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Best Practices Focus: Anticoagulation Strategies

College medical center develops DTI management service

Program wins Best Practices award

Pharmacists are uniquely qualified to monitor direct thrombin-inhibitor (DTI) drug therapy and should consider working with physicians and hospital leaders to improve patient outcomes by developing such a program.

The 2008 Joint Commission National Patient Safety Goals include a goal of reducing the risk of patient harm from anticoagulation use. So a DTI drug therapy management program could meet this goal by reducing medication errors related to adjusting DTI dosages.

One model for involving pharmacists in DTI drug therapy management is through the implementation of a collaborative drug therapy management agreement that enables trained pharmacists to make changes to medication doses without first contacting a physician.

Pharmacists at the Medical University of South Carolina (MUSC) have created such an agreement over a two-year period, and it has resulted in better patient outcomes.[1,2]

Summary points

- Pharmacists are well-qualified to monitor direct thrombin-inhibitor drug therapy.
- DTI program can improve patient safety and improve clinical outcomes.
- Program requires strong education and training.

For example, a study of DTI patients post-implementation showed that they had achieved therapeutic activated partial thromboplastin time (aPTT) more rapidly and maintained therapeutic aPTT more consistently. The pre-implementation rate was 7.7 hours vs. the post-implementation rate of 3.4 hours.[1]

Also, the program resulted in reduced medication errors. Data show that pre-implementation, med-

ication errors occurred in 40% of patients, while post-implementation, medication errors occurred in 12% of patients. And prescribing errors, which occurred in 24% of patients pre-implementation, were eliminated post-implementation.[1]

The MUSC pharmacist team received a 2009 Best Practices Award in Health-System Pharmacy from the American Society of Healthcare Pharmacists (ASHP) for their DTI process.

The first step was to create a DTI treatment protocol as part of the collaborative drug therapy management agreement.

"The protocol was approved by physicians and pharmacists," says **Heather Kokko**, PharmD, clinical assistant professor, director of pharmacy services, and director of graduate pharmacy education at MUSC.

"We have a process to make sure pharmacists are well-trained by going through a credentialing process," Kokko says. "Only those pharmacists could participate in the program."

Joseph Mazur, PharmD, a clinical pharmacy manager at MUSC, helped develop the credentialing program and competencies.

"I've always been involved in anticoagulation," Mazur notes.

Mazur, along with Kokko and the other MUSC pharmacists who received the ASHP award for the DTI program, researched available literature on DTI programs and pharmacists and found little to no available guidelines and protocols.

Yet it made sense to make DTI management a pharmacist-driven process, Mazur notes.

"We think we can do as well as physicians in terms of dosing patients," he says. "They're diagnosticians, and we can manage the protocols."

So a team of MUSC pharmacists worked for more than six months to develop a preprinted order form and protocol. These outlined how pharmacists would manage DTI patients, and it included these main features:[1]

- Practice pearls for diagnosing heparin-induced thrombocytopenia (HIT);
- Choice of DTIs and initial dosing;
- Pharmacist-driven and nursing instructions for monitoring DTI therapy;
- Information for safely transitioning a patient from a DTI to warfarin;
- Scoring system to determine probability of HIT.

After the protocol was developed, it had to be approved by MUSC's pharmacy and therapeutics (P&T) committee, which consists of pharmacists, physicians, nurses, and dietitians.

"Once the P&T committee had all of its questions answered, and the committee approved the protocol, then it was sent to the medical executive committee for approval," Kokko says. "That committee mostly consists of physicians, but also includes the hospital's leadership."

Kokko sits on the medical executive committee as a nonvoting member.

The protocol is 3-4 pages long and is available to MUSC clinicians via an Intranet.

"The protocol is in an electronic format, but they can print it out, fill it in, and we still have a paper chart," Kokko notes.

The order form for prescribing DTIs includes a definition of heparin induced thrombocytopenia, along with a boxed decision diagram that juxtaposes "Clinical suspicion" with "Platelet Factor 4 Antibody" and lists high and low instructions for both positive and negative results.[2]

For example, an HIT-confirmed positive result that is high would require the actions of stopping heparin and LMWH products and starting DTI. A

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low positive HIT result would result in the actions of stopping heparin and LMWH products, considering other causes of thrombocytopenia, and using DTI specific to patient risk versus benefit.

The order form also includes checkboxes for indicating anticoagulation use for prophylaxis, use of argatroban, use of bivalirudin, and pharmacy dosing.

