VANDERBILT UNIVERSITY MEDICAL CENTER

Category	Clinical Practice
Protocol Number	BC-2018-3

Protocol: Adult DVT Chemoprophylaxis

Approval Date:
February 1, 2018
Review Date:
February 1, 2019

Applicable to						
☒ VUH	☐ Children's	☐ DOT	☐ VMG Off-site locations	☐ VMG	☐ VPH	☐ Other

Team Members Performing						
☐ All faculty & staff	☒ Faculty & staff providing direct patient care or contact	☒ MD	☒ House Staff	☒ APRN/PA	☐ RN	☐ LPN
☐ Other:						

Content Experts	
Authors: Callie Thompson, MD Sarah Folliard, ARNP	Date reviewed & accepted: MDBC October 5, 2017

I. Purpose:

Burn patients are at an increased risk of venous thromboembolism (VTE) due to burn induced coagulation changes as well as many of the risk factors native to all hospitalized patients[2]. The purpose of this protocol is to prevent VTE as a complication to any hospitalized burn patient.

II. Population:

Adult patients with cutaneous burns or inhalation injury admitted to Vanderbilt University Medical Center (VUMC)

III. Risk Factors:

Risk Factors	High Risk Factors	Very High Risk Factors
• Age > 40 years • Central venous access • Blood transfusions (≥4 units) • Surgical procedure within 72 hrs • Immobilization • Malignancy • Extensive soft tissue trauma • Hormone therapy • Obesity • Burn wound infection	• Inhalation injury • Age > 60 years • ISS > 15 • GCS < 9 for > 4 hours • Major venous injury/repair • 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

IV. Assessment:

A. Physical Exam Findings
   1. PE- tachycardia, tachypnea, mental status changes, diaphoresis
   2. DVT- extremity pain, fever, localized edema, warmth/erythema

B. Lab and Radiology Findings
   1. Arterial Blood Gas – respiratory alkalosis, hypoxemia
   2. Chest X-ray- nonspecific, peripheral wedge defect
   3. Extremity Duplex – occlusive/non-occlusive thrombus
   4. CT Angio Chest – filling defect(s)

V. Intervention/Treatment:

A. All burn patients, unless otherwise specified, should receive VTE prophylaxis with enoxaparin (Lovenox) 30 mg SQ q12 hr within 24 hours of admission.

B. Obesity: For patients with a BMI of ≥ 40 kg/m^2, starting enoxaparin dose is 40 mg Q 12 hrs.

C. For patients with > 20% TBSA burn injury with either high risk or very high-risk factors, chemoprophylaxis will be continued until hospital discharge. For patients with impaired mobility who undergo inpatient rehabilitation, chemoprophylaxis is continued.

D. *No doses of enoxaparin will be held for operative procedures unless requested by the operating attending.*

VI. Exceptions to VTE Prophylaxis Protocol

A. Renal Impairment: 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 q8 hours may be substituted.
   1. For patients on renal replacement therapy, heparin 5000 units q8 hours is recommended.

B. Traumatic brain injury and spinal cord injury excluded by the Trauma and Surgical Critical Care VTE Protocol (attached)

VII. LMWH Anti-factor Xa (Anti- Xa) Level Monitoring

A. An Anti-Xa level should be drawn in patients with the following characteristics:
   1. Burn ≥20% TBSA
   2. Weight ≥ 180 kg and any risk factor (all categories)
   3. BMI >40kg/m2 and any HIGH risk factor
   4. Anyone with 2 or more high risk or very high risk factors or 3 total of any category of risk factor
   5. Patients with concomitant trauma
      i. Spinal cord injury with paraplegia, quadriplegia
      ii. Complex or multiple ((≥ 2) lower extremity fractures
      iii. Major pelvic fracture
      iv. Multiple (≥ 3) long bond fractures or ≥ 1 lower extremity fracture

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.

1. To order: LMW Heparin Assay (must be timed correctly)
2. Goal peak is 0.2-0.4 IU/mL
3. Once the goal range is reached, no further monitoring needed.
4. Maximum dosing for enoxaparin is 1mg/kg BID (therapeutic dose). If that dose is reached and assay is still not in goal range, a hematology consult should be considered for heparin resistance and potential alternative therapeutic options.

VIII. Considerations

A. IVC Filter Placement
1. A prophylactic IVC filter may be considered in high risk burn patients with a contraindication, failure, or complications of anticoagulation.
2. Indications for a therapeutic IVC filter include patients with a known PE or lower extremity DVT and a contraindication, failure, or complication of anticoagulation.

IX. References:

1. Geerts, W.H., Bergqvist, D., Pineo, G.F., Heit, J.A., Samama, C.M., Lassen, M.R., et al. Prevention of venous thromboembolism. *American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th ed)*
2. Meizoso JP, Ray JJ, Allen CJ, et al. Hypercoagulability and venous thromboembolism in burn patients. *Seminars in thrombosis and hemostasis.* 2015;41(1):43-48.
3. Lin H, Faraklas I, Cochran A, Saffle J. Enoxaparin and antifactor Xa levels in acute burn patients. *Journal of burn care & research : official publication of the American Burn Association.* 2011;32(1):1-5.
4. Lin H, Faraklas I, Saffle J, Cochran A. Enoxaparin dose adjustment is associated with low incidence of venous thromboembolic events in acute burn patients. *The Journal of trauma.* 2011;71(6):1557-1561.
5. Pannucci CJ, Osborne NH, Wahl WL. Venous thromboembolism in thermally injured patients: analysis of the National Burn Repository. *Journal of burn care & research : official publication of the American Burn Association.* 2011;32(1):6-12.
6. Pannucci CJ, Obi AT, Timmins BH, Cochran AL. Venous Thromboembolism in Patients with Thermal Injury: A Review of Risk Assessment Tools and Current Knowledge on the Effectiveness and Risks of Mechanical and Chemical Prophylaxis. *Clinics in plastic surgery.* 2017;44(3):573-581.
7. Sikora S, Papp A. Venous thromboembolism in burn patients is not prevented by chemoprophylaxis. *Burns : journal of the International Society for Burn Injuries.* 2017;43(6):1330-1334.
8. Van Haren RM, Thorson CM, Valle EJ, et al. Hypercoagulability after burn injury. *The journal of trauma and acute care surgery.* 2013;75(1):37-43; discussion 43.