Title: Evaluation of enoxaparin dosing for VTE prophylaxis in heavier and underweight populations

Purpose:

To evaluate the efficacy and safety of a weight-based protocol in VTE prevention for obese patients in comparison to a BMI-based protocol and to evaluate the safety of standard enoxaparin dosing in underweight patients

Methods:

This study is a retrospective analysis of obese and underweight patients admitted from January 2010-October 2020. Patients were considered heavier if they weighed ≥ 100 kg and/or had a BMI ≥ 40 kg/m^2. Patients are considered underweight if they weighed < 55 kg and/or had a BMI < 18 kg/m^2. Patients included must be at least 18 years or older, have met one of the previously mentioned weight cutoffs, and received at least 3 consecutive enoxaparin administrations of the same dose and frequency. Patients were excluded if they were on anticoagulation prior to admission, had a positive Covid-19 PCR test on admission, a history of VTE, or a creatine clearance less than 30 mL/min. Data collected included patient demographics, measurements, past medical history involving comorbid conditions that increased risk for bleeding or clotting, medications on admission that increased risk for bleeding or clotting, and data from admission involving enoxaparin administration and bleeding/clotting. The primary outcome was rate of venous thrombo-embolism (VTE) development during hospital stay among each individual patient groups. Secondary outcomes included rate of bleeding events, provider adherence rate to protocol, and average anti-Xa level.

Results:

Per Saint Luke's weight-based protocol, VTE was lowest when the protocol was followed (0.63% VTE rate) when compared to encounters who were received an inferior dose per protocol (1.02% VTE rate). Encounters receiving a superior dose did not show an improvement (1.08% VTE rate). There was no increased bleeding rate in encounters receiving higher doses of enoxaparin when compared to the weight-based protocol. Per the reference BMI-based protocol, VTE rate was lowest when the patient was dosed higher than the reference protocol (0.48%). Laboratory-suspected bleed rate (19.9%) was highest in the superior dose group although there was not a clear trend to confirm an increased bleed risk as transfusion rate (3.45%) and confirmed bleed rate (0.95%) was lower when compared to the equivalent dose group. Bleeding risk was minimalized when dosing below the reference protocol (lab suspected bleed rate=15.7%, transfusion rate=4.73%, confirmed bleed rate=0.71%).

When examining underweight dosing, there was a lower VTE rate in encounters receiving 40 mg daily (0.71%) when compared to 30 mg daily (0.94%). There was no increased bleeding risk when examining laboratory suspected bleed rate, transfusion rate, and confirmed bleed rate.

Conclusion:

In patients receiving enoxaparin for VTE prevention, a weight-based approach to increasing daily dose with increasing weight should be utilized. A standard binary approach to enoxaparin dosing with a BMI cutoff was shown to be inferior in VTE prevention when compared to the tiered-system approach to weight-based dosing. There was no increase in bleed risk when utilizing a weight-based approach. It is reasonable to dose the underweight population

with standard 40 mg daily of enoxaparin if no other risk factors for bleeding are present. A more robust sample size for underweight population specifically patients receiving 30 mg daily is needed to further assess the safety and efficacy of various enoxaparin doses.