



The Price of Safety

Reducing the risk of medical errors takes constant vigilance and an instrument to monitor progress.

Franks Frassica looks at risk management in very pragmatic terms. The orthopedic surgery director's faculty perform 5,000 operations and see 50,000 outpatients each year. That's 55,000 chances to make a medical error. And even a 1 percent error rate could harm 50 patients, result in five legal actions and push up malpractice premiums.

It's no wonder that on every clinical round with residents and in every meeting with faculty, Frassica pounds home the message that the price of safety is eternal diligence.

Still, with the complexities of conditions and treatments, the host of care delivery systems and the increasing physician workload, so many things can go wrong that it's difficult to keep track of them. To help clinical department directors like Frassica keep an eye on their risks and measure how far they've come in reducing them, the Center for Innovation in Quality Patient Care helped them develop safety dashboards.

This measurement tool—a concept borrowed from other industries—lists a department's major safety and quality care issues, such as deep-vein thrombosis, brachial plexus palsy or length of stay. It also includes a means for improving them—targeted reductions and charts that monthly track a department's progress in addressing its high-risk problems.

The safety issues are broken into three of the six areas of improvement identified by the Institute of Medicine's 2001 report *Crossing the Quality Chasm: A New Health Care System for the 21st Century*. "We thought that using all six would be too much for departments to bite off all at once," says Richard "Chip"



Orthopedic Surgery Director Frank Frassica is determined to prevent medical errors on his watch. Here, he observes chief resident Brett Cascior check a patient for compartment syndrome, a safety issue for his department.

Davis, the center's executive director. "We focused instead on safety, effectiveness and efficiency."

In a specialty like orthopedic surgery, the risks seem fairly standard: surgical site infections, unrecognized compartment syndrome, deep-vein thrombosis and the timely use of prophylactic antibiotics—all of which appear on the department's safety dashboard. To keep a handle on these risk factors and reduce their frequency or eliminate them, the department's goal is to thoroughly investigate incidents, share lessons from them and follow evidenced-based protocols to prevent them from recurring.

But Frassica found that each risk presented its own set of difficulties, such as dealing with compartment syndrome, a

painful condition often associated with postoperative patients in which pressure builds in the muscle. Since it's normal for patients to experience pain and swelling around a surgical site, compartment syndrome can easily escape the untrained eye of a resident. So Frassica decided to set up an attending-to-resident tutorial to teach residents how to recognize and document the condition. "We do this on every round," he notes. As for how the teaching has worked, Frassica shrugs: "Whether it's because they want to learn or whether they're afraid of me, I can't say, but we haven't had one case of unrecognized compartment syndrome in a year."

Harold Fox, Gyn/Ob's director, sees dashboards also as complementing other

to, among other things, collect data on traumatic birth injuries, uterine rupture and fetal death to establish a baseline. The data will be benchmarked against the other MCIC institutions.

Ultimately, Frassica, Fox and other clinical department directors will each meet twice a year with Dean/CEO Edward Miller and Hospital and Health System President Ron Peterson to discuss the department's progress in reducing errors and liability risks. But will it all work?

"I've never known a doctor or nurse who wanted to harm a patient," Frassica emphasizes. "So why do we still see harm? The answer is buried in a very complex problem involving culture, system and people." ■

Part of a Sample Patient Safety Dashboard



Annual Safety Culture Survey Results: _____

- I. Safety Defect Investigation** *Fixing system flaws to prevent recurrence*
 Of safety "defects" tracked below, learnings and follow up plan (what happened, why, what did you do about it) for a minimum of 1 event each month using defect investigation or other tool. <http://innovation.jhmi.edu/content.cfm?sectionid=37sect&pageid=89>
- II. Safety Defect Tracking** *To identify areas for investigation/ improvement*
 –Hospital acquired infections: BSIs, SSIs
 –Patient Safety Net events, e.g., near misses and/or Level E or above
 –Risk claims or issues
- III. Safety Defect Tracking** *To assess safety climate*
 Percent of units with ≥ 80% of staff reporting a positive safety climate

Inside:



