By Dwayne J. Gallagher, PharmD, and Ronald E. Lay, MS, RPh

Cerner Millennium

PENN STATE MILTON S. HERSHEY MEDICAL CENTER, LOCATED IN HERSHEY, Pennsylvania, is a 479-bed teaching and research hospital motivated to improve patient safety, efficiently deliver high-quality care, improve our recruitment and retention of talented and dedicated personnel, and increase patient satisfaction. In 2002, we embarked on a multidisciplinary selection process to choose a vendor for CPOE, nursing documentation, and a new pharmacy system. We wanted an integrated electronic medical record that would meet the needs of physicians, nurses, pharmacists, and other clinicians in effectively delivering patient care, and based on that philosophy, we chose Cerner Millennium. The major benefit from pharmacy's perspective was Cerner's closed-loop, integrated medication process, including the PharmNet pharmacy system.

Millennium's numerous applications all utilize the same database. All of the applications use the same units of measure, routes of administration, dosage forms, and so on. They also share the same frequencies, which are crucial to the timely delivery and administration of medications. In addition, different departments share the same patient tables, order tables, documentation, allergies, problem lists, and clinical drug checking. Due to Millennium's integrated structure, the majority of medication ordering is bi-directional; medication orders can be entered, reviewed, modified, and discontinued from the PowerOrders CPOE platform or the PharmNet pharmacy information system. We cannot overstate the benefits of having every clinician utilize the same database.

Implementation

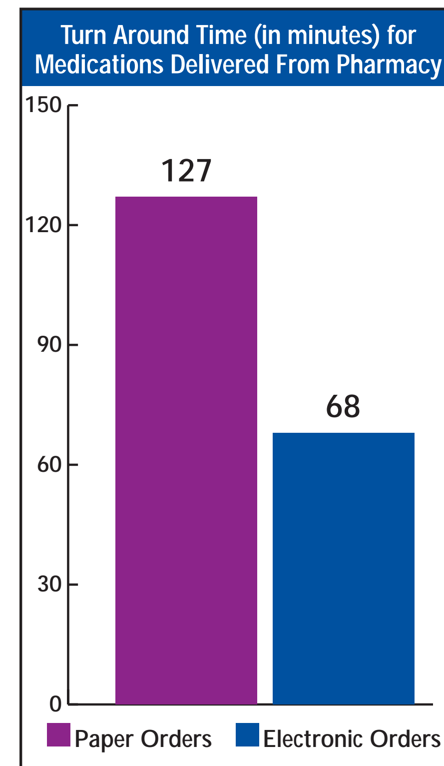
Our project's first phase was initially broken up into two major parts – A and B. Phase 1A included the rollout of PharmNet, HIS (medical records), and limited nursing documentation, such as the admission assessment, which included patient allergies and weight. During Phase 1A, medication order entry was completed in PharmNet, which, at that point, was essentially a standalone pharmacy application. One year later, in May 2005, full CPOE (including meds, labs, radiology, diet, etc.), pharmacy order verification, and full nursing documentation, including the EMAR, went live as part of phase 1B. Our house-wide go-live was an overwhelming success.

From a pharmacy perspective, the transition to verification was very smooth, due to three major factors. First, we had complete executive support for the entire project, which facilitated the adoption of the electronic medical record and CPOE and a clinical transformation. Second, our pharmacists had been using PharmNet for a full year prior to the CPOE go-live. Third, our medication-management build team, composed of pharmacy clinicians and IT analysts, was involved in the design and build of all aspects of medication integration, including ordering, dispensing, and administration, thereby maximizing the benefits of an integrated system.

A Change in Pharmacy's Perspective

The switch from order entry to CPOE required a change in perspective for the pharmacists. Gone was the "security blanket" of the written order sheet. However, pharmacy quickly realized many benefits from CPOE. The system was built to eliminate unapproved abbreviations and dose and frequency ranges, and a required field for a reason for all PRN orders brought us into compliance with regulatory requirements for order writing. Furthermore, the multidisciplinary nature of the project put the entire medical record at the pharmacists' fingertips, further ensuring medication safety.

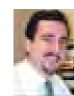
Prior to implementing PharmNet, pagers were the primary means of communication between pharmacists and nurses. Pharmacists were paged numerous times each hour for missing medications, refills, or changes from tablets to liquids, disrupting our daily workflow. With PharmNet's electronic "Med Request" function, which nurses access from the EMAR, nursing can easily and reliably communicate with the pharmacy. Pages have since decreased to only a few per day.



At first, the pharmacists felt like slaves to PharmNet's unverified orders monitor; just when you thought you were caught up, another order would populate the screen. It took a few months to get comfortable with allowing orders to queue up while focusing on other activities. After the implementation, the mean turnaround time for medications stored in automated dispensing cabinets decreased significantly, with 61% of nurses stating they can obtain their medications within 30 minutes, compared to only 15% prior to CPOE. The turnaround time for medications delivered from the pharmacy decreased from 127 to 68 minutes. (See above) Medication orders are often verified before the nurse is ready to administer them or before the patient has left the recovery room.

We experienced a 20% increase in order volume after the implementation of CPOE, because we began verifying orders for items such as flushes and plain IVs. The improved efficiency of CPOE allowed us to handle this increase with no additional staff. Orders can be verified from any computer in the medical center, allowing pharmacists to assist one another when time permits. We have also moved two pharmacists to patient care areas, where they verify orders and interact directly with physicians, nurses, and patients.

In the two years since the 1B go-live, we have implemented all the ancillary documentation modules (later named phase 1C) and a major code upgrade. In the future, we will add more applications and functionality to the system. Current and future implementations include PharmNet Retail, auto-verification, bar coded medication administration, pharmacist intervention documentation, physician documentation, ambulatory clinics, surgery, and anesthesia. Due to the integrated nature of our system and the successful clinical collaboration over the last four years, pharmacy will play a role in each of those projects. ■



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