JOHNS HOPKINS
# Quality Update

A Newsletter from The Center for Innovation in Quality Patient Care and Johns Hopkins International

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## Short Cuts

### TOOLBOX FELLOWSHIPS

When hospital systems break down, it would take a small army of experts with the right skills to analyze the process, find which steps are responsible, come up with solutions and measure the results.

The Center for Innovation in Quality Patient Care is hoping to provide that army. It's offering three one-year fellowships at Johns Hopkins Medicine designed to give health care staff the opportunity to learn the tools for systems analysis and then train others. Two fellowships are part-time, one targeted to non-physician patient care workers, and the other to clinical administrators. The third is a full-time fellowship for postdoctoral students or physicians. The fellows will work alongside the center's four quality-improvement coaches for the first half of the fellowship, then return to their departments and work on projects for the remaining six months.

### SE HABLA ESPAÑOL EN BALTIMORE

Hospital administrators in Latin America are increasingly concerned with issues related to quality and patient safety. To facilitate the exchange of information with colleagues from Argentina and Mexico about projects under way at Hopkins Hospital, the center recently sponsored two live video lectures.

At the first lecture, part of the 12th International Seminar sponsored by OSDE Foundation, participants from six Argentine universities engaged in a round-table discussion on patient safety, led by Emilio Williams, managing director for the Americas at Johns Hopkins International, and Cheryl Dennison, the center's operations director. The second lecture, directed by Lori Paine, the center's patient safety research director, showcased several ongoing patient safety pilots to more than 50 health leaders from the Mexican private and public sectors, who were able to pose questions and exchange opinions during a 24-hour session. ■

# Walking the Talk of Patient Safety

## Hopkins Hospital leaders adopt intensive care units and send a message to employees that they're committed to eliminating medical errors.

SITTING IN THE CRAMPED break room of the cardiac surgery intensive care unit (CSICU), Bill Brody listened intently as nurse manager Tina Cafeo explained that a checklist the unit had initiated to prevent infections from improperly inserted central lines wasn't going as well as anticipated. Nurses are supposed to make sure that residents follow each step, but according to Cafeo, "residents sometimes skip steps and the nurses don't always call a halt to the procedure and insist that the insertion be done correctly."

Cafeo's complaint didn't fall on just anyone's ears. Brody is the president of The Johns Hopkins University, and every month he sits down with the CSICU staff to discuss patient safety issues, come up with solutions and go over results. And he isn't alone. Every top leader of Johns Hopkins Medicine has adopted an intensive care unit (ICU) as part of an executive safety rounds program, demonstrating the leadership's commitment to seeing that no preventable harm comes to patients.

The Johns Hopkins Hospital's patient safety committee launched the program two years ago after a survey of about 400 health care staff showed they had little inkling of the leadership's role in championing safety. Beryl Rosenstein, hospital vice president for medical affairs and committee chair, asserts that the commitment always had been there, it just hadn't filtered down to employees. "It became important to give executives visibility," he says, "and let employees know we were serious about protecting our patients."

According to Richard "Chip" Davis, executive director of the Hopkins Center for Innovation in Quality Patient Care, which is now collaborating with the safety committee on the program, it also gives leaders an opportunity to hear about problems directly from frontline staff, encourages them to take responsibility for finding solutions and knocks down barriers to making changes that improve patient safety.

**Updating University President Bill Brody on their unit's patient safety projects are from top, the Cardiac SICU's Elizabeth Martinez, intensivist, Nauder Faraday, SICU co-director, and Tina Cafeo, nurse manager.**

The executive rounds actually is part of an eight-step process that begins with measuring a unit's attitude about patient safety. This is followed by a talk by critical care specialist Peter Pronovost, Hopkins Hospital's safety expert, stressing that correcting medical errors isn't a punitive exercise, but teamwork aimed at finding and changing system failures before they lead to mistakes. The staff also is asked to produce revealing answers to questions, such as when was the last time a patient was harmed on their unit, how, and when they think the next person could be hurt and how that could be prevented.