A second page of the order form features monitoring instructions, clinical practice points, and a flow chart of the process from initiation of warfarin.

And the last page provides a table for a scoring system for the pretest probability for the presence of HIT.

The next part of the process is to train pharmacists who are part of the collaborative care agreement.

"We held interactive educational sessions on DTIs, pharmacokinetics," Mazur says. "We had two-hour training sessions with PowerPoint slides, and then we gave participants competency exams with a minimum passing score of 85%."

The in-depth exams included one oral exam and one written assessment involving two patient cases, he adds.

Physicians can look up on-line the names of pharmacists who are credentialed for the DTI drug therapy management program. This way they'll know who to call when they have a case.

It took a while for the program to expand, and this created a little difficulty at first for the handful of pharmacists who were trained, Mazur notes.

"For about a year, we only had three of us who took calls from physicians, and it was a lot of work," he says. "Now we have expanded to about a dozen people trained."

Pharmacy residents can assist the trained pharmacists with patient care, but they are not credentialed and are not part of the DTI drug therapy management program.

"We require pharmacy residents to be backed up by a preceptor, and all of their recommendations are co-signed by faculty back-up," Kokko says.

Hospital pharmacists should be able to convince health system leaders that a DTI drug therapy management program and collaborative agreement are good investments both from the patient safety perspective and from the indirect cost savings.

"Many people will say that a medication error could cost a hospital an average of $5,000 because this increases the patient's length of stay and requires additional treatments," Kokko says. "So having the kind of reduction in medication errors that we had is really valuable for a hospital from a cost standpoint, as well as from a patient safety standpoint."

MUSC has 100 full-time equivalency pharmacist positions, and the medical college did not need to hire additional staff to implement the DTI drug therapy management program, Kokko says.

Pharmacists who receive the special training do so voluntarily.

And it wasn't difficult to obtain physician buy-in.

"We have medication management agreements in other areas, so this was not a new concept to our physicians," Kokko says. "They've been very supportive of our pharmacy services, and we're only limited by how much of our resources we can offer to our physician friends."

Before starting the program, pharmacists provided informal input on DTI cases, Mazur says.

"In this state, nurses cannot take verbal [medication] orders from pharmacists," he explains. "So per our institutional protocol, we are allowed that opportunity to assist in medication monitoring and prescribing."

Everything is based on the protocol and collaborative agreement, and pharmacists are responsible for ensuring that pharmacists using the DTI protocol are deemed competent and have received credentials for their expertise and training.

"Often when we are involved with monitoring programs, we have to get a verbal order from the physician," Kokko says. "What makes this different is we are able to dose the medications without going to the physician each time we want to make a change."

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2. Cooper T, Taber D, Mazur J. Implementation of a collaborative drug therapy management service for inpatients receiving direct thrombin inhibitors. *Am J Health-Syst Pharm* 2009;66:1297-1303. ■

Protocols and programs help improve quality of anticoagulation therapy

Project saves money, reduces LOS

Shortly after the Joint Commission included anticoagulation therapy on its National Patient Safety Goals two years ago, Winter Haven Hospital's pharmacy services began a major project to improve its own handling of anticoagulation.

"We researched available protocols and found very little information for inpatient care," says **Jovino Hernandez**, PharmD, clinical coordinator of pharmacy services at Winter Haven Hospital.

So Hernandez and another clinical pharmacist **Karen Siegel**, PharmD, spearheaded a project to develop an inpatient warfarin protocol. This protocol received immediate and positive feedback from physicians, who now had one less problem to worry about, Hernandez notes.

"They no longer would be getting phone calls in the middle of the night because a pharmacist could follow warfarin therapy with the protocol," he adds.

The outcomes also have been encouraging.

The hospital's length of stay (LOS) for warfarin patients at baseline was 6.4 days. Since making the change, the LOS has dropped to a low of 5.5 days, Hernandez says.

"The protocol helps with our National Patient Safety Goals," he adds. "So even though it takes more pharmacist time, the administration sees the value of this, partly because of the LOS decline."

Here's how the hospital developed the protocol:

• **Design protocol to fit hospital's patient population:** The first step is to assess your hospital's patient population.

"Over 50% of our population is on Medicare, so it's a very old population," Hernandez says. "Most of our patients have comorbidities like congestive heart failure, for example."

He took these factors into consideration as he looked at potential models for the protocol and worked on the one that eventually would be used.

