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Special Report: Preparing for Pandemic

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[Editor's note: Drug Formulary Review presents a look at how pharmacy disaster planning experts have handled the recent novel H1N1 influenza A crisis in a two-part series. In this issue, hospital pharmacy experts discuss the importance of communication during disaster preparation, and one hospital pharmacist outlines what she and her staff learned from an infectious disease disaster drill early in 2009 and how this helped them when confronted with a real life flu pandemic drill. In the July 2009 issue there will be more stories and advice about how to improve your own hospital pharmacy's response to a possible fall flu pandemic.]

Disaster planning pharmacy experts offer advice on preparing for next flu pandemic

If swine flu virus returns, some are ready

Hospital pharmacies across North America had a real life disaster drill this spring when a new influenza virus began making people sick.

What alarmed public health officials was the discovery that it was a novel H1N1 influenza A virus, the first new flu virus to raise a pandemic alarm in 40 years. It also appeared initially to be quite virulent as it killed dozens of people in Mexico before it jumped to the United States.

By early May, the virus seemed more ordinary than health authorities had feared, but public health officials remained concerned about the potential for the virus to re-emerge this fall in a deadlier pandemic.

The infamous 1918 flu pandemic was caused by an H1N1 influenza A virus that was genetically different from the one that emerged in 2009. The 1918 flu virus first appeared in the late spring and summer with a mild outbreak. When it entered a second phase in the fall, it spread

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quickly around the world, killing millions of people, including many people between the ages of 20 and 40. (See **flu pandemic timeline**, p. 63.)

Against this backdrop, hospital pharmacists have helped their institutions prepare and assess readiness for handling an influenza pandemic.

“Clearly this is an endemic and evolving situation that involves a novel virus,” says **Richard G. Thomas**, PharmD, DABAT, emergency management coordinator in the emergency department and rapid treatment unit pharmacist at Primary Children’s Medical Center in Salt Lake City, UT.

“One of the challenges whenever you have a new outbreak of an infectious disease is getting enough information about the disease to characterize it and put the risk into perspective,” Thomas says.

“Everyone should be concerned about whether this flu will come back in the fall,” Thomas says.

“And will there be enough time to generate a vaccine that will include what’s already anticipated to be the flu strain and this new H1N1 variety

remains to be seen.”

Hospitals already have policies and procedures in place for dealing with infectious diseases like influenza, which typically kills more than 30,000 people a year in the United States,

Summary points

- Hospital pharmacy experts on disaster planning say clear communication is crucial during pandemic.
- The novel H1N1 influenza A virus that raised pandemic fears this spring might return with the fall flu season.
- Hospitals should promote good handwashing and coughing techniques.

says **Carsten Evans**, PhD, FASHP, assistant dean of continuing professional education in the College of Pharmacy at Nova Southeastern University in Fort Lauderdale, FL.

These policies and procedures include promoting hand-washing and flu vaccination among patients and staff.

“We’re trying to reinforce education about good hand hygiene and cough etiquette,” says **Sharon S. Cohen**, RN, MSN, CEN, CCRN, an emergency preparedness clinical nurse specialist/instructor trainer with the department of emergency preparedness at Broward Health in Fort Lauderdale, FL.

“If you cough in your hand then use a tissue and wash your hand immediately,” Cohen says. “Try to cough in the bend of your arm so your hands don’t get contaminated.”

And if hospital employees see that someone has an influenza-like illness and that they’re coughing, then they should ask the person to wear a mask for self-protection and the protection of those nearby, Cohen adds. “They need to keep a three-foot distance between each person.”

During the spring H1N1 influenza A outbreak, Broward Health printed hand-washing and cough etiquette tabletop cards to put out in all public areas, including waiting rooms, business offices, and the cafeteria, Cohen says.

A flu pandemic is more challenging for hospitals because of the increase in patients crowding the emergency room and the higher level of panic.

One of the keys to staying the course during a pandemic flu is to keep all lines of communication open between the hospital pharmacy, the hospital’s emergency preparedness department, county preparedness and public health

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Editorial Questions

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departments, physicians, and the community.

"You need to provide clinicians with as much information as possible on the current outbreak," says **Erin Mullen**, RPh, PhD, assistant vice president for Rx Response, a Washington, DC-based coalition that includes PhRMA.

"If the hospital emergency room is seeing a spike in unusual influenza-like illnesses, then you should report these to the local public health authority," Mullen says. "Providing as much information and being as open and transparent with employees and the public is the best way to go about it."

