

PRHI Executive Summary

University of Pittsburgh WISER Center

Medical simulators come of age

The man on the ground has stopped breathing. He has a pulse. A physician is on the scene, ready to insert the laryngoscope to open this man's airway. The physician doesn't have much time before the man sustains brain damage from lack of oxygen.

Steadily, coolly, he positions the man's head back and inserts the laryngoscope. He tries once, then again. The soft tissues in the man's mouth and throat begin to swell, further reducing the chance that the doctor can succeed. Now wielding a scalpel, the physician makes an incision in the cricothyroid membrane in his neck, hoping to place a breathing tube. But even this last-ditch effort fails. With the physician still working frantically, the man's pulse becomes fainter, then fainter still.

"Stop," calls the instructor.

Had this been a real person, he or she would have died. But this patient is a Laerdal SimMan, a computerized mannequin used, in this case, to simulate a difficult-to-open adult airway. SimMan resides at the Peter M. Winter Institute for Simulation Education and Research (or WISER Center), allied with the Safar Center for Resuscitation and Research at the University of Pittsburgh.

"Don't feel too bad," says the instructor. "Eighty-two percent of doctors fail this simulation the first time."

Continued, page 4

July 2004

Guest editorial

Hospital quality: What's the next step?

By Paul O'Neill, Ken Segel, Jan Jennings, John Snyder, Jon Lloyd, MD, and Karen Wolk Feinstein, Ph.D. on behalf of the Pittsburgh Regional Healthcare Initiative. Adapted from invited comments for the Commonwealth Fund Funded Study by the Economic and Social Research Institute, "Hospital Quality: Ingredients for Success."

At one local hospital recently identified as providing among the highest quality and lowest cost care in the country, we were struck by this comment from the CEO: "We may be good by comparison, but we could be a lot better."

One finds this attitude ingrained in organizations performing at high levels. And indeed, in any American hospital today, it is true. We can do much, much better. But how?

At the Pittsburgh Regional Healthcare Initiative, we have had the privilege of working closely with

dozens of fine institutions from Southwest Pennsylvania, and learning from many others across the country. We also draw on our own experience outside health care. One of us led the safest business in the world, an 120,000 employee corporation operating in 41 countries that, as of May 7, 2004, was 33 times safer to work in than the average American hospital (Alcoa lost workday rate = .070 per 200,000 work hours, US hospitals = 2.3).

Here are a set of linked observations, meant to

Continued, page 6

Inside:

<i>Can we eradicate MRSA in Southwestern Pennsylvania?</i>	2
<i>More reimbursement stories</i>	3
<i>Hospital Quality: What's the next step?</i>	6
<i>Calendar, Contact</i>	8

PRHI is a consortium of those who provide, purchase, insure and support health care delivery in Southwestern Pennsylvania.

Together, we are working to achieve:

- ✧ Zero hospital-acquired infections.
- ✧ Zero medication errors.
- ✧ The world's best patient outcomes in: cardiac surgery; obstetrics; diabetes and depression.

*Op-Ed reprint***Can we eradicate MRSA in Southwestern PA?*****Collaborating on this article were:***

- ✧ **Robert R. Muder, MD**, a professor and Infectious Disease physician at the VAPHS.
- ✧ **Richard P. Shannon, MD**, a professor and the Director of Medicine at Allegheny General Hospital.
- ✧ **Carlene Muto, MD**, Director of Infectious Diseases at UPMC Presbyterian.
- ✧ **Cheryl Herbert, RN, CIC**, Director of Infection Control at Allegheny General Hospital. Muto and Herbert co-chair the PRHI Infection Control Action Group.
- ✧ **Naida Grunden**, PRHI Communications Director

As the recent tragic deaths at the Butler Veterans Administration (VA) hospital recently demonstrated, antibiotic-resistant bacteria are relentless killers. Most unfortunate, these bacteria, known by the acronym MRSA*, are present in every American hospital. Of the 2 million American patients who will contract an infection in the hospital this year, 100,000 of them will die. Nationwide today, almost half of hospital-acquired infections are antibiotic resistant. These preventable infections add about \$1 billion in cost to the healthcare system. The human cost, however, is incalculable.

It doesn't have to be this way.

