In the first-floor conference room of Pittsburgh’s UPMC Presbyterian Shadyside hospital, its then-president, Elizabeth Concordia, sat with a dozen of her direct reports in the weekly meeting of the executive management team. As always, the agenda included a briefing on any patient safety incidents that had occurred since the group’s last meeting. As far as seriousness, the event discussed in this day’s meeting was of relatively mild medical consequence. A nurse specializing in starting and placing IV lines had been called to start one on a recently admitted patient, whose records indicated an allergy to latex. With HIPAA regulations and electronic medical records, this information was not readily available at the patient’s bedside, causing the nurse to miss that important detail and administer the IV wearing latex gloves.

The patient, incredulous at the mistake, exhibited symptoms almost immediately and expressed her outrage to the attending clinicians, as well as to the staff who had been called in to assist. With a long history of treatment at UPMC Shadyside, the patient wondered aloud, “How could you have not known about my allergy?” The review that followed found that the nurse had inadvertently violated established policy by failing to first look at the patient’s electronic medical records. Such was the cut-and-dried conclusion that UPMC Shadyside’s Chief Nursing Officer reported at the meeting, and the latex case was, for all intents and purposes, closed.

Leadership Spotlight
At UPMC, David Sharbaugh rose to the position of Senior Director of Quality Improvement and Innovation by way of auditing. So it’s no surprise that a rigorous, questioning instinct was part of his nature. That same instinct helped lead UPMC to develop a first-of-a-kind smart nursing solution.

How UPMC got smarter
Structured tasks may be at the core of nursing, but the nursing unit itself is always in a state of change. That means nurses—always in motion—need to think on their feet and make crucial decisions based on constantly changing information. To help optimize nursing care delivery, UPMC developed SmartRoom®, a workflow optimization system that leverages clinical intelligence to guide nursing decisions and activities.

Smarter nursing practices lead to better quality care, improved safety and happier patients

— David Sharbaugh
Senior Director of Quality Improvement and Innovation, UPMC

继续阅读下一页
**Stirred to action**

But there was something about the case that didn’t sit well in David Sharbaugh’s mind. As former Senior Director of Quality Improvement and Innovation, Sharbaugh had a bent for taking a deeper, more systemic view of process and workflow issues, and an abiding faith in the power of observation as a tool for understanding the difference between what’s actually happening on the floor and what the policy says should happen. In the wake of the latex incident, Sharbaugh and his team spent many hours observing frontline behavior and considered everything from the nurse’s perspective—from task routines to where they walked to the type of information they had to keep track of along the way.

In a white paper he later submitted to Concordia, Sharbaugh concurred with the group’s basic finding of fault through noncompliance in the latex case, but also proposed a broader and more fundamental point. “If our solution is to basically blame it on a nurse not following policy, then we should be prepared to have it happen again,” Sharbaugh maintained. “Nurses are busy, and in the chaos of her days, this nurse missed a step. But by the same token, we haven’t made it all that easy for her to perform that step.”

**Writing on the wall**

Far from offering excuses, Sharbaugh’s intent was to lay out a framework for preventing similar missteps in the future, one that would promote simplicity through a combination of structured workflow and intelligence. “If the electronic medical record ‘knows’ the patient has an allergy, why should nurses have to go fetch that information, slowing them down and taking time away from care-giving?” Sharbaugh recounts. “If a nurse could walk into the patient’s room and have the walls automatically indicate that this person has an allergy—or any other relevant information—we’ve saved that nurse’s time, reduced the chance of error and made possible a better patient experience.” Sharbaugh’s idea drew directly on his training in the application of lean design to healthcare delivery, especially the tenet that having the right information in the right place and time is the key to achieving high levels of efficiency and quality.

---

**The benefits of the SmartRoom solution**

- Nearly 60% reduction in time spent completing routine documentation of nursing tasks, meaning more time for caregiving and consultation
- 77% increase in reporting related to turning patients in their beds
- Expected reduction in medical errors and falls
- Easier allocation of work among nursing unit staff
- Improved patient satisfaction
- More seamless handoff of patient information between shifts

“If the electronic medical record ‘knows’ the patient has an allergy, why should nurses have to go fetch that information, slowing them down and taking time away from care-giving?”
Leadership is:

**Going to bat for resources**

With much of the UPMC system facing across-the-board cuts, Elizabeth Concordia (after she became EVP and president of its Hospital and Community Services Division) and Tami Minnier, Chief Quality Officer, gave their active support to ensuring that SmartRoom had the resources it needed to meet its promise. “They were completely supportive of this emerging innovation and were willing to prioritize it.”

—Dave Sharbaugh
current President of SmartRoom LLC.

Lesson learned:

**Solve real problems and don’t overextend**

From the outset, the increasingly resource-constrained environment at UPMC conditioned David Sharbaugh and the SmartRoom team to have the discipline to stay focused on solving problems, not chasing the latest technology. “We started with a set of principles around simplicity and low cost. That means knowing what to reject, and how to keep the eye on the ball,” says Sharbaugh.

Practically speaking, SmartRoom is an intelligent workflow tool that uses interactive, in-room screens to present nurses and nursing support personnel with the information they need to optimize their task flow. Clinicians know that in an ever-changing environment like the nursing unit, optimization—around the rhythm of routine, structured activities—is a moving target. Whether it’s a change in a patient’s condition, a doctor’s availability, or anything else that is unpredictable, nursing units need to be able to adapt the task flow on the fly. SmartRoom’s intelligence derives from access to real-time clinical data, but even more importantly, from the underlying decision rules that guide the ordering and prioritization of tasks. When unpredictable things happen in the nursing unit—as they inevitably do—SmartRoom ensures that the task recommendations nurses receive reflect the situation as it stands now—not an hour ago.