"We had to get a feeling for what our experiences were with warfarin therapy," Hernandez says.

Summary points

- Inpatient warfarin protocol was well-received by physicians.
- Design warfarin protocol to fit patient population.
- Educate physicians about reducing vitamin K use.

• **Form an anticoagulation team:** This is necessary for the National Patient Safety Goals. The Winter Haven Hospital anticoagulation team is co-chaired by Siegel and a physician and also has members who are from nursing, the lab, hematology, and cardiology.

"Our main focus was on the safety goals and how to address them," Hernandez says. "Through our pharmacy and therapeutics [P&T] committee we found a high level of elevated INRs associated with warfarin."

The P&T committee sent the information to the anticoagulation team to see if they could come up with a strategy that would improve this issue.

The anticoagulation committee eventually developed protocols for other anticoagulant issues, including heparin induced thrombocytopenia (HIT) and enoxaparin. **(See story on HIT and enoxaparin protocols, right.)**

"All of these are in place to follow best practices and decrease adverse drug reactions as much as possible," Hernandez says.

• **Obtain physician agreement to have pharmacy dose warfarin:** "We had the medical staff approve the warfarin protocol as our hospital's protocol," Hernandez says. "And physicians can sign the form if they want pharmacists to manage their patients' warfarin therapy."

So far every physician who was approached has signed the protocol, he adds.

"We're seeing 80% of patients who are on warfarin," Hernandez says.

The hospital's hospitalist was the first to sign the agreement. But over 1.5 years, other physicians signed it, as well, he adds.

• **Educate all involved:** "We had to educate everyone," Hernandez says.

The change entailed training pharmacists on dosing warfarin and having pharmacists shadow a clinical pharmacist.

"For physicians, the main education involved vitamin K associated with warfarin," Hernandez says. "This was a huge piece."

This also was a good example of how education on these changes and protocols is ongoing and evolving. Once the protocol was accepted and used, Hernandez followed outcomes data

and saw that two things were occurring: First, use of the protocol did help reduce the number of elevated international normalized ratios (INRs), and, secondly, physicians still were prescribing a lot of vitamin K, resulting in an increased length of stay.

Physicians would see a high initial INR and then prescribe vitamin K as an antidote, even though the pharmacists were following the protocol and were carefully monitoring INR levels. Then the patient would have to stay in the hospital longer because of the effect of too much vitamin K, Hernandez explains.

"In most situations if the patient doesn't have an active bleeding problem or too high of INR, then you don't have to give the patient vitamin K," he says.

"But physicians would see that a patient had an elevated INR and give the patient a subcutaneous injection of vitamin K in the morning," he adds. "Then they'd look for INR results later that night and still not see the results they wanted, so they'd give the patient another dose of vitamin K."

By the next morning, the patient's INR level would be very low, resulting in an increased LOS while pharmacy tried to get the INR back to a therapeutic level.

This costs the hospital money. The typical warfarin patient's daily cost is $1,080 per day, so a small decrease of 0.4 days in the LOS would equal $800,000 in annual savings, Hernandez says.

Once physicians were educated about holding off on vitamin K orders, the LOS began to decline, he adds.

Also, the INRs declined by one-third since the change was implemented, Hernandez says.

"The staff's satisfaction with the program has increased because they can see improvements in warfarin protocols," he adds. ■

Here's how hospital handled enoxaparin and heparin protocols

Argatroban use greatly decreased

Winter Haven Hospital in Winter Haven, FL, developed several protocols involving the pharmacy's involvement with anticoagulation therapy, including protocols specific to enoxaparin and heparin.

Here is how those protocols worked:

• **Enoxaparin:** "For this protocol we screen every patient who starts on enoxaparin for renal function," says Jovino Hernandez, PharmD, clinical coordinator of pharmacy services at Winter Haven Hospital.

Pharmacists can adjust enoxaparin dosing on all physician orders when appropriate, based on the protocol.

"We reduce their dose based on their renal function," he says. "We screen for patients even if their creatinine clearance was less than 50."

Anecdotal evidence has shown less retroperitoneal bleeding associated with enoxaparin use since the protocol was implemented, Hernandez says.

Summary points

- Screen every patient on enoxaparin for renal function.
- Screen patients for heparin-induced thrombocytopenia (HIT).
- Pharmacists follow-up with lab for faster results.

"The physicians were very responsive, and many of these initiatives are discovered in conjunction with quality outcomes here," he adds.

