Venous Thromboembolism (VTE) Prophylaxis in Trauma and Orthopaedic Trauma

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PURPOSE:

This guideline prepared by the members of the Wisconsin TQIP Collaborative is intended to serve as a general statement regarding appropriate hospitalized injured patient care based upon the available medical literature and clinical expertise of the team at the time of development. This document is intended to provide guidance and allows for professional discretion and deviation when the health care provider deems appropriate.

SCOPE: Guideline for venous thromboembolism (VTE) prophylaxis in injured adult patients

DEFINITIONS:

Goal = Time from admission

BACKGROUND:

The traumatically injured are at high risk for developing VTE, including deep vein thrombosis (DVT) of the femoral veins, iliac veins, and vena cava as well as pulmonary embolism (PE). Certain injuries, procedures and venous lines increase the risk of upper extremity DVT because of endothelial injury and prolonged immobility. Although the risk begins with the traumatic event, it increases within the first 24-48 hours after injury. DVT is seen in 69% of lower extremity fractures, 62% of spine fractures, 54% of major head injuries, and 40% of patients with blunt thoracoabdominal trauma. As such, it has become national standard to begin VTE prophylaxis no later than 48 hours from admission. Contra- indications for prophylaxis are rare events and aggressive efforts to initiate DVT prophylaxis should be maintained.

MANAGEMENT MECHANICAL PROPHYLAXIS:

Sequential Compression Devices (SCD)

SCDs cannot be recommended as ROUTINE prophylaxis in trauma patients, due to lack of data. SCDs may be useful in patients with intracranial hemorrhage or patients who are at high risk for bleeding when chemical prophylaxis cannot be used.

- Special populations in which SCDs would not be suggested:
- History of peripheral vascular disease
- Acute DVT (within 1 month of admission)
- Concern for compartment syndrome or crush injury
- Open or complex lower extremity fractures

PHARMACOLOGIC PROPHYLAXIS FOR PATIENTS WITH POLYTRAUMA (TRAUMA SURGERY SERVICE):

Low molecular weight heparin (LMWH) in injured patients has been demonstrated to be superior to unfractionated heparin (UFH) in preventing DVT and PE. (GOAL: administration in <6 hrs of arrival unless noted below)

Dose Adjustments: Enoxaparin (LMWH) dosing will be based on Estimated Blood Volume - EBV (see addendum) unless EBV is <3.0L.

- Current Contraindications to early initiation of LMWH prophylaxis include the following:
- Active intracranial hemorrhage
- Incomplete spinal cord injury with associated peri-spinal hematoma
- Ongoing, uncontrolled hemorrhage or hemodynamic instability
- Uncorrected coagulopathy
- Early transition to comfort/palliative care (i.e., within 3-4 days of admission)

PHARMACOLOGIC PROPHYLAXIS FOR PATIENTS WITH ISOLATED FRACTURE (ORTHO TRAUMA SURGERY SERVICE):

- Aspirin 81 mg orally BID is recommended for VTE prophylaxis for most patients
- Conditions where recommend anticoagulation prophylaxis (apixaban 2.5 mg BID, rivaroxaban 10 mg daily, or Enoxaparin (LMWH) dosing based on Estimated Blood Volume - EBV (see addendum) unless EBV is <3.0L.)
    - Previous VTE
    - Active Cancer/Undergoing chemotherapy or hormonal therapy
    - Thrombophilia: known hypercoagulable states (protein C, protein S, antithrombin, Factor V Leiden, prothrombin gene mutation, antiphospholipid antibody syndrome) OR ≥2 1st degree family members with thrombosis.
    - Sickle cell disease
    - Contraindication for aspirin (e.g. peptic ulcer disease, Roux-en-Y gastric bypass, allergy)

SPECIAL POPULATIONS:

1. Pelvic, Hip, Femur or Tibia fractures: will be expected to have chemical prophylaxis on day of admission
2. AKI/CKD: For those with reduced CrCl (<30 ml/min) - Unfractionated Heparin 5,000 units three times daily is recommended over LMWH
3. Solid Organ Injury: prescribe pharmacologic prophylaxis to trauma patients with solid organ injuries within 24 hours of admission if there is no evidence of ongoing bleeding

