VANDERBILT UNIVERSITY
MEDICAL CENTER

DIVISION OF ACUTE CARE SURGERY

Practice Management Guidelines for Venous Thromboembolism Prophylaxis

I. Purpose

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

II. Risk Factor Categories

High Risk Factors	Very High-Risk Factors
• Age > 60 years • GCS < 9 for > 4 hours • PMH of venous thromboembolism (VTE) • Lower extremity fracture • Multiple spinal fractures • Pregnancy	• Spinal cord injury with paraplegia or quadriplegia • Complex or multiple (≥ 2) lower extremity fractures • Major pelvic fracture • Multiple (≥ 3) long bone fractures (≥ 1 in the lower extremity) • Age ≥ 75 years with any high risk factor • Abdominal or lower extremity venous repair or ligation

III. VTE Prophylaxis Protocol for Trauma Patients

A. All trauma patients should have sequential compression devices (SCDs) placed on bilateral lower extremities, unless an injury prohibits its use.

B. All trauma patients, unless otherwise specified, should receive VTE prophylaxis with weight-based enoxaparin.

Current patient weight	Enoxaparin initial dose	Axa Monitoring Required
<50 kg	30 mg q12h	Yes
50 – 89 kg	30 mg q12h	No
90 – 129 kg	40 mg q12h	Yes
130 – 179 kg	60 mg q12h	Yes
≥ 180 kg	80 mg q12h	Yes

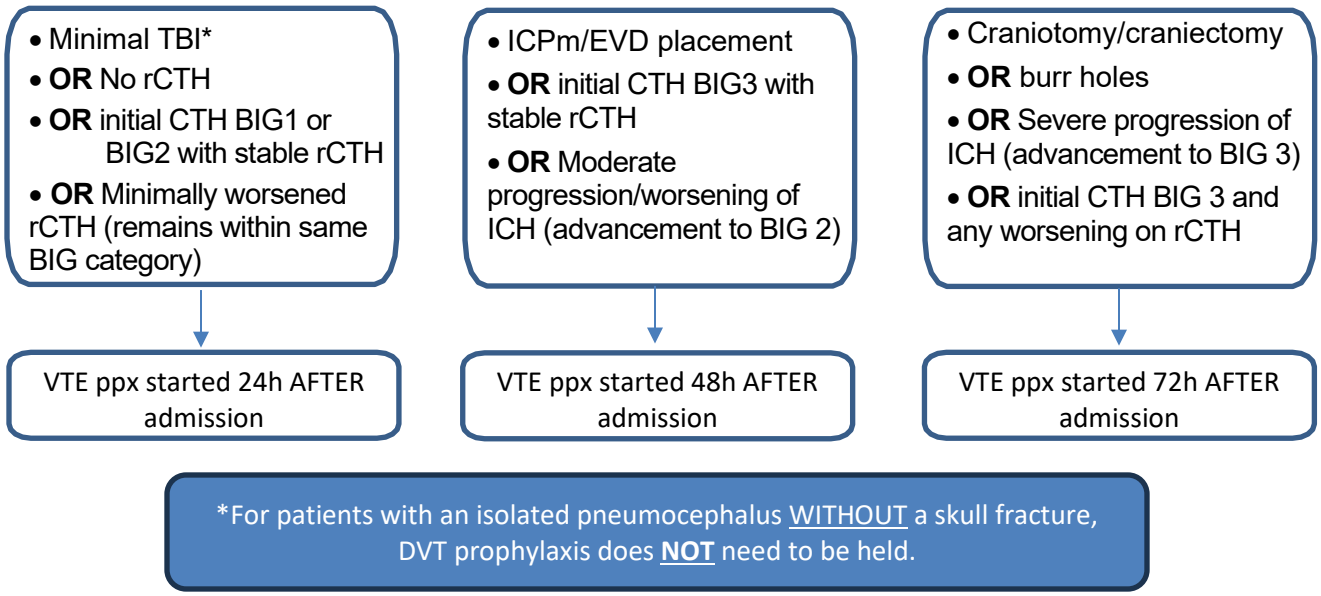
C. VTE prophylaxis should NOT be held for patients with an elevated baseline INR due to liver dysfunction.

D. No doses of VTE prophylaxis will be held for operative procedures except for spine and neurosurgical operative cases or unless requested by the attending.