Hospital pharmacists could stress to hospital staff the importance of not over-reacting, says **Deborah J. Larison**, PharmD, BCPS, clinical pharmacy specialist in emergency medicine at Sarasota Memorial Hospital in Sarasota, FL.

"We're encouraging everyone to develop a family disaster plan, not just for a pandemic, but also for hurricanes, tornadoes, and fires," Larison says. "We're encouraging them to reassess their family emergency plans, which I have done with my family, and not spread rumors."

Pharmacists at Sarasota Memorial Hospital have established a direct communication link to county emergency management officials, and this has been invaluable, Larison says. **(See story about Sarasota Memorial Hospital's disaster planning best practices, p. 64.)**

"What has truly made the biggest difference in the preparedness of this hospital is the pharmacy's direct involvement in our county emergency management discussions and planning," Larison says.

Hospitals might already send administrators, infection control staff, and epidemiologists to county emergency response planning sessions. But this isn't enough, Larison notes.

"They're not experts in the supply chain issues and drug-related issues that occur in highly infectious disease epidemics," Larison says. "Having someone from pharmacy in those meetings and contributing effectively helps us be well prepared."

Pharmacists should be part of their hospital's disaster planning process or at least be in close communication with the people who are involved with disaster planning, Mullen suggests.

For instance, hospital pharmacists need to be in the loop so they can answer this very important question: "If resources for a particular product like an antiviral become very scarce, how do you request assistance?" Mullen says.

"Chances are the emergency planner for the

hospital knows that information, so this would be a good time for the pharmacy to connect with the emergency planner and find out whether we have contingency plans in place or whether we need to start working on that," Mullen adds.

Hospital pharmacists need to be proactive, joining in conference calls with the Centers for Disease Control and Prevention (CDC) and state and local health departments during the early days of a pandemic, Cohen suggests.

"We need to be sure we're all speaking the same language and are on the same page," Cohen says.

The pandemic updates from official sources should then be communicated to hospital staff and the community, a process that ensures the information disseminated is accurate and reliable, she adds. ■

Flu Pandemic Timeline

New influenza strains are rare, and pandemics are even rarer. If the 2009 Mexican flu virus disappears entirely, this year's neoantigen flu likely will be considered a pandemic scare. But if it returns and causes illness and deaths later this year and next winter, it will join the three other influenza pandemics of the past century.

They are as follows:

- **1918 Spanish flu:** An estimated 20-40% of the worldwide population became ill, and 20-40 million people died across the globe. There were more than 500,000 deaths in the United States. The flu had the worst impact on people between the ages of 20 and 50, often killing them within hours of their first symptoms.

- **1957 Asian flu:** Originating in Asia, this pandemic virus was quickly identified and vaccine was available by August 1957. There were small outbreaks in the United States during the summer, and the disease spread quickly that fall. School children had the highest infection rate, and about 69,800 people, mainly the elderly, died from it in the United States.

- **1968 Hong Kong flu:** The pandemic began in Hong Kong early in 1968 and spread to the United States by September. The virus impacted the elderly the most, and deaths peaked in December 1968 and January 1969. It was the 20th century's mildest pandemic, with around 33,800 deaths.

There were three flu scares that were highly localized and did not result in a spike in morbidity and mortality. These were the 1976 swine flu scare at Fort Dix, the 1977 Russian flu which caused illness primarily in children, and the 1997 avian flu scare, which caused a handful of deaths before China slaughtered 1.5 million chickens and ended the spread of the virus.

Florida hospital's disaster drill prepared it well for flu

Changes were in place when H1N1 arrived

A well prepared hospital pharmacy can look an awful lot like a very smart hospital pharmacy.

When the hospital pharmacy at Sarasota Memorial Hospital in Sarasota, FL, took the lead in holding a pandemic disaster drill in November 2008, little did anyone guess that the drill would be followed within six months by a real-life pandemic scenario.

"We educated our staff in the fall about disaster planning, and some of the predictions we made at the time were that, number one, a pandemic was on the horizon, and, two, we didn't know if the epidemic on the horizon would be worse or less severe than the annual seasonal flu in the United States," says **Deborah J. Larison**, PharmD, BCPS, clinical pharmacy specialist in emergency medicine at Sarasota Memorial Hospital.

The hospital's pandemic drill took an all-hazard approach and involved a fictional germ that could replicate rapidly and was easily passed from one person to another. While it wasn't specifically designated an influenza virus, the emergency responses tested by the drill would be nearly identical to the responses necessary in the event of an influenza pandemic. (See story about **Sarasota Memorial's pandemic disaster drill in the January 2009 issue of DFR.**)

After the drill ended, Larison and other hospital officials assessed how well the hospital and staff did and came up with an action plan for what would need to be improved.

