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Pharmacists' role in discharging patients takes center stage in study to increase medication adherence

Key is continuity of care to community

A collaboration of pharmacists, physicians, psychologists, and other researchers have begun a study to see how hospital pharmacists, communicating with patients, community physicians, and pharmacies, might impact patient outcomes post-discharge.¹

Public health leaders and researchers have noted in recent years that hospitalized patients often have difficulty adhering to their medication regimens after they're discharged. This problem can lead to increased health care costs as patients rebound to the hospital's emergency room or intensive care units and become "frequent fliers," experts say.

The Joint Commission of Oakbrook Terrace, IL, has recently required hospitals to provide medication reconciliation across various levels of care, partly in response to recognition of medication adherence problems.

"One of the big problems, particularly in the large tertiary hospital, university hospital, is that despite our best efforts there's often times discontinuity as the patient goes home for a wide variety of reasons," says **Barry Carter**, PharmD, FCCP, FAHA, professor in the division of clinical and administrative pharmacy in the college of pharmacy and a professor and associate head for research in the department of family medicine at Carver College of Medicine, University of Iowa in Iowa City, IA. Carter also is a senior scientist with the Veterans Administration Iowa City Health Care System.

"A patient might have misunder-

Summary points

- Iowa Continuity of Care project focuses on pharmacist involvement.
- Medication reconciliation, intake history, discharge follow-up are priorities.
- The study hopes to demonstrate decreased ER visits and adverse events.

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standings about their new medications and the medications they had been receiving," Carter says. "Many times there's not good communication linkages with the community physician and community pharmacy to help solve this problem of patient misunderstanding."

Previous studies have shown that up to 20% of discharge medications are not filled when patients are sent home, Carter notes.

"So our study is designed not to just educate patients about their medications at discharge and to reconcile them and answer questions," Carter says, "but also to let the patient know what the actual care plan is for each medication."

For instance, a patient might be confused about whether a specific new medication is something they need to take just for two weeks and then be done with it, or whether it's something they'll need to take for the rest of his or her life, Carter explains.

The idea is to show how having a pharmacist assist with discharge planning relates to actual

downstream adherence by the patient, says **Alan J. Christensen**, PhD, a professor in the departments of psychology and internal medicine at the Carver College of Medicine. Christensen also is a senior scientist with the Veterans Administration Iowa City Health Care System.

Downstream adherence issues include medication errors made by patients, failing to fill prescriptions initially, or failing to take them, Christensen says.

"These all are interconnected issues that involve the discharged patient's understanding of the medications he's going home with and how he's supposed to use them," he explains. "We're addressing any barriers that might be evident and impede the patient from understanding the discharge instructions and going home to fill them at the neighborhood pharmacy."

Researchers have identified a clear role for a pharmacist case manager in providing patient education and medication changes during patients' hospital stays and as they are transitioned to the community, says **Karen Farris**, PhD, RPh, a professor of pharmaceutical socioeconomics at the University of Iowa.

"Anyone enrolled in the study is met daily with a pharmacist," Farris says. "At the first meeting, they'll review the medications the patient has and make sure the patient understands what's going on with their medications, answering any questions."

This daily contact continues throughout the patient's stay, and as medications are changed, the pharmacist case manager continues to educate and inform patients, Farris adds. **(See article about pharmacists developing care plans, p. 87.)**

Carter, Christensen, and Farris are part of a team of researchers who will be involved in the largest study thus far to address these continuum of care issues. It's funded by a \$3.6 million grant from the National Health Lung and Blood Institute (NHLBI), Carter says.

The five-year study, which has begun enrollment, ultimately will enroll 1,000 people, divided into three arms, including the following:

- One study arm provides usual care in which patients are educated by the nursing staff and given a list of medications at discharge. The usual care group and community physicians will receive a discharge summary from the hospital.
- A second study arm provides a minimal intervention in which the pharmacy manager works with the patient throughout the hospitalization, providing patients with education along

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Editorial Questions

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the way, Carter says. Patients in the second arm will receive a wallet card list of their medications.

