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Hospital technology efforts will increase in coming years

Federal funding will give giant push

Hospitals across the United States are expected to increase their investments in electronic medical records and other new technology as they absorb the new federal stimulus package funds.

The American Recovery and Reinvestment Act, signed by President Barack Obama on Feb. 17, 2009, provides $1.5 billion to health centers for construction, renovation, equipment, and the acquisition of health information technology systems.[1]

But even without the added incentive, hospitals and their pharmacies have been moving in that direction, experts say.

U.S. hospital pharmacies increasingly have adopted a variety of new technologies in recent years, according to a new national survey by the American Society of Health-System Pharmacists (ASHP) in Bethesda, MD.[2]

For instance, 44% of hospitals responding to the ASHP survey reported using smart pump technology, and 24% reported use of barcode administration, says **Karl F. Gumpper**, BSPharm, BCNSP, BCPS, FASHP, director of the section of pharmacy informatics and technology at ASHP.

While the use of these technologies definitely is on the rise, they still lag far behind the increasingly ubiquitous use of automated dispensing cabinets, which an estimated 83% of U.S. hospitals now have, Gumpper notes.

"Of hospitals with less than 50 beds, about 75% use automated dispensing cabinets," he adds. "But among the hospitals with greater than 800 beds, 100% use them."

The ASHP survey found that only

Summary points

- U.S. hospitals will increase use of electronic medical records with federal stimulus funding.
- ASHP survey found that 44% of hospitals use smart pump technology.
- A chief problem when implementing new technology involves organizational culture.

about 12% of respondents used computer physician order entry (CPOE), Gumpper notes.

"The issue with CPOE is you need a large, multidisciplinary process to make it happen," he explains. "This includes educating pharmacists, nurses, physicians, nurse practitioners, and physician assistants on how to use the system and how to create orders for everything — not just medication."

The infrastructure complexity makes this type of technological endeavor more difficult and somewhat dependent on whether the hospital employs physicians or contracts with them, Gumpper adds.

Now that the reinvestment act likely will motivate more hospitals to move toward CPOE and more fully integrated electronic medical records, hospitals will need to establish protocols and implementation programs to make certain employees are on board with technological changes.

"If you look at why information technology projects don't succeed, there are a lot of shortcomings early on," says **John Manzo**, BS, PharmD, FASHP, managing consultant with IBM Healthlink Solutions of Armonk, NY.

"Maybe you didn't identify 'Gotchas' or understand how new technology was going to affect your staff or workflow," Manzo explains.

Often the problems with technological change are not that a health system needs more machines or a wireless system, but that there is a need for the organization's culture to transform, he adds. **(See tips on assessing readiness for technology change, p. 51.)**

"The staff is so resistant to change that they won't accept it," Manzo says. "Those cultural issues tend to be tougher to identify and mitigate than the other problems of not having enough printers or devices."

This is why hospital pharmacies first need to assess their organization's readiness for any major technology change.

"When implementing a project it's important that you have a good scope and definition of what you're going to do in your project," says **Michael D. Schlesselman**, PharmD, FASHP, director of information technology program management at Lawrence & Memorial Hospital in New London, CT. **(See story on preparing for barcode technology, p. 53.)**

"So as you go along in your project you won't develop scope-creep and find that you can never get it implemented," Schlesselman says. "You have to make sure everybody agrees up front with what you're going to implement."

Hospital pharmacists should make sure that any technology change involves a collaboration of pharmacists and nurses, he notes.

"They both need to be working toward the same goal so it's not just a nursing-driven project or a pharmacy-driven project," Schlesselman adds. "You need to make sure you have a commitment and buy-in by both groups."

Hospital professionals have a main goal of taking care of patients and trying to get their work done as efficiently and as safe as possible, Gumpper notes.

"By putting technology in the mix we have to be careful we don't totally disrupt their workflow," he explains. "And if we have a bad process to begin with, and we throw technology on top of it, then we have to make sure the technology will fix the problem."

This is why it might be a good thing that the adoption of technology is slower in health care

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than in other industries, Gumpper adds.

"I think that means we're stepping back and making sure that what we do implement is done in a safe and effective manner," he says.

The ASHP technology survey found that hospital progress toward electronic medical records (EMRs) is incremental.