"People did great, but we discovered some shortfalls, and we made some improvements based on what we learned," Larison says. "I think those improvements are paying off right now, honestly."

For example, hospital pharmacists learned that maintaining its supply chain is a challenge during a pandemic.

"One of the things we learned in particular from the drill is that real-time tracking of our supply chain is important," Larison says.

During the recent pandemic scare caused by the novel H1N1 influenza A virus that spread in Mexico and North America after emerging in the spring, there were localized shortages of the two antivirals that were found to be effective in treating the new flu virus. Both oseltamivir (Tamiflu®)

Summary points

- Hospital's fall 2008 pandemic disaster drill highlighted areas of improvement.
- Hospital pharmacist led efforts to prevent supply chain distribution problems during a pandemic.
- Hospital ramped up influenza vaccination program for employees.

and zanamivir (Relenza®) and masks were in short supply in the area, Larison notes.

But Sarasota Memorial Hospital was prepared for the shortage.

"What we discovered during our

pandemic drill is that we may not have stocked enough of these products to get us through the first few days of an epidemic," Larison says.

"We discovered the importance of the supply chain," Larison says. "So we contacted our suppliers and had meetings with the purchasing and supply people."

They identified the products they would need to keep in a greater supply, the products they'd be able to order rapidly, and the products they'd need a longer lead time to order, she explains.

"What is happening this spring is spot shortages of these flu drugs and masks," Larison says. "But it's a distribution problem, not a supply problem because there are enough of these products that manufacturers are producing, but they're not being distributed quickly enough."

During a pandemic, everyone orders the same products at the same time and the distribution pipeline becomes clogged.

"We recognized this issue a few months ago with our pandemic drill," Larison says. "So we were able to predict where those spot shortages might occur and prevent them from happening in our institution."

Larison and others involved with the disaster drill predicted the hospital would quickly run out of the influenza antiviral drugs, so they changed the par levels and gradually ordered more doses until the hospital had the new par levels in stock.

"We changed our par levels based on our expectation that the number of patients we could treat on a daily basis was higher," Larison says. "We realized our distributor might not be able to get us enough of the product quickly."

Changing the par level is different from stockpiling, she notes.

"We changed our par levels from 50 doses to now 120 doses," Larison explains. "And we did this over time so we didn't overnight increase our

par levels.”

This meant there was no overnight huge expenditure and no significant increase in the pharmacy’s drug budget within one month’s time, she adds. The other major lesson from the fall pandemic disaster drill was that the hospital needed to do a better job convincing staff to be vaccinated against the flu.

“We know that in order for a vaccine to be effective in preventing transmission of the flu in the hospital, a minimum of 35% of health care workers should be vaccinated,” Larison says.

“So we evaluated during our drill the percentage of staff members who were vaccinated, and we decided to do a heavy push this year to get our health care workers vaccinated,” she explains. “Now, 47-50% of our health care workers are vaccinated for the flu.”

The hospital had encouraged employees to get their flu vaccine as the flu season began in the fall of 2008, but when the disaster drill showed that too few had, Larison headed up a second big push.

“We vaccinated people up until the last day of what is considered the vaccination period,” Larison says.

One of the most successful methods the hospital employed to encourage vaccination was a drive-through vaccination strategy.

“We had the hospital’s employee health team take the vaccine and swabs and station them at the entrance to the parking garages,” Larison explains. “As employees pulled in they were asked if they would like a flu vaccine.”

If they consented, they would be given a shot right as they sat in their car.

“We also sent employee health workers around to every department for many days to find the people who didn’t get vaccinated in the drive-through,” Larison says. “We had a competition between departments and held ice cream parties for those who achieved a minimum vaccination rate.”

When flu season begins again this fall, the hospital likely will employ many of the same successful methods in encouraging employee vaccination, she notes. “We start an awareness program just before the vaccine becomes available, and so we have a lot of people who get vaccinated fairly early,” Larison says.

Since people will still have the H1N1 flu pandemic scare on their minds this fall, Larison anticipates a great deal of interest in the flu vaccination program this year.

“We predict people will voluntarily take the

vaccination at a much higher rate than average,” she adds.

Larison has developed theories about why many hospital employees decline flu vaccination each year.

For instance, some employees might believe that they would be placed at higher risk of contracting Guillain-Barre Syndrome (GBS) if they take the vaccine, she says.