- The third group is an enhanced intervention group that receives the same assistance provided in the minimal intervention group, plus additional communication efforts. In this arm, the pharmacy case manager will fax a care plan for medications to the community physician and the community pharmacist, Carter says.

"We hope they'll identify problems as they occur," Carter adds. "We want to identify where there are duplications in medications."

The study's ultimate goals are to see if the intervention reduces adverse drug events, re-hospitalizations, and unexpected visits to the emergency room, Carter says.

The enhanced intervention will be costly, but the study also is addressing whether it will provide long-term economic benefits to the broader health care community.

"This isn't a free lunch, so if you want to do this extra care, we have to realize it costs money," says **John Brooks**, PhD, an associate professor of the program in pharmaceutical economics in the college of pharmacy at the University of Iowa.

Brooks, who is also among the study's investigators, will be studying how many resources were spent on the intervention and how much these might save the hospital and/or insurance payers.

"It could be that even though the hospital spends money to do this program that it could be a cost savings for the hospital," Brooks says. "Or, if it's not or if it cost a little more, the question is, 'Did we avoid a lot of bad outcomes that we would have had to pay for.'"

If the study's hypotheses are correct and the enhanced intervention ends up reducing adverse events, re-hospitalizations, and repeated emergency room visits, then it would definitely be a money-saver to private health care payers, as well as to Medicare and Medicaid, Brooks says.

"Then the insurers will be very happy about this project," Brooks says.

"We then could demonstrate that it would be very costly for the University of Iowa hospitals and clinics to cover all of its costs," he adds. "So to have an incentive they need to be reimbursed by the insurance company."

The patients who will be enrolled in the study include those with diagnoses of hypertension, hyperlipidemia, heart failure, past heart attacks, diabetes, and other common chronic medical conditions, Carter says.

One key to sending these patients back into the community is to make certain they're taking the medication that's necessary to keep them stable, Carter says.

"So many times these patients are hospitalized because their disease state worsens, and they should have been on a higher dose of medications, but they weren't," Carter explains. "So one big role of the pharmacy case manager is making certain the patient who is diabetic, for example, is taking aspirin so that all the guidelines of concordant therapy are followed."

Also, the pharmacy case manager can help to adjust medication prescriptions as the patient moves closer to discharge and notify the community providers of the patient's situation.

"So the care plan helps to communicate to the community physician and pharmacist what the plan is, and it educates the patient as to what to expect," Carter says. "Many times the patient doesn't realize how the medication will need adjustment and that the patient will continue to need to have his blood levels checked after he goes home."

Reference

1. Carter BL, Farris KB, Abramowitz PW, et al. The Iowa Continuity of Care study: Background and methods. *Am J Health-Sys Pharm* 2008;65:1631-1642. ■

Pharmacist case manager draws up comprehensive care plan for discharge

Plan is faxed to community MDs, PharmDs

The Iowa Continuity of Care project includes intensive case management by pharmacists, who begin medication reconciliation and education upon a patient's admission and continue with the education and medication reconciliation through discharge.

The pharmacist case manager model is being studied as part of a federal grant that will provide safety outcomes, economic outcomes, and other data about using pharmacists to support patients who have chronic illnesses and multiple medications to take upon discharge from the hospital.

“We’re trying to improve drug safety and reduce adverse events among patients,” says **Karen Farris**, PhD, RPh, a professor of pharmaceutical socioeconomics at the University of Iowa in Iowa City, IA.

One way the intervention part of the study is doing this is through having pharmacist case managers send detailed care plans to community physicians and community pharmacists.

“So many medication changes are made during hospitalizations that a family physician will get a discharge summary in a certain period of time, but a community pharmacist rarely gets anything,” Farris says. “This project brings community pharmacists into the loop.”

The focus is on medication reconciliation, monitoring for symptoms and outcomes, and making certain patients continue to do well and remain stable after they return home, she adds.

“When a patient is enrolled we send the informed consent documents and HIPAA release form and letter explaining the study to the community physician and pharmacist’s offices,” says **Cindy Webber**, PharmD, a pharmacy practice specialist at the University of Iowa College of Pharmacy. Webber is one of two part-time pharmacist case managers who work with the study’s enrolled patients.