Rosenstein, Pronovost and Lori Paine, Hopkins' patient safety coordinator, go over with the executive the program's goals and the safety issues facing the adopted unit, then meet with the ICU team to frame safety priorities. "We want them to identify," Rosenstein says, "two or three problems that can be solved by simple and quick system changes, and then several that could take longer and require more extensive resources."

Each executive and unit is expected to keep tabs on their progress using a score card that is submitted monthly to the patient safety committee. So far, the results have been encouraging. Since the program started, safety climate scores have risen from 34.6 percent to as high as 67.7 percent in some ICUs. This dramatic increase suggests that patient safety has become a valuable aspect of employees' work environment.

Back on the CSICU, Brody told Cafeo and the rest of the team that they should insist on zero tolerance for noncompliance with the central line checklist. "I understand that accepting anything less is revolutionary thinking in health care," he said, "but we owe our patients nothing less." ■

## Senior Executive Safety Rounds

**Program Goals**

- **Demonstrate leadership's commitment for improving quality**
- **Fuel a culture for change**
- **Identify new quality-improvement opportunities**
- **Start development of a "quality feedback loop"**
- **Establish a framework for quality-based, rapid-cycle improvements**

**Questions Executives Ask**

- **Can you think of recent events resulting in prolonged hospitalization for any patient?**
- **Have we harmed any patients recently?**
- **What systems fail you on a consistent basis and are likely to harm the next patient?**
- **What leadership interventions would make your work safe, effective and efficient?**

**The Director's Chair**

# Invitation to an Exciting Idea

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

WELCOME TO OUR FIRST ISSUE of *Quality Update*, a publication conceived to share the experiences of the Center for Innovation in Quality Patient Care with health leaders in the United States and around the globe.

The health care industry is experiencing an unparalleled era of innovation and discovery . Sophisticated new technologies and medications appear on the scene almost daily. At the same time, hospitals face enormous challenges: Nurses, technicians and other health care workers often are in short supply, budgetary belt tightening has become standard business practice, and regulatory and documentation requirements grow more complex. With these rapid changes and the pressures they place on caregivers comes the increased likelihood of inefficiency, system failures and patient harm.

More people die each year from medical mistakes in the United States than from AIDS, breast cancer or motor vehicle accidents. To cure this epidemic, we must transform the rhetoric of patient safety into an everyday reality. The goals of better quality health care are broad and demanding, and involve more than incremental improvements to its processes. Providing ideal care for our patients requires fundamentally new approaches to quality and the creation of disruptive models of care.

The mission of the Center for Innovation in Quality Patient Care mirrors that of Johns Hopkins Medicine: patient care, education and research. In fulfilling its mission, center staff work with multidisciplinary care teams to expedite the identification and quick transformation of improvement ideas into reality. The center provides Hopkins employees the support and tools they need to make a difference—to patients, coworkers and health care professionals. As part of its mission, the center also features the extraordinary talents of the faculty and staff of the top-rated hospital and the Schools of Medicine, Nursing and Public Health to advance the science of safety. The center also offers educational and technical assistance programs to health care organizations worldwide.


Quality and safety must be embedded in every organization's systems, culture and policies. And this is what we are learning at Johns Hopkins: Old ways of doing things do not work with today's environment. The health care team requires new skills and tools to empower, lead and sustain a quality-focused organization.

We hope to become your partner in developing those skills and tools. ■

Conversation with **Laura Winner**

# Simple Steps

When cardiac surgery wanted something done about its surgical site infections, it partnered with Laura Winner. A black belt in Six Sigma, graduate of Hopkins' Business of Medicine MBA program, fellow in outcomes research and veteran nurse, she has the skills to help employees work through a process.

**What was the problem in the CSICU?**
The surgical-site infection rate for coronary artery bypass graft surgery in the unit had climbed to an acceptable level.

**What does that mean?**
It means that these infections, which can lengthen hospital stays and increase the risks of a poor outcome for patients, were occurring too frequently. Dr. Bill Baumgartner [cardiac surgery chief] and others pointed to this as a major problem when they met with [University President] Bill Brody, the center's executive champion for no harm by infection.

**How did you get involved?**
I was assigned to this issue by the Center for Innovation in Quality Patient Care as a quality innovations coach, focusing on no harm by infection—one of the patient-safety areas identified by the Institute of Medicine.