Larison has researched the subject and found that it would take every resident of Sarasota being vaccinated each year for 11 years to produce one case of GBS.

“In addition, people believe falsely that you get the flu by getting the influenza vaccination, and that’s clearly not true,” Larison says.

So she has worked at educating hospital staff about the benefits of flu vaccination, including the decade-old research finding that vaccinating healthcare workers reduces all-cause patient mortality during the winter season by 50%.¹

Any efforts the hospital makes in improving flu vaccination this fall will be useful, particularly if the novel H1N1 flu virus returns.

Larison predicts this flu epidemic will return in a second wave.

“There is still a lot that’s unknown about the current H1N1 variant, and there is a possibility that a second wave will be worse than the first wave,” Larison says. “People would be less inclined to distinguish between seasonal flu and novel flu, so I believe that during a second wave the anxiety levels of the public will be greater.”

Reference

1. Potter J, Stott DJ, Roberts MA, et al. Influenza vaccination of health care workers in long-term-care hospitals reduces the mortality of elderly patients. *J Infect Dis* 1997;175:1-6. ■

Technology Tips

Health system brought stakeholders together

Nurses walked in pharmacists’ shoes

One strategy for making certain hospital staff are ready and willing to work with new

Summary points

- To ensure a smooth transition to information technologies, pharmacy first should assess hospital's readiness.
- It's also wise to have nurses and pharmacists visit each other's work place to gain perspective.
- Monthly meetings to analyze data help keep IT transition on track.

technology is to thoroughly involve them in the beginning phases of implementation.

Pinnacle Health System in Harrisburg, PA, anticipated workflow issues and buy-in reluctance from the start of its process

to move to barcoding technology.

"So we made sure we had all stakeholders involved from the beginning of putting the process in place," says **Janice Dunsavage**, RPh, MAS, director of pharmacy at Pinnacle Health System. Dunsavage has spoken nationally about how to implement pharmacy technologies.

"We knew this would be one of the toughest initiatives we ever undertook, and we'd need all parties on board if we were going to make it a success," Dunsavage says.

After nearly four years the health system's transition to barcode point-of-care infrastructure can be called a success, she notes.

"On an ongoing basis we see errors stopped by the system," Dunsavage says. "We look at it and are grateful to have a system in place to stop errors."

Dunsavage offers these tips on how to ensure a smooth transition to information technology (IT) implementation:

- **Assess readiness to transition to new IT:**

"When we first took on the barcoding initiative, the first thing we did was get some laptops and software for barcoding and walked around the pharmacy to scan-check every drug," Dunsavage says. "We found that 19% of our medications were ready to scan at the bedside, so we had issues from the start."

Another issue involved checks and balances: In the existing process, the pharmacy had an electronic system while the nursing department used a paper process. This resulted in a natural checks and balance in finding mistakes, Dunsavage says.

So one goal was to build into the new electronic system checks and balances, she adds.

But just transitioning from a paper medical administration record (MAR) to an electronic barcode scanning system in a short period of time is a challenge.

To prevent these types of problems, nurses received advanced notice of the changes and education about how to use the new technology, Dunsavage says.

- **Partner with IT vendors and staff:** Hospital leaders treated the information technology experts and staff as equal partners in the process.

IT vendors and staff were part of the development and transition process, offering their input along the way, Dunsavage says.

And when it came time to create interfaces for the various electronic technologies used by the hospital, hospital leadership brought together the various IT vendors, many of whom represented competing products, she says.

So the IT vendor for the automated dispensing cabinets would attend the meeting, along with the vendor for the pharmacy information system, etc., Dunsavage explains.

"The idea wasn't for them to share or give up trade secrets, but to help us get to where we needed to be," she says. "We have strong relationships with our vendors and didn't desire to change any of them."

But it was important for the hospital to make changes where necessary to ensure that databases from one system would be able to communicate accurately and effectively with a database from another system, she says.

"We wanted to take our pharmacy information system and have it be the master system," Dunsavage says.

"We built tables to populate downstream systems any time we add, delete, or change a formula item," she adds. "This assures the systems are in sync and the information matches letter for letter and digit for digit."

The vendors were essential to developing this interface process, and they worked well together despite competitive differences.

"We were all committed to creating better patient care, and if we kept the patient at the center of our focus, it was easy to see how to make this more successful," she says.

This preliminary work was necessary to create a workable system that would connect all of the various electronic components, Dunsavage adds.

"If we kept in mind the goal of better patient care, it was easy," she said.