“We go over the patient’s medications when the patient is admitted to the study,” Webber says. “We catch more issues that way, as opposed to just looking at medications at discharge — but it is very time-consuming.”

The pharmacist case manager also sees the patient regularly, continues education, faxes a care report to the patient’s community physician and pharmacist, and makes follow-up phone calls to see how the patient is doing, she adds. **(See steps taken for the intervention, right.)**

There are times when thorough communication between the hospital pharmacy case manager and the community pharmacist is crucial, Farris notes.

For example, a patient might be given a higher dose of a new drug while in the hospital to take the patient’s lab values to a certain level, she explains.

“But in the community, we know the drug needs to go down to a maintenance dose,” Farris adds. “So those are the important things to transmit back into the community so the physician and pharmacist know that.”

Or perhaps a certain hypertension drug is used while a patient is in the hospital, but there are

problems with getting the blood pressure under control, Farris says.

“So we get that under control and send the patient back with a different regimen,” Farris adds. “We want to make sure everyone knows what that is.”

How the Iowa continuity of care plan works

Intervention begins at admission

The Iowa Continuity of Care study’s intervention arm includes extensive work on the part of a pharmacist case manager to make certain a chronically ill patient is discharged with the education and support needed to remain stable.

Investigators hope this time-consuming intervention will result in study patients having fewer drug adverse events and fewer returns to the hospital or emergency room.

Pharmacist case managers fax information to community physicians and pharmacists and follow-up with them to address any patient issues that arise, says **Karen Farris**, PhD, RPh, a professor of pharmaceutical socioeconomics at the University of Iowa in Iowa City, IA. Farris is one of the team of investigators involved in the continuity of care study.

Here’s how the pharmacist case manager process works:

1. A pharmacist case manager takes the patient’s medication history on admission. “We take an inpatient history,” says **Cindy Webber**, PharmD, a pharmacy practice specialist with the

University of Iowa College of Pharmacy in Iowa City, IA. Webber is one of two pharmacy case managers who has been working with the first enrolled patients in the five-year study.

“We try to go over every medication they’re taking,” Webber

Summary points

- Continuity of care first step is to obtain extensive medication history.
- Next, pharmacist case managers visit patients daily to educate about medications.
- Last, pharmacist CMs fax care plan to community physicians and pharmacists and follow-up with patient through phone calls.

adds. "And we call their pharmacy to make sure we have the right doses and strengths."

Webber discusses over-the-counter (OTC) medications, mentioning specific names of drugs the patient might not think to mention, and she reviews the patient's symptoms and the possible OTC treatments for these.

"We have a lot of problems with this," Webber admits. "Patients don't consider those [OTC drugs] as medications, and they don't list them or tell their doctor of the medications they're taking."

For instance, a patient might forget that she's taking ibuprofen or ginseng.

Or the patient might be reluctant to mention herbal remedies because he has heard that doctors won't like hearing about these supplements, Webber says.

So Webber's strategy is to ask specific questions, such as the following:

- What do you take for pain that you can buy without a prescription?
- Do you use anything for your sinuses or colds or flu?
- We've talked about most of the things you can buy without a prescription, but what about herbal things like ginseng and echinacea, teas and other herbals for treating colds?
- Do you take any vitamins or multivitamins?

These admission interviews will take from 15 minutes to 45 minutes, depending on the complexity of the patient's case, Webber says.

Also, Webber spends an additional 5-10 minutes on calling the patient's community pharmacist to verify the prescribed medications.

2. The pharmacist case manager provides daily patient education. The average length of stay for the hospitalized patients is 3-5 days, and Webber makes it a point to visit the patient each of those days.

Occasionally there will be a patient who is admitted for an extended period of time, and so the daily visits are not necessary, she notes.

"We had one patient who was here for a liver transplant," Webber says. "She was here for five weeks, and I didn't visit her every day, but after a while, it was maybe twice a week."

Also, the daily visits vary in length of time depending on the patient's educational needs.

"For patients who are newly prescribed warfarin, they need a great deal of medical teaching," Webber says. "We try to teach them early on in their stay and then answer any questions that come up because it takes patients time to digest the information."

