Rates of pharmacist intervention utilizing an enoxaparin system list

Authors: Josh Rumph PharmD, Stacy Dalpoas PharmD MPH BCPS, Jacky Olin PharmD MPH BCPS
Practice Site: Novant Health Forsyth Medical Center Winston Salem, NC
Background: Venous thromboembolism (VTE) is estimated to affect up to 900,000 adults annually in the United States. 70% of these events are estimated to be preventable, with only 50% of patients estimated to receive appropriate chemoprophylaxis. Low molecular weight heparins, and specifically enoxaparin, are recommended as first line agents for the treatment and prevention of VTE in hospitalized adults. Enoxaparin is one of the most commonly administered medications in hospitalized patients and can require extensive monitoring by clinical pharmacists. Clinical pharmacists are responsible for ensuring the safety and efficacy of enoxaparin in hospitalized patients to prevent hospital-acquired VTE as well as bleeding events. Many hospital systems utilize pharmacy informatics to enable pharmacists to monitor enoxaparin therapy more effectively. Novant Health utilizes what will be referred to here as an enoxaparin system list. This enoxaparin system list scores patients with active enoxaparin orders according to the presence of one or more "triggers" which indicate that pharmacist intervention may be required. Pharmacists can then make changes per the enoxaparin protocol, reach out to providers with recommendations, order anti-Xa levels, actively monitor, or choose not to intervene.
Objective: The primary objective of this study was to assess the rate of pharmacist interventions made utilizing an institutional enoxaparin system list. Secondary objectives include assessing the frequency of individual list triggers, the rates of pharmacist intervention of individual list triggers, as well as the outcomes of pharmacist interventions on these list triggers.
Methods: This was a single center, observational, retrospective chart review performed at a 941 bed community hospital from February 7, 2022 to February 20, 2022. Included patients were $\geq$ 18 years of age, admitted to an inpatient unit, and had a score of $\geq$ 1 per an institutional enoxaparin system list within the electronic medical record (EMR). Subjects were excluded if they were identified to be receiving a non-standard enoxaparin dose for the treatment of COVID-19. Subjects were identified via a daily review of the enoxaparin system list. Interventions were evaluated via review of EMR documentation and enoxaparin orders. The primary endpoint was percentage of triggers resulting in pharmacist intervention. Secondary endpoints included frequency of individual list triggers, rates of pharmacist intervention of individual list triggers, and outcomes of identified pharmacist intervention.
Results: 1,021 triggers were identified during the study period. 54 triggers were excluded for non-standard enoxaparin doses for COVID-19 treatment. 63 triggers did not undergo documented pharmacist review and so were also excluded. 895 triggers between 206 patients were included in the final analysis. The primary endpoint of percentage of triggers resulting in pharmacist intervention resulted at 30.6% (274/895). The most common triggers included weight/CrCl and dose mismatch (211), prophylactic treatment requiring labs (154), low/decreased hemoglobin (137), and low/decreased platelet count (126). The triggers most commonly intervened upon were daily treatment dosing in CrCl>29 mL/min (72.2%), CrCl<15 mL/min (71.8%), Recent anti-Xa level (66.7%), anti-Xa level needed (57.1%), and weight/CrCl and dose mismatch (43.6%). 58% of interventions were dose changes per-protocol, 18.6% active monitoring, 15.3% recommendation to provider, and 4.3% anti-Xa level ordered.

Conclusion: The overall pharmacist intervention rate when evaluating enoxaparin system list triggers was 30.6%. Notably, the most common triggers were triggers that could often result multiple days in a row without being resolved, such as patients with low hemoglobin or platelets, as well as patients

receiving prophylactic dosing who are not having labs collected frequently. In contrast, the triggers most likely to be intervened upon were triggers which indicated a more specific need such as dose mismatches, need to order or evaluate an anti-Xa level, or renal function contraindicating enoxaparin use. Notably, the most common intervention was pharmacist per-protocol dose adjustment and many of the most commonly intervened upon triggers were triggers which allowed for pharmacist per-protocol action. These data overall demonstrate the value of utilization of an enoxaparin system list as a tool for monitoring enoxaparin therapy. Further, the high rates of per-protocol interventions suggest the ability for pharmacists to intervene in this fashion would positively impact the efficiency and efficacy of a drug monitoring program.