- **Have staff walk in each other's shoes:** One way the hospital prevented workflow problems was by giving nurses and pharmacists time to see how the process worked from the other side's perspective.

Nurses were invited to spend a day working beside pharmacists, and pharmacists spent a day with nurses, she says.

This process of having each side walk in the other's shoes worked well.

"When walking in nurses' shoes, we anticipated some issues we could resolve ahead of time, and we put additional checks and balances in place," Dunsavage says.

This process also helped earn nursing buy-in, and the word spread about the transition was positive.

"The nurses who worked in the pharmacy became our ambassadors to other nurses," Dunsavage says.

Pharmacists also began to see how barcoding might be a problem in the day-to-day work world of nurses.

"Pharmacists began to understand how frustrating it is for nurses when they don't have the medications they need; it was eye-opening for both sides," Dunsavage says.

For instance, pharmacists could see how the barcoding process would falter when barcodes weren't easily readable. So they put in a process to test one dose in each lot of medication that comes from the wholesaler each day to make certain its barcode could be read, she explains.

"This way we're not sending nurses barcodes that are difficult or impossible to use," she says. "That doesn't mean there won't be one individual dose that has a wrinkled barcode, but that's a rarity."

The chief problem the barcode testing process avoids is having multiple barcodes from a lot that are difficult to read, resulting in nurses giving up and overriding the barcode scanning process, Dunsavage says.

"We make sure every dose is barcoded, and on our units we have bedside scanning in place so we can scan over 99% of our medications at the bedside," she adds. "So it's rare that something is not scanned."

About the only times something isn't scanned is when there's a life-threatening emergency that could not have been anticipated, Dunsavage says.

• **Pilot, roll out, and re-evaluate:** The technology change was piloted in a couple of nursing units, so the remaining problems could be identified and resolved before the final implementation stage.

"By the time the pilot units went live, the other units' nurses were interested in getting on board with the change, so it wasn't that difficult to

make the transition," Dunsavage says.

"As each unit went live we discussed any problems that might be unique to them," she adds.

Also, as each nursing unit began to implement barcode scanning, its staff helped other staff with their transition, she notes.

"We had a lot of issues teased out in that process," she says.

A group of stakeholders, including nurses, pharmacists, IT specialists, and others met weekly for about a year before the technology change took place. This group helped to identify and evaluate any problems that occurred with the transition, Dunsavage says.

Finally, after barcode scanning was fully implemented hospital-wide, the group of stakeholders continued to meet to analyze data and further improve the process, Dunsavage says.

"The group meets monthly to look at reports that come out of the system," she says.

Initially the group publicized incidents and potential safety risks identified in weekly reports, issued by e-mail and on the hospital's web site, and posted on nursing units, she adds.

"Now we put these out less often," Dunsavage says. ■

Reduce medication errors through following metrics

Pharmacy targets workflow issues

Hospital pharmacists should learn how to develop metrics for charting a variety of processes, including switching to new technology, following medication error reduction programs, and tracking best practices at multiple sites, an expert says.

For example, MedCentral Health System in Mansfield, OH, has a goal of having 92% or greater of all medications scanned without an override, says **Brian F. George**, PharmD,

Summary points

- By capturing metrics, a hospital pharmacy can document progress on IT change.
- Metrics also provide proof to hospital leaders that a new process produces benefits.
- Both actual medication errors and near-misses can be captured in metric.

assistant director of pharmacy services.

By using metrics to track progress on safety and other goals, hospital pharmacists can keep track of how well staff are adhering to policies and procedures and note areas that need improvement.

The pharmacy department tracks its success with meeting the goal through metrics that were developed over a six-month period, George says.

Here are some examples of their metrics and how they tracked and improved progress in those areas:

- **Metric: Are 92% or greater of all medications scanned?**

“Every medication that leaves our pharmacy has a barcode on it, and they’re checked when they come in,” he adds. “So we hit that goal in the first few months of being live on this process.”

“We saw early on that we were hitting that 92% benchmark,” George says.

There always will be some unavoidable overrides, but for the most part the process has been successful, George says.

The hospital pharmacy also tracks workflow and process, making sure the barcode is in place and scans well.

“So when the drug comes into the pharmacy, we verify that the barcode reads correctly,” George says. “If we bring a drug into the pharmacy and don’t check it, then when it doesn’t scan right for the nurse, the nurse will override it.”

Nursing overrides is a big workflow issue, so the pharmacy improves its metric in this area by checking all product orders and verifying that they can be scanned, he adds.

Another way to improve workflow is to focus on nursing education and compliance enforcement.

