Letter to the Editor

Importance of Interdisciplinary Collaboration Regarding Updated Activated Partial Thromboplastin Time Reporting for Heparin

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To the Editor:

Heparin is an indirect anticoagulant. The majority of its anticoagulation effect is due to the binding of heparin to antithrombin, which in turn inactivates coagulation factors IIa and Xa.¹ Only one-third of heparin molecules administered to a patient have any anticoagulant effect, and the variance in chain length contributes to whether it binds to antithrombin over factor Xa.¹ Shorter molecules bind to factor Xa, which contributes to the difference in anti-factor Xa units and activated partial thromboplastin time (aPTT) measurements in vivo.¹ This activity is particularly useful in patients with or at increased risk for a venous thromboembolism (VTE) or patients with coronary heart disease.^{1,2}

In practice, there are multiple ways to determine therapeutic aPTT levels in patients on heparin therapy. The tests currently available for measuring the extent of coagulation with heparin include aPTT or antifactor Xa (anti-Xa) level assays or a direct measurement of heparin concentration using protamine titration. Anti-Xa assays are associated with lower rates of variability in comparison to aPTT levels, and many institutions have begun to transition from the traditional aPTT laboratory tests to the newer anti-Xa assays.³ Variations in results between each facility are found with the commercially available reagents that are used to perform each test.^{1,2} Due to the variations, each laboratory is required to calibrate their tests on a regular basis against plasma heparin concentrations for accurate utilization of the tests in therapy.^{1,2}

According to the *Chest* 2012 guidelines for anti-thrombotic therapy and prevention of thrombosis, standard practices for heparin use require individualized dose adjustments based on monitoring of aPTT levels.² Monitoring coagulation in patients on heparin is necessary for adequate therapy and safety, as subtherapeutic levels increase the risk for the patient to acquire a clot and supratherapeutic levels increase the risk for the patient to develop a bleed.²

Any heparin order sets for continuous intravenous infusion should be facility-specific and incorporate the most recent therapeutic aPTT levels. This is necessary due to the variation between labs regarding the therapeutic reference range. Heparin rate adjustments and bolus dosing are adjusted according to an institution-specific protocol or a practitioner's order with appropriate aPTT reference ranges. Order sets also serve as reminders to health care providers involved in the care of patients on heparin therapy to ensure that all aspects of heparin therapy are being monitored. Key elements to incorporate in these facility protocols include the required labs to be drawn (ie, CBC, aPTT), how often to draw them, algorithms for determining bolus and maintenance heparin doses, and parameters for which a physician should be notified.

All reference lab values in any protocol/order sets should be updated with the periodic recalibration of the lab tests, as even a 1% error can lead to a much larger problem.⁴ Once these data are available to the laboratory, communication to the appropriate

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departments, such as pharmacy and any physician groups, is of the utmost importance. Sharing this information allows for all hospital order sets/protocols to be updated, resulting in patients receiving a heparin infusion with the most current and accurate aPTT reference ranges.

Collaboration is key in order to provide excellent patient care, and any breakdown can lead to negative outcomes.⁵ If order sets are not updated with the scheduled recalibration of lab tests, patients can be under- or overdosed with heparin. Risks of underdosing include potentially fatal events such as the formation or promulgation of clots, whereas overdosing can lead to serious bleeding events. Although the adjustments of these numbers may not seem significant from one year to the next, cumulative changes may be drastic. The accuracy of an order set/protocol directly impacts the decisions a health care provider makes, which is why interprofessional communication and collaboration is essential for exceptional patient care and outcomes. For example, a patient may have a therapeutic aPTT range, but if the protocol has not been updated, adjustments may be made to the heparin infusion rate when it is not needed.

At our facility, the following steps have worked well for interdisciplinary collaboration. Once the lab aPTT values have been updated, a communication is made to the pharmacy department and the appropriate committees, such as the Deep Vein Thrombosis Prevention Committee, Pharmacy and Therapeutics (P&T) Committee, or Forms Committee, overseeing the heparin infusion protocol. After the notification has been made, the committees review the new aPTT therapeutic values and approve the change on the protocol/order sets accordingly. If the committee is not scheduled to meet, a vote via e-mail or a brief meeting is called to approve or deny the changes so

as not to delay appropriate therapy to patients. At the next meeting, the topic may then be formally introduced. Once the appropriate committees have approved the updated laboratory data, all documents with older data are revised. Utilizing an interdisciplinary approach for implementing changes to our hospital protocol or procedure has resulted in better patient care by providing accurate order sets.

By having processes in place for increased collaboration between lab and pharmacy departments, the pharmacy department will know when the lab has updated the aPTT therapeutic range for patient care optimization. Each facility may wish to review their current practice to determine whether it is appropriate or whether a change needs to be made.

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