**What steps did the unit take to find a solution?**
We defined the critical things that happen in the operating room before incision, and then we started focusing on areas that are known to increase infection risks. Since the center model calls for rapid-cycle change, we decided to concentrate on evidenced-based recommendations from the CDC. Those were hair removal methods, surgical prep drying time and antibiotic administration.

**How did these cause infections?**
When you remove hair with a razor it can leave abrasions on the skin, which become reservoirs for bacteria. Evidence sets the standard for giving antibiotics before the first incision at 60 minutes, and a delay can increase infection risk, and the same holds true if the surgical drape is applied while the skin is still wet.

**What happened next?**
We got all of the players in the room, which included nurses, physician assistants, surgeons, perfusionists and Hopkins Hospital epidemiology and infection control to brainstorm on the best way to address this problem. Then we measured the compliance with the CDC recommendations for these prep steps.

**What solutions did they come up with?**
Simple things, really. The team decided to either avoid hair removal whenever possible or remove hair with clippers instead of a razor, and switch to a faster drying, tackier surgical skin prep that allows the drape to adhere better. They also borrowed a safety idea from the airline industry and posted a checklist on the OR's communication board of steps that must be done prior to incision, including making sure the antibiotics are there and ready to be given to the patient on time.

**Have infections come down?**
Yes, the surgical site infection rate this quarter has dropped slightly, but we have room for improvement. It'll take some time before these changes show more dramatic results. We're 95 to 100 percent compliant with the changes adopted, and we're planning more aggressive interventions. ■

# Excellence Without Borders

## Symposium to showcase quality worldwide.

IN INTENSIVE CARE UNITS AND scattered medical wards throughout The Johns Hopkins Hospital, mini-revolutions are taking place. The change, slowly gaining steam, is in the way frontline medical staff are questioning the way they provide patient care. They've become empowered to find system breakdowns that impinge on quality or safety and fix them.

Their successes, great and small, are numerous. In the Weinberg ICU, for example, nurses are double-checking medication orders to make sure patients are discharged on the proper drugs. And in the medical ICU, staff frustrated by taking time away from the bedside to transport patients to laboratory and imaging tests came up with the idea of creating a skilled transport team to take on that job, an idea that has been adopted hospitalwide.

Now, Hopkins wants to export its experiences around the world. The Center for Innovation in Quality Patient Care and Johns Hopkins International have joined forces to hold a three-day symposium Oct. 29–31 on tools and solutions that lead to quality and safe care. It will be held at the Wyndham Baltimore Inner Harbor Hotel and open to health care leaders from the United States and abroad. The symposium will include morning plenary sessions, afternoon tracks on quality, safety and nursing/patient care, as well as tours of the hospital units where these creative changes have occurred.

The idea for the symposium germinated last year, when Johns Hopkins International held a seminar for foreign CEOs and physician and nursing executives from countries as diverse as Jordan, Spain and Japan. Topics ranged from developing quality improvement strategies, to reducing medication errors and hospital-acquired infections to the purchasing of medical equipment. Concerns over whether these issues would hold the attention of foreign health care officials was unfounded, notes Clara Marin, International's senior manager for external communications, as the seminar held in November, and a subsequent session in May, were sold out. For more information about this or other educational events, please contact the Center for Innovation in Quality Patient Care at 1+ 443-287-8654 or e-mail innovations@jhmi.edu. ■

Spotlight

# On the Trail of Medication Errors

## Spurred by a pharmacist's zeal, an ICU tracks down system failures and goes for the fix.

When Faramarz Zarfeshanfard talks about no harm by medication error, the look in his eyes and the steel in his voice confirms that this isn't a principle he tosses around lightly. "On average, there are 12,000 medication doses dispensed every day around the hospital," says The Johns Hopkins Hospital point-of-care pharmacist. "If there is one error on any given day, that's one too many."

Zarfeshanfard infused his zeal to protect patients from the first day he joined the staff of the hospital's cardiac surgery intensive care unit (CSICU). He arrived as Hopkins' new patient safety committee was turning up the pressure to make the hospital mistake free, and the Center for Innovation in Quality Patient Care was assisting numerous safety projects in units, including work with the CSICU's safety and quality care team.

