



Implementing an Automated Medication and Supply Distribution System in an Oncology Practice

by Bruce Feinberg, D.O., Richard S. Leff, M.D., and Michael Reagan, R.Ph.

The use of automated systems in health care has been increasing over the past several years. At the same time studies in the hospital setting have shown that automated medication distribution (AMD) systems reduce the risk of medication errors and the time needed for medication administration.^{1,2} Since oncology uses more pharmaceuticals than any other branch of medicine, a medication delivery system that minimizes waste and reduces the standard drug inventory could ensure the financial viability of any large oncology practice.

Georgia Cancer Specialists (GCS) is a private oncology practice with more than 21 full-service clinics located throughout north and central Georgia. Depending on their size and location, our clinics see anywhere from 15 to 110 patients per day with 110,000 patient visits projected for 2001. Nearly 96,000 individual medication orders were written last year.

GCS clinics originally used a labor-intensive manual system for medication delivery, and our financial losses on pharmaceuticals were severe. Medications that were stable for more than 36 hours were mixed in the central pharmacy and delivered to the clinics daily, and medications with shorter periods of stability were mixed by nurses at

Bruce Feinberg, D.O., is CEO, Richard Leff, M.D., is CIO, and Michael Reagan, R.Ph., is executive vice president, Business Operations, of Georgia Cancer Specialists, which has administrative offices in Decatur, Ga.

the clinic site. Sometimes up to \$40,000 worth of prepared medications expired every day, and many unused medications were returned when low-blood-count patients had to postpone their therapy.

The drugs that were mixed in the pharmacy and sent to the clinics were labeled for specific patients. In accordance with state law, these medications could not be given to anyone else and were destroyed if they couldn't be dispensed. Low-use medications (such as IL-2, antibiotics, and emergency medications) routinely kept at the clinic would expire before they were used, although this phenomenon accounted for only 1 to 2 percent of the total loss.

Although the pharmacy was centrally located in Atlanta, delivering drugs quickly to the more distant locations (some of which were 90 miles away) was difficult.

A cumbersome, time-intensive review process for chemotherapy orders increased the risk of medication errors. Under this system, orders were written by hand and review was a manual task. The pharmacist did not have access to the patient's entire chart, which often meant calling each clinic for the information to process incomplete orders, clarify calculation errors, and avoid drug interactions. Finally, poor tracking of billable drugs resulted in missed opportunities for reimbursement.

The practice decided it needed an AMD system.

CHANGING THE SYSTEM

Although GCS is a private physician practice, it is organized like a hospital. Physicians write chemotherapy orders that are reviewed by pharmacists, filled

from a central pharmacy, and sent to off-site clinics. The AMD system selected had to be able to control access to the drugs, allow pharmacists to review the medication orders, generate reports for restocking and inventory use, and streamline the billing process.

Over a five-month period, several AMD systems were observed in area hospitals, and two were tested in a GCS office. Only one system had all the features needed including:

- An automated billing/charge capture
- Interface with an electronic medical record system
- Automatic electronic transmission of restock lists
- Daily inventory counts and usage reports
- Optional pharmacy order entry
- The option of medication being released only after pharmacy review
- Locking medication drawers and cabinets
- Not vendor-specific so the practice has the choice of ordering products from any vendor, not just the one specified by the AMD.

This system (Omniceil, Palo Alto, Calif.) was selected and pilot tested at two GCS offices and the central pharmacy.

Few technical difficulties occurred when the system was tested; staff (especially nursing staff) acceptance was the only real issue. Educational programs and hands-on training sessions helped the staff become more comfortable with the system.

Adjustments to the AMD's drug inventory tracking system were made so that usage patterns were followed for 90 days and inventory

levels were increased or reduced as needed. Following the success of the pilot program, AMD systems were installed in the remaining clinics over the next six months.

HOW THE AMD WORKS

The AMD system has changed the way medications are ordered and delivered to the 21 clinics. Physicians begin the process by generating an order for chemotherapy on integrated clinical management software. This electronic medical record (EMR) system calculates the dose based on the patient's weight, body surface area, and estimated renal function, eliminating the potential for dose calculation errors. The EMR lays out the patient's entire treatment plan, including any needed laboratory or radiological tests, premedications to prevent nausea and drug reactions, and prophylactic antibiotics (when indicated) for patients who receive immunosuppressive drugs.

