BACKGROUND

Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) affect approximately 900,000 people in the United States each year. The incidence of DVT in trauma patients may range from 5% to 63% depending on the patient's risk factors and type of prophylaxis. Therefore, an aggressive approach to prevention of thromboembolism is warranted on the trauma service.

RISK FACTORS FOR DVT

These factors include:

1. Age $\geq$ to 40
2. Lower extremity fracture with abbreviated injury score (AIS) $\geq$ 3
3. Ventilator days > 3
4. Head injury with AIS $\geq$ 3
5. Venous injury
6. Major operation
7. Blood transfusion
8. Spinal cord injury
9. Obese patient

WHO RECEIVES PROPHYLAXIS?

Some authors have developed scoring systems in an attempt to categorize patients as low or high risk for the development of DVT/PE. Unfortunately, it is unclear which risk factor or combinations of risk factors in various trauma patients will consistently predict the probability of DVT/PE. Risk assessment scoring systems can also be cumbersome to use in a busy trauma center especially the AIS component as it is performed by the registrars and is not available to the trauma team in the ER. Additionally, patients that are initially scored as minor risk may develop complications and ultimately fall into the high-risk category.

> *Due to the complexity of trauma patients and the above noted risk factors, every trauma patient should be considered a candidate for prophylaxis with sequential compression devices and if there are no major bleeding risk should also receive pharmacologic prophylaxis. Chemical prophylaxis should begin within 24 hrs. of admission if possible. Exceptions may include isolated hand and minor facial fractures who are ambulatory*.

MECHANICAL PROPHYLAXIS

Intermittent pneumatic sequential compression devices (SCDs) are the main form of mechanical prophylaxis. These should be ordered on admission to the trauma center for all patients. Possible contraindications are:

1. Suspected DVT, SCD may potentially dislodge clot
2. Lower extremity fracture
3. Lower extremity compartment syndrome
4. Lower extremity complex soft tissue injury

Foot pumps are another type of mechanical compression device that may be a second line therapy if SCDs are not available.

PHARMACOLOGIC PROPHYLAXIS

Multiple agents exist for prophylaxis. The two most common at this institution are heparin (UFH) and low molecular weight Heparin (LMWH). First line pharmacologic prophylaxis should be with LMWH as it has

been found to be more efficacious in preventing thromboembolism in the trauma population.

Pharmacologic prophylaxis should be used in addition to SCDs in all patients unless there is a significant bleeding risk or for the few exceptions such as isolated hand or minor face fractures.

1. Use LMWH (Enoxaparin) as chemoprophylaxis unless CrCl is <30ml/min.
2. Please refer to VTE Prophylaxis algorithm for dosing, timing and contraindications.
3. For patients scheduled for Orthopedic surgery/procedure: VTE prophylaxis will be continued to be given during the full course of the patient's hospital stay including the day of surgery. Eye, brain and spine surgeries are the ONLY exceptions. MD will be notified by staff if VTE prophylaxis is held/not given for any reason.

VENA CAVA FILTERS

The classic indications for vena cava filter (VCF) placement are in patients with an acute proximal DVT who had a contraindication to receive Heparin, who had a bleeding complication during Heparin treatment, or who had a PE despite appropriate anticoagulation. There is no level I or level II recommendation about insertion of a prophylactic VCF. However, the Eastern Association for the Surgery of Trauma supports insertion of a prophylactic filter in patients considered very high risk for DVT/PE who must be immobilized for a long period of time and cannot receive anticoagulation because of increased bleeding risks.

SCREENING

Universal scheduled ultrasound screening for asymptomatic DVT is not supported in the literature.

Patients that were admitted to an outside hospital for several days and subsequently transferred to our trauma center should be considered for a screening ultrasound.

Also, patients that were unable to have any prophylaxis within the first week of admission should be considered for a screening ultrasound.

TRAUMA/NEUROSURGERY PATIENTS WITH HIGH RISK FOR BLEEDING COMPLICATIONS

Where pharmacological prophylaxis is contraindicated the following guidelines apply:

a. ***Neurosurgery*** patients: where there is a concern for active bleeding or re-bleeding and pharmacologic prophylaxis may be contraindicated initiate mechanical prophylaxis. Pharmacologic prophylaxis (LMWH) is to be reassessed q 24 hours and may be initiated when there are no clinical or radiological signs of active bleeding. Pls. refer to Trauma TBI Guidelines.
b. ***Trauma*** patients: where there is concern for ongoing bleed, where pharmacologic prophylaxis is currently contraindicated, start with mechanical prophylaxis and reassess q 24 hours for clinical signs of active bleeding. When risk of bleeding has decreased to low, use LMWH.

