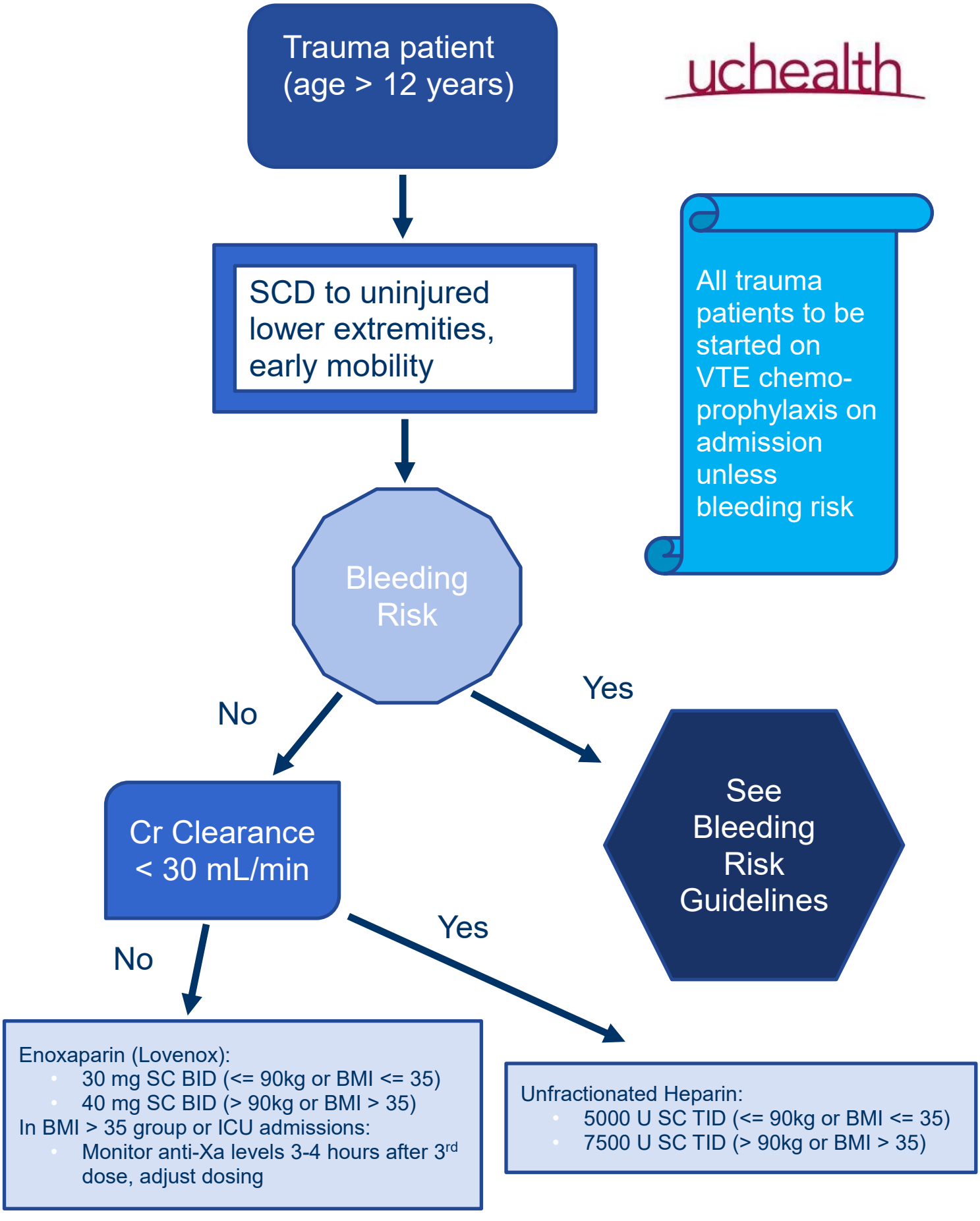
UCHealth Trauma Services
Venous Thromboembolism (VTE) Prophylaxis Protocol



Bleeding Risk Guidelines (Dosing as above unless otherwise specified)

TBI / ICH

BIG/BIG-MAC 1/2 - start VTE prophylaxis within 24 hours with stable neurologic findings
BIG/BIG-MAC 3 - start VTE prophylaxis within 48 hours of stable CT Head

Spinal Cord Injury

Incomplete SCI or spinal epidural hematoma - start by 48 hours (24 hours with spine team clearance)

Spine Surgery

Hold VTE prophylaxis on the morning of surgery, resume at 48 hours post-op

ICP Monitor / EVD / Spinal Drain / Epidural catheter

Enoxaparin 40 mg daily, starting 12 hours after insertion (or Heparin if CrCl < 30 mL/min)

Solid Organ Injury

If initially hemodynamic stability - start within 24 hours
Once hemodynamically stable, no active transfusions, or with bleeding control - start within 24 hours of meeting these criteria

Intra-occular injury with risk of hemorrhage

Start at 24-48 hours with ophthalmology clearance

Uncorrected coagulopathy (INR > 2, Platelets < 50,000, oral anticoagulant use)

Hold VTE prophylaxis until underlying coagulopathy addressed

Ongoing hemorrhage and resuscitation

Hold VTE prophylaxis until stable and not requiring transfusion, then start within 24 hours