The idea for the daily visits is to reinforce medication use education that was taught the day before, or to teach patients about changes in their medication regimen and about the drugs they'll be prescribed when they are discharged, Webber explains.

3. Create care plan that will be faxed to community providers. The care plan is a 3-4 page document that lists all discharged medications and gives a summary of what happened in the hospital, as well as providing information about any monitoring and follow-up care that is needed, Farris says.

For example, the care plan might include information about monitoring a symptom, monitoring a lab value, medication dosing, timing for discontinuing medications, liver tests, etc., Farris explains.

"We make recommendations that are more long-term than the usual care plan," Webber says.

Since Webber's role includes obtaining a detailed medication history and daily meetings with patients, she learns of potential drug interactions or risks that most providers would never anticipate.

For instance, Webber might have worked with a diabetic patient who has not been using aspirin. If she hadn't done the extensive medication review at admission, she or the patient's physician might have assumed that the patient would be taking aspirin when discharged home.

Since aspirin use is recommended in the national guidelines, Webber will include a recommendation in the care plan that the community physician start the patient on aspirin.

"Or we could recommend a long-term strategy of having the physician consider advising the patient to take aspirin at a later date, in the event that the hospital physician did not want the patient on aspirin for a period of time," Webber explains.

In another example, there might be a patient with hypertension that was treated with a particular medication during the patient's hospitalization.

"We will recommend to the outpatient provider that they monitor the blood pressure, and we'll give the range the blood pressure was in while the patient was in the hospital," Webber says. "We'll provide the patient's blood pressure goal and explain why a particular medication was withheld and how the provider still should perform monitoring after discharge."

If it's warranted, the care plan then will pro-

vide a recommendation for an additional choice of medication if the patient still is hypertensive, Webber adds.

The pharmacist case manager has the skills necessary to detect the most subtle potential medication problems.

"We might have an older patient, a 75-year-old, who had been using Tylenol PM, which is inappropriate for the elderly," Webber says.

"Obviously, they're not using Tylenol PM while in the hospital and the hospital physician wouldn't write a prescription for that," Webber adds. "But the patient could go home and buy that medication again."

So the care plan will note that the patient had been using the OTC drug prior to being admitted into the hospital and that the patient had been counseled not to continue using it, Webber says.

"Then we'll recommend to the community physician that she prescribe a low dose of trazodone as a prescription for helping the patient with sleeping," Webber adds.

4. The pharmacist case manager provides follow-up care. The pharmacist case manager will call the patients about 3-5 days after they've returned home, Farris says.

The calls will ask about new symptoms, medication problems, and any other obstacles to their medication adherence, she adds.

If there are problems, then the pharmacist case manager will contact the community physician and/or pharmacist and provide them with an update.

Hospitals could adopt the continuity of care and medication reconciliation model used for the Iowa study, but it would require some financial and time investment.

The most challenging part of the educational efforts for hospital pharmacists would be to find time for it, Webber notes.

"On some days the hospital pharmacist has dedicated time to complete these activities, and that's critical," she says. "Any hospital pharmacist is going to be capable of making recommendations and explaining things to the community physician about why things were done a certain way in the hospital."

But finding time to talk with patients and discuss any medication issues with inpatient physicians takes time that hospital pharmacists often do not have, Webber says.

There is another potential drawback that the Iowa study might identify when it's complete, Webber notes.

Community physicians and pharmacists might not read through the care plans as carefully as is needed for them to be useful in producing the positive outcomes of reducing adverse events and improving safety.

"I have a feeling that the care plans are sort of long and physicians might gloss over the medication list," Webber says. "So we make the main recommendations at the very top."

So far, the only feedback Webber has received from community pharmacists who received the care plans involved one pharmacist asking if these were supposed to be medications that should be filled and another one inquiring about a dose change and deactivating an old prescription, she says.

"We haven't had a lot of feedback from community pharmacists," Webber says. "They're very busy." ■

Barcode technology moves to ICU bedside

Goals are to decrease workflow problems

Although hospital pharmacists and other staff have had some time to become accustomed to barcode technologies at many health care organizations, there continues to be a need to study how the process can be expanded and improved.