IV. Exceptions to VTE Prophylaxis Protocol

A. Traumatic Brain and Spine injuries

Brain Injury Guideline (BIG)	
BIG 1*	• Isolated pneumocephalus • Non-displaced skull fracture • Unilateral SDH≤4 mm • Single IPH ≤4 mm • SAH
BIG 2*	• Unilateral SDH 5-7 mm • Bilateral SDH <4 mm • Single IPH 5-7 mm • Multiple IPH <4 mm • EDH 1-7 mm • IVH trace or < 2mm
BIG 3	• Any SDH≥8 mm • Any IPH≥8 mm • EDH ≥ 8 mm • IVH ≥ 2mm
*Patients unable to be clearly classified into a BIG category should be determined by the attending trauma surgeon.	



a. Patients with middle meningeal artery (MMA) embolization planned should have VTE prophylaxis held the morning of the procedure. Timing of VTE prophylaxis after procedure should be discussed with neurosurgery.

b. Patients with an intraspinal hematoma should have VTE prophylaxis started within 48 hours of admission unless otherwise specified by the Ortho Spine or Neuro Spine teams.

c. For patients requiring an operative spine intervention, VTE prophylaxis can be given until the night before surgery. It should be held the morning of surgery and may be resumed 24 hrs post-operatively unless otherwise specified by the operating team.

d. For patients on the minimal spine pathway OR preliminarily nonoperative with only upright imaging pending, VTE prophylaxis may be initiated.
e. Patients with an ICP monitor or external ventricular drain should preferentially receive enoxaparin for prophylaxis.

B. Epidural, Paravertebral Block or Lumbar Drain Placement

a. Enoxaparin will not be used 12 hours prior to epidural, paravertebral block or lumbar drain placement, while the catheter is indwelling, or for 4 hours after removal.
b. Heparin 5000 units Q 8 hrs and SCDs may be substituted for enoxaparin during the indwelling time.
c. Patients with low body weight (< 50kg) who require subcutaneous heparin should preferentially receive heparin 5000 units SQ q8h (over q12h dosing)
d. After removal of the drain, patients should be changed to the appropriate weight-based enoxaparin dosing if eligible.

C. Renal Impairment

a. For patients with a significant rise in SCr (> 50%) or a creatinine clearance < 30 mL/min, subcutaneous heparin may be substituted for enoxaparin.
b. In patients on renal replacement therapy, heparin is recommended over enoxaparin.
c. If receiving subcutaneous heparin, patients with BMI≥40 kg/m^2 (and without epidural catheter, paravertebral block or lumbar drain) should receive a higher dose of heparin 7500 units SQ q8h
d. Patients with low body weight (< 50kg) who require subcutaneous heparin should preferentially receive heparin 5000 units SQ q8h (over q12h dosing)

D. History of Heparin Induced Thrombocytopenia or Contraindication to Heparin/Enoxaparin

a. Creatinine clearance ≥30 ml/min and without epidural, paravertebral block or lumbar drain: Fondaparinux 2.5mg SQ daily
b. Creatinine clearance <30 ml/min or epidural, paravertebral block or lumbar drain: Consider aspirin 81mg BID

V. LMWH Anti-factor Xa (Anti-xa) Level Monitoring

A. An Anti-xa level should be drawn in patients with the following characteristics:
   a. Weight <50 kg or ≥ 90 kg
   b. All patients in the very high-risk factor group
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 Epic: LMW Heparin Assay (must time correctly)
   b. Goal peak is 0.2 to 0.4 IU/mL.
      i. If Anti-xa level is drawn appropriately and below the goal range, increase the dose to the next syringe size.
      ii. If Anti-xa level is drawn appropriately and above goal range, decrease to the next syringe size.
         1. If already at 30 mg q12h, reduce to 30 or 40 mg q24h.
         2. If anti-xa level remains above goal range despite changing to q24h dosing, then change to subcutaneous heparin 5000 units Q 8 hrs.

c. If the enoxaparin dose is adjusted to a dose that differs from empiric weight-based doses (see table in section III) based on anti-Xa monitoring, anti-Xa levels should be monitored weekly and doses adjusted per guidance above.
d. For patients who achieve goal anti-Xa on their empiric weight-based dose (see table in section III), no further anti-Xa monitoring is needed.

VI. Surveillance

a. Routine lower extremity duplex ultrasound should be completed 72 hrs after admission and weekly thereafter for four weeks in patients who are in the very high-risk factor group. After four weeks, may decrease frequency to lower extremity ultrasound every two weeks.

VII. IVC Filter Placement

A. Refer to IVC filter protocol (see IVC Filter Placement PMG)
   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 ≥ 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.

VIII. Post-Discharge VTE Prophylaxis

A. Certain patients remain at a high risk of VTE even after hospital discharge. The following patients should be discharged with VTE chemoprophylaxis they were receiving while inpatient:
   a. VTE prophylaxis for 30 days post discharge
      i. Very high risk VTE patients *(see spinal cord injury below)*
      ii. Operative lower extremity fracture regardless of weight-bearing status
      iii. Femoral head fracture
      iv. Unable to ambulate >30 feet with physical therapy
   b. VTE prophylaxis for 90 days post discharge:
      i. Spinal cord injury

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