Additional considerations

- **Chemoprophylaxis will NOT be held on the morning of surgery except for:**
  - **Neurosurgical, spine, or ophthalmologic surgeries**
  - **Axial blocks**
- **Isolated hip fractures – may substitute Xarelto PO for EnoxaparinSC as inpatient at orthopedic surgeon discretion**
- **Consider IVC filter for high risk patients (e.g. SCI, significant TBI, pelvic or lower extremity fractures, ICU admission) especially with anticipated prolonged contra-indications to chemical VTE prophylaxis**
- **Transfer patients – if > 24 hours from injury with unknown or inadequate chemoprophylaxis, consider screening 4 extremity duplex U/S on arrival of transfer**
- **Monitor Anti-Xa levels, drawn 3-4 hours after 3rd dose:**
  - **< 0.2 – Adjust enoxaparin up 10mg per dose**
  - **0.2 – 0.5 – Maintain current dosing**
  - **> 0.5 – Adjust enoxaparin down 10mg per dose**
- **Outpatient prophylaxis**
  - **Enoxaparin 40 mg SC daily or Xarelto 10 mg PO daily**
    - **Pelvic/acetabular/hip fractures – 4 weeks**
    - **> 2 non-weight bearing extremities – 4 weeks post-op or until ambulatory**
    - **New SCI – 3 months**
- **VTE Prophylaxis will not be held without a physician/APP order**
  - **Please refer to patient refusal escalation pathway**

This protocol represents a safe, preferred approach to patient care based on institutional and personnel capabilities. However, the ultimate determination regarding guideline application is to be made by the treating physician and healthcare professionals with full consideration of the individual patient's clinical status as well as available institutional resources. Protocols are not intended to take the place of healthcare providers' judgment in diagnosing and treating individual patients. Individual patient circumstances may warrant deviation from these guidelines, and it is the clinician's judgment that should determine the course of management. Literature addressing the care of the injured patient is continually evolving.

References:

1. 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 Surg. 2016 Nov 1;151(11):1006-1013. doi: 10.1001/jamasurg.2016.1662. PMID: 27383732.
2. Benjamin E, Recinos G, Aiolfi A, Inaba K, Demetriades D. Pharmacological Thromboembolic Prophylaxis in Traumatic Brain Injuries: Low Molecular Weight Heparin Is Superior to Unfractionated Heparin. Ann Surg. 2017 Sep;266(3):463-469. doi: 10.1097/SLA.0000000000002359. PMID: 28650361.
3. Stutsrim AE, Eady JM, Collum M, Rebo GJ, Rebo KA, Miller PR, Nunn AM. Weight-Based Enoxaparin Achieves Adequate Anti-Xa Levels More Often in Trauma Patients: A Prospective Study. Am Surg. 2020 Sep 11:3134820949519. doi: 10.1177/0003134820949519. Epub ahead of print. PMID: 32915054.
4. Lu VM, Alvi MA, Rovin RA, Kasper EM. Clinical outcomes following early versus late pharmacologic thromboprophylaxis in patients with traumatic intracranial hemorrhage: a systematic review and meta-analysis. Neurosurg Rev. 2020 Jun;43(3):861-872. doi: 10.1007/s10143-018-1045-y. Epub 2018 Oct 29. PMID: 30374758.
5. Costantini TW, Min E, Box K, Tran V, Winfield RD, Fortlage D, Doucet J, Bansal V, Coimbra R. Dose adjusting enoxaparin is necessary to achieve adequate venous thromboembolism prophylaxis in trauma patients. J Trauma Acute Care Surg. 2013 Jan;74(1):128-33; discussion 134-5. doi: 10.1097/TA.0b013e3182788fa7. PMID: 23271087; PMCID: PMC4010946.
6. Jacobs BN, Cain-Nielsen AH, Jakubus JL, Mikhail JN, Fath JJ, Regenbogen SE, Hemmila MR. Unfractionated heparin versus low-molecular-weight heparin for venous thromboembolism prophylaxis in trauma. J Trauma Acute Care Surg. 2017 Jul;83(1):151-158. doi: 10.1097/TA.0000000000001494. PMID: 28426561; PMCID: PMC7055932.
7. Hecht JP, Han EJ, Brandt MM, Wahl WL. Early Chemoprophylaxis in Severely Injured Trauma Patients Reduces Risk of Venous Thromboembolism. Am Surg. 2020 Jul 29:3134820939914. doi: 10.1177/0003134820939914. Epub ahead of print. PMID: 32723180.
8. Byrne JP, Geerts W, Mason SA, Gomez D, Hoeft C, Murphy R, Neal M, Nathens AB. Effectiveness of low-molecular-weight heparin versus unfractionated heparin to prevent pulmonary embolism following major trauma: A propensity-matched analysis. J Trauma Acute Care Surg. 2017 Feb;82(2):252-262. doi: 10.1097/TA.0000000000001321. PMID: 27906870.
9. 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. J Trauma Acute Care Surg. 2016 Dec;81(6):1101-1108. doi: 10.1097/TA.0000000000001193. PMID: 27488490.
10. Spano PJ 2nd, Shaikh S, Boneva D, Hai S, McKenney M, Elkbuli A. Anticoagulant chemoprophylaxis in patients with traumatic brain injuries: A systematic review. J Trauma Acute Care Surg. 2020 Mar;88(3):454-460. doi: 10.1097/TA.0000000000002580. PMID: 31923051.
11. Horlocker TT, Vandermeuelen 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 (Fourth Edition). Reg Anesth Pain Med. 2018 Apr;43(3):263-309. doi: 10.1097/AAP.0000000000000763. Erratum in: Reg Anesth Pain Med. 2018 Jul;43(5):566. Vandermeuelen, Erik [corrected to Vandermeulen, Erik]. PMID: 29561531.
12. 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. N Engl J Med. 1996 Sep 5;335(10):701-7. doi: 10.1056/NEJM199609053351003. PMID: 8703169.
13. Jamjoom AA, Jamjoom AB. Safety and efficacy of early pharmacological thromboprophylaxis in traumatic brain injury: systematic review and meta-analysis. J Neurotrauma. 2013 Apr 1;30(7):503-11. doi: 10.1089/neu.2012.2584. Epub 2013 Mar 21. PMID: 23517138.