• **Heparin:** Pharmacists manage all patients' heparin therapy based on the heparin protocol, Hernandez says.

"We also have screening for patients who have heparin-induced thrombocytopenia (HIT), and we work in conjunction with the lab," he adds. "Whenever someone orders a HIT study, the pharmacy follows up on the results and proper management."

Prior to implementing the HIT portion of the heparin protocol, there was no specific process for handling these issues.

"Before, when a patient's platelets dropped while on heparin, we didn't tend to notice like we do now," Hernandez says. "When there was a HIT screening order there was no one designated to follow-up on these."

Now, pharmacists will follow-up with the lab and try to obtain the results as quickly as possible.

Also, pharmacists and hematologists have educated physicians that a decrease in platelets on heparin is not necessarily an indication for treating for HIT.

"What we now do is a grading system that assesses previous heparin use and time from a patient's last heparin exposure to the decrease in platelets," Hernandez explains. "We check with physicians to see if there are any signs or symptoms of thrombosis."

For example, if there's an active clot, they'll start on argatroban, the treatment for HIT.

The outcome has been a cost savings from a decrease in the inappropriate use of argatroban, Hernandez says.

"That saves an enormous amount in costs," he adds. "Argatroban costs over $1,000 a day, and patients can take 4-5 days of the drug."

In the past year, the hospital has used only 12 vials of the drug, a five-fold decrease that has saved thousands of dollars, he says.

In five steps you can develop a stellar evidence-based medicine program

Come up with best answer each time

Hospital pharmacists need to think like research investigators before recommending medication changes to hospital formularies or prescribing best practices. Each answer to a clinical question should be based on the strongest possible evidence, an expert says.

"Pharmacists need to get involved more with evidence-based medicine," says **Patrick J. Bryant**, PharmD, FSCIP, director of the drug information center and a clinical professor in the division of pharmacy practice and administration in the school of pharmacy at the University of Missouri-Kansas City. Bryant is the primary editor of a book, titled, *The Pharmacist's Guide to Evidence-Based Medicine for Clinical Decision Making*, which was published in paperback in 2008.

Bryant worked in the pharmaceutical industry for 15 years, and has been in academia for 12 years. It was while teaching a drug information course that he realized that this needs to be expanded and broadened for health system pharmacy practice.

The result is a five-step process for making the best decisions based on existing evidence in the literature. Here is how the process works:

1. Define the clinical question.

Unpublished data show that 85% of the time hospitals in seeking an answer to a question end up with an answer to a different question, Bryant says.

"It justifies the time you spend on finding an answer if you make sure you're asking the correct clinical question," he says. "It also assists you in staying focused as you go through this process."

The key is to clarify objectives and reconcile these with what it will be possible to discover in the literature. And it might be that the original question is abandoned and a better one is posed.

2. Retrieve pertinent information.

"Use database searching strategies and bibliography searching," Bryant advises. "In the papers you do find, look at their cited references in the back of the article and see if there are any other questions there that might relate to your question."

These could be something a pharmacist has overlooked in the initial search.

Once a pharmacist has collected a pile of studies, it'd be a good strategy to sort these according to which are randomized clinical trials, which tend to be a higher quality of evidence, Bryant says.

Sometimes, there might be little high-quality evidence, and a pharmacist will have to settle for studies lower on the strength scale, such as observational trials, followed by testimonials and case studies, he adds.

"Having an understanding of the strength of the studies will help you decide where to start," Bryant says.

3. Evaluate the literature.

"A lot of people will use a multi-item checklist for this," Bryant says. "This could have 20-40 different items related to specific questions you'd ask yourself about an article or study."

The simple questions would be as follows:

- Was the study randomized?
- Were investigators from a reputable institution?

Bryant recommends using 10 major considerations when evaluating the literature. **(See story on 10 literature review considerations, p. 43.)**

"We boiled these down to 10 specific attributes or considerations that you should look at and use to determine whether each of those is a strength or limitation," Bryant says. "Any of these being a limitation can have a devastating effect on the results of the trial, and it's your job to determine how devastating that would be."

4. Categorize the quality of the evidence.

"Once you identify what the limitations are and whether you think these have affected the results, then you need to categorize the quality of evidence," Bryant says.

This is difficult to do, so Bryant and colleagues came up with a five-point scale, with level one being the highest level of evidence and five being the lowest.