“We talked with nurses about the whole process, and we had great support from the nursing administration,” George says.

The nursing administration made barcode scanning overrides a disciplinary issue.

“If nurses knowingly bypassed the barcoding system just because they wanted to bypass it, then it would be a disciplinary issue,” George says. “That might sound like a hard line, but that’s what you have to do.”

Also, nurses were told that if supervisors found extra barcode armbands on patients or on medical carts then they’d be subject to disciplinary action, he adds.

“I’ve heard of sites where you would see an armband taped to the wall and things like that,”

George notes. “That was never an issue here.”

- **Metric: What is overall error rate?**

One of the convenient aspects of metrics is that these can be grouped however one likes. So for this metric, there were a number of items included, such as omissions, scheduled medications that were not charted, etc.

“We also looked at early PRNs,” George says.

For instance, if a physician ordered pain medication to be administered every six hours, as needed, for a patient, then it would be a mistake for a nurse to administer the medication after three hours, he explains.

“We would need to stop that from happening,” he says. “If someone needs the pain medication that much earlier, then someone needs to evaluate the order.”

Other errors would be if the wrong patient’s armband is being scanned.

“The scanner would give a beep, and it would be a near miss,” George says. “But we count that as an error.”

George examines the errors that were caught by the barcode scanning system to see what type of mistakes might have occurred if the technology had not been in place to stop the nurse from administering medication incorrectly.

“While we prevented these and they’re counted as saves, these are errors because without our barcoding system these medications would have been given incorrectly,” George adds.

The metric calls for a less than 2% error rate of these near misses.

Whenever a pharmacy uses metrics to measure success, it’s also necessary to have tools that help with measurement.

At MedCentral Health System, there is a medication error form that assesses severity of errors.

It has a score of 1 through 9, with 9 being equal to a patient’s death, George says.

The lowest score of an error goes to a near miss.

“So when you implement a system like this, you hope any medication-related errors of higher severity would decrease and medication errors of low severity would increase — like near misses,” George says.

“These are things that weren’t reported before, and you wouldn’t have had a good way of capturing them because they were self-reported,” he adds. “So the near misses weren’t captured really well before barcode scanning.”

This is why the hospital anticipated these low severity numbers to rise once the barcode

scanning technology was put in place.

"That number goes really high, and you want it to do this because it shows the effect and benefit of the system," George explains. "So we know the system is helping us prevent mistakes."

The barcode scanning system decreases the number of errors that impact patients, and the metrics proved this point: "We saw a reduction from the year prior to implementation to the year of implementation, and we've seen a reduction that has been maintained every year since," he adds.

For instance, the medication error metrics showed that the rate of errors was 0.37 per 1,000 doses prior to the implementation of barcode scanning, George says.

After the implementation, the rate decreased to 0.29 per 1,000 doses, showing that the new technology prevented 140-150 events, George adds.

• **Metric: How well is pain reassessed?**

"We also look at pain reassessment and have it set up in the system where 30 minutes after the administration of pain medication they have to reassess," George says.

"The system prompts them for that, and if they fail to do it, we re-evaluate," he adds. "We want greater than 90% of all pain medications administered re-assessed, whatever the dose."

By following this metric, George knows that the hospital achieves this goal.

"We're above 90%," he says.

"I have a philosophy that if you want something improved, you have to measure it," George adds. "By measuring it, it will be improved because people know it's being measured and they start to do better."

When metrics show that employees are not doing as well as expected, then the results can be used to coach people to do a better job, he says.

"This is a tool to better evaluate that processes are done in a timely fashion and well documented," George says.

The metrics have been a successful tool for the hospital pharmacy, George notes.

"It's helped us stay more involved in the process," he says.

Tracking and documenting success data about the technology change will have a long-term positive impact on the hospital pharmacy, he says.

"It's put our department in a good position for when we ask to do other projects," George says. "It allows us to utilize our staff to do stuff, and it allows us to say, 'Here is a project we did very successfully, and here's another project I'd like to do.'"

Hospital leaders are more likely to let the pharmacy implement new processes and technology if they are given data demonstrating patient safety and success, George adds.

"We want to provide medication in the safest fashion possible," he says. "That was our whole goal with the project, and I think we showed them we could do that." ■

Here's how to better manage oral antidiabetic drugs toxicity

Poison expert offers guidance

Most of the medication overdoses reported to the national Association of Poison Control Centers are unintentional, and many are related to diabetic medications, a poison control expert says.