2 Conversation With Sean Berenholtz on how a group of surgical faculty set up DVT prevention standards.

2 Director's Chair Chip Davis talks about reaching the tipping point on patient safety.



3 Spotlight On an e-learning idea that will spread Hopkins patient safety content around the world.

4 Points From Pronovost Are we safer? Pronovost gives us a qualified yes.

Sustaining Change

Richard "Chip" Davis, Ph.D.
Executive Director

At a recent meeting of the Johns Hopkins Medicine trustees, we discussed the institution's progress toward broadening our culture of safety and revolutionizing the way we deliver quality care. We believe that we are approaching the "tipping point," which Malcom Gladwell defines in his book *The Tipping Point* as "the name given to that one dramatic moment in an epidemic when everything can change all at once".

Gladwell describes three underlying patterns associated with the tipping point: contagious behavior, little changes have big effects, and it happens in a hurry. I have seen evidence of each of these patterns at Hopkins related to attitudes toward safety. First, there is contagious behavior. All levels of the organization, ranging from trustees/executives to frontline staff, have made improving patient safety their number one priority. We recently completed an organizational safety assessment questionnaire in which all participants openly expressed both their concerns about patient safety as well as ideas for improving it.

On the second pattern, we've seen numerous examples of small changes producing bigger results, especially in the multidisciplinary safety teams based in nursing units throughout Hopkins Hospital. One particularly powerful example is the reduction in catheter-related bloodstream infections in the surgical intensive care unit, where physicians and nurses worked to lower their rate from far above the national average to

nearly zero. Without minimizing the tremendous accomplishment by these teams, many of the interventions that they used were simple and low-cost solutions, such as a line-insertion checklist and bedside supply carts.

The final pattern is that things happen in a hurry. In less than a year, each of the clinical departments developed and implemented dashboards to identify and address patient safety risk areas and measures to demonstrate improvement. Another important change that came quickly was the incorporation of patient safety and quality into the teaching program.

I'm excited that we have reached the point at which our vision for improving patient safety as the highest priority has caught fire. We now have a passionate critical mass that believes in this priority's importance and has received training in how to make it happen. Our challenge has now changed from sparking the fire to feeding its growth. We can do this by guaranteeing that anyone who wants to improve patient safety is equipped with the knowledge, tools and support to make a difference.



A Conversation With **Sean Berenholtz**

More Than a Coin Toss

When a group of surgical faculty decided that uniform standards for treating deep-vein thrombosis could improve patient safety, they sought help from critical care specialist Sean Berenholtz. He and his ICU colleagues had shown national success with their models for standardizing care and reducing risks. Berenholtz takes the story from there.

What was your starting point?

We know that the most common reason why there's a gap between best evidence and practice is that providers are not aware of the evidence. Perhaps that's not surprising given that the American College of Chest Physicians evidence-based guidelines for DVT prophylaxis is 63 pages. Providers need something they can use at the bedside.

So, we partnered with our colleagues from Hematology, Pharmacy, PI/UM—and especially with Deb Hobson from the Center for Innovation in Quality Patient Care—to convert the guideline into a one-page summary that walks providers through the process of determining a patient's risk for DVT and what therapies the patient should receive based on that risk. The summary page also serves as an order form to make it easier for providers to comply with the guideline.

Did you pilot the model?

We did that in several different surgical services. The order form has since gone through many revisions.

What were some of these changes?

The earlier versions, for example, only included postoperative patients, but providers pointed out that patients coming in for surgery who for some reason never had the procedure done were also at risk for DVT. We had to account for those patients.

Additionally, we listed risk factors for providers to consider and one of those was for strokes. But providers were unclear whether that meant a past stroke, a stroke in progress, or if the number of strokes mattered. So we had to clarify this.

What was your next step?

We brought care teams from 10 different surgical services together, provided education on the importance of appropriate DVT prophylaxis, gave them a tool for measuring compliance and trained them on the use of the order form. Then we asked them to find out how many patients on their service were receiving the evidence-based prophylactics.

What did they find?