Of the responding hospitals, nearly 43% have partial EMR, while 5.9% have complete EMR.[2]

Although 90.7% have pharmacists view the complete EMR, only 56.7% of hospitals with EMR allowed pharmacists to document in the electronic record, which means its use in facilitating communication between health care practitioners could be improved.[2]

Similarly, among the nearly 21% of hospital respondents that have ePrescribing systems, only 37% of these systems made clinical patient information beyond the electronic prescription available to outpatient pharmacies.[2]

The survey also found that about 10% of responding hospitals used a robotic distribution system that automates the dispensing of unit-dose inpatient medications in a centralized distribution system.[2]

The use of robotics varied according to the hospital's type. For instance, Veterans Affairs hospitals, general hospitals, and children's medical-surgical hospitals with 200 or more beds were most likely to have a robot.[2]

Hospitals that have the resources to implement robotic automation for preparing IV medications typically will use the technology, Gumpper says.

"There are a lot of different types of automation and robotics that hospitals are using," he says.

Overall, ASHP's research shows that even smaller hospitals are implementing some forms of technology.

"One thing we noticed within the survey was that barcode administration seemed to have a higher uptake in implementation in some smaller hospitals, and CPOE had better uptake in larger hospitals," Gumpper says.

"We don't have a good explanation for that," he adds. "The presumption is that the number of medications dispensed at larger hospitals on a daily basis is a large number, and, therefore, the repackaging and relabeling that has to go with barcode administration might be a lot for some pharmacies to deal with at the start."

Although the survey paints a point-in-time picture of how well U.S. hospitals are using advanced technologies, it's difficult to predict how quickly continued technological changes will take place.

"Health care is difficult in the sense that you're balancing the role-out of technology with changing scientific knowledge," Gumpper says. "And you need to make sure you balance those discoveries with the technology you're implementing."

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Expert provides guidance on assessing readiness for new technology

Assessment tool lays groundwork for change

Using new technology in a health care system is not as simple as buying state-of-the-art products and having the vendor install them.

There's a people factor that cannot be ignored, or else the millions spent on technological efficiencies will be wasted.

One of the biggest mistakes a health care system can make is not having taken the time to learn how the new technology will affect staff, says **John Manzo**, BS, PharmD, FASHP, managing consultant with IBM Healthlink Solutions of Armonk, NY.

So health systems need to assess how the new technology will affect staff and workflow, Manzo says.

Manzo offers these tips on performing a technology readiness assessment:

•Understand your project's scope: Everyone involved in a hospital system

Summary points

- Health systems should assess technology's impact on staff.
- Ask questions of hospital leadership and staff to identify potential problems.
- Develop gap analysis to show what's missing between current state and future state.

technology change needs to understand what the scope is and what the organization is trying to accomplish.

"Once you've defined the scope, you document the scope that people agreed on, and you don't spend time assessing things that are not within that scope," Manzo says.

"So this helps you write your assessment questions and make sure they're not all over the place," he adds.

• **Initiate assessment process:** "You need tools to do a current state assessment, asking questions you'd use to identify and tailor the project to your organization's needs," Manzo says.

The questions asked of hospital leadership will be different than those asked of a department head or front-line pharmacist, Manzo says.

"You need to get a good 360 degree perspective on the current state," he adds.

The goal would be to learn more about these issues:

• What is your ultimate goal?

• How do you see this technology transforming your business?

• What are the workflows associated with this future state?

When interviewing hospital leadership, it works well to discuss their vision and higher-level goals, Manzo notes.

"When you interview the pharmacy leadership team, you can be a little more granular and ask more about operational issues, such as what keeps them up at night and what are the benefits they'd get from technology," he adds. "Then you take it down another layer to the end users, and you do that because you have more folks involved."

Interviews on this level could be done in focus groups with structured questions and different interviewing techniques, Manzo explains.

For instance, the assessment might include answers to these questions:

• What are the cultural issues preventing you from being successful?

• Walk me through a typical workflow;

• How many people are involved in the process?

• **Develop gap analysis:** "Then you compare your current state from the readiness assessment to a future state and develop a document or tool called a gap analysis," Manzo says.

The gap analysis looks at where an organization is today with technology and where it could be in the future with new technology, and it estimates what it will take to get from today's reality to tomorrow's goals.

"What will it take to get there?" Manzo says. "An example of a gap could be that we don't have enough computers, and we don't have enough people who know how to use computers well."

Another example might be in how medications are charged.

A hospital system might be planning a switch to electronic medication dispensing, where medication now is billed on administration. Previously, it had been billed when dispensed, Manzo says.