In the top levels, pharmacists will place the well-designed randomized, controlled clinical trials. The studies rated a three or four would include observational studies, and level five

Summary points

- Pharmacists should be more involved with evidence-based medicine.
- Search databases and bibliographies for pertinent literature.
- Use checklist to evaluate quality of literature.

would be the case studies, case theories, testimonials, and case reports.

The next step is to put together a table of evidence called the summary table of evidence that lists the name of the study, the author, and whether it was a level one through five, Bryant suggests.

"What was the outcome? Was the drug better than another agent?" he says. "The fourth column would show major limitations, which come from the 10 literature review considerations."

If the answers to the 10 considerations show all strengths, then this is a very high quality study. If there are a few limitations, it would be less so. But a study with major limitations in most or all categories would be a real problem.

"When you're looking at this table, it allows you to look at everything you have at one time," Bryant says.

5. Reach a conclusion and make a recommendation.

This is the easiest of the five steps because with all of the thinking and work put into the other four steps, a pharmacist should be able to say with confidence, "We believe, based on our research of the evidence-based medicine, that this is the conclusion."

The formulation of the recommendation is based on the quality of the evidence, logical reasoning, and clinical judgment.

"We teach our students that if they're making a population-based decision, like a formulary decision where you'll affect a lot of different patients and they don't have very much detail on any of those patients, then they'll have to make a more conservative recommendation," Bryant says. "But if this is an individual patient decision where you know a lot about that patient through his medical chart, then you can be less conservative and make a decision based on less quality of evidence." ■

Here are 10 considerations when doing evidence-based literature review

Process helps with making best drug decisions

Before hospital pharmacists make medication change recommendations to their hospitals' pharmacy and therapeutics (P&T) committees, they need to do a thorough evaluation of the literature.

An expert recommends that they do this evaluation with 10 major considerations. Here's what they are:

1. Was the power set and met?

"Was the power set and met with the appropriate number of people needed in the study?" says **Patrick J. Bryant**, PharmD, FSCIP, director of the drug information center and a clinical professor in the division of pharmacy practice and administration in the school of pharmacy at the University of Missouri-Kansas City.

2. Was the dosage or treatment regimen appropriate?

For instance, if investigators used minimal doses of the comparative agent and a strong/higher dose of the study drug, then that might make the study drug look better than it otherwise might, Bryant says.

"What we're looking for is whether these are dosages you would normally see in a clinical setting and whether they're equitable between the two drugs being studied," he adds.

3. Was the length of the study appropriate?

The study's length needs to be appropriate to what is needed to show a true intervention effect.

For example, with antidepressant drugs, these sometimes take eight weeks or longer to demonstrate a maximum effect, Bryant notes.

"So if you did a study that's only three weeks long then you probably won't see how well these drugs will perform," he explains.

4. Is the inclusion/exclusion criteria adequate to picking out the population of people you want to study?

Using the antidepressant drug study example, it would be important to make certain that if a hospital P&T is considering including the drug for treating anxiety, that studies that enrolled anxiety diagnoses are reviewed. It might be less helpful to review only the literature pertaining to the drug's treatment of major depression disorder, Bryant says.

"You don't want to mix apples and oranges," he says. "So you need to make sure it defines what you're looking for, and this ties back to that clinical question."

5. Is the exclusion criteria adequate?

"You want to make sure that you're excluding people that the drug could harm," Bryant says. "Perhaps people with certain disease states shouldn't be given this drug because it might

exacerbate their disease state."

The goal is to find studies that list adequate exclusion criteria so a pharmacist can assess the risk more thoroughly.

6. Was blinding present?

"This is important because if you have a blinded study, meaning neither the investigator nor patient know what the patient's getting, then you can eliminate a lot of the bias," Bryant explains. "You can have a double-blinded study where neither person knows or a single-blinded study where the physician does know but the patient doesn't, or it could be unblinded where they both know which drug is given."

Each of these scenarios will result in a different bias, he adds.

7. Randomization resulted in similar groups.

"Randomization makes sure everyone has an equal chance of getting into one or the other group," Bryant says. "That's important because the way you can tell how a randomization schedule works is if you look at the demographics of each group."

For instance, generally the first table in an article is the demographics table.

"Go down the table to see if the ages were about the same, if there were the same amount of men and women," he explains.

"If there is a difference in the groups when you start out, then when you get to the end of the study and you see a difference in results, how would you know if the difference is due to the drug or whether it's due to the difference in people between the study drug and the control drug? Bryant says. "You need to start out with similar groups up front so if you see a difference in blood pressure at the end of the trial, then you can be reasonably certain the groups were at least the same in the beginning."