That patients at risk for DVT were receiving the proper therapies, overall, only 32 percent of the time.

Was that surprising?

Not really. We know from national studies that patients, on average, receive the appropriate therapies only 55 percent of the time—not much better than the flip of a coin.

Has the DVT order form improved compliance?

We're still collecting data, so we don't have an answer for all teams. However, a few teams—Orthopedics, Physical Medicine and Rehabilitation, and Urology—have already made significant improvements.

What isn't clear is how this will affect outcomes. We're focused on improving compliance with the best evidence, or the process of care, on the theory that this also will improve outcomes. When we improved compliance in our other collaboratives, we reduced, for example, ventilator-associated pneumonia rates by 30 percent and catheter-related bloodstream infection rates by 50 percent.

Has the feedback from providers been positive?

For the most part, the teams are very engaged. However, not all of our surgeons have fully embraced the use of evidence-based guidelines as a tool.

Where do you go with the DVT project now?

The next step is to bring the teams back together to discuss what has worked and what barriers they're still encountering. Many teams have experienced difficulty finding the time required to implement interventions. We also want to roll this out in other services at Hopkins and hospitals participating in our other collaboratives. Everyone focuses on DVT prevention, so there's no reason to reinvent the wheel. We should learn from each other. ■

Into the Safety Net

Encouraging reports of medical errors might seem, at first glance, to go against the grain of conventional health care wisdom. But throwing that axiom out in favor of encouraging participation in making patients safer, Johns Hopkins adopted Patient Safety Net (PSN), an online system designed to make it easier to report and track adverse events.

PSN finished its first year of operation logging more than 8,900 patient events, ei-

ther errors or near misses. Through May 31, medication errors led the list of specific events, with more than 2,700 reported, followed by mistakes related to procedures, treatment or diagnostic testing (1,921), patient falls (602) and transfusions errors (77).

Nurses were the most frequent users of Patient Safety Net, accounting for 54 percent of all reports. On the other hand, only 1 percent of reported events came from physicians, residents and clinical fellows.

The online reporting system replaced the often cumbersome paper and electronic methods of reporting adverse events. Error notification forms, once varying by department and event type, were integrated into PSN, offering unprecedented data collection capabilities.

Patient Safety Net is a product of the University HealthSystem Consortium, an alliance of academic medical centers in the United States, nearly two dozen of which are using the PSN system. Ultimately, all

error reports enter a PSN-supported central database, and the data are used to map trends across departments and event types, and, for the first time, to benchmark Hopkins against other institutions.

Lori Paine, the Hospital's patient safety coordinator, stresses that the system can only succeed at Hopkins if employees do their part in exposing problems. "We need to build a culture where people know how to report and feel comfortable doing it," she says. ■

Spreading the Word

A new e-learning project looks to bring safety-related classroom courses and training to a computer near you—and around the world.

For several years, pulmonologist Nancy Collop would take her PowerPoint presentation about sleep deprivation and schlep off to early-morning breakfast gatherings, lunches or department residency program meetings to teach house staff about recognizing fatigue. She put the course together at Hopkins' request after the Accreditation Council on Graduate Medical Education (ACGME) imposed an 80-hour workweek and mandated that residents be given this kind of education to quell growing concerns about overworked physicians in training.

But Collop's course was catch-as-catch-can, without any way for the institution to demonstrate a systematic approach to the training. Then, when the ACGME insisted that graduate medical education programs better document resident's training and measure its effectiveness, Collop's course took on an even greater priority. "Last year, we moved my lecture online," she says, "but it was rudimentary and didn't satisfy our needs or ACGME's requirements."

Then several months ago, John Rybock, assistant dean for GME compliance, put Collop in touch with a fledgling e-learning enterprise created to distribute Hopkins-generated content on patient safety within the institution and to hospitals around the world. Called Johns Hopkins Medicine

Interactive, it helped Collop create a three-part Web-based, interactive sleep-deprivation course that residents can fit into their demanding schedules.