The gap analysis will look at the changes that have to be made to revise the billing practice and the charging mechanism.

"Traditionally, pharmacies charge when medication is dispensed, and then if some medication goes back they'll do a credit," Manzo explains. "With the electronic system they are set to charge on administration, which is more accurate since it charges for what the patient actually receives."

But the gap analysis might highlight logistic problems, such as how this change in charging practice will occur.

"Are we going to change charging practices and charge algorithms?" Manzo says. "Will this change the culture because much more is dispensed than what is given to the patient?"

When medication is charted on administration there is a more accurate record, but this may change revenue. So finance staff will need to be involved, he adds.

"You need to identify the differences in the gap and create a mitigation strategy for every one of those issues," Manzo says. "You should identify who will make these changes: is it your leadership, your administration? Who owns it, and when is it expected to be done?"

On the positive side, the hospital won't have to manage credits anymore for drugs that were charged and then returned, he adds.

"It creates a lot of gaps and deltas that need to be addressed," Manzo says. "Identify them and see who is going to talk with finance and revise pharmacy workflows, making sure they understand the diligence they need to have."

• **Create assessment tool:** "You can create a simple word processing document or map it out with a flow diagram and process map," Manzo says.

"The diagram might identify a task, such as charge crediting, and show its 10-15 step process

and then do the same thing for its future state after the technology change," Manzo says.

"You'll want to compare the flow diagram and process maps, and as a group identify which things are different and need to be addressed," Manzo explains. "Then you collect data, analyze data, and go back to the work group and say, 'This is what we found, and this is what it will take to get it done.'"

The analysis will include details about gaps, including where a resource no longer will be needed and where the organization might lose revenue, he adds.

"As you identify gaps, you put them in those groups, showing whether they are things that need to be mitigated or whether it's just interesting information," Manzo says. "One of the most important parts of a gap document is the mitigation column that includes issues that need to be removed or roadblocks that need to be addressed."

For example, suppose this is a nine-month project, the diagram might show what is expected to be done at month three and at month five, he says.

"Another thing is that new issues will come up that you might not have identified in the first go-round, so you'll use those check points and constantly review the document, identifying changes and revising as needed," Manzo explains.

People respond better to visual descriptions, so the assessment tool should include flow charts and visual timelines, he says.

A technology readiness assessment tool illustrates potential obstacles and expected benefits from a major technology change, and it is a dynamic process that can be adjusted when inevitable disappointments arise.

"You learn from your mistakes," Manzo says. "There might be tough problems that a tool like this can help you identify and at least make an attempt to clean-up." ■

IT director offers tips on achieving transition to bedside barcoding

Never underestimate people factor

When hospitals make the transition to barcode technology or when they update the barcode system they currently employ, it's essential to develop a process that will work both physically and culturally.

> ***Summary points***
>
> - When implementing barcoding assess organization's readiness.
> - Nursing environmental workflow issues need to be addressed.
> - Prepare for changes and new workflow issues from time to time.

"Each hospital pharmacy will do it a little differently," says **Michael D. Schlesselman**, PharmD, FASHP, director of information technology program management at Lawrence & Memorial Hospital in New London, CT.

"The important step is to define a process so when the drug comes in the door from the wholesaler you have a way to ensure that medication is barcoded and gets into the system," Schlesselman says. "If you have a good process in place to capture that barcode at the beginning when it comes in, then you'll have fewer problems downstream."

Lawrence & Memorial Hospital has used bedside barcode technology for several years, long enough to resolve many workflow issues, he notes.

"We have a packaging machine to make sure all medications are barcoded," Schlesselman says.

The hospital also uses automated dispensing cabinets, order scanning technology, and other technology, he adds.

Barcodes often change from the manufacturer or when a different product arrives, so hospital pharmacies have to make certain they have a process that will ensure the new barcode is entered into the system, Schlesselman says.

Also, if the pharmacy puts a prescription number on the barcode and then makes any changes to that prescription, it might create a new prescription number, he explains.

"If you do that then any product with the old barcode will be a mismatch," Schlesselman says. "So how do you deal with that?"

Schlesselman offers these tips on making the transition to bedside barcode technology as smooth and efficient as possible:

- **Assess barcode technology readiness:** Schlesselman used the barcoding readiness assessment tool developed by the American Hospital Association, the Health Research and Educational Trust, and the Institute for Safe

Medication Practices.[1]

"It's a publicly available tool, and I found it very helpful," Schlesselman says. "I used it as my framework as I got ready to implement the system to ensure I wasn't missing anything and I was going down the right path."