“A framework for smarter nursing care”

To explain the benefits of SmartRoom, Sharbaugh views the work of a nurse as having two primary components. “One basic component is the structured daily tasks such as turning patients in their beds, administering meds, taking vital signs and doing documentation,” Sharbaugh explains. “The other is what’s going on in the nurse’s mind—processing information, keeping track of their schedule and where they need to be next, knowing when the family is visiting and which doctor is rounding at night. SmartRoom’s proposition is that by simplifying the structured part of their job, nurses can spend more time with patients and their families and more time dedicated to the critical thinking component of their job.”

Sharbaugh’s impulse in laying out his ideas was not an abstract exercise, but a call to action. The hospital’s president, supporting the vision and eager to see it in action, gave the green light for Sharbaugh to collaborate with the hospital’s CIO to create a working prototype. Working on a shoestring budget, they implemented a solution that—while modest in scope and limited in scale—succeeded in conveying the promise of delivering intelligent decision support to the patient’s bedside. That success was rewarded with a series of internal grants that enabled Sharbaugh to assemble the resources he would need to expand and refine the solution. First came Lucy Thompson, a nurse recruited from another hospital in the UPMC system, whose background made her an ideal emissary to the nursing units where the solution would ultimately be deployed. Her ability to funnel feedback from nurses about which information was most important and how to best present it was essential to the design of the solution. Soon after, the core of the team came together when Sharbaugh secured two outstanding technical resources to design and implement the intelligent architecture at the heart of the solution. Within six months, the team had taken the solution from the proof-of-concept stage to a fully functional bedside application—known as SmartRoom—that was deployed in four rooms at UPMC Shadyside.

“SmartRoom’s proposition is that by simplifying the structured part of their job, nurses can spend more time with patients and their families and more time dedicated to the critical thinking component of their job.”
Upon SmartRoom’s introduction, the response of the nursing staff—its intended beneficiaries—ranged from skeptical to lukewarm, at best. Such a reaction wasn’t a complete surprise, notes Sharbaugh, given that nurses had largely come to view technology as making their jobs even more complex. “Most of the technology that nurses have seen before SmartRoom hasn’t done much to make their lives easier,” Sharbaugh explains. “To overcome that mind-set, we send a clear signal to nurses that we’re committed to following through from training and beyond, giving them all the support they need.”

The approach has paid off. SmartRoom has expanded to 130 rooms, with 30 beds being added every other month. In units where SmartRoom is deployed, efficiency and traditional measures of quality have all risen significantly. For instance, SmartRoom has reduced the amount of time nurses and nursing assistants spend on documentation of routine tasks by nearly 60 percent; less time walking to and from a computer terminal means more time at the bedside where nurses can do the most good for patients. On the quality front, SmartRoom has increased the rate of documentation for turning of patients in their beds—a necessary task to prevent pressure ulcers—from 12 percent to 89 percent.

### Meeting the promise

So what about improved decision making, the pursuit of which gave rise to SmartRoom in the first place? As Sharbaugh points out, it’s hard to measure events that don’t happen, especially this early in the game. But one story he relates shows how SmartRoom may have already saved a life. When a UPMC physician on his rounds visited one of his patients after surgery, he noticed immediately upon entering the room that the patient’s potassium levels were elevated, an extremely dangerous situation given the patient’s cardiac issues. Because SmartRoom had made the patient’s results available at the bedside the instant the physician walked into the room—the physician was able to order immediate corrective action, thus preventing what could have easily been a fatal event.

But despite the success of SmartRoom, the road hasn’t always been smooth for Sharbaugh and his team. Like most healthcare providers, UPMC has experienced tightening of resources in nearly

---

**UPMC: The parameters of smarter nursing care**

- **Instrumented**
  In-room sensing devices authenticate nursing staff and trigger the retrieval and display of relevant patient information.

- **Interconnected**
  SmartRoom connects UPMC’s clinical knowledge base and best practices in real time to nurses on the floor.

- **Intelligent**
  Algorithms developed by UPMC clinical staff control the prioritization of nursing tasks, ensuring the right treatment at the right time.
all areas. As a promising yet unproven program, SmartRoom was initially particularly vulnerable. It was the strong support and advocacy of EVP Elizabeth Concordia, who is president of UPMC’s Hospital and Community Services Division, and Tami Minnier, UPMC’s Chief Quality Officer, that proved critical in securing the resources Sharbaugh’s team needed to get an operational foothold. To Sharbaugh, this emphasis on resource efficiency has grown to become perhaps the most characteristic quality of UPMC’s SmartRoom strategy. “In short,” Sharbaugh explains, “we focus on a very specific problem and deliver the most cost-efficient solution.”

While SmartRoom was conceived to address the challenges of the nursing unit, Sharbaugh also sees the solution as helping to facilitate the changes that will be necessary for UPMC to thrive in the emerging healthcare environment. “With changes in the delivery of and reimbursement for healthcare services, innovation will be critical for us to grow and to provide the highest quality to our patients,” says Sharbaugh, who is now President of SmartRoom, a wholly owned UPMC company, also headquartered in Pittsburgh. “The more informed clinical decisions and improved efficiency enabled by SmartRoom are right in line with tomorrow’s demands on the frontline healthcare provider.”

UPMC’s SmartRoom solution is:

Software
IBM WebSphere® Message Broker, IBM WebSphere Application Server

Servers
IBM BladeCenter® HS21

Services
IBM Global Business Services®, IBM Global Technology Services®

Business Partner
Sonitor Technologies

For more information
Please contact your IBM sales representative or IBM Business Partner.

Or visit us at:
ibm.com