St. Luke's Episcopal Hospital in Houston, TX, was an early adopter of barcode technology in the acute care setting, says **Craig P. Frost**, RPh, MBA, pharmacy manager.

But placing the technology in the hospital's intensive care unit (ICU) would not be a simple process.

Implementing barcode technology in the ICU

has resulted in minor difficulties, partly because physicians were not receiving the patient information they needed on time, says **Sujit Sansgiry**, PhD, an associate professor and director at graduate studies

Summary points

- Barcode technology documentation is complex.
- The technology can alter a nurse's workflow for better or worse.
- Titrated medication infusions documentation is a challenge.

of the University of Houston in Houston, TX.

Frost and Sansgiry are co-investigators of a study they've begun that will identify workflow factors in implementing safe and effective bedside barcode technology in the ICU. **(See article about what study will do and its goals, p. 91.)**

"We know the ins and outs of it," Frost says. "But we were hesitant placing the technology in the ICU because of three main challenges."

Frost describes the challenges, as follows:

1. The documentation is complex. "The electronic medication administration documentation that we're trying to achieve is coupled in our software with all of the other non-medication-related documentation that the nurse has to do," Frost says.

For example, the nurse has to measure vital signs, fluid balance, and provide head-to-toe nursing assessments, he says.

"In our technology, the nurses have to document those data points along with medication administration," Frost says. "But the ICU requires more intensive documentation of those types of data points."

So the ICU staff nurses and other professionals were reluctant to use the technology, Frost adds.

2. It alters the staff's workflow. The order entry process drives the nurse's workflow and can determine what the nurse's workflow is, Frost says.

The process highlights when the first dose is ordered and the time medication therapy is discontinued, he explains.

"These can all drive the nurse's workflow goals," he says.

For example, if there's an order for a new antibiotic to be given twice a day, and it is

Some of the barriers to placing technology in hospital

Resolving issues of 'wrinkled barcodes'

Any time a hospital pharmacy introduces new technology into the workflow there will be process changes and barriers to overcome.

"They won't magically standardize the process, so there has to be a detailed workflow analysis that involves end users of that technology and process," says **Craig P. Frost**, RPh, MBA, pharmacy manager.

1. Equipment can fail. "If the barcode scanner isn't scanning, or it's not in the right field of its software, then there's a problem impacting workflow," Frost says.

Sometimes this is a problem that can be prevented through robust staff training, Frost notes.

And after training, there needs to be heavy support during the barcode scanning technology's implementation, he says.

Also, it's a good idea to have a collaborative team available to listen to any workflow complaints and issues that arise, Frost says.

"We have a collaborative team of information technology professionals, pharmacists in a steering committee, so that any issue can be brought up and addressed and followed appropriately," he explains. "You need a guiding team representing all parties to address any type of workflow problem."

2. Nurses develop work-around habits. Often when the new technology doesn't work the way

nurses expect or if it belabors a process, the nurse will find a way to work around the technology.

"You need to have assistance for front-end users because nurses more than any other health care worker will find a practical way of getting around anything that prevents them from taking care of their patients," Frost says. "So it's critical to have early on-site support, around-the-clock support during the implementation, to prevent work-arounds and bad habits from developing."

And when a bad habit or barrier crops up, there should be a support person to show the nurse how to resolve it.

3. Wrinkled IV barcodes slow the workflow. "The barcode could be wrinkled on the IV bag, and if the nurses are trained to smooth it out, that is one of those little tricks that really work," Frost says.

The barcode scanner needs a flat, unencumbered surface to read that machine code on the label, he notes.

"So if the label is torn, smudged, wrinkled, or crinkled, there's a chance the scanner cannot detect what the bar code is, and it will stop the workflow," Frost explains.

The pharmacy department is responsible for making certain the IV bag's barcode is not damaged or altered in any way, Frost says.

"And we need to teach nurses to recognize the problem and to know who to call to get it fixed," he adds. "Maybe the IV bag needs to be relabeled."

This is why barcode technology support is critical, he says.