4. Traumatic NON-OPERATIVE Brain Injury: Start VTE prophylaxis with LMWH in all patients with traumatic brain injury after repeat imaging of the brain is stable and at least 24hrs from admission*
5. Traumatic NON-OPERATIVE Brain Injury with Monitor: Start VTE prophylaxis with LMWH (while monitor is in place) in all patients with traumatic brain injury and external monitor after repeat imaging of the brain is stable. Hold prophylaxis dosing for 12 hours post placement and 12 hours before removal of monitor*
6. Traumatic Operative Brain Injury: Initiate VTE prophylaxis if Head CT 48 hr post op is stable
7. NON-OPERATIVE Spine Trauma: VTE prophylaxis is safe in spine injury patients and should be initiated at 24hr if there is no epidural hematoma or progressive neurologic deficit. LMWH is preferred for prophylaxis*
8. OPERATIVE Spine Trauma: VTE prophylaxis should be held prior to operative intervention. VTE prophylaxis should be initiated 48 hours post operatively. LMWH is preferred for prophylaxis*
9. Epidural Catheter (Guideline: Use of Antithrombotic Medications In The Presence of Neuraxial Anesthesia):

Holding Doses

- Hold LMWH prophylactic dose 12 hours prior to placement or removal (if 40mg daily or 30 mg BID or less), can be resumed 4 hrs post removal*
- Hold UFH prophylactic dose (5000 units) 4-6 hours or for (7500 units) 12 hours prior to placement or removal of epidurals, can be resumed immediately after removal

Initial Dosing

- Use of UFH 5000 units or 7500 units TID is safe for prophylaxis while epidural is in place
- Initial prophylaxis dose can be given immediately after placement (UFH) or 12 hours after placement (LMWH). Only LMWH 40 mg daily is allowed with an indwelling catheter. BID dosing is contraindicated. Alternative Agent Dosing
- ASA use is up to 325mg is safe before, during and after epidural use. Plavix and Warfarin are contraindicated. Plavix can be initiated immediately after removal of epidural, or 6hrs after if loading dose.
- For other medications contact RAAPS/Anesthesia for recommendations.

10. IVC filter: Should be considered for patients diagnosed with a DVT/PE who cannot be therapeutically anticoagulated

***If providers are deviating from these guidelines, we request that providers document the reasoning and indicate a firm time for VTE prophylaxis initiation**

SPECIAL CIRCUMSTANCES:

1. Holding Doses: VTE events are increased by holding doses. Pharmacologic prophylaxis should not be held unless surgery is for TBI, spine surgery, epidural placement or removal or a greater than minimal risk IR/ARP procedure (see procedural or department guidelines on the Anticoagulation Scout Page for definitions)
2. General Trauma Discharge Dosing: Pharmacologic prophylaxis with Aspirin (81mg Q day) should be considered after discharge for high-risk patients (TBI, spine, those who major surgeries including chest, abdomen, pelvis) for a period of 3 months
3. Ortho Discharge Dosing: ASA (81mg BID) or anticoagulant prophylaxis (LMWH BID, Eliquis 2.5mg BID, Xarelto 10mg QD) for 30 days prophylaxis dosing is indicated 30 days post injury/op for:

    -Distal lower extremity fracture requiring immobilization above the knee

    -Tibial plateau fracture and more proximal fractures

    -All pelvic fracture and acetabular fracture

    -Bilateral LE fracture or combined LE and UE fractures who are non-weight bearing (because their immobility will be significantly reduced having 2 involved extremities)

    -ASA 81mg BID does not need to be held for staged fixation of pilons, plateaus, etc

    If a patient is discharging from the ED to home or not admitted to Ortho service, Ortho to communicate prophylaxis recommendations directly to the ED, and document in their consult/sign off note

4. **Patient Cannot be on Medication Based Prophylaxis**: Consider US to screen for DVT within 4 days of admission and prior to discharge especially for immobile, high-risk patients

MOBILITY AND ACTIVITY:

A culture of mobility will be encouraged and expected for ALL traumatically injured patients. It is recommended that patients should begin ambulating within 24 hours of admit.