In Holland and certain Scandinavian countries, MRSA is rare, and outbreaks are quickly contained. They've done it through scrupulous attention to hygienic precautions among healthcare workers and by isolating anyone who might be harboring MRSA—with or without symptoms—until testing proves otherwise.

One "risk factor" that will cause you to be isolated upon admission to a Dutch hospital may come as a shock: it's being an American.

Could Southwestern Pennsylvania be the first American community to eradicate MRSA?

Promising work in our community indicates that we could make rapid progress against MRSA. The Pittsburgh Regional Healthcare Initiative (PRHI) provides a community-wide forum for discussing and disseminating scientific patient safety information to all hospitals, across competitive lines. The goals, set and embraced by the entire region, include reducing hospital-acquired infections to zero.

Southwestern Pennsylvania hospitals have reduced infections in central lines (a type of IV in vessels leading

to the heart) by 45%. This significant accomplishment resulted from countless hours of hard work, cultural change, education and most of all, the support and encouragement of top leadership. While more remains to be done, the decline proves that a region can work together toward major improvements in patient care.

Another area of significant improvement has been against MRSA at the VA Pittsburgh Healthcare System (VAPHS). In one post-surgical unit in the Oakland hospital, the VAPHS, together with PRHI and the Centers for Disease Control and Prevention (CDC), teamed up to address MRSA. During the past two years, MRSA infections have declined from one per month to one per year in the study unit. These gains have been made through a series of low cost, low tech improvements that make it easier for healthcare workers to observe known precautions. New strategies ensure that hand hygiene products are always readily available, as are gowns, gloves, masks and equipment. Posters graphically show the superiority of alcohol hand rub over soap and water for hand hygiene in most cases. Gown-and-glove lines painted on the floors of the isolation rooms and other simple techniques improve awareness and compliance.

To improve observance by physicians and residents, medical staff leaders created a teaching module on hand hygiene. Now, every chief surgical resident completes the module and receives a wallet-sized card as a reminder of proper procedures. The chief resident in turn trains every new resident, intern and student, and is expected to model perfect hand hygiene on rounds. The University of Pittsburgh School of Medicine recently adopted this teaching module.

Southwestern Pennsylvania has the unique opportunity to work cooperatively to eliminate MRSA, as has been

*Methicillin-resistant *Staphylococcus aureus*

done across northern Europe. Determined leadership from the highest levels is needed to create the enthusiasm to spread the words and actions of quality. The only defense against the contagion of microbes is the contagion of ideas and improvements. If the entire region embraces change and improvement in the straightforward areas of hand hygiene and isolation precautions, Pittsburgh could indeed be the first area in the country to eradicate MRSA.

How can MRSA be eradicated?

PRHI, in consultation with local and national partners, has published ten simple, inexpensive steps that every healthcare facility could begin immediately to stem the tide of infections, particularly MRSA.

1. Use hand hygiene precautions for all patient contacts. By itself, adequate hand hygiene may reduce healthcare-acquired infection by 25%.
2. Ensure that hand soap and alcohol sanitizer are present when and where needed.
3. Use antimicrobial soap or alcohol sanitizer in intensive care units.
4. Identify colonized and infected patients through surveillance cultures. (Those who are colonized, while asymptomatic, harbor MRSA and may spread it.)
5. Isolate patients known or suspected to be colonized or infected with antibiotic-resistant microorganisms.
6. Use gowns, gloves and masks when caring for patients in isolation, to protect workers as well as patients. In one study, 69% of healthcare workers' freshly laundered white coats had detectable MRSA contamination.
7. Clean the patient environment effectively: include floors, beds, linens, tables and drawers, call bells, patient gowns—any surface that could be contaminated.
8. Use disposable or dedicated equipment or clean all shared equipment such as blood pressure cuffs and stethoscopes with an alcohol swab.
9. Flag medical records of all colonized patients to ensure that they are isolated on subsequent admissions.
10. Control antibiotic use. Between a quarter and half of all hospitalized patients are taking antibiotics: yet half of all antibiotic therapy is either unnecessary or inappropriate.



Patients and families, if you are not certain whether your healthcare worker has sanitized his or her hands, ask. Visitors should sanitize theirs as well, coming and going.