The most common antidiabetic exposures are related to overdoses of the drugs in the sulfonylureas and biguanides classes, including metformin, says **Dawn R. Sollee**, PharmD, DABAT, the assistant director at the Florida/USVI Poison Information Center in Jacksonville, FL. Sollee also is a clinical assistant professor at the University of Florida College of Pharmacy in Gainesville, FL.

Typically, antidiabetic drug toxicity exposures occur among the elderly, Sollee says.

"They forget they took their medication and then took more than they need," she explains. "Or a small child found a grandparent's medication or a parent's medication and took it."

Occasionally, there will be a suicide attempt in which someone purposely injected him or herself with insulin, but most of the exposures are unintentional, she adds.

The most common problem seen is

Summary points

- The most common antidiabetic exposures related to drug overdoses are in the sulfonylureas and biguanides classes.
- Typically, antidiabetic drug toxicity exposures occur among the elderly.
- Glucagon can be used to treat a patient who has ingested a sulfonylurea, as well as a calcium channel blocker.

with sulfonylureas.

"Sulfonylureas have been on the market the longest, and their main problem regarding toxicity is they cause hypoglycemia," Sollee says. "Even one tablet in a child can be life-threatening."

Biguanides usually do not produce hypoglycemia, she adds.

"But the main problem is that someone can get lactic acidosis or metabolic acidosis with these drugs," Sollee explains. "One side effect is you get a conversion of glucose to lactate, and you may be more at risk if you have an infection, liver impairment, are an alcoholic, or have heart failure."

Diabetics who have renal impairment could have this toxicity even if they are taking the proper dosage, she adds.

When patients are treated in the hospital for a metformin overdose, the standard care is supportive unless the patient develops lactic acidosis, Sollee says.

"Once lactic acidosis is diagnosed, its mortality rate is 50%," she says. "In severe cases, they institute hemodialysis, and if the patient is too unstable they can use hemofiltration."

So the key is to monitor the lactic acidosis levels of patients who come into the hospital with a biguanide overdose, Sollee says.

When someone has a toxic exposure to sulfonylurea, the main symptoms of a hypoglycemia reaction would be confusion, sweatiness, increased heart rate, and seizures, Sollee says.

"All of these are consistent with having low blood sugar," Sollee says. "Most emergency rooms have blood sugar check machines, so they can do a finger-stick check right then and get the answer back that it's hypoglycemia."

Initially, the patient will be treated with a bolus of 50% dextrose unless the patient is a child, Sollee says.

"It comes in a pre-filled syringe, and most resuscitation and emergency trays will have that, so it's pretty standard," Sollee says.

Once the persons' blood sugar is brought back to the right range, the treatment commonly is to give the patient an infusion of 5% dextrose, which can be increased to 10% dextrose, if needed, she adds.

"You keep monitoring their blood sugar, and if the patient keeps having rebound hypoglycemia, then there's a consideration of using the antidote octreotide," Sollee says.

Octreotide is an octapeptide that is a potent inhibitor of insulin secretion.

"Octreotide tries to stop your body's own

insulin response," Sollee says. "Octreotide blunts the insulin secretion response by the pancreas and prevents rebound hypoglycemia."

One advantage to having octreotide on hand for the occasional sulfonylurea overdose is that the drug is used for other diseases, as well, Sollee notes.

"Octreotide's main use is for esophageal varices," she explains.

So hospitals typically have adequate stock of octreotide to handle antidiabetic drug toxicity, she adds.

Another group of medications that can cause hypoglycemia, although these exposures are less common, are meglitinides, including repaglinide and nateglinide, Sollee says.

"These can cause hypoglycemia, but their duration of action is a lot shorter — about four hours instead of the 24 hours for sulfonylureas," Sollee says. "The hypoglycemia doesn't last as long, so you can give the patients the same treatment, but there usually is not as much of a rebound effect."

If a patient has ingested a sulfonylurea as well as a calcium channel blocker, another antidote may be utilized: glucagon.

This might be the most difficult situation for a hospital pharmacy because few hospitals will stock enough glucagon to sufficiently treat one overdose of this nature, Sollee says.

"Usually you'll give the patient 2-5 mg of glucagon intravenously per hour, and these come in 1 mg vials," Sollee says. "The patient might be on it for several hours, but most will be on it for more than a day, and 24 hours of 5 mg per hour equals 120 vials of glucagon."

So hospitals will have to borrow the additional vials necessary from other hospitals in their area, she adds.

"At our institution we carry more than 100 vials on site, but our institution has a poison center on site," Sollee says.