The 54-page tool includes details about environmental factors, including poor lighting, cluttered work spaces, and noise, and workflow issues, including whether pharmacists consistently follow existing processes for medication distribution.[1]

• **Initiate system for capturing barcode:** "Some organizations put a double-check in place so that any medication getting ready to go up to the floor is scanned to make sure it can be scanned before it goes out the door," Schlesselman says.

Hospitals also could check a barcode's ability to be scanned before it goes up to the pharmacy unit, he adds.

"There are a number of places in that process to put checks and balances in place," Schlesselman adds.

"What we do is have two checks," he adds. "We have someone check it when it comes in the back door from the wholesaler, and then we have it checked after it's packaged."

• **Assess nurses' environmental workflow issues:** "One of the issues you have to look at and address is what kind of computing devices nurses use," Schlesselman says. "Do they use a computer on wheels or a workstation on wheels?"

And if nurses are taking their computers into patients' rooms, are they ergonomically sound and will the computer's wireless work?

"If you're using this method, then you need to make sure the wireless network is robust enough to not have dead spots so the nurse who goes to the patient in a far corner won't lose the signal," Schlesselman explains. "If you're using a computer in the patient's room you can only eliminate the wireless if you actually have a computer that physically stays in the room."

Another nursing issue is making certain the scanner will read all of the different technology and symbols on barcodes, he notes.

"Make sure that whatever scanner is used on the nursing unit can read all the barcodes from medications," he adds. "Make sure the scanners are reliable and rugged enough to handle day-to-day nursing activity."

If nurses use a cordless scanner then there need to be extra batteries in each unit. If nurses use corded scanners then there might be problems with the scanner's cord draping over a patient's dirty linen, Schlesselman says.

Likewise, someone should assess how often the nursing computers will last before they need to be plugged in and recharged, and the plugs must be compliant with fire codes, he adds.

"And you need to make sure you have an adequate number of computer devices for nurses," he says. "If you have nine nurses administering medications and only eight devices, then someone has to borrow a computer to dispense medications and that's decreased efficiency."

It's also advisable to have spare computers and scanners so that nursing workflow isn't interrupted when a device breaks, Schlesselman says.

"You need a back-up," he adds.

• **Prepare for continual changes and workflow issues:** Just as American consumers have become accustomed to the idea that they must change and update their computers every so often, so should hospital pharmacists plan to update and replace barcode scanning technology.

"Your laptops are used quite a bit, so you have to have a process for replacing those laptops or repairing them as time goes on," Schlesselman says.

The barcoding system should provide good reporting and feedback measures to managers so they can appropriately monitor the system and counsel staff where needed, Schlesselman says.

Sometimes the initial compliance with new technology is high, but it decreases as time goes on, and hospital leadership might not be prepared for the change.

"The biggest issue is that nurses will find a way to work around it if the technology doesn't work efficiently," Schlesselman says. "So you need to provide feedback to ensure their compliance because sometimes it won't be efficient to do barcoding on a patient as you administer medications."

• **Anticipate wristband barcoding problems:** "The wristband has a barcode that serves as a confirmation on the computer that the nurse is administering the medication to the correct patient," Schlesselman says.

But for this to work as designed, the wristband's barcode must be easily read by the scanner, he adds.

"Also you need to make sure it's in the right format for your information system to read," Schlesselman says. "And you may have to adjust

it to find the right format."

Also, as the patient is moved around and bathed, there's the potential for the barcode to become stewed or wrinkled or wet, and the coding might bleed, which could impact scanning, he says.

"Depending on what kind of barcode you have, the lighting in the room could be a factor in how well or poorly the patient's wristband is scanned," he adds.

"So when using a barcode on a wristband, you need to be cognizant of other systems using the barcoding, such as a lab system that reads the barcode on the patient and attaches the barcode to the blood they've drawn," Schlesselman explains.

"They have confirmation they have the right patient, and they might use some other type of handheld device," he says. "Everyone is using the same wristband, but they might have different devices they're scanning with, so you have to make sure everyone can read the barcode."

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Best Practices Spotlight

Anticoagulation program helps keep patients' lab results within range

Pharmacists keep patients motivated

A hospital pharmacy's anticoagulation consultation tool has proven to be an efficient and productive way to improve patient safety.