RISK OF THROMBOSIS VERSUS RISK OF TREATMENT

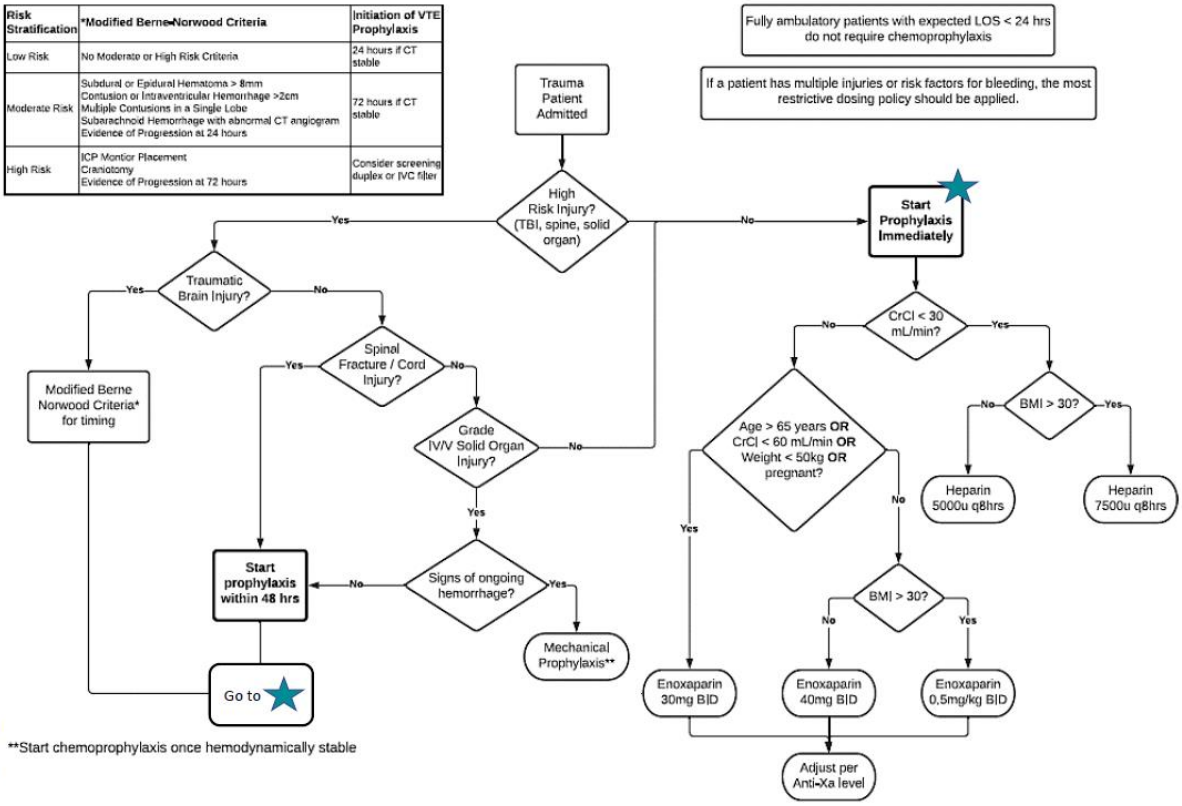
These patients are complicated in the fact that they are high risk for DVT/PE and at the same time have injuries that result in significant blood loss; therefore, it is important that the treatment is individualized for each patient with close collaboration between the various subspecialties.

Atrium Health

Atrium Health Navicent Medical Center Trauma Services

MODIFIED AAST/ ACS-COT Clinical Protocol for Inpatient VTE Prophylaxis After Trauma (≥ 15 yo)

Risk Stratification	*Modified Berne-Norwood Criteria	Initiation of VTE Prophylaxis
Low Risk	No Moderate or High Risk Criteria	24 hours if CT stable
Moderate Risk	Subdural or Epidural Hematoma > 8mm Contusion or Intraventricular Hemorrhage >2cm Multiple Contusions in a Single Lobe Subarachnoid Hemorrhage with abnormal CT angiogram Evidence of Progression at 24 hours	72 hours if CT stable
High Risk	ICP Monitor Placement Craniotomy Evidence of Progression at 72 hours	Consider screening duplex or IVC filter



**Start chemoprophylaxis once hemodynamically stable

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Reference:
Yorgitis et al. AAST / ACS-COT Clinical Protocol for inpatient venous thromboembolism prophylaxis after trauma. *J Trauma Acute Care Surgery*. 2021;92:597-604.