Hospital pharmacists would need to do a little research to see whether their area receives many of these types of dual overdoses of both antidiabetic medication and calcium channel blockers.

"Calcium channel blockers are one of the leading causes of death by suicide," Sollee says.

"They're always in the top three categories in terms of leading to death and overdose that are reported to the American Association of Poison Control Centers."

The Florida/USVI Poison Information Center receives several calls about these overdoses each

year, she adds.

"Hospital pharmacies will want to keep enough vials of glucagon on hand to last a couple of hours," Sollee suggests. "If they know they can get a hold of more from a sister facility or another hospital then they might need only 60 vials in stock."

[Editor's note: Any hospital pharmacist who has questions about how to dose certain antidotes or side effects should call 800-222-1222 to reach their local poison center, which will have toxicologists on call 24 hours a day.] ■

Drug News

Chronic metoclopramide use linked to tardive dyskinesia

The FDA notified health care professionals that manufacturers of metoclopramide, a drug used to treat gastrointestinal disorders, must add a boxed warning to their drug labels about the risk of its long-term or high-dose use.

Chronic use of metoclopramide has been linked to tardive dyskinesia, which may include involuntary and repetitive movements of the body, even after the drugs are no longer taken. These symptoms are rarely reversible and there is no known treatment.

Metoclopramide is available in a variety of formulations, including tablets, syrups, and injections. Names of metoclopramide-containing products include Reglan® tablets, Reglan oral disintegrating tablets, metoclopramide oral solution, and Reglan injection.

Manufacturers will be required to implement a risk evaluation and mitigation strategy [REMS] to ensure patients are provided with a medication guide that discusses this risk. Current product labeling warns of the risk of tardive dyskinesia with chronic metoclopramide treatment. ■

Licorice blocks absorption of cyclosporine used by transplant patients

Chemists in Taiwan are reporting that an ingredient in licorice, which is widely used in various foods and herbal medicines, appears to block the absorption of cyclosporine, a drug used by transplant patients to prevent organ rejection.

This drug interaction could potentially result in transplant rejection, causing illness and even death among patients worldwide who take cyclosporine and licorice together, the researchers caution.

The study is the first report of this potential drug interaction, the scientists say. Their findings were presented at the American Chemical Society's 237th National Meeting, held March 22-26, 2009, in Salt Lake City, UT. **Pei-Dawn Lee Chao**, PhD, a chemist at China Medical University in Taichung, Taiwan, presented the research findings.

The researchers say they do not know exactly how much licorice it takes to have a toxic effect in humans. Licorice-based products vary widely in the content of their main active ingredient, a substance called glycyrrhizin.

Also, thousands of patients also take cyclosporine for rheumatoid arthritis, certain skin conditions, and other diseases.

Other medications, foods, and herbs that can reduce levels of cyclosporine in the body and should be avoided when taking that immunosuppressant drug include St. John's wort, quercetin, onions, ginger, and ginkgo. Other studies show that some substances, such as grapefruit juice, can actually boost cyclosporine levels.

Researchers will continue to study the reasons why licorice interferes with cyclosporine.

Previous studies have indicated that licorice can interfere with the effectiveness of high blood pressure medications, aspirin, anti-inflammatory drugs, insulin and oral contraceptives. ■

COMING IN FUTURE MONTHS

■ Take this emergency medication challenge

■ Recession makes budget-planning more difficult

■ Hospital pharmacy builds new revenue sources; here's how

■ New antibiotics could impact hospital drug budgets

■ New study offers non-antibiotic treatment possibility

Mycophenolic acid has new medication guide

The FDA and Novartis notified health care professionals of the introduction of a Myfortic® Medication Guide to provide important safety information in language that patients can easily comprehend.

By May 15, 2009, a copy of the Myfortic Medication Guide will be enclosed with every Myfortic bottle. Pharmacists are required to distribute a copy of the Medication Guide with every Myfortic prescription. ■

Zencore Plus® is recalled because of undeclared drug

Bodee LLC and the FDA notified consumers and health care professionals of a nationwide recall of all the company's supplement product sold under the name Zencore Plus®.

FDA lab analysis of Zencore Plus samples found the product contains benzamidenafil, an undeclared drug product and a PDE5 inhibitor.

The use of Zencore Plus by an unsuspecting user of organic nitrates may pose a life-threatening risk of sudden and profound drop of blood pressure due to potential interaction between benzamidenafil and organic nitrates.

Zencore Plus is sold in health food stores and by mail order on the internet nationwide. Hospital patients who use organic nitrates should be screened for use of Zencore Plus. ■

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