The e-learning business was started by Johns Hopkins International and the Center for Innovation in Quality Patient Care, where it will be housed. The two made natural partners: International has a non-exclusive licensing agreement with Accelera, one of the leading online learning software providers for health care organizations, and it has a history of providing global telemedicine programs. The center has a wealth of such patient safety and quality care learning as multimedia teamwork communication training, which will be Interac-

"We're offering those interested in creating interactive content programs a place to come so everyone isn't reinventing the wheel."

tive's mainstay product. "We knew there was a need within Hopkins to coordinate e-learning initiatives," says Emilio Williams, until recently the Interactive's director, "and there was a market to sell e-learning content."

The institution has seen a number of prominent faculty create multimedia e-learning

programs, including one to train residents in ambulatory medicine and another to teach several first-year medical school courses. Alex Nason, Interactive's project manager and chair of Hopkins Medicine's telemedicine committee, stresses that Interactive "isn't trying to replace those efforts or force anyone onto our platform. Instead, we're offering those interested in creating interactive content programs a place to come so everyone isn't reinventing the wheel."

That place will be an e-learning lab where faculty and other staff can bring content related to patient safety, clinical care or regulatory compliance training (clinical trials, HIPAA, conflict of interest) that's applicable for distribution within Hopkins or to other medical institutions nationally and overseas. Every e-learning program will be different, Nason points out, depending on its content and purpose and how much money someone is willing to spend for bells and whistles—PowerPoint presentations, images, video clips. All programs will have some level of assessment, such as quizzes, reviews and final tests.



Nancy Collop has found a better way to teach residents like clinical fellow Kim Goring how to overcome sleep deprivation.

and treat deep-vein thrombosis (see article, page 1).

In addition to paying a fee for producing higher-end e-learning courses, other institutions will buy the licenses so that a predetermined number of people can access Hopkins content over a given period, according to Williams. An institution, for example, can buy a three-month license so its people can access a certain class. Then the institution will get a monthly report showing who took

the class and who passed. Hopkins users will get free access to the content.

The advantage to other hospitals, Williams says, is to give the capacity to train all their employees through Web-based e-learning for the cost of training one person. "We'll share our knowledge in patient safety and quality care," he notes, "in a way that allows us to recover our investment and also helps faculty create new e-learning content."

Nason says he's not aware of another academic medical center offering a comprehensive e-learning business. There are private companies, such as Health Stream, that are taking content from academic medical centers and marketing it as a class from a Cleveland Clinic faculty member. "So we think we have value in the Hopkins brand," he adds. ■

Tools

Analyze This

With patients moving too slowly through its system, Emergency Medicine turned to Lean Sigma to find out why.

Hopkins' Urgent Care Center had a problem: The unit, designed to ease overcrowding in the Emergency Department and the long waits for patients with less acute injuries and illnesses, wasn't living up to its name or its goal. In fact, it was taking nearly two and a half hours for patients to be seen by a practitioner and discharged—almost double acceptable national standards.

Clearly, there were breakdowns in the process for moving patients through the center. But department administrators wanted to validate suspected reasons for the throughput failures and find how to fix them. "We always struggled to meet the 90-minute goal," says Jim Scheulen, Emergency Medicine administrator. "The perplexing thing was that some patients were in and out in less than 90 minutes, while others took twice as

long." To find answers, an ED team turned to Lean Sigma, a data-driven systems analysis tool they had been trained in through the Center for Innovation in Quality Patient Care.

This process-improvement technique combines two methods with proven track records in industry—Six Sigma, which eliminates errors and defects by reducing variation, and Lean Methodology, which eliminates waste in the process and creates streamlined procedures that reduce errors. Used in tandem, these techniques "give caregivers a more rigorous tool better suited for the complex systems found in health care," says Laura Winner, head improvement coach in the Center for Innovation. Nearly 50 people have taken the center's Lean Sigma training, and many are involved in the 30 ongoing Hopkins projects.

The Urgent Care Center team set a goal of reducing the patients' length of stay from 2.4 hours to 1.5 hours, which is a national benchmarking standard. Initially, the team divided patient visits into three segments: the period between registering and entering an examining room, the time until a practitioner arrives, and the remaining time until discharge. "We focused on the last two intervals," explains Geeta Kotwani, ED assistant administrator and team leader, "because that's where practitioners play a role and where we can reduce length of stay."