But at the root, it's up to the healthcare community to find the leadership and the will to make these improvements. PRHI is a community resource, ready to help with education, techniques and assistance. Pittsburgh has the opportunity—and the imperative—to work together as a region to become the first place in the United States to knock out MRSA, on the way to wiping out every error in the care of those we seek to heal.

Second in a series

More reimbursement stories

***W**e've been gratified by a great response to the examples of payment policies that are not "pro-patient" published in last month's PRHI Executive Summary. Policymakers are calling to say that these examples are helping them understand the issues more clearly. And partners are calling with more examples. They include:*

- Clinical breakthroughs present financial dilemmas "at the point of patient care." New clinical treatments with promising outcomes often face barriers or complex and varying conditions for reimbursement by payers. For one promising agent—Erbix—hospitals face a \$30,000-\$40,000 gamble per patient. If they administer it, but find that complex and varying payment rules among payers weren't met in a particular instance, they must assume that cost.

From page one

Medical simulators come of age

By the fifth try, 100% of the people attempting the simulation—usually physicians, nurses and paramedics—will successfully open the airway.

While the first basic flight simulators came into use in aviation before World War II, modern technology has only recently made simulators for human conditions feasible. The ability to train students using

realistic simulators seems to be providing the same revolutionary effect on physician training that it's had on pilot training. The old medical adage, "See one, do one, teach one," is yielding. Medical "practice" now implies "practicing" on mannequins first.

How did the WISER Center get started?

The WISER Center namesake, Peter M. Winter, as chairman of the Department of Anesthesiology and Critical Care Medicine at the University of Pittsburgh, realized the importance of establishing a simulation center

for training Department personnel in the early 1990s. The Department obtained the only simulator available then, at the high cost of over \$250,000. By adding computers, anesthesia machines, monitors, and ventilators, the group was soon able to simulate an operating room, an ICU bed, or a bay in the emergency department.

In 1996, Drs. Renae Gonzales (director from 1994-1996) and John Schaefer (director 1996-present) designed and patented a difficult-airway simulator that was more functional, affordable, and portable than the original version. A

Texas company, Medical Plastics Laboratory, later acquired by the Laerdal Corporation, undertook commercial manufacture of this new simulator (AirMan) that has also been incorporated into a "full-scale" human simulator (SimMan). Like flight simulators, these human body simulators provide an eerily realistic experience, from the skin to the pulse, to the feel of underlying organs.

Based on the success of the first training programs, soon other departments (Surgery, Medicine, Emergency Medicine), as well as the schools of Medicine and Nursing, and hospital administration expressed interest in expanding the program through a larger, interdisciplinary facility. This expanded training mission, coupled with an interdisciplinary initiative in educational research and an expanded effort in continuing medical education for patient safety, led to the partnership that established WISER in the year 2000.

Build your own satellite facility

From one simulator in 1994, WISER has grown into an 1100-square foot facility with 16 full size simulators and a number of partial body task trainers, a large lecture hall fully equipped with personal computers, notepad/laptops and other up-to-date intellectual

82% of all who attempt the difficult airway simulation fail the first time. By the fifth try, 100% pass.

**—John Schaeffer, MD
Director, WISER Center
University of Pittsburgh**



Physicians, nurses, and paramedics train on SimMan at the WISER Center at the University of Pittsburgh. The simulators track the clinician's every move, for later review and critique of both individual and team.

technology. Faculty have developed a broad range of curricula, using performance evaluations that included Internet, CD-ROM, Palm-based, and digital video-based components. WISER serves as the training resource for the 20-hospital UPMC health system and The University of Pittsburgh health science schools. In 2003 WISER trained approximately 9000 trainees and ran approximately 8000 simulations.

WISER staff have contributed to both the technical design and software programming of the SimMan platform. Today, WISER's computerized simulations can be downloaded by anyone with a SimMan, making it possible for any center to become a satellite simulation facility. (Prices on the SimMan have also come down from the initial \$250,000 to about \$28,000 each.)



A classroom like no other. The SimMan simulators reside in a realistic hospital atmosphere in the 1100-square foot WISER Center.

"Real" simulations

Recently a group of Board members from the Pittsburgh Regional Healthcare Initiative (PRHI), including former Treasury Secretary Paul O'Neill, toured the WISER