Medication orders are then reviewed online, or sent via fax to the central pharmacy where pharmacists review orders for premedications and chemotherapy, and nurses generate prescriptions for oral medications. When dose adjustments are ordered by the physician, nurses enter the necessary changes and their justifications in the EMR chemotherapy flowsheet.

Medication orders are received at least two (and sometimes five) days before their scheduled appointments. Pharmacists review the orders to see if they conform to the standards set in the EMR protocol book. Orders for treatment regimens that have not been included in the EMR by prior group decision are sent back to the ordering physician for verification and corroborating references.

After the orders are returned to the pharmacy, they are entered into the patient's profile in the AMD system. Only medications reviewed by pharmacists can be entered or accessed. If a treatment is not given on the planned day of therapy, the order is automatically dropped from the AMD at 11:30 p.m. that night. Subsequent orders must be verified by the physician prior to administration.

As a final safety precaution, when patients arrive for their appointments at the clinic, a nurse

reads their profiles and checks the orders in the AMD against the original orders written by the physician. There is no way for the nurse to override the system. If the orders match, a nurse or pharmacy technician prepares the medications for administration (about one-third of the clinics have pharmacy technicians on staff).

The AMD system has eliminated the need to inventory medications in the clinics and has reduced wastage from expired medications. Each unit has a five-day supply of drugs. Every afternoon, the AMD automatically checks the supply of each drug at each clinic, and restock orders are generated for any item that is below a preset inventory level. The restock orders are sent directly to Oncology Supply in Dothan, Ala., which sends the needed items via express courier to each clinic by 10:30 a.m. the next day, and also sends a usage report to the GCS central pharmacy in Atlanta.

Some medications are routinely supplied in larger package sizes. If a clinic needs just one vial of that medication, it is sent out from the central pharmacy instead of from the supplier.

The AMD system's success with patient medications has prompted its use for IV tubing and solutions, dressings, and office supplies. Although access to these items is less controlled, the supply inventory is managed in the same way as the medication inventory. Reports generated by the AMD system indicate what supplies are needed based on inventory levels. The restock order is sent directly to a warehouse, and supplies are sent to the clinics within three days via courier. An AMD unit located at the warehouse automatically charges each clinic.

BENEFITS

An AMD is an important step in integrating electronic information management into the clinical side of an oncology practice. The office alterations necessary for the AMD (such as office cabling) are the first physical step in creating an electronic management system, but the alterations necessary in staff attitudes toward information technology are even more important.

Staff members need to know how beneficial an AMD can be.

Electronic medical record systems have been under development for many years, and using an oncology-specific clinical management system coordinated with an AMD allows a practice to integrate business and clinical functions. In addition, having a central location where data are reviewed can facilitate quality care and patient safety.

Our AMD system has resulted in a 40 percent reduction in standing inventory and has reduced waste from expired medications. Nurses spend less time looking for and ordering supplies and medications, which means they can spend more time with patients. Since the inventories are managed electronically, there are no forms or requisitions to fill out, medications and supplies are there when needed, and the risk of medication errors is reduced.

The economic impact has been significant. The standing medication inventory has been reduced from \$2.4 million to \$1.6 million, considerably lowering carrying costs. Since stored inventory turns over every 28 days, this cost reduction was maintained even when the number of patients increased. And with all medications coming from a single vendor, purchase prices are lower. GCS's vendor also responds to our needs more timely than it could when it took orders over the phone.

Pharmaceuticals are the practice's number one expense. Their cost exceeds the amount of the combined salaries of our 330 employees. Although the economic effect of using the AMD system for supplies has not yet been calculated, similar savings are expected.

GCS is planning to fully integrate its AMD system with its EMR system to create "superbills" that cover all the services a patient receives, eliminating the need for manual medication billing. The long-term goal is to completely automate the practice by integrating medical records, the EMR, the AMD, and the billing system.

Because the AMD must meet Joint Commission on Accreditation of Healthcare Organization (JCAHO) standards, it has features JCAHO requires including controlled access to medications and pharmacy review of all medication orders.