With the tool, medical staff easily keep track of patients whose International Normalized Ratio (INR) is outside the range and who need intervention.

"We chose this as a project because we're a Joint Commission-accredited establishment, and part of the Joint Commission's 2009 National Patient Safety goal is to improve the safety of using medications, particularly anticoagulants," says **Brad Mattke**, RPh, an assistant director of pharmacy at Maricopa Integrated Health System in Phoenix, AZ. Mattke is in charge of outpatient pharmacy operations.

Mattke and a pharmacy student on rotation developed the tool, which has been revised several times.

The tool is simple with one page of questions to answer about the patient's medication, nutrient, and herbal intake. The tool's reverse side lists drugs, herbs, and food that impact anticoagulant effects of warfarin. **(See sample items from tool on p. 57.)**

The list of drugs, herbs, and food makes it convenient for pharmacists to review when consulting with patients, Mattke notes.

"The whole purpose of this tool is that we do a face-to-face consultation with the patient who is receiving warfarin every time the patient gets his or her medication," he says.

The pharmacists goes through the tool's questions, asking patients for the last time they had their medication refilled and whether they are taking any new prescription medication.

"We walk the patient through the tool and what happens with drug-drug interactions," Mattke explains. "We discuss any changes in the patient's diet and drug-nutrient interactions, including how if they go on a diet it may affect their vitamin K intake and things like that."

If the patient mentions something new, then the pharmacist can flip over the tool and look to see if the patient's new drug is listed on the back and to see what type of impact the drug could have, Mattke says.

Pharmacists also explain to patients how their herbal products might cause a drug-herbal interaction.

"Our population uses herbals a lot, so we ask them whether they've started taking any herbal products since their last refill, and we mention gingko and green tea, which decrease the anticoagulation effect of warfarin," Mattke says.

The tool takes only a

Summary points

- The Joint Commission identifies anticoagulation management as patient safety goal.
- Anticoagulation tool asks about patient's medication, nutrient, herbal intake.
- Pharmacists can access the patient's last INR value.

few minutes to use once a pharmacist is experienced in using it.

"In December, 2008, we rolled it out across the health system," Mattke says.

The hospital system purchased a software program by Standing Stone Inc. of Westport, CT. The program, called CoagClinic, links the hospital's system to a network that has information about patients' INR data, he says.

"So anyone who would need to verify what the patient's INR is and when it was last drawn could do so," Mattke explains.

"When we receive a warfarin refill or a new prescription, the pharmacist goes into the CoagClinic software program and verifies when and what the last INR value was," he adds. "We check to see that it was within our goal, and our hope is that it has been drawn in the last 30 days."

If the information is old, pharmacists can call patients and remind them that it's time for a lab test.

"Once we do that we document in the patient's profile that we have verified the INR," Mattke says. "And if everything is okay, we'll fill the prescription and then attach the consultation tool."

When pharmacists learn that a patient's lab results are higher than the acceptable range, they'll notify the physician and fax or telephone him the findings, Mattke says.

If the INR results are greater than 5, then the pharmacist will need to speak with the patient's physician before giving the patient the medication, he adds.

"We go over this information with patients to let them know they need to cooperate with the doctor and do whatever the doctor wants in adjusting the medication dose," Mattke says. "What we want to do is work with the patient and doctor and make sure the patient is taken care of and the dose is adjusted."

Mattke's goal is to see a long-term improvement in patients' INR results.

"My goal would be to track this over the next year and trend it and hopefully see that we're going from 40% of patients having INR results within range to 50-70% of patients having results within range," Mattke says. "It'll never be 100%, but how I'd measure the success of this program is by increasing the number of patients within range."

Before starting the program, the lab results went to patients' charts, and the physicians might never have seen them, Mattke notes.

"It would have been up to the physician to look at the results and make changes," he says.

For the more adherent patients, who don't need to be motivated, their regimen would remain the same. But for the less adherent patients, things would change and the patients would need to be re-educated and motivated to improve their adherence, Mattke says.

"Our no-show rate for doctors' office visits is 35-40%, so motivation and getting patients interested in their own care is going to have the biggest impact on their health outcomes," he adds. "Talking to these patients and taking an interest in their care might encourage them to take more interest in their own care and treatment."

Pharmacists also update patients' prescription changes in the software so these can be tracked.

"For patients who continue to have higher or lower results, we continue to work with the doctor and continue to let him know if the patient's condition is not being controlled," Mattke explains.