Baseline measurements revealed a "defect rate" of 74 percent, meaning that only 26 percent of patients completed visits in less than 90 minutes. The analysis found, for example, that too much time was wasted in examining rooms because patients needed X-rays or con-



Geeta Kotwani led a team that solved breakdowns in moving patients through the Urgent Care Center.

sultations. "These problems become real," Kotwani says, "when people actually see the numbers."

Her team, which included emergency physician Melissa Wu, nurse practitioner April Lewis and nurse Paula Murphy, created (as part of a department-wide effort) an advanced triage program called "First-Nurse." It re-educates the staff on triage guidelines to help identify patients who could get more appropriate care elsewhere, ensure that X-rays and lab tests are performed well before a practi-

tioner arrives, and deal with multiple patient complaints.

Nurse practitioners are developing "care maps" that will standardize treatments. This should minimize practice variability, improve quality and save time. The project team issues provider report cards with feedback data. These weekly control charts list individual productivity so practitioners

can see how they are doing. Two months into the project, average length of stay in the Urgent Care Center has dropped from 2.4 hours to 1.8 hours. Almost half the patients are in and out within 90 minutes. Wait time in an examining room until a practitioner arrives is 18 minutes—down from 32 minutes. The team is looking at other strategies to help hit the six-month target of 90 percent of patients flowing through urgent care in 90 minutes. ■

Are We Safer?

By Peter Pronovost

IN THE LAST ISSUE, I RESPONDED TO a tough question posed by Sorrel King: How do we know that our efforts to protect patients from harm are working? My answer was that safety at Hopkins has improved since her 18-month-old daughter Josie died in 2001, because we have developed ways to identify safety hazards and make improvements.

But, how much safer we are since 2001 is harder to quantify. Yes, we have measurements in place, but if we want to confidently say how much safer we are today, we'll need to measure our changes to show improvement. For a patient safety measure to succeed, it must be important or valuable to the patients, caregivers and administrators and provide meaningful data to those using the data to make improvements. Additionally, the data for the measure must be scientifically sound, feasibly obtained and usable anywhere in the hospital to improve safety.

With these criteria in mind, we can develop measures to answer the following four questions and confidently say our efforts are improving patient safety:

• **How often do we harm patients?** Answering this question would appear to be easy, but measuring harm is difficult and influenced by such variations as the definition of harm, the methods and expertise of data collection, and bias in reporting errors. For this reason, we are focusing on things like hospital-acquired infections that have a standard definition and collection method and less chance for bias.

• **How often do patients receive the interventions they need?** We live in a country that is one of the leaders in modern medicine, yet patients in the United States receive about half of the interventions that evidence-based measures or quality standards recommend. One reason is that clinical practice guidelines are cumbersome for caregivers to use and don't evaluate performance. We have asked each Hopkins clinical department to decide what evidence-based processes are important to measure and to start monitoring how often their patients receive appropriate therapies. Dis-



ease-specific measures from all clinical departments then are summed up to estimate how often patients admitted here receive needed interventions.

• **How often do we learn from defects?** The real measure of safety is whether we learn from mistakes, rather than creating a rate that is scientifically unsound. For example, self-reported events (e.g., medication errors) are not valid measurements because of bias or inconsistencies in the way they are investigated and reported.

We still can learn from sentinel events, but this involves individual case inquiries. At one extreme of these investigations is a root-cause analysis, but that can takes months, involves hundreds of staff hours and doesn't necessarily lead to institution-wide fixes of a hazardous system. The other extreme is the Toyota production system (TPS), in which defects are identified in real time, production is stopped and

What an Idea!