AMD System Providers: A Resource List

These four companies are just a sample of AMD system providers. This list is not meant to be a recommendation.

McKessonHBOC Health Systems

One Post St., 30th Floor
San Francisco, CA 94104
Phone: 800-571-2889
Web site:
www.mckhbochealthsystems.com

McKesson Health Systems provides comprehensive pharmaceutical distribution services, information management systems, and clinical support services to help manage the pharmaceutical supply process within complex health care environments and improve patient outcomes. The Health Systems businesses offer a broad portfolio of products and services to help streamline the medication-use process from the manufacturer to the patient's bedside, to facilitate the most effective use of human and financial resources and optimize patient outcomes. MedManagement provides comprehensive clinical consulting programs and pharmacy management services separately and on an integrated basis. The services reduce medication errors, enhance patient safety, and assist health care organizations in measuring both clinical and financial outcomes.

Omnicell

1101 East Meadow Dr.
Palo Alto, CA 94303
Phone: 650-251-6100
Fax: 650-251-6266
E-mail: info@omnicell.com
Web site: www.omnicell.com

Omnicell provides clinical infrastructure and workflow automation solutions that allow health care facilities to acquire, manage, dispense, and deliver medications and supplies more effectively and efficiently. *OmniBuyer* is a web-based procurement application that automates and integrates health care facilities' requisition and approval processes, increasing the efficiency and productivity of the supply chain. *DecisionCenter* is a web-enabled product that offers users of Omnicell's pharmacy and supply systems a comprehensive data analysis system for easy and accurate decision-making. *DecisionCenter* provides a variety of reports, drawing on current and historical data from the point-of-use pharmacy and supply systems. Omnicell's integration services link the pharmacy and supply systems and *OmniBuyer* with health care facilities' back-end information systems (i.e., ADT, accounting, MMIS, ERP) to reduce manual data entry and improve the accessibility of information.

PrimeMed

PrimeMed Pharmacy Services
3960 Howard Hughes Parkway
Suite 650
Las Vegas, NV 89109
Phone: 888-892-8040
Fax: 702-892-8588
E-mail: info@primemedrx.com
Web site: www.primemedrx.com

PrimeMed is a provider of pharmacy managed care solutions through the implementation of Internet technologies and software solutions. In addition to wide application of technology,

PrimeMed offers a continuum of pharmacy cost management, including physician office dispensing, operation of ambulatory pharmacies in strategic locations where managed care physicians predominantly conduct their practices, home delivery of prescriptions, and other health care products through the usage of Web-enabled technology. PrimeMed's point-of-care medication management and distribution solution aids physicians to improve outcomes and contain cost.

Pyxis

3750 Torrey View Court
San Diego, CA 92130
Phone: 800-367-9947 or
858-480-6000
E-mail:
Catherine.Christensen@pyxis.com
Web site: www.pyxiscorp.com

The Pyxis

MEDSTATION®/System 2000/Rx System 2000 automates the distribution, management, and control of medications. The 2000 Rx version provides a pharmacy link to individual patient medical profiles. *MEDSTATION 2000* provides timely access to controlled substances, PRN meds, and first doses, interfaces to hospital ADT and billing systems, tracks inventory, increases productivity and accountability, eliminates narcotic counts and keys, and reduces diversion potential. The *SUPPLYSTATION® System 30* is Pyxis' secure, automated distribution system that controls patient supplies and provides comprehensive tracking and utilization information for more effective inventory management.

Georgia Cancer Specialists' experience with its AMD has been positive. The system has substantially reduced inventory costs and medication wastage, provided safeguards against medication errors, and freed up more nursing time for patient care. Most importantly, medication access and use is controlled, and all dosages and

regimens are correct.

The key to our success was getting the staff to accept the importance of accurate inventory and billing records, and to realize that these improvements would free them to provide quality patient care. Once that was accomplished, teaching them to actually use the system was simple. ☐

REFERENCES

- ¹Shirley K. Effect of an automated dispensing system on medication administration time. *Am J Health-Syst Pharm.* 1999;56(15):1542-1545.
- ²Borel J, Rascati K. Effect of an automated, nursing unit-based drug-dispensing device on medication errors. *Am J Health-Syst Pharm.* 1995;52(17):1875-1879.