"All of us need to work together to make the technology work," Frost says. "If one of us slips up, it won't work." ■

supposed to be started immediately, there's a problem if the bedside processes make it difficult or impossible to meet that goal, Frost explains.

"That can cause a problem in the nurse's workflow because the nurse will be late with the task, even though it's not the nurse's work efficiency that is the problem, but a technology issue that is making the nurse late in medication administration," Frost says.

"So the pharmacist has to be sensitive to those sorts of workflow issues and think about order entry and the downstream impact of scheduling that order entry," he adds.

This workflow barrier has been a challenge since the beginning of the bedside administration, Frost notes.

For pharmacists, there isn't that much information about how it will impact their workflow in the ICU, Frost says.

"In the ICU environment, there are more emergent clinical situations where nurses need to administer more medications more quickly, and that can be held back by technology," Frost explains. "If barcode technology adds time to an already urgent situation, then it can be a barrier."

Also, if the electronic documentation isn't done in a timely manner then physicians who rely on the data to assess patient status will be concerned that they cannot make a decision about their patients' therapeutic needs, he adds.

3. Documenting titrated medicated infusions is a challenge. "The rate of administration of medicated infusions changes based on physiological parameters of the patient," Frost says. "Frequently, the software package we have does not have a robust way of dealing with that."

This is an obstacle that is primarily limited to the ICU environment, he adds.

The primary barrier to a smooth implementation of barcode technology and the theme that is present in all three challenges is timing, Frost says. **(See sidebar about barcode technology barriers in acute care setting, p. 91.)**

"How long does it take to do a particular administration-related task? How long does it take to document oral medication versus infused versus dialysis medication?" Frost says. "We need to look at details around the timing of those nursing tasks." ■

Barcode study to seek new

ways to improve workflow

Focus is on barcodes in the ICU

Barcode technology provides hospitals with efficiencies and the potential benefits of improved medication safety, but there can be problems with the technology due to workflow issues.

A study that is just beginning has one of its fundamental goals to identify barriers and inhibitors to success and to formulate strategies for overcoming those workflow barriers, says **Craig P. Frost**, RPh, MBA, pharmacy manager at St. Luke's Episcopal Hospital in Houston, TX.

"So if we see perhaps some unnecessary time being spent on something or a step that is causing everyone problems, it may need to be eliminated," Frost explains.

This study will include observation of how nurses use the barcode technology and how their time and workflow change with its use, says **Sujit Sansgiry**, PhD, an associate professor and director of graduate studies at the University of Houston in Houston, TX.

Sansgiry and Frost are co investigators of a study that recently was funded by a 2008 medication safety team grant on optimizing bedside technology solutions by the American Society of Health-System Pharmacists (ASHP) Research and Education Foundation. The study is titled, "A randomized controlled study to identify workflow factors in implementing safe and effective bedside barcode technology in the intensive care unit."

The investigators hope to learn more about the different aspects of workflow in both direct patient care and indirect patient care and medication activities, Sansgiry says.

For instance, they'll study where nurses spend their time when they don't use barcode technology versus where they spend their time when they have access to this technology, he adds.

"We started down the barcode path in the hospital, unit by unit," Frost says. "So we have some patient care units we could study before barcode technology and after barcode technology, and we can start collecting data in the ICU."

The researchers expect that the amount of time nurses spend on medication administration activities before barcode technology is implemented is time that could be available for direct patient care after the technology is implemented, Sansgiry

says.

"The reality is that barcode technology allows documentation, and it allows the pharmacist to see what is happening in the ICU setting, because as soon as it's scanned, the information is available to the pharmacy," Sansgiry says. "Once nurses give the medications then the information is immediately available to anyone who wants it."

So Sansgiry and Frost will study how nurses spend their time before and after barcode technology is implemented to see which type of activity changes, he adds. ■

Software Strategies

New technology catches mistakes on camera

Pharmacist can check techs remotely

As hospital pharmacies grow and their volumes increase, it becomes essential to consider new technology that will enhance efficiency and improve safety.

The 300-bed Flagler Hospital of St. Augustine, FL, has incorporated a new software technology to meet these goals and to provide a way of tracking precisely how pharmacy technicians are performing their tasks.

