

# Using Automated Heparin Protocols and CPOE to Reduce Errors

When the Joint Commission adopted a National Patient Safety Goal requiring hospitals to reduce the likelihood of patient harm from the use of anticoagulants, St. Clair Hospital in Pittsburgh, Pennsylvania, swiftly mobilized and seized the opportunity to improve patient care. In fall 2007, the 329-bed hospital collected and analyzed data on anticoagulant medication occurrences over the preceding 2 years. According to the Institute for Safe Medication Practices, a medication occurrence “is any error occurring in the medication use process,” whether or not the error was detected and corrected before the medications were administered or any harm was caused. Based on its analysis, St. Clair determined that heparin infusions accounted for the highest percentage of anticoagulant medication occurrences. Through process mapping, St. Clair targeted opportunities for improvement:

- **Medication administration complexity.** Determining the appropriate heparin infusion dose and dispensing rate is inherently complex. Dosing is determined through calculations based on patient weight and activated partial thromboplastin time (aPTT) value. The aPTT is determined by a blood test and is performed every 6 hours. The heparin infusion rate is adjusted with each new aPTT value until the aPTT reaches the goal range and is stable. Calculations were performed manually.
- **Number of heparin protocols.** St. Clair had six heparin protocols, requiring nurses to adjust dose and rate half-a-dozen different ways. Choosing from

among six protocols could create confusion.

In 2007, the facility formed the Anticoagulation Safety Team to review the processes and recommend corrective action. To build support, facilitate implementation, and ensure the adoption of best practices, every constituency using or affected by the heparin initiative had at least one representative on the team.

The Anticoagulation Safety Team evaluated all six protocols and determined that four updated evidence-based versions would meet all patient needs. St. Clair also opted to work closely with its hospital information systems (HIS) department, to activate clinical decision support capabilities within the EHR installed at the hospital. Adding clinical decision support rules ensures that the ordering and calculation processes work seamlessly. This collaboration included tasking HIS to hardwire the protocols and alerts into the EHR. HIS also incorporated into the system the capability of automated calculations—pulling a patient’s weight and aPTT value to automatically calculate the correct dosage and rate, thus eliminating error-prone manual processes. In order to provide complete patient care, HIS automated orders for all other required laboratory tests as well as timely reminders for the unit secretaries to renew these orders. Duplicate

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laboratory orders are addressed by the system at the time of entry. Heparin protocol entry was specifically designed for computerized physician order entry (CPOE) as well as nurse, unit secretary, or pharmacist entry, and serves the unique needs of all disciplines.

Using evidence-based standards and best practices with enabling technology to revise and automate the heparin infusion protocols, as well as providing education for all clinical disciplines, St. Clair decreased heparin occurrences by 43% on the inpatient units during its fiscal year ending June 30, 2009. A heparin occurrence is considered any error occurring in the medication use process whether or not it actually reaches the patient. An additional 25% reduction hospital-wide is expected this fiscal year ending June 30, 2010.

## ED Challenges

St. Clair rolled out the new system to the inpatient units in July 2008 and the emergency department (ED) in October 2008. The system yielded benefits almost immediately. However, improvement was slower to materialize in the ED.

## TECHNOLOGY OVERVIEW

To improve the safety and delivery of care, St. Clair Hospital uses a wide variety of Eclipsys Sunrise Enterprise™ solutions, including the company’s acute care, emergency care, ambulatory care, charting and performance management solutions, as well as utilizing the company’s revenue cycle solutions and outsourcing and remote hosting services.

The introduction of the heparin infusion protocols coincided with the roll out of CPOE in the ED. One type of error occurred when ED physicians inadvertently selected a maintenance heparin protocol in the EHR instead of an initial dosing protocol when initiating heparin therapy. To mitigate this problem, the system alerts the user when a maintenance protocol is ordered without a prior order for the initial dosing protocol, thus preventing inadvertent selection by the physician or other health care provider.

Physician outreach, along with numerous software programming changes to reduce errors and improve CPOE workflow, promoted physician confidence and efficiency. The result of this endeavor was improved patient safety. There have been zero heparin infusion occurrences in the ED over the last 12 months.

### **Widespread Nursing Acceptance**

As with any change, a learning curve was anticipated. Staff, however, embraced the heparin process after seeing how it saved time and reduced stress. Nurses loved the ease of use and automated calculations that ensure proper dosing.

St. Clair provided multi-faceted education and training to obtain nursing buy-in and competency. This training support included one-on-one consultations, mandated independent study, "quick-read" newsletters, and other materials such as screen shots to detail the new procedures and why they were needed. Similar tools are used whenever the protocols are refined. These educational efforts helped propel a dramatic reduction in heparin infusion occurrences during the past year-and-a-half.

Although the catalyst for St. Clair's initiative was the Joint Commission's National Patient Safety Goal, the experience underscored that constant monitoring and updating of clinical protocols and leveraging technology resources are key to improving patient safety. This proactive approach is critical because best practices, standards, regulations,

and reporting requirements evolve over time. By periodically reviewing and updating protocols and workflows and identifying how technology can support their adoption, hospitals can quickly identify and shore up potential weaknesses. **IPSQH**

*Both authors work at St. Clair Hospital in Pittsburgh, Pennsylvania.*

**Amy Georgulis** is a clinical pharmacy specialist and served as the team leader for the Anticoagulation Safety Initiative. She may be contacted at amy.georgulis@stclair.org.

**Sabina Daroski** is an internal medicine specialist and served as the physician champion for the initiative. Daroski also served as president of the medical staff for two years (2008 and 2009).

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