

UAMS MEDICAL CENTER
TRAUMA and CRITICAL CARE SERVICES MANUAL

SUBJECT: Venous Thromboembolism Prophylaxis Guidelines for Trauma & Emergency General Surgery

SUPERSEDES: 9/2019

PAGE: 1 of 4

RECOMMENDATION(S): Dr. Kyle Kalkwarf

APPROVAL: 5/30/2019

CONCURRENCE(S): Drs. Allie Oswalt & Rebecca Smith

EFFECTIVE: 7/1/2020

PURPOSE:

Standardize practices for the treatment of trauma and emergency general surgery patients and establish guidelines for the administration of venous thromboembolism (VTE) prophylaxis in high-risk patients

Establish a consensus for administration of chemical VTE prophylaxis in patients who are to undergo invasive procedures or have high-risk injuries

DEFINITIONS:

High-risk patients: those anticipated to be hospitalized for >24h and have one or more of the following risk factors:

- Multiple system trauma
- Traumatic brain injury with GCS <12
- Major vascular injury to neck, thorax, abdomen, or extremities
- Multiple rib fractures
- Pelvic fracture
- Long-bone fracture
- Spinal fracture
- Anticipated immobilization >24 hours
- History of VTE (DVT/PE)
- History of hypercoagulable disease
- History of or current diagnosis of cancer
- Obesity (BMI > 30)
- Tobacco use within one month
- Critical illness

PROCEDURES:

- 1) **Sequential compression devices (SCDs) should ONLY be used for patients not receiving chemical VTE prophylaxis**
 - a. SCDs are contraindicated in legs with fractures prior to fixation
 - b. SCDs are contraindicated in legs with external fixators or large open wounds
 - c. SCDs may be used on fractured lower extremities following open reduction and internal fixation

- 2) **Relative contraindications to INITIAL chemical VTE prophylaxis include:**
 - a. Uncontrolled blood loss
 - b. Coagulopathy
 - c. Non-operative management of liver, spleen, or renal injuries
 - d. Intracranial hemorrhage
 - e. Spinal cord hematoma

UAMS MEDICAL CENTER
TRAUMA and CRITICAL CARE SERVICES MANUAL

SUBJECT: Venous Thromboembolism Prophylaxis Guidelines for Trauma & Emergency General Surgery

SUPERSEDES: 9/2019

PAGE: 2 of 4

RECOMMENDATION(S): Dr. Kyle Kalkwarf

APPROVAL: 5/30/2019

CONCURRENCE(S): Drs. Allie Oswald & Rebecca Smith

EFFECTIVE: 7/1/2020

3) All high-risk patients who do not have a contraindication should be started on enoxaparin (heparin is reserved for GFR <30 mL/min and/or patients with epidurals):

- a. GFR > 30 mL/min: enoxaparin (Lovenox) 0.5 mg/kg SQ q12h (maximum starting dose is enoxaparin 60 mg SQ q12h)
- b. GFR < 30 mL/min:
 - i. Weight < 90 kg: heparin 5000 units SQ q8h
 - ii. Weight > 90 kg: heparin 7500 units SQ q8h

4) Management of enoxaparin (Lovenox) dosing for trauma and emergency general surgery patients:

- a. An Anti-Xa Assay should be ordered 4h AFTER the 3rd dose of enoxaparin (either 0100 or 1300 depending on when enoxaparin was started)
 - i. If < 0.2, increase the enoxaparin dose by 10 mg and recheck an anti-Xa after three doses of the new regimen
 - ii. If 0.2 – 0.4, no adjustment necessary and no further anti-Xa levels needed unless there is a change in renal function or patient clinical status
 - iii. If > 0.4, reduce the enoxaparin dose by 10 mg and recheck an anti-Xa after three doses of the new regimen

5) Patients with a history of HIT/HITT – Fondaparinux is preferred

- a. If weight > 50 kg and GFR > 50 mL/min: 2.5 mg SQ daily
- b. If GFR 30-50 mL/min: use with caution (consider dose reduction)
- c. If GFR <30 mL/min: use is contraindicated