"I first saw this IntelliFlow technology when I went to a mid-year conference," says **Toni Covato**, RPh, MS, director of pharmacy at Flagler Hospital. "I was excited about it because we didn't have a way of tracking access and to go back

and be 100% certain who prepared something."

When there's a problem in the pharmacy, it's often difficult to find out where the mistake occurred.

"If you have

a problem, you want to be able to go back and investigate," Covato says.

Hospital pharmacies have a heightened sensitivity to medication errors these days because of the recent high profile cases involving heparin overdoses, including the cases involving infants, says **Dennis Tribble**, PharmD, chief pharmacy officer and chief technology officer of ForHealth Technologies of Daytona Beach, FL. ForHealth markets the IntelliFlow software, as well as similar hospital software called IntelliFill IV and IntelliFill Chemo.

"What these incidents are bringing home is we're seeing a system architected to handle a relatively low volume of medicines for a relatively small patient population in their 60s and 70s that hasn't changed functionally in the last 30-40 years," Tribble says.

"The result is that system is beginning to be stressed as baby boomers age and the demand for product increases," Tribble adds. "We could argue the methods and systems set in place years ago are being stretched to the limit, and very good and competent people are being pushed into situations where errors are inevitable."

Human errors are inevitable, he notes.

"If your hospital is producing 10 medical errors a month then it's probably because it's designed to do that," Tribble says. "If, for the sake of argument, there's a 1% error rate, which most of us would say is pretty good, then on the average day in a 350-bed hospital's pharmacy, there are several errors."

So the point is that the errors are not the result of incompetent pharmacy staff, but the result of system and process problems, he adds.

The solution is to incorporate new systems and processes in the hospital pharmacy, making use of new technologies that reduce the potential for human errors.

Flagler Hospital's adoption in March, 2008, of new software that provides a fully integrated workflow manager for IV rooms has been doing precisely that.

"We've had a whole process change for pharmacy technicians because they have to take pictures of all the steps they take," Covato says.

The new technology includes the use of cameras and foot pedal shutters to provide digital pictures that can be checked remotely by hospital pharmacists from any computer connected to the hospital's intranet.

"We don't have to have a pharmacist sit in the

Summary points

- Hospitals today have greater volumes, greater potential for medication errors.
- Pharmacies need new software technology to track the processes.
- Florida hospital finds intranet-tracking through pictures saves pharmacists' time.

IV room all day long to check IVs," Covato says. "They can go into the computer while at the work station and check remotely."

The digital pictures also improve checks and balances.

"We can go back to the pictures if the nurse says, 'I sent an order an hour ago, where is it?' to see where the product is in the process," Covato says.

One of the challenges in adopting the new technology was in training staff how to use it correctly, she notes.

"The information technology (IT) helped us initially to train our staff, especially the super users, the people who could work faster," Covato says. "Supervisors ended up training the rest of the staff."

The initial training wasn't time-consuming, but there was a need for follow-up training as technicians had difficulty taking pictures in the optimal way, she says.

"It's a matter of getting everyone to do it the same way," Covato explains. "Some people handle the drug first and some people handle the solution first, and some people were taking too many pictures."

The pharmacist didn't need 20 pictures of the same image, so supervisors had to work with the staff to create standards for when to take the pictures, Covato says.

"We have them set the product under the camera, tap the foot pedal, and go on to the next one," she says. "It shows the lot number, expiration date, and how much solution they add to the product and how much is taken out."

At first, this process added a little time to the technician's tasks, but as they became more comfortable with the new system, they returned to the same efficiency as before, Covato adds.

The software also provides other process improvement and safety measures, including these:

- Label processor and local database cache server that accounts for every dose, continually updates and sorts doses, provides integrated formulary alerts to doses of high-risk or short effectiveness drugs, automatic sorting, and a continual server back-up;

- Situation board that continually updates with a complete view of the IV room workload, provides view of backlog of doses, reminds staff when the next dose is due, and reminds staff of remaining time to compound doses with short effective periods;

- Permits pharmacist to check workstation from anywhere on the hospital's intranet and continuously updates the full audit trail for each dose prepared;

- Pharmacy tech workstation that has a touch-screen user interface, integrated barcode scanning system, automatic calculation of dose amounts, on-demand printing of dose labels, verification and audit trail of dose measurements, digital imaging and bar code verification, and makes all completed doses immediately available at the pharmacist workstation.

