE) in the surgical intensive care unit (SICU) at Vanderbilt University Medical Center (VUMC).

Background:
The incidence of VTE in general surgical patients not receiving prophylaxis ranges from 15-30% for deep vein thrombosis (DVT) and 0.2-0.9% for pulmonary embolism (PE).[1] Both low dose unfractionated heparin (LDUH) and low molecular weight heparin have been shown to significantly reduce the risk of VTE when compared to no prophylaxis in general surgery patients.[2-5]

The Chest Guidelines recommend using a risk stratification score to determine the type of VTE prophylaxis for general and abdominal-pelvic surgery patients [6]. However, these scores can be cumbersome, have many limitations, and have not been validated in the critically ill. The ideal pharmacologic agent for VTE prophylaxis in surgical patients depends on the type of surgery being performed and the patients’ specific risk factors. Studies examining the general surgery population have shown no difference in symptomatic VTE between LDUH and LMWH.[1] In orthopedic, multi-trauma, and malignancy, LMWH has been shown to be superior to LDUH.[7-9] Some advantages of using LMWH are a lower incidence of heparin-induced thrombocytopenia (HIT) and once daily dosing. Disadvantages of LMWH are possible increased rates of minor bleeding, renal dosing adjustments, cost, and a contraindication with epidurals. Due to the diversity of patients admitted to the SICU, VTE prophylaxis must be individualized based on each patient’s risk factors for VTE and bleeding (see Table).

<table>
<thead>
<tr>
<th>Risk Stratification for VTE†</th>
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<td><strong>Procedures</strong></td>
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<tr>
<td><strong>Low</strong></td>
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<tr>
<td>Laparoscopic cholecystectomy</td>
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<td>Appendectomy</td>
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<td>Transurethral prostatectomy</td>
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<td>Inguinal herniorrhapy</td>
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<td>Unilateral/bilateral mastectomy</td>
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<td><strong>Moderate</strong></td>
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<td>Gynecologic (non-malignancy) surgery</td>
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<td>Cardiac surgery</td>
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<td>Thoracic surgery</td>
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<td>Spinal surgery for malignancy</td>
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<td>Bariatric surgery</td>
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<td><strong>High</strong></td>
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<td>Open-abdominal</td>
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Contraindications to Pharmacologic VTE Prophylaxis:

- **Heparin**
  - Active bleeding
  - Heparin-Induced Thrombocytopenia (HIT)
- **Enoxaparin**
  - Active bleeding
  - Heparin-Induced Thrombocytopenia (HIT)
  - Epidural catheter - Enoxaparin thromboprophylaxis will not be used 12 hours prior to epidural placement, while the catheter is indwelling, or for 24 hours after removal.
  - Intra-cranial Pressure (ICP) Monitor
  - External Ventricular Drain (EVD)

Initiation for Pharmacologic VTE Prophylaxis:

All patients admitted to the SICU should be started on VTE prophylaxis on admission to the unit unless they have a contraindication or one of the following:

- Intra-cranial hemorrhage – start 72h after injury
- Craniotomy – start 72h after procedure
- Significant spinal injury/surgery – start 24h after injury or surgery

Treatment Flow Diagram:
Special Population: Obese Patients [10-14]

- Heparin:
  If enoxaparin is contraindicated, higher doses of low dose unfractionated heparin may be used.
  - Dosing:
    - Heparin 7,500 units subQ q8h

- Enoxaparin:
  Obese patients with a BMI > 40 may benefit from higher doses of enoxaparin for VTE prophylaxis and monitoring of low molecular weight heparin assays (anti-Xa levels).
  - Dosing:
    - BMI > 40 = enoxaparin 40 mg subQ q12h (normal renal function)
    - BMI > 50 = may consider enoxaparin 60mg subQ q12h (normal renal function)
  - Monitoring
    - Low molecular weight heparin assay (Anti-Xa levels) should be obtained 4 hours after the 3rd or 4th dose
    - Goal level = 0.3-0.5

Holding VTE Prophylaxis:

- Epidural Placement/Removal
  - Heparin:
    - Hold dose prior to epidural placement and removal
  - Enoxaparin:
    - Hold VTE prophylaxis for 12 hours for placement or removal of epidural catheter
    - VTE prophylaxis can be resumed 2 hours after removal of epidural catheter

Sequential Compression Devices (SCDs)

- It is the SICU practice to have SCDs ordered on every patient on admission to the unit.

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