Pharmacists also try to determine why a particular patient is not adherent with treatment.

It could be that the patient was on vacation and forgot to bring his medication along. So the pharmacist would note that the patient missed doses and have a talk with the patient about adherence.

"The pharmacists educate them about the importance of not missing doses and about what they should do if they do miss a dose," Mattke says.

"For example, if it's time for their next dose after they've missed one, then they should just take that dose," he adds. "But if they were supposed to take their dose in the morning and now it's 5 p.m., then they should go ahead and take the dose, but get back on the regular schedule the next morning."

Pharmacists, using the tool, also inquire about adverse drug reactions.

"We ask if the patient has had any signs of bleeding, like nose bleeds, bleeding gums, signs of clotting, vision problems, leg pain, and chest pain," Mattke says.

The ultimate aim of having pharmacists use the tool to help track patients' progress is to provide patients with treatment adherence reinforcement at the times when they pick up their prescription refills, Mattke notes.

"They will refill their prescriptions each month, but they might see their doctor only once every three or four months," he adds. "So this

Here are sample items from anticoagulation patient consultation form

Maricopa Integrated Health System in Phoenix, AZ, has developed an anticoagulation consultation tool that pharmacists can use to help improve anticoagulation therapy among patients.

Here are some sample items included in this tool:

- Current Warfarin Dose
- Warfarin Indication:
  - DVT/PE
  - AFib
  - MI/Coronary heart disease
  - Valvular heart disease
  - Mechanical heart valve
  - Other
- Patient's INR goal:
  - 2.5 (2.0-3.0) — most indications
  - 3.0 (2.5-3.5) — mechanical valve
- Most Recent INR and Date

Potential Adverse Drug Reactions/Error Intervention

- Drug-drug interaction:
  - Any new/changes to prescription medications?
  - Any new/changes to nonprescription medications? And list changes
- Drug-nutrient interaction:
  - Any new/changes in foods or vitamin K intake?
  - Any new/changes to multivitamins containing vitamin K?
  - Any new/changes to nutrient supplements containing vitamin K? And list changes
- Drug-herbal interaction:
  - Any new/changes to herbal products? Examples of common herbal interaction: gingko, St. John's wort, ginseng, echinacea, ginger, feverfew, etc. And list changes
- Checkmark if the following happened:
  - Drug allergy/ADR prevented
  - Incomplete order/prescription
  - Expired/damaged medication
  - Wrong frequency
  - Therapeutic duplication
  - Insufficient patient knowledge
  - Wrong dose
  - Wrong patient
  - Omission
  - Other, and list

Actual Adverse Drug Reactions

- Any signs of bleeding? Examples: nose bleeds, bleeding gums, bruising, etc.
- Any signs of a clot? Examples: vision problems, speech problems, leg pain, chest pain, etc.
- Any missed doses of warfarin?
- Patient received last dose of suspected medication: date, time
- Treatment:
  - Drug discontinued
  - Drug changed
  - Antidote given

gives us a great opportunity to maintain a relationship and try to keep these patients motivated." ■

Improve both costs and safety by changing habits

Subcommittee makes effective changes

Hospital pharmacists can help health care systems significantly reduce costs by focusing on the areas where changes can have a big impact on both cost and safety.

The Hospital of Saint Raphael in New Haven, CT, decentralized its pharmacy and therapeutics committee eight years ago with a focus on improving compliance, safety, and costs.

The hospital has benefited from both improved safety and cost savings.

"We looked at the major cost centers and those high on the Joint Commission's compliance areas of interest, and we created subcommittees to the pharmacy and therapeutics committee," says **Janet M. Kozakiewicz**, MS, PharmD, director of pharmacy services at the Hospital of Saint Raphael.

Pharmacists are leaders on the subcommittees, which focus on infectious disease, cardiology, anesthesia, oncology, nephrology, radiology, and adverse drug events.

An example of how hospital pharmacists can reduce costs is in the antimicrobial program in which a hospital that spends about $2.7 million per year on antimicrobials could save $370,000 by eliminating inappropriate use of broad spectrum antimicrobial agents, according to Saint Raphael's antimicrobial stewardship review in May 2008.