6) IVC Filters

- a. **IVC INSERTION:** Filters will be placed within 48h of time of consult in patients who meet the following criteria:
 - i. The patient has a documented DVT and cannot be fully anticoagulated
 - ii. The patient cannot receive VTE prophylaxis for at least five days (rare)
- b. **IVC REMOVAL:** When it is medically appropriate to start VTE prophylaxis:
 - i. If there is no contraindication, perform a bilateral lower extremity venous duplex. If negative for DVT, schedule retrieval of the IVC filter during the current admission.
 - ii. If the patient is cleared for VTE prophylaxis, but doses are being held for frequent trips to the OR, the IVC filter may be left in place. When the series of operations are complete, a bilateral lower extremity venous duplex should be performed. If negative for DVT, schedule retrieval of the IVC filter during the current admission.

7) Initiation of anticoagulation for at-risk patient populations:

a. Solid Organ Injury

- i. In the non-operative management of liver, spleen, and renal injuries, VTE prophylaxis may be initiated:
 1. Day of injury for grade I injuries

UAMS MEDICAL CENTER
TRAUMA and CRITICAL CARE SERVICES MANUAL

SUBJECT: Venous Thromboembolism Prophylaxis Guidelines for Trauma & Emergency General Surgery

SUPERSEDES: 9/2019

PAGE: 3 of 4

RECOMMENDATION(S): Dr. Kyle Kalkwarf

APPROVAL: 5/30/2019

CONCURRENCE(S): Drs. Allie Oswald & Rebecca Smith

EFFECTIVE: 7/1/2020

2. 24h without significant blood loss for grade II/III injuries
3. 48h without significant blood loss for grade IV injuries

b. Traumatic Brain Injury

- i. Chemical VTE prophylaxis should be initiated 24h following stable head CT
- ii. Chemical VTE prophylaxis should be initiated 48h following craniotomy
- iii. VTE prophylaxis should NOT be held for EVD/ICP monitor placement or removal

c. Spinal fractures and spinal cord injuries (SCI)

- i. Patients with spinal fractures or SCI may be started on VTE prophylaxis once the spine surgeon has deemed that there is no emergent need for surgical decompression or stabilization (usually within 24h – an attending discussion is required for a 48h delay)
- ii. Patients with spinal cord hematoma may be started on VTE prophylaxis once cleared by the spine surgery team (usually within 24h – an attending discussion is required for a 48h delay)
- iii. If surgery is planned, VTE prophylaxis will be held the night before the operation and resumed 24h post-operatively

d. Chemical VTE Prophylaxis should not be held for non-spinal musculoskeletal injuries or procedures

e. Regional anesthetic catheter placement for pain control (e.g., epidural) or lumbar drain

- i. Before Puncture:
 1. Prophylactic enoxaparin (Lovenox) should be held for 12h
 2. Therapeutic enoxaparin (Lovenox) should be held for 24h
 3. IV heparin should be held for 4-6h
 4. SC heparin should be held for 8-12h
 5. Fondaparinux should be held for 36-48h
 6. INR should be < 1.6
- ii. While epidural or lumbar drain is in place:
 1. Appropriate weight-based dosing of heparin should be used (section 3b)
 2. Enoxaparin (Lovenox) should NOT be used if epidural or lumbar drain is in place
- iii. After removal of epidural or lumbar drain:
 1. Enoxaparin (prophylactic or therapeutic) should be held for 4h
 2. Heparin (IV or SQ) should be held for 1h
 3. Fondaparinux should be held for 6-12h
 4. Warfarin (Coumadin) or novel anticoagulants should not be started until after epidural/lumbar drain removal

REFERENCES:

UAMS MEDICAL CENTER
TRAUMA and CRITICAL CARE SERVICES MANUAL

SUBJECT: Venous Thromboembolism Prophylaxis Guidelines for Trauma & Emergency General Surgery