According to Institute of Medicine white papers on medical errors, medication mistakes cause the majority of patient injuries or deaths. One of the areas the institute noted is the most prone to mistakes is the availability of patients' medications on hospital units. "In an ICU setting," Zarfeshanfard points out, "if the medications aren't there when the patient needs them, it starts a whole cascade of events that likely will have negative consequences for care and result in costly, longer hospitals stays." It takes nurses away from the bedside, he adds, to hunt down missing medications and request replacements, and pharmacists have to interrupt their work to renew orders.

It was understandable then, that one of the first issues the CSICU team targeted was medication errors. The team tracked medication availability for two patients for a week and discovered that during the busiest time of administering medications, 10 a.m., 30 percent of the doses were missing.

After reviewing each step in the medication delivery process, the team devised a simple, cost-free remedy. During the night when activity on the CSICU slowed down, the nurses on that shift would check the medication inventory. If any doses turned up missing, nurses would place a reorder with the pharmacy so the drugs were on the floor ready for use the next morning. The safety team monitored this intervention for a week and found only one case of a missing dose.

> "If there is one error on any given day, that's one too many."

This small pilot project also revealed a lack of sufficient inventory control and the low quality of the information pharmacists and nurses used to dispense and administer medication. So, the CSICU team refocused its efforts on how medication orders get to the pharmacy. Normally, physicians hand-write the medication order on a form, with the original sheet going into the patient's chart and the carbon delivered or faxed to the pharmacy. The team compared the orders in the charts with the pharmacy patient medication profiles and the unit's medication administration record, which list the drugs for each patient, but don't interface with each other. "These comparisons should match every time," Zarfeshanfard says. "But we found discrepancies up to 50 percent of the time."

In reviewing these inconsistencies, the team discovered that in most cases the written orders were illegible because of the physician's handwriting or the poor quality of the carbon copies or faxes. The review also indicated, for example, that when a physician used a stack of forms to write multiple orders, cross outs and substitutions of medications or doses on one form would be transferred to the carbon of subsequent orders.

The CSICU's solution in this case wasn't simple or inexpensive. The safety team looked at two PYXIS products: one, scanning/communications software; the other, an inventory storage device, much like a vending machine with restricted access. These products would allow the original orders to be scanned into the computer system linked to the pharmacy. Once the orders were filled, they would appear on the unit's PYXIS profile machine, allowing nurses access to the medication. The outcome would eliminate carbon copies and patient-specific medication carts, increase significantly the accuracy of entering orders and decrease turnaround time of medication availability from hours to minutes. But Hopkins also is set to spend $21 million on a physician order entry system and, the question remains whether both systems are needed.

The CSICU isn't alone in taking on medication errors. The Weinberg intensive care unit, for example, has put together a medication reconciliation project that uses crosschecks to make sure patients are discharged on the proper medicines. On oncology floors, the Hopkins Hospital pharmacy is checking each step of the chemotherapy delivery process to detect flaws and recommend improvements. And the Hopkins pharmacy, among several hospitalwide projects, has placed point-of-care pharmacists on every ICU and 17 clinical pharmacy specialists on other inpatient units and some outpatient clinics. ■

**Faramarz Zarfeshanfard feels like he became the point-of-care pharmacist for the cardiac surgery intensive care unit at just the right time.**

### The Numbers Count

**Complexity of Medication Delivery at Hopkins (mean values):**

| | |
|---|---|
| Patients per day: | 720 |
| Doses per day: | 12,000 |
| New orders per day: | 3,000 |
| Drugs in the formulary: | 900 |
| Missing doses per day: | 150 (1%-1.6%) |
| Steps in medication delivery process: | 100+ |
| Orders transcribed from a piece of paper into a computer per day: | 3,000 |

Tools

# Building Success

## Six Sigma proves its mettle in removing obstacles to quality patient care.

**Last year, Johns Hopkins Nuclear Medicine Chief Richard Wahl and the staff of the country's first commercial PET/CT imaging operation were trying to figure out how to meet a growing demand for its services, increase patient flow and take full advantage of this cutting-edge technology. It was a situation ready-made for the PET Center staff, who shared a desire to improve patient and staff satisfaction and enhance the operation's financial performance, to use Six Sigma.**