Here are the ways some of the subcommittees have improved the high-cost areas:

- **Infectious diseases:** "We looked at evidence with regard to surgical antimicrobial prophylaxis," Kozakiewicz says. "We looked at different types of surgeries, and based on IDSA guidelines and what antibiotics were shown to be effective, that's how we determined what changes to

Summary points

- Hospitals can save hundreds of thousands of dollars by cutting inappropriate antibiotic use.
- Cost savings, safety can be improved in radiology with focus on purchasing and use of contrast media.
- Oncology order sets help improve efficiency and drug use and are popular with oncologists.

make."

Surgery departments might have 400-500 different surgeons who use a wide variety of antibiotics for surgical prophylaxis, she notes.

"So we did a medication use evaluation on surgical patients to look at exactly what we were using, and we mapped this to guidelines of whether it was appropriate or not," Kozakiewicz says. "We looked at which drug was used, the drug's dose, the time the drug was administered, and duration of therapy."

The subcommittee reviewed a month of data, looking at 80% of all surgeries, she adds.

"We have an infectious diseases pharmacist specialist and a pharmacy resident, who did this as a residency project," she says. "They found all different kinds of prescribing practices and brought that information back to the infectious diseases subcommittee and identified those physicians we need to educate more."

For example, they found that physicians were giving antibiotics for longer than 24 hours postoperatively in the bone and joint center.

"Patients were receiving antibiotics for 72 hours and sometimes for a week, and the physicians thought it was necessary," Kozakiewicz says.

• **Radiology:** "We thought that the radiology department might not have maximized its contracting," Kozakiewicz says. "So we started purchasing the contrast media for them."

Hospital pharmacy departments often have contracts with the same suppliers, and so they can obtain better prices based on their volume of business.

Also, hospital pharmacists and the radiology group could come up with strategies to make the use of contrast media more efficient and safer. **(See table on resource utilization review, p. 59.)**

"We added the radiology subcommittee two years ago because the Joint Commission was starting to classify contrast media that we use in radiology for procedures as a drug," Kozakiewicz says. "So pharmacy screens those patients for interactions with contrast media, and we had to have a subcommittee to integrate pharmacy and radiology."

• **Cardiology:** This group reviews drugs used in cardiology, including the glycoprotein 2b3a inhibitors, a class of antiplatelet medications. The drugs are used in treating acute coronary syndromes and in patients undergoing percutaneous coronary intervention.

"They're very, very expensive, so we have put together protocols for their use," Kozakiewicz says.

The cardiology group also looks at safety and outcomes associated with medications used in this area, she adds.

For example, if a cardiology patient has an adverse drug event associated with antibiotics, then it's reported to the subcommittee, which also has the adverse events group follow-up the report, she explains.

"The adverse event group evaluates it," Kozakiewicz adds.

In another example, hospital pharmacists noticed early data indicating problems with aprotinin injection (Trasylol®), a drug used in cardiac thoracic surgery, she says. "We brought it to the subcommittee for evaluation of use and educated physicians about how it might cause excessive bleeding."

Surgeons reduced their use of the drug, and then the FDA eventually suspended marketing of the drug, she adds.

• **Adverse events:** The hospital system uses a computer software program to help monitor recalls of drugs, devices, and other items, Kozakiewicz says.

"If the recalled drug is something we have on our formulary, then I ask our purchasing coordinator to make sure he checks our stock, and we address this at the subcommittee," Kozakiewicz says.

The adverse events group also works with other groups when problems occur with drugs used in radiology, cardiology, oncology, etc.

• **Oncology:** The oncology group has been very successful, Kozakiewicz says.

"We developed disease-specific standing orders (DSSOs), and there's an order for each modality," she says.

For instance, the hospital handles a large number of lung cancer cases, so there is a DSSO for lung cancer, she adds.

The DSSO lists the recommended drugs and dosages, and physicians can follow the recommendations or not, depending on their patients' clinical conditions and needs.

There are close to 30 order sets available to oncology physicians. These were developed by the oncologists themselves along with the oncology subcommittee, Kozakiewicz says.

"The subcommittee and physicians read them and approved them, and then they were sent to the pharmacy and therapeutics committee for final approval," she adds.

After the P&T committee approved the order sets, they were put on the web site, and an oncology pharmacist helped educate physicians about their use, she says.

"We'd propose them at oncology section meetings, and they were rolled out there," she says.

Another change they made was to segregate oncology drugs in the computerized provider entry system, Kozakiewicz says.

"We took oncology drugs out and have a separate system for them," she explains. "The doctor prints out an order set, depending on the cancer they're treating, and it's given to the oncology pharmacist who enters it into the computer system."

