

GETTING SMART

Looking to avoid allergic reactions and increase patient safety, UPMC creates some very smart rooms.

by Stacey Kramer

It all began with a latex glove. In the spring of 2006, when a patient with a known latex allergy at a University of Pittsburgh Medical Center (UPMC) facility was touched by an IV nurse, at first, everything seemed normal. What followed, though, was anything but. After the patient made contact with the glove, she suffered a severe reaction. Her arm reddened and became puffy and swollen. Understandably angry, she threw a bowl of soup at someone. While unfortunate, the patient's allergic reaction was luckily not fatal. But instead of just chalking the event up to human error, UPMC decided to use it as the impetus for implementing better patient safety processes, and developed a homegrown "smart" room.

"When we speak about these kinds of problems, healthcare has said that the solution is to yell at the nurse and say, 'You needed to be careful,' 'You did not follow the policy,' or 'You need to go to orientation,'" says David Sharbaugh, senior director of the Center for Quality Improvement and Innovation at UPMC, and the leader of the smart room project. "But the fact is we as an organization made it easy for her to fail."

To Sharbaugh, the idea that in order to avert the



David Sharbaugh

episode, the nurse needed to fetch information about the patient's possible allergies meant UPMC's work flow — and perhaps even its patient safety stop guards — was broken. So Sharbaugh set out to fix it with better bedside patient care. To do so, he didn't look at another hospital; he looked to the Toyota production system. "They have embedded in their system this idea that you don't separate information

from the product it describes. In our case the issue is, don't expect me to go in and take care of patients when the information I need is down the hall."

Part of the problem, Sharbaugh believed, was actually part of the solution. "We had a number of events on this unit. When I look at each one of them, I say, 'This was a serious event. It could have been prevented if they had better information.'"

The message, he says, "is really that electronic health records and medical information is, in a large part, cooped up in computers located at different strategic locations throughout the unit. All we are trying to do is to make that information accessible without adding extra work for the caregivers and the patient." Sharbaugh believes there is a flaw in EMR design. "We aren't always putting the information where it's



needed, when it's needed, within the context of the situation. That's the big lever we're trying to pull on with smart room technology."

If a patient has been on 30 medications at different points, Sharbaugh says he wants only the two currently in use to come up, so that caregivers don't have to sort and sift through data. UPMC's smart rooms are designed to provide the information, where, when, and at the time it's needed. The idea is that upon walking into the room, the clinician immediately knows who the patient is, and what kind of allergies the patient has. "If I could, we'd invent a system that would stick the patient's latex allergy on their arm," he adds.

A game of tag

The allergic event happened in April 2006 and, for a year, UPMC looked for a partner to develop the smart room. When one couldn't be found, UPMC's leaders decided to do it on their own. And though the event happened at a different UPMC hospital with a different EMR, the healthcare system decided to create a smart room and test it at its Shadyside campus. After six months of working on the project, the UPMC smart room went live in October at the 486-bed hospital. The organization piloted the project in six rooms and had plans to expand it to the rest of the 24-bed unit by the end of March.

UPMC's smart room gets its clinical patient data from a Cerner (Kansas City, Mo.) EMR. The room works with Sonitor (Norway) ultrasonic tags, worn by UPMC clinicians. About half the size of a pager, the tags are picked up by sensors in the room. Each room is outfitted with a dedicated computer that operates two monitors, one for the provider, and one for the patient (at first this was installed behind the patient, but was later moved to be adjacent as patients requested a more comfortable view). Using the tags, the sensors identify the types of clinicians in the room and display the patient's name and allergies.



Brian Adams



Christine Henderson

"If I could, we'd invent a system that would stick the patient's latex allergy on their arm."



Dan Drawbaugh

In addition, when tagged people enter the room, their names and roles are displayed on the screens for the patient. Currently, UPMC has five roles: physician, nurse, nurse's assistant, phlebotomist, and host (who brings the patient into the room and is charged with transport and dietary work). In addition to tracking tagged providers, an infrared sensor mounted above the room's doorway picks up non-tagged visitors entering the room, signaling the computer to turn on a spotlight pointed toward a wall-mounted hand sanitizer.