**A statistical term, Six Sigma measures the extent to which a process varies from perfection. It has become a corporate mantra for improving efficiency by reducing errors or defects, and thereby increasing profits. And it has been gaining a slow but steady hold in health care. At The Johns Hopkins Hospital, Six Sigma has flourished mainly in Radiology, which has used the quality improvement analysis in several major projects. Now, the Hopkins Center for Innovation in Quality Patient Care is applying the same techniques to improve the safety and level of care for patients.**

**Hospitals can have thousands of systems, each with as many as 100 steps. The Six Sigma doctrine is to streamline a process, because the more steps involved in delivering care, the higher the statistical chances for mistakes. The Center for Innovation has used Six Sigma in a number of its patient safety projects, including ones aimed at eliminating medication errors and reducing surgical site infections on the cardiac surgery intensive care unit. "We'll be applying Six Sigma on more projects," says Laura Winner, the center's head quality improvement coach and an advanced Six Sigma expert, "to complement our rapid-cycle approach to fix system breakdowns before they put patients in danger and diminish the quality of their medical care."**

**In applying Six Sigma to the issues facing the PET/CT operations, the staff, including registration clerks, technologists, physicians and the pharmacist began to identify areas of potential improvement. They agreed that workflow and communication problems caused delays that limited their efficiency. The staff began their analysis by dividing up the workflow into time units, tracking patient arrivals, registration, prep time, waiting time after radioisotope injection, the length of the scan and how long it took to discharge the patient. Each staff member documented the times they began and ended each step. The data showed that patients often arrived late and delays occurred during the prep phase of the scan that resulted in down time between scans.**

> Changes have increased the number of clinical PET/CT scans per day to 10 and nearly doubled annual charges.

**Because the 45-minute wait after the injection and the 30-minute scan were clinical care protocols that couldn't be changed, the staff decided to set other time goals. One was to get the first patient through registration and prepped in 30 minutes. To accomplish this, the pharmacist designed a new scheduling format, and registration clerks and their manager, Julita Nieve, improved patient education and streamlined the registration process. These and other changes have increased the number of clinical PET/CT scans per day to 10 and nearly doubled annual charges. "The success of Six Sigma," says Peg Cooper, nuclear medicine's technical manager who's experienced in the process improvement technique, "relies not only on the quantitative analysis, but on the entire staff working together to implement changes." ■**

## Points from Pronovost

# Communication: A Daily Goal

*By Peter Pronovost, M.D., Ph.D.*

It is rarely the case that a patient is solely cared for by one provider. In fact, patient care occurs at the hands of a team of health care workers with one goal in mind—improving a patient's quality of life. One of the great features about an institution like The Johns Hopkins Hospital is the diversity of health care workers, both professionally and personally. With this variety comes an array of work and communication styles.

In a hospital setting, and particularly intensive care units, how effectively a team works and communicates is imperative for patient outcomes. We recognized the need to improve communication after listening to discussions during patient care rounds. In a teaching institution, rounds have a dual purpose: to educate medical students, residents and fellows about evidence-based medicine, and to medically treat the patient. We realized that rounds tended to be provider rather than patient centered, with providers discussing pathophysiology and relevant literature, which frequently lacked clarity in tasks and care plans for their patients.

After surveying residents and nurses following rounds and finding that less than 10 percent understood the daily tasks and therapies for their patients, my research coordinator, Christine Holzmueller, and I knew that developing an effective communication tool had to become a top priority. With input from all ICU care team members, a daily goals sheet was developed. This hybrid checklist prompts the care team to identify the work needed to get the patient to the next level of care, the patient's greatest safety risk, the care plan and the communication plan. It also covers issues of pain management, medication changes, other care processes and whether someone has kept the family informed about their loved one's care.

**Peter Pronovost**

The beauty of the daily goals sheet is the ability to modify it to meet the needs of any inpatient unit or medical care facility. For example, one ICU has modified the form to list goal 1, goal 2 and so on, while a separate ICU in the same hospital has initiated a checklist of specific therapies. Not surprisingly, the daily goals sheet is now being used in more than 50 intensive care units in the United States that participate in the Institute for Healthcare Improvement and VHA initiatives to improve ICU care.