Oncologists like the new system because it's easy to use, and it has reduced the number of calls they receive with questions about orders, she notes.

"Historically, they'd write an order, and it'd be incomplete," Kozakiewicz says. "The prior blood work wouldn't be available or something, and now the order sets say that if you do this and this, your order is complete and you won't get a phone call."

For example, a two-page chemotherapy order form includes check-off boxes and fill-in-the-blank lines for the oncologist to complete, including the following:

- Chemotherapy agent
- Dose/m^2
- Total dose
- Route
- Diluent, frequency, and administration information

Hospital pharmacy's sample resource utilization review

Contrast media usage can be reduced

The Hospital of San Raphael of New Haven, CT, has developed a comprehensive program for reducing pharmaceutical costs, including in the area of contrast media.

Here is an excerpt from the hospital's drug class review of contrast media and how to contain costs:

Drug Class Review Contrast Media Introduction

- There are several approved, low-osmolar contrast media (LOCM) available in the United States. These include iohexol (Omnipaque™), iopromide (Ultravist®), ioversol (Optiray™), iopramidol (Isovue®), ioxilian (Oxilan®), ioxaglate (Hexabrix®), and iodixanol (Visipaque™).
- In general, clinical studies have not shown gross differences with regard to pharmacokinetics, pharmacodynamics, or diagnostic effect among the various LOCM.
- The incidence and severity of early and late adverse effects and cost should be taken into consideration when selecting a particular contrast medium for formulary.

Indications

- In general, iodinated contrast media are used for computed tomography (CT) — head and body, digital subtraction angiography, intravenous urography, and venography. When administered intra-arterially, contrast media is used for angiocardiography, coronary angiography, pulmonary angiography, aortography, visceral and peripheral arteriography, digital subtraction angiography, and central nervous system angiography.

FDA-approved indications of various LOCM currently on the market in the United States:

- Ioxaglate meglumine (320 mg/mL) with the trade name Hexabrix is indicated for pediatric angiocardiography; arteriography; ventriculography; aortography; angiography; venography; phlebography; urography; computed tomography; arthrography; hysterosalpingography.
- Iodixanol (270 and 320 mg/mL) with the trade name Visipaque is indicated for intra-arterial, digital subtraction angiography (270 mg/mL only), angiography (left ventriculography and selective coronary arteriography), peripheral arteriography, visceral arteriography, cerebral arteriography (270 mg/mL only); Intravenous: Contrast enhanced computed tomographic (CECT) imaging of the head and body, excretory urography; peripheral venography (270 mg/mL only).

COMING IN FUTURE MONTHS

- Revise emergency medication management
- Improve your metrics to reduce medication errors
- Update your medication use process
- Follow best practices in managing antidiabetic medication toxicity
- Here are drugs to watch for 2009-2010

• Days

Another section addresses the medications needed to treat nausea and vomiting and includes the following:

• Ancillary medications

- Anti-emetics for acute nausea/vomiting (DAY of Cisplatin) — Premedication
- Aprepitant 125 mg po
- Ondansetron 8 mg IVP
- Dexamethasone 10 mg IVPB
- Other

The order forms have helped improve care and save money, Kozakiewicz says.

"We have an outpatient oncology provider, as well, so we've been able to have a considerable savings on both sides — inpatient and outpatient," she adds. "As a result of this change, we were able to open a pharmacy satellite — two years ago — in the outpatient oncology area, so we do all of our mixing there." ■

Drug News

Watson Pharmaceuticals announces recall

Watson Pharmaceuticals Inc. of Corona, CA, has voluntarily recalled a lot of propafenone HCl 225 mg tablets, sold in 100-count bottles in the United States.

It's being recalled as a precautionary measure because some tablets may have higher levels of the active ingredient than indicated. The drug is used to treat cardiac arrhythmias.

Because propafenone has a narrow therapeutic index, some patients who are particularly sensitive to small variations in dose may experience potentially serious side effects, including arrhythmias or low blood pressure.

The affected lot (# 112680A, expiration date July 31, 2010) of propafenone HCL tablets was shipped to customers between Oct. 15, 2008 and Nov. 26, 2008.

Any adverse reactions experienced when this product is used should be reported to the FDA's MedWatch Program by phone at 1-800-FDA-1088 or on the FDA's MedWatch web site at: www.fda.gov/medwatch. ■

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