Title: Evaluation of time to heparin continuous infusion rate adjustment in response to partial thromboplastin time at a community hospital

Background: Unfractionated heparin is an anticoagulant with a fast onset and offset of action that is often used in the treatment of acute coronary syndromes and venous thromboembolism. Heparin infusions require frequent laboratory monitoring by collecting partial thromboplastin time (PTT) and adjusting infusion rates to achieve a targeted therapeutic range. The objective of this study is to evaluate the time to heparin rate adjustment from laboratory charting an out of range PTT level to heparin infusion rate adjustment by nursing staff.

Methods: This was a single-center retrospective study approved by the Institutional Review Board. Patients were included if they were 18 years or older, had an order for heparin continuous infusion using the venous thromboembolism (VTE) or acute coronary syndromes (ACS) protocols, had at least one out of range PTT, and were admitted from May 1, 2019 to July 31, 2019. Exclusion criteria include patients with no rate adjustment documented or the infusion stopped before a PTT was drawn. The electronic medical record system was utilized to collect the following data points on each out-of-range PTT level: PTT level, time of PTT level result, indication for heparin use, time of infusion adjustment, nursing unit, department drawing the PTT level, and rate adjustment. All data was recorded without patient identifiers and maintained confidentially.

Results: One hundred and two patients had a combined 257 out of range PTTs during the study period. The average time to rate adjustment for all PTTs was 50 minutes. Seventy-nine patients (77%) were placed on the ACS protocol and 23 patients (23%) were placed on the VTE protocol. Eighty percent (155/193) of PTTs from the ACS protocol were subtherapeutic, whereas 67% (43/64) of PTTs from the VTE protocol were supratherapeutic. Sixty-six percent of patients on the ACS protocol (52/79) were started on the correct infusion rate. The time to rate adjustment was higher in the ACS protocol compared to the VTE protocol, 52 minutes vs. 42 minutes, respectively. Critically high PTT values that required verbal notification to nursing staff had a shorter time to rate adjustment than non-critically high PTT values, 31 minutes vs. 44 minutes, respectively.

Conclusions: Several opportunities for improvement were identified from this study. Pharmacy staff will explore opportunities to improve the accuracy of initial infusion rate through collaboration with nursing staff education. Laboratory policy compliance will be reviewed, as nursing staff was inconsistently being notified by laboratory staff of critical PTT values. Finally, to help reduce rate adjustment times for low PTTs, the option to add critical low PTT values to the ACS and VTE protocols will be investigated.

Learning Objective: Identify opportunities to improve overall compliance with nursing-driven heparin protocols for acute coronary syndromes (ACS) and venous thromboembolism (VTE).