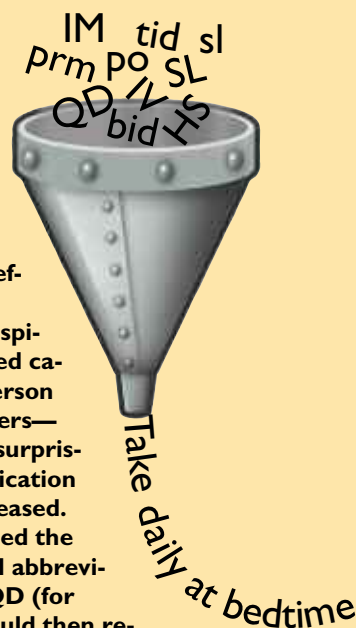
With The Johns Hopkins Hospital operating at peak volumes, moving patients through the system efficiently, from finding beds for those coming in through the ED to getting them discharged earlier, can be a source of frustration and a safety concern.

Nowhere is this more important than on Jefferson 2, the Department of Medicine's busy hospitalist unit. In fact, the department's Hospital units are running at nearly 100 percent bed capacity. So when a team of caregivers on Jefferson 2—from physicians and nurses to housekeepers—recently examined the discharge process, it surprisingly found duplication in preparing the medication list patients were given before they were released. Physicians were writing the list, which included the name of the drug and the dosage in technical abbreviations. A doctor, for example, might write QD (for daily) and HS (for bedtime). Then nurses would then reproduce the same medication list, eliminating the dosage information.

"Not only was the process wasteful," says hospitalist Lena Chen, "but if patients aren't clear about their discharge medications, a lot of work that's gone into their treatment in the hospital could go to waste. They'll be right back in here."

The team, supported by nurse manager Tanya Henly, developed an electronic medication discharge worksheet that was incorporated into the computerized provider-order entry system. Soon, a physician can prepare the medication list by choosing a drug and dosage from drop-down menus. The program automatically computes the dose and when it should be taken into language patients can easily understand.

Once a software glitch that's preventing the list from being printed out can be fixed, the single medication discharge list should be in the hands of patients soon, according to Chen. ■



Identifying the Right Patient

At the Johns Hopkins Outpatient Center, front-desk patient service coordinators could feel they're up against Murphy's Law. There are many things that can go wrong in accurately identifying patients in a hospital as large and busy as Hopkins.

Such identification errors can affect patient safety and require considerable time and expense to correct. For the last three years, an ad hoc work group has carefully examined the causes of patient misidentification and put into place steps that have virtually eliminated the problem at the point where patients and the Hospital meet: registration.

The Joint Commission on Accreditation of Healthcare Organizations has reported that incorrect patient identification contributes to 13 percent of medical errors in surgery and an astounding 67 percent of transfusion errors.

Using root-cause analysis similar to that used in investigating sentinel events, the 13-member Hospital work group uncovered 33 factors contributing to identification mistakes. Based on its recommendations, the Hospital has established a series of policies, including one requiring staff to double-check patients' wrist ID bands prior to clinical procedures.

Focusing particularly on registration problems, the group found that last July, for example, when the Hospital averaged 130 admissions and more than 3,000 outpatient visits per day, 15 patient identity errors occurred that month. By November, policy and procedure changes had dropped the number of mistakes during Hospital admissions to zero and cut misidentifications in ambulatory clinics to one.

Soon the panel will expand its patient identification project by coordinating with another work group from the Center for Innovations in Quality Patient Care, on laboratory specimen misidentification problems. ■

JOHNS HOPKINS Quality Update

© Johns Hopkins Medicine 2005

Center for Innovation in Quality Patient Care
Johns Hopkins Outpatient Center
601 North Caroline Street / Suite 2080
Baltimore, MD 21287-0765

Quality Update is published for Johns Hopkins Medicine's Center for Innovation in Quality Patient Care by the Office of Corporate Communications. Elaine Freeman, vice president.

Center for Innovation in Quality Patient Care

Executive Director
Richard "Chip" Davis, Ph.D.

Medical Director
Peter Pronovost, M.D., Ph.D.

Communications and Marketing
Emilio Williams

Newsletter Staff

Edith Nichols, Director of Publications
Patrick Gilbert, Editor/Writer

Non-Profit Org
U.S. Postage
PAID
Permit No. 1167
Baltimore, MD