8. Biostatistical tests appropriate for the type of data analyzed?

Data can be categorized into four types: interval data, ratio data, nominal data, and ordinal data, Bryant says.

"Each are a different kind of data that has a different distribution, and so most of these will require a different type of test," he explains. "Ratio and interval data have the same type of test."

9. Measurements, standards, validation and accepted practice.

"Did you use a test that is generally accepted and/or validated to be able to measure something that is also generally the way you'd practice in a clinical situation?" Bryant asks.

"For example, was the blood pressure measured with a sphygmomanometer, which is the accepted tool?" he says. "It's what we use in clinics."

If a study had investigators using a different blood pressure measurement, then that might raise a red flag, or at least a question.

10. What are the authors conclusions?

"You want to see that the author's conclusions are supported by the results," Bryant says. "Use your logic."

If a pharmacist sees some questionable items in the study and it appears the author is over-reaching with his or her conclusions, then it's time to look more closely at potential biases in the data, he adds. ■

Hospital pharmacy develops DVT prophylaxis program

Each patient is assessed

Winter Haven Hospital in Winter Haven, FL, targeted deep vein thrombosis (DVT) prophylaxis as a goal, targeting this project to prevent readmissions related to DVT.

"We formed a multidisciplinary team of a pharmacist, nurse, and physician to see what we could come up with for a DVT protocol," says **Jovino Hernandez**, PharmD, clinical coordinator of pharmacy services at Winter Haven Hospital.

After reviewing existing DVT protocols, some with very complex scoring systems that might be impractical to use, they settled on an order form that put patients into three categories: low risk, moderate risk, or high risk.

"It's a nurse-driven system," Hernandez says. "Every adult medical or surgical patient who enters our hospital is assessed at admission by the nurse as low risk, moderate, or high risk, and the physician

Summary points

- Create program targeting prevention of deep vein thrombosis.
- Physicians document why they didn't use DVT prophylaxis
- Nursing stations are given incentives to ensure DVT assessments and interventions are done.

determines which therapy to administer."

Then the order is faxed to pharmacy, and the pharmacist enters the order, documenting that the DVT assessment was done.

The system automatically looks for patients who don't have that order documented, and reports are sent to the nursing stations with lists of patients who have not had their DVT risk assessed and treatment ordered, Hernandez says.

For patients who are not ordered DVT prophylaxis, the physician needs to document why he or she believes it is not needed.

"Nurses receive this report each morning, and the results are put on their score card which shows how well they're doing," he says. "Each month, there's a report that shows how each floor is doing as far as recording proper assessment and treatment."

This process was developed over a year and then implemented in 2006, beginning with pilot runs on a few floors, Hernandez says.

The pilot process highlighted some problems requiring additional staff education and better timing, he notes.

"The order form was by no means perfect and required more nursing input," he says. "We needed a cue to remind nurses of targeted patients, those who really needed the assessment because they hadn't had one yet."

That cue became the list sent to nursing stations each morning.

To help nurses make this process a habit, the hospital held a contest with floors competing against one another.

"We ran reports to see who was doing the best job, who had highest percentage of DVT assessment and intervention compliance," Hernandez says.

The winning floor receives a lunch-and-learn session in which a pharmaceutical company is invited to provide education about a particular medication while feeding attendees lunch.

"They call us up every month and say, 'Who won this month?'" Hernandez notes. "The nursing staff wants to win."

Prior to 2008, there were no electronic DVT data, but the problem of avoidable DVTs has largely disappeared since the program began, he adds.

Another change has been that as of January, 2010, the assessment has been shifted to physicians. The nursing stations still are responsible for making certain all of the assessments are recorded, but the nurses no longer do them.

"It's become automatic for all patients to be assessed, and a lot of our physicians are automatically upon admission doing it themselves now," he says. "They know if they don't do the assessment they'll have a nurse calling them about doing it."

The new protocol moves in the direction that each patient should be given a DVT prophylaxis unless a physician documents a reason why it's not needed, he adds. ■

Provide mentoring and support throughout staff work experience

Hospital makes programs mandatory

Hospital pharmacies can enhance staff's satisfaction and improve their knowledge base by providing mentoring and professional development activities throughout their career progression.