"With IVs, the system takes every dose that needs to be prepared from the pharmacy, and it knows what is supposed to go into that and what bar code in each injectable drug means," Tribble says.

"It tells someone when they grab the wrong item, and it calculates the dose for them," Tribble says. "It gives them the volume in milliliters, and then it captures pictures of the process so if we have to look at it for any reason, we can do that."

The pictures improve the pharmacist's ability to check the work because they can be viewed repeatedly and are three to five times life-size, he adds.

For Flagler Hospital, the new technology has enabled pharmacists to check technician's work without having to leave their work station, Covato says.

"Before, a pharmacist would get out of his seat, go into the back and check everything, doing this at certain times of the day," she explains. "Now pharmacists don't have to physically go back there because they can see the whole process on their computer screen — so it's a big time saver for the pharmacists."

Pharmacists also save time by being able to check on where medication is in the process without having to make a phone call, Covato says.

But it's the quality assurance and safety aspects of the new software that matter the most, she notes.

"You have a visual documented record of what happened," Covato says.

"You have different people working in the IV room, and things get mixed up, labels are switched, and mistakes might be missed at any point in the process," Covato explains. "This is a way for a pharmacist to go back through the process, flip through pictures, and see exactly what each person did." ■

Pharmacy News

Be cautious with topical thrombin

Hospitals should be alert to potential problems with giving topical thrombin intravascularly, the Institute for Safe Medication Practices (ISMP) warns hospital pharmacists.

Thrombin products are produced as a frozen solution and a reconstituted powder, and they can be packed with a parenteral syringe for the purpose of preparing and withdrawing the product.

Since topical thrombin can stop minor bleeding, it should only be applied to the surface of a bleeding tissue, and it should never be injected systemically. If the product is injected systemically it could lead to clotting and death.

ISMP describes an incident where a hospitalized patient was given topical thrombin 5,000 units intravenously, which soon after led to the patient's cardiopulmonary arrest and death.

Hospital pharmacies need to make certain staff are trained to read the thrombin labels, which warn against injecting the product. This routine practice should prevent staff from mistaking topical thrombin with parenterals.

ISMP suggests these precautions be taken:

- The hospital pharmacy should prepare, label, and dispense the drug, including doses used in the operating room;
- Hospital staff should never leave a topical thrombin vial or syringe at the patient's bedside because it might be confused as a parenteral product;
- Put the product's warning label, saying, "For topical use only — do not inject," to syringes containing topical thrombin;
- Consider using solutions of topical thrombin that can be used with an absorbable gelatin sponge, if it's appropriate for the patient's surgery; also, a dry form of topical thrombin can

be placed on oozing surfaces;

- Hospital pharmacies might consider using spray kits of topical thrombin products, but should again refrain from leaving reconstituted topical thrombin in an unlabeled syringe before attaching the spray mechanism.

For more information, check out the ISMP Medication Safety Alert's March, 2008, issue, available at www.ismp.org/newsletters/nursing/articles/2008_03-1.asp. ■

Off-label injection of P 32 is problematic

FDA MedWatch issued a warning in September, 2008, that patients injected with chromic phosphate P 32 suspension, or Phosphocol P 32, into a joint might be at greater risk for leukemia.

A 9-year-old child and a 14-year-old child with hemophilia developed acute lymphocytic leukemia about 10 months after receiving intra-articular injections of Phosphocol P 32 (0.6 and 1.5 mCi total dose, respectively), according to FDA MedWatch.

The MedWatch report also warns that radiation injury, including necrosis and fibrosis, to the small bowel, cecum, and bladder, could follow administration of P 32 into the peritoneal cavity.

Both adverse reactions were associated with post-approval use, and the FDA has no estimate as to their frequency.

A full report can be found at the FDA's web site at www.fda.gov. ■

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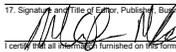
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