"The first display when the provider walks into the room, we call HIPAA mode because we mask any information that might be sensitive," says Brian Adams, design engineer at UPMC, and co-developer of the smart room application.

In order to maintain privacy, when people enter the patient's room — even tagged providers — the patient is asked if they may proceed to the next screen. With the patient's approval, providers push a button on their tags and confidential clinical information from the EMR is shown. However, without patient approval, or when the tagged members leave the patient's room, the screens default to a standby mode where confidential information is hidden, and where things like time, date and weather are displayed.

However, even in this standby HIPAA mode, the screens provide precautionary notes to the patients. With data on patients' medications, as well as drug side effects, the smart room can identify patients at increased risk of falling, perhaps as a result of a medication they are on. The smart room can also be programmed to remind patients to ask for assistance before getting up.

"I guess the bottom line is we're trying to reduce the information barriers to both the patient and the caregiver," says Christine Henderson, project director and co-developer of UPMC's smart room application.

Geometry of care

According to Dan Drawbaugh, senior vice president and CIO at UPMC, the smart room application is integral to the organization's overall IT strategy. The model, Drawbaugh says, is part of the Pittsburgh institution's layered pyramid known as connected or unbound healthcare.

"On the bottom of the pyramid is data, voice and video that provide the infrastructure for all the things that you want to accomplish to deliver best-in-class patient care," he says. Drawbaugh says there are a variety of technologies such as wireless, telemedicine, high-definition video and integrated VoIP that are foundational for making the smart room possible. In fact, patient and provider reminders and voice commands are already in use, and educational videos and e-mail get-well cards are coming down the pipeline.

The layer above that, Drawbaugh refers to as virtualization, consisting of servers, storage and operating systems, that can be dynamically accessed across a variety of systems. "As you move into your applications, you have your revenue cycle, you have your financial systems, and then you get into your electronic health systems," he says.

Drawbaugh says interoperability and advanced clinical decision support are essential, being as there isn't one solution for all. "As you get near the top of the pyramid, you see interoperability and advanced clinical decision support, and these capabilities are becoming paramount to delivering best-in-class patient care. From there, then you can achieve interoperability of all these layers and all

"The bottom line is we're trying to reduce the information barriers to both the patient and the caregiver."

these systems. At each step, you get closer to delivering it to the patient at the bedside with the integration capabilities where you're delivering the right information

at the right time in the right place. That truly becomes a differentiating factor in the delivery of care."

The development stage of UPMC's smart rooms isn't over yet. In fact, the whole process is what Drawbaugh calls iterative, and Adams says the goal is to push out new enhancements every six weeks. The next will be one where patients on pain medicine are told when their next dose is coming. The rooms themselves are currently one-directional, where the smart room receives clinical data in an XML format into the system, and the information is pulled in so the provider can see everything from the EMR, but where the information is not pushed out to other departments. Adams says UPMC is interested in adding on other directions so the data is either sent to other departments or to a database where they can keep track of it separately offline. In addition, the on-demand video patient education UPMC has in mind would leverage data on patient procedure scheduling so that the smart rooms could explain in a step-by-step format what to expect.

Henderson says she didn't anticipate how well patients would receive the smart room. "When we initially set this up, the first patient that went in the first room didn't have a lot of visitors," she says. "But he really enjoyed the people visiting him to see the system. By the time he left, he was teaching people how to use it. Initially he said, 'I'm not good at technology,' and within three or four days, he was teaching staff."

And though UPMC's smart rooms may in fact be a differentiating factor from other facilities, Drawbaugh doesn't want it to end there. "I hope in my lifetime that I walk into a medical facility and every room has these technologies in place," he says.

The Cost

How to Add up the Numbers

To set up the entire unit at Shadyside, the grand total of the UPMC smart rooms was \$80,000, though David Sharbaugh, senior director of the Center for Quality Improvement and Innovation at UPMC, estimates the total cost of ownership is likely to come in somewhere between \$2,000 and \$2,800 per room. "If you calculate that cost over the course of six years, which is about how long maybe those monitors would last before upgrades or replacements, it's maybe a dollar and a quarter a day," he says. — S.K.

For More Information

Online Resource Center: www.healthcare-informatics.com/Wireless
Search Our News Archives by Organization Type: acute
Search our Web Site by keywords: patient safety, ultrasound