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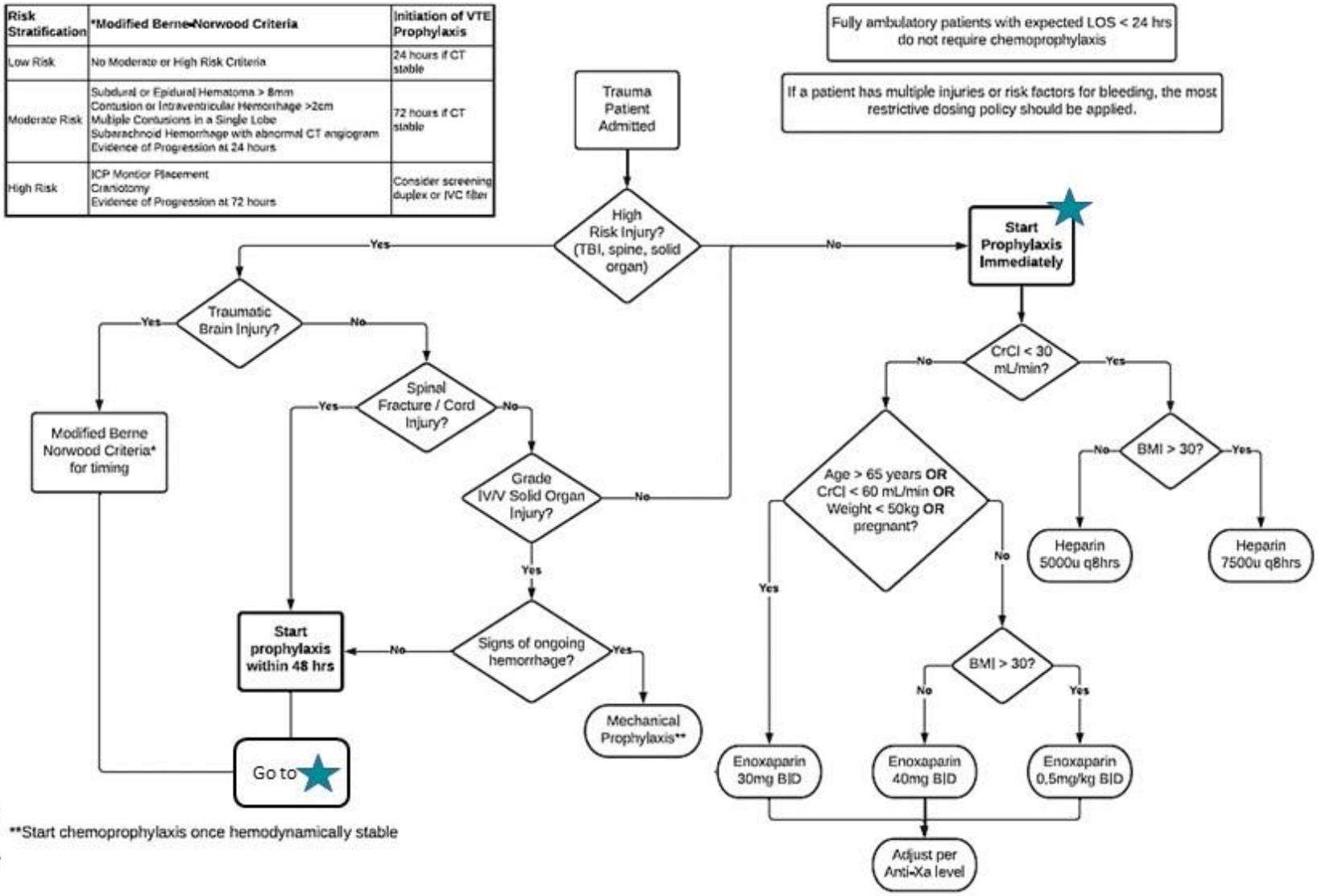

**Start chemoprophylaxis once hemodynamically stable

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