

# Practice Management Guidelines for Venous Thromboembolism Prophylaxis

## Division of Trauma and Surgical Critical Care

### I. Purpose

To prevent pulmonary embolism (PE) and deep vein thrombosis (DVT) in trauma patients

### II. Risk Factor Categories

Risk Factors	High Risk Factors	Very High Risk Factors
<ul style="list-style-type: none"> <li>• Age &gt; 40 years</li> <li>• ISS &gt; 9</li> <li>• Blood transfusions</li> <li>• Surgical procedure within 72 hrs</li> <li>• Immobilization</li> <li>• Malignancy</li> <li>• Extensive soft tissue trauma</li> <li>• Hormone therapy</li> <li>• Obesity</li> <li>• AIS ≥ 3 (any region)</li> </ul>	<ul style="list-style-type: none"> <li>• Age &gt; 60 years</li> <li>• ISS &gt; 15</li> <li>• GCS &lt; 9 for &gt; 4 hours</li> <li>• Major venous injury/repair</li> <li>• PMH of venous thromboembolism (VTE)</li> <li>• Lower extremity fracture</li> <li>• Multiple spinal fractures</li> <li>• Pregnancy</li> </ul>	<ul style="list-style-type: none"> <li>• Spinal cord injury with paraplegia or quadriplegia</li> <li>• Complex or multiple (≥ 2) lower extremity fractures</li> <li>• Major pelvic fracture</li> <li>• Multiple (≥ 3) long bone fractures (≥ 1 in the lower extremity)</li> <li>• Age ≥ 75 years with any high risk factor</li> </ul>

### III. Physical Exam Findings

- A. PE- tachycardia, tachypnea, MS changes, diaphoresis
- B. DVT- extremity pain, fever, localized edema/swelling, warmth/erythema

### IV. Lab and Radiology Findings

- A. Blood gas – respiratory alkalosis, hypoxemia
- B. CXR – nonspecific, peripheral wedge defect
- C. Extremity Duplex – occlusive/non-occlusive thrombosis
- D. CT angio Chest – filling defect(s)

### V. VTE Prophylaxis Protocol for Trauma Patients

- A. All trauma patients, unless otherwise specified, should receive VTE prophylaxis with enoxaparin (Lovenox) 30 mg SQ Q 12 hr within 24 hrs of admission.
- B. *No doses of enoxaparin will be held for orthopedic operative procedures unless requested by the orthopedic trauma attending or fellow.*

### VI. Exceptions to VTE Prophylaxis Protocol

#### Traumatic brain and spinal cord injury

- C. VTE prophylaxis will be initiated 72 hrs after the injury/procedure for most intracranial hemorrhages and after craniotomy.

- D. Prophylaxis may be considered 24 hrs after a stable repeat head CT scan for patients with mild TBI and the following:
  - a. GCS of 15 within 30 minutes of injury
  - b. Subdural or epidural hematoma < 8 mm
  - c. Contusion or intraventricular hemorrhage < 2 cm (single lobe only)
- E. For patients requiring operative intervention following spinal cord injury, VTE prophylaxis should be held the morning of surgery and may be resumed 24 hrs post-operatively unless otherwise specified by the operating team.
- F. Enoxaparin is preferred in these patient populations, as well. However, patients with one of the above conditions and an ICP monitor or spinal drain in place should receive heparin 5000 units Q 8 hrs. After removal of the ICP monitor or drain, patients should be changed to enoxaparin 30 mg Q 12 hrs.

### **Epidural Placement**

- G. Enoxaparin will not be used 12 hours prior to epidural placement, while the catheter is indwelling, or for 2-4 hours after removal.
  - a. Heparin 5000 units Q 8 hrs and SCDs may be substituted for enoxaparin during the indwelling time.

### **Renal Impairment**

- H. For patients with a significant rise in SrCr (> 50%) or a creatinine clearance < 30 mL/min, enoxaparin may be renally adjusted to 30 mg daily or subcutaneous heparin 5000 units Q 8 hrs may substituted for enoxaparin.
  - a. In patients on renal replacement therapy, heparin 5000 units Q 8 hrs is recommended over enoxaparin.

### **Obesity**

- I. For patients with high-risk factors for VTE and with a BMI  $\geq 40$  kg/m<sup>2</sup>, enoxaparin should be increased to 40 mg Q 12 hrs.

## **VII. LMWH Anti-factor Xa (Anti-xa) Level Monitoring**

- A. An Anti-xa level should be drawn in patients with the following characteristics:
  - a. Weight  $\geq 180$  kg and any risk factor
  - b. BMI  $\geq 40$  kg/m<sup>2</sup> with any high risk factor
  - c. Spinal cord injury with paraplegia, quadriplegia
  - d. Complex or multiple ( $\geq 2$ ) lower extremity fractures
  - e. Major pelvic fracture
  - f. Multiple ( $\geq 3$ ) long bone fractures ( $\geq 1$  in the lower extremity)
- B. Anti-xa level peaks should be drawn 4 hours after the administration of enoxaparin. These labs should be ordered after the third dose of enoxaparin.
  - a. To order in WIZ: LMW Heparin Assay (must time correctly)
  - b. Goal peak is 0.2 to 0.4 IU/mL.
  - c. Once the goal range is reached, no further monitoring needed

## VIII. Surveillance

- a. Routine lower extremity duplex ultrasound should be completed on day 3 (72 hrs after admission) in those patients who are in the very high risk factor group.
- b. Those patients who are in the very high risk factor group should then have lower extremity duplexes weekly thereafter.

## IX. IVC Filter Placement

- A. Refer to IVC filter protocol (see Procedures Section at <http://www.traumaburn.com/mdprotocolstyle.htm>)
  - a. A *prophylactic* IVC filter may be considered in patients with paraplegia or quadriplegia; IVC, iliac, or femoral venous ligation/repair; severe pelvic fracture with lower extremity long bone fracture; AIS head  $\geq 3$  with contraindication to anticoagulation; or high risk patients with contraindication, failure, or complications of anticoagulation.
  - b. Indications for a *therapeutic* IVC filter include patients with known PE or lower extremity DVT and contraindication, failure, or complication of anticoagulation, among other indications.

## References:

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