While many health care systems have residency and internship programs for pharmacy students, they also should consider ongoing training and mentoring for their staff, says **Nannette M. Berensen**, PharmD, MBA, BCPS, director of pharmacy services for Intermountain Medical Center of Murray, UT.

Berensen, whose background includes teaching pharmacy college students, has assisted Intermountain Medical Center with developing a preceptor program and a continuing professional development program.

"When I joined Intermountain, I interviewed all the pharmacists and said, 'There's a huge need for precepting and mentoring future practitioners,' and 'What are your barriers to doing this? Why haven't you been involved?'" Berensen says.

She readily identified these needs: They wanted more experience with structuring learning experiences, and they wanted to network with other preceptors.

"The pharmacists needed to share information with other preceptors, cultivate ideas, and incorporate them," Berensen says.

So in January, 2009, Berensen started a program to help pharmacists develop the skills they'd need to serve as preceptors for students.

Summary points

- Pharmacists need training, networking to become preceptors.
- Employee professional development program improves training, morale.
- Pharmacy technicians also benefit from development program.

Pharmacists attend monthly preceptor workshops. These involve about 25 pharmacists and take about an hour each month.

"Originally, the content was developed in a workshop format with a significant amount of dialogue and sharing between practitioners," Berensen says. "Initially, preceptors were invited to submit topics they thought were most beneficial."

The topics included:

- Helping learners achieve independence;
- Using and evaluating case presentations;
- Tailoring rotations to best suit personality types;
- The benefits of mentoring relationships.

The session on personality types was based on a book, titled, I*nsight Personality Instrument*, that one of the pharmacists had read, Berensen notes.

"The point is that we have different learners at different stages and interests and personalities," she explains. "And what resonates with them will be different based on personality differences."

The preceptor workshops have accomplished the goal of increasing the number of pharmacists who serve as preceptors and have enabled the medical center's internships and residency rotations to grow.

For instance, in 2007, the medical center offered 42 rotations; in 2008, this increased to 114 rotations; in 2009, there were 189 rotations, and this year there will be 215 rotations, Berensen says.

"We also observed the workshops' effect on promoting comradery between preceptors," she adds. "Some have adopted new practices and innovations stemming from workshops."

The medical center also has implemented a comprehensive pharmacy professional development program.

"Its goal is to elevate the level of pharmacy practice and also increase employee satisfaction and retention," Berensen says.

"These are all interconnected," she adds. "If you have a really well-developed staff then you have a rich learning environment for students and interns."

The development program involves weekly meetings for pharmacists and bi-weekly meetings for pharmacy technicians.

The medical center's pharmacy technicians and 67 pharmacists are required to attend at least 65% of the sessions, which are repeated for two meetings in a row. This way, staff that is on a 7-on-7-off schedule will not have to miss a meeting.

"We typically have between 25 and 30 people at each presentation," Berensen says.

Pharmacists and pharmacy technicians are invited to speak at the sessions about their particular areas of expertise.

"The speakers all come from within the department," Berensen says. "This is a tremendous tool in terms of building comradery, harvesting intellectual capital, and sharing practice innovations."

Each year, pharmacy leaders conduct a formal assessment of what the staff's learning needs are and which items are a top priority, she notes.

"We look for common themes, the greatest demands, and we try to adjust it based on a priority of need," Berensen says.

Here are some of the pharmacist sessions that were held in the past year:

- Fluid and electrolyte replacement;
- Renal replacement modalities;
- Pleiotropic effects of statins;
- Innovations in clinical pharmacy practice;
- Reimbursement for cognitive pharmacy services;
- Review of immunosuppression;
- DVT prophylaxis and treatment;
- Hypertension management in special populations;
- Principles of medication safety.

"We have 26 new topics each year for pharmacists, and the presentations are 50 minutes long, leaving 10 minutes for questions and answers," Berensen says.

As an additional incentive for attending the presentations, the hospital offers continuing education credits that can be used toward pharmacists' licensing renewal.

The program works in a similar way for pharmacy technicians, although the sessions are held every other week, and there is a new topic each month. Also, about 80% of the technician presentations are done by pharmacists, with technicians covering the remaining 20%.

Some of the topics presented to pharmacy technicians were as follows:

- USP 797 update;
- Medication reconciliation;
- Automated dispensing cabinet

troubleshooting;
- Calculations;
- Using drug information references;
- Diversion avoidance;
- Effective communication;
- Leadership principles;
- Medication error reduction strategies;
- Compounding essentials;
- Teamwork.