- Goal would be to ambulate three times daily /out of bed to chair for meals
- If trauma dedicated PT/OT teams are not available, then trauma specific education for PT/OT therapists should be available

ATTACHMENTS:

A. EBV Estimation Charts
B. Contraindications to LMWH, DOAC, ASA Prophylaxis Guidance

RELATED DOCUMENTS (posted on internal Froedtert Pharmacy page):

Link to Anticoagulation Management Page (internal link)

Guideline: Use of Antithrombotic Medications In The Presence of Neuraxial Anesthesia

Guideline: Use of Antithrombotic Medications Periprocedural for Vascular Interventional Radiology, Advanced Radiology Practice, and Neuroradiology Procedures

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ATTACHMENTS

A. Estimated Blood Volume (EBV)–Based Dosing Guideline for Enoxaparin VTE Prophylaxis in Trauma Patients

1. Determine if patient has any contraindications to starting enoxaparin VTE prophylaxis and should instead receive subcutaneous heparin:
   a. Acute or chronic renal dysfunction with CrCl < 30 mL/min
   b. Estimated blood volume less than 3.0 liters
2. Place order for SQ enoxaparin (either 30 mg, 40 mg, or 60 mg) twice daily per EBV dosing table (or use online calculator: https://www.easycalculation.com/medical/blood-volume.php)

Estimated Blood Volume	Enoxaparin Dose
3.0 – 4.9 L	30 mg twice daily
5.0 – 6.9 L	40 mg twice daily
≥ 7.0 L	60 mg twice daily

FEMALES:

Ht (ft.in)	Ht (in)	Wt* (kg)	EBV (L)	Enoxaparin Dose
4'10"	58	51	3.0	30 mg twice daily
4'11"	59	49	3.0	
5'0"	60	48	3.0	
5'1"	61	46	3.0	
5'2"	62	44	3.0	
5'3"	63	42	3.0	
5'4"	64	40	3.0	
5'0"	60	108	5.0	40 mg twice daily
5'1"	61	106	5.0	
5'2"	62	104	5.0	
5'3"	63	102	5.0	
5'4"	64	100	5.0	
5'5"	65	98	5.0	
5'6"	66	95	5.0	
5'7"	67	93	5.0	
5'8"	68	91	5.0	
5'9"	69	88	5.0	
5'10"	70	86	5.0	
5'6"	66	156	7.0	60 mg twice daily

MALES:

Ht (ft.in)	Ht (in)	Wt* (kg)	EBV (L)	Enoxaparin Dose
5'0"	60	34	3.0	30 mg twice daily
5'0"	60	50	3.5	
5'6"	66	83	5.0	40 mg twice daily
5'7"	67	80	5.0	
5'8"	68	78	5.0	
5'9"	69	76	5.0	
5'10"	70	73	5.0	
5'11"	71	70	5.0	
6'0"	72	67	5.0	
5'6"	66	145	7.0	60 mg twice daily
5'8"	68	140	7.0	
5'9"	69	138	7.0	
5'10"	70	135	7.0	
5'11"	71	132	7.0	
6'0"	72	130	7.0	
6'1"	73	127	7.0	
6'2"	74	123	7.0	
6'3"	75	120	7.0	

*NOTE: Always use the patient's "dry weight" for EBV calculation (i.e. documented pre-operative weight or the lowest measured weight within the first ten days of admission).

** Pharmacy will adjust the LMWH dosing accordingly to match EBV dosing schedule through use of the collaborative practice agreement and a verbal order from the attending of record.

B. Contraindications to LMWH, DOAC, ASA Prophylaxis Guidance

Contraindications to enoxaparin (Lovenox):

- Active major bleeding
- Recent ICH
- Severe HTN
- Hemophilia/hemorrhagic disorder
- Heparin induced thrombocytopenia
- Peptic ulcer disease
- Recent Sx to eye or nervous system
- Hypersensitivity to enoxaparin, heparin or pork
- Risk outweighs benefit as determined by clinician

Contraindications to aspirin:

- Active major bleeding
- Peptic ulcer disease/hx of GI bleed

Contraindications to DOACs:

- Active major bleeding
- Recent ICH
- Severe HTN
- Hemophilia/hemorrhagic disorder
- Peptic ulcer disease
- Recent Sx to eye or nervous system
- Risk outweighs benefit as determined by clinician

Permanent VTE Risk factors:

- Hormone therapy
- Personal or 1st degree relative hx of VTE
- Active smoker
- Pregnant or immediately post partum*
- Serious medical comorbidity including CHF/COPD/CKD/IBD
- Extensive varicosities
- Active Cancer
- Obesity (BMI > 30)
- Known thrombophilia
- Age > 60