SUPERSEDES: 9/2019

PAGE: 4 of 4

RECOMMENDATION(S): Dr. Kyle Kalkwarf

APPROVAL: 5/30/2019

CONCURRENCE(S): Drs. Allie Oswalt & Rebecca Smith

EFFECTIVE: 7/1/2020

1. Arabi YM, Al-Hameed F, Burns KE, Mehta S, Alsolamy SJ, Alshahrani MS, Mandourah Y, Almekhlafi GA, Almaani M, Al Bshabshe A, Finfer S. Adjunctive Intermittent Pneumatic Compression for Venous Thromboprophylaxis. *New England Journal of Medicine*. 2019 Feb 18.
2. Walker CK, Sandmann EA, Horyna TJ, Gales MA. Increased Enoxaparin Dosing for Venous Thromboembolism Prophylaxis in General Trauma Patients. *Ann Pharmacother*. 2017 Apr;51(4):323- 331.
3. Geerts WH, Jay RM, Code KI, Chen E, Szalai JP, Saibil EA, Hamilton PA. A comparison of low-dose heparin with low-molecular-weight heparin as prophylaxis against venous thromboembolism after major trauma. *New England Journal of Medicine*. 1996 Sep 5;335(10):701-7.
4. Geerts WH, Bergqvist D, Pineo GF, Heit JA, Samama CM, Lassen MR, Colwell CW. Prevention of venous thromboembolism: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2008 Jun 1;133(6):381S-453S.
5. Horlocker TT, Vandermeulen E, Kopp SL, Gogarten W, Leffert LR, Benzon HT. Regional anesthesia in the patient receiving antithrombotic or thrombolytic therapy: American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines. *Regional anesthesia and pain medicine*. 2018 Apr 1;43(3):263-309.
6. Singer GA, Riggi G, Karcutskie CA, Vaghaiwalla TM, Lieberman HM, Ginzburg E, Namias N, Lineen EB. Anti-Xa-guided enoxaparin thromboprophylaxis reduces rate of deep venous thromboembolism in high-risk trauma patients. *Journal of Trauma and Acute Care Surgery*. 2016 Dec 1;81(6):1101-8.
7. Ko A, Harada MY, Barmparas G, Chung K, Mason R, Yim DA, Dhillon N, Margulies DR, Gewertz BL, Ley EJ. Association between enoxaparin dosage adjusted by anti-factor Xa trough level and clinically evident venous thromboembolism after trauma. *JAMA surgery*. 2016 Nov 1;151(11):1006-13.
8. Sumislawski JJ, Kornblith LZ, Conroy AS, Callcut RA, Cohen MJ. Dynamic coagulability after injury: Is delaying venous thromboembolism chemoprophylaxis worth the wait?. *Journal of Trauma and Acute Care Surgery*. 2018 Nov 1;85(5):907-14.
9. Linkins LA, Dans AL, COL LK, Bona R, Davidson BL, Schulman S, Crowther M. Treatment and prevention of heparin-induced thrombocytopenia: antithrombotic therapy and prevention of thrombosis: American College of Chest Physicians evidence-based clinical practice guidelines. *Chest*. 2012 Feb 1;141(2):e495S-530S.
10. Joseph B, Pandit V, Harrison C, Lubin D, Kulvatunyou N, Zangbar B, Tang A, O'Keeffe T, Green DJ, Gries L, Friese RS. Early thromboembolic prophylaxis in patients with blunt solid abdominal organ injuries undergoing nonoperative management: is it safe?. *The American Journal of Surgery*. 2015 Jan 1;209(1):194-8.
11. Rostas JW, Manley J, Gonzalez RP, Brevard SB, Ahmed N, Frotan MA, Mitchell E, Simmons JD. The safety of low molecular-weight heparin after blunt liver and spleen injuries. *The American Journal of Surgery*. 2015 Jul 1;210(1):31-4.
12. Eberle BM, Schnüriger B, Inaba K, Cestero R, Kobayashi L, Barmparas G, Oliver M, Demetriades D. Thromboembolic prophylaxis with low-molecular-weight heparin in patients with blunt solid abdominal organ injuries undergoing nonoperative management: current practice and outcomes. *Journal of Trauma and Acute Care Surgery*. 2011 Jan 1;70(1):141-7.
13. Alejandro KV, Acosta JA, Rodriguez PA. Bleeding manifestations after early use of low-molecular-weight heparins in blunt splenic injuries. *The American surgeon*. 2003 Nov 1;69(11):1006.
14. Kwok AM, Davis JW, Dirks RC, Wolfe MM, Kaups KL. Time is now: venous thromboembolism prophylaxis in blunt splenic injury. *The American Journal of Surgery*. 2016 Dec 1;212(6):1231-6.