A survey showed positive feelings toward the program among both pharmacists and technicians.

About half the attendees responded to the survey, and among them 82.6% said the professional development program had positively affected their practice, Berensen says.

All but 4.3% of respondents had rated the program as valuable, and 24.6% said it was extremely valuable, she adds.

Perhaps most telling, 63.2% of respondents said the professional development program was a factor in their continued employment, Berensen says.

"And then we asked whether the IMC professional development program facilitated department unity and comradery, and of the 70 respondents, 50.7% said 'Yes,'" she says. ■

Process came in handy when hospital had heparin shortage

Pharmacy had 48 hours to make changes

A North Carolina hospital pharmacy recently demonstrated the importance of having a good performance improvement (PI) strategy readily available when the pharmacy had to act quickly in February due to an IV heparin shortage.

"There was a national heparin shortage as the manufacturer changed from the old formulation to a new formulation," says **Lynn Eschenbacher**, PharmD, MBA, clinical manager at WakeMed Health & Hospitals in Raleigh, NC.

WakeMed's manufacturer was Hospira for the IV bags of heparin. Hospira attributed the shortage of heparin vials to supply and demand issues, according to the American Society of Health-System Pharmacists (ASHP). Hospira announced in January, 2010, that all large-volume heparin sodium in dextrose 5% premix solutions and one presentation of heparin sodium in 0.45% sodium chloride would be unavailable through the end of March, 2010. The company also reported it was working to implement new manufacturing procedures associated with the new USP reference standard for heparin products.

The WakeMed pharmacy had managed the potential shortage by measuring the hospital's daily use of heparin, analyzing its needs, and monitoring product supply.

Then something unexpected happened: One day in mid-February, 2010, the hospital's heparin distributor said it had no more old product and the new product wouldn't be available until April, 2010.

The current IV heparin bags were on national back order and there were only a few of the current IV bags left in the hospital, Eschenbacher says.

"We quickly had to develop a plan, and we pulled together a team that included the vice president of patient safety, chief medical officer, medical director of the laboratory, pharmacy, and nursing," she says.

The team had 48 hours to implement a process improvement (PI) plan and prevent the heparin shortage from impacting patient care.

These questions had to be answered:
- How many heparin bags were left?
- How will the hospital make the transition?
- Where would the hospital find the new formulation when its usual distributor reported the bags being backordered until April, 2010?
- How would they change out materials in dispensing machines?
- How would they educate nurses and physicians about the formulation change?

COMING IN FUTURE MONTHS

- ■ Navigate hazards of estimating renal function
- ■ Improve bedside administration with high-tech integration
- ■ Sepsis bundle program has reduced mortality
- ■ ER pharmacy program improves patient care, wait times
- ■ Reduce potential drug diversion with thorough risk management process

Quickly, the team assigned people to handle different parts of the PI project.

The pharmacy buyer called different distributors until finding a company that could deliver the new product immediately. Another person was in charge of the physical operational change and making certain stickers were put on every new vial of heparin, Eschenbacher says.

"I went to a nursing leadership meeting and educated nursing directors and supervisors about the new product," she says. "The new heparin product looks different from the old formulation, and we didn't want nurses to worry that they were administering the wrong medication."

Eschenbacher also worked with the hospital's public relations department to send hospital staff an Intranet message and to put a notice about the heparin switch in the hospital's weekly newsletter.

"I sent a follow-up e-mail to all nurses, as well, and I did this within 24 hours," Eschenbacher says.

The PI process worked. WakeMed obtained the new heparin before running out of the old product, the staff was educated, and the change-over went smoothly.

As a final part of the performance improvement process, the hospital will monitor the change and ensure the new product is safe for patients.

"We're going to gather blood samples from 30 patients to verify there is no potency difference between the new heparin and the old formulation," Eschenbacher says.

Pharmacists will collect information from using activated factor Xa and aPTT tests. Then they'll send those results to physicians within two or three weeks, she adds.

"If the tests are okay, then we'll let them know," she says. "If there is a change, and there's not the same correlation then we'll have to develop a new tool to measure heparin potency and change order sets and re-educate the hospital staff."

Another PI action will be to distribute the phone number of the medical director of laboratories to hospital staff, asking them to notify the medical director if anyone identifies a problem or unexpected issue with heparin use, Eschenbacher says.

"We've assured that all the old products are taken out, we've put the new products in place, and we've communicated that if anybody has any questions, this is what we've done," she adds. ■