> Not surprisingly, the daily goals sheet is now being used in more than 50 intensive care units in the United States.

The daily goals sheet was first implemented in the intensive care units at The Johns Hopkins Hospital in July 2001. By week 7, more than 95 percent of residents and nurses reported they understood the daily goals for their patients. There is also the potential that the goals sheet may have decreased ICU length of stay (LOS). Before the form was used, mean LOS was 2.2 days. After implementation, LOS dropped to 1.1 days. While implementation of the goals sheet correlates with the reduction in LOS, there were other studies focusing on quality improvements in the ICUs at the same time which may have contributed to this reduction.

The essence of the daily goals sheet is its ability to structure patient care rounds and facilitate communication between care team members about daily goals. All care team members—physicians, nurses, respiratory therapists and pharmacists—review the goals for each patient three times during the course of the day and leave the form by the patient's bedside to make sure the plan is explicitly followed. As goals of care change, so does the form. The goals sheet helps everyone work as a team and focus on the patient's needs. Use of the goals sheet significantly improves effective and efficient patient care, and setting goals also improves providers' personal effectiveness and efficiency. ■

## What an Idea!

**Neonatologist Christoph Lehmann was finding too many problems in ordering medication for infants in the neonatal intensive care unit (NICU). But with equal doses of entrepreneurial enthusiasm, computing programming and ingenuity, Lehmann found a solution. Why not use a common Web development tool to create a system allowing physicians to place their orders electronically and catch errors quickly—before they affected the unit's tiny patients?**

**In the NICU most infants typically receive parenteral (intravenous) nutrition for days or weeks. These nutrition orders may include up to 15 ingredients, calculated on the basis of the infant's weight and other key factors.**

**With the help of a pediatric pharmacist and a nutritionist, Lehmann developed an electronic addition to the pharmacy order system that he calls the total parenteral nutrition calculator. Based on certain rules and logarithms, it automatically computes factors involved in newborn medications and issues warnings—highlighted in either red or orange—if something is amiss. It also provides a description of the mistake in the nutrition order. Physicians can use the calculator on any public workstation computer or on their own desktops.**

**Lehmann's simple solution has cut the NICU's medication errors by 89 percent. And because the program does all the calculations, Lehmann says this electronic ordering form has reduced the time doctors spend on orders from about 10 to two minutes per patient. It took Lehmann's team just three weeks to develop the prescription calculator which involved no costs other than their time. ■**

## Dispatches from the Frontlines

• **Walking the line** between administering just enough medication to help, but not so much as to harm, is a concern in every division of The Johns Hopkins Hospital. In pediatric oncology, where patients can be very small and very sick, the margin of safety can be razor-thin. A new, online template for pediatric chemotherapy orders aims to make the process even safer. With a mandate from Pediatrics Chairman George Dover, a multidisciplinary team was assembled to develop an electronic system to reduce the potential for errors found in the existing paper process. Two nurses will still check every order before administering medication, and two pharmacists will check every order before dispensing, but the template, called the pediatric oncology chemotherapy order, will introduce another level of safety.

• **On the pediatric intensive care unit** (PICU) and the infant and toddler floor of the Children's Center, there is renewed emphasis on hand washing. Purell disinfecting-gel dispensers are now in the hallways, along with colorful signs reminding people to wash their hands. Parents and staff are given purple buttons that ask, "Have you washed your hands?" Staff model the behavior by using Purell every time they come into the child's room, and parents start using it themselves. The trend continues to spread: Now all Children's Center units have Purell dispensers strategically positioned, from patients' rooms to utility rooms.

• **The Weinberg ICU staff** unearthed a problem with transfer orders. They feared that when patients left the unit, the list of medications and allergies to medications might contain errors. A two-week audit showed their concerns were well-founded. Even though most of the errors wouldn't have harmed patients, it was disturbing nonetheless. Now, as part of the routine discharge process, nurses perform something called medication reconciliation, matching medications on the transfer orders to what patients have been getting on the ICU. If there's a discrepancy, nurses go to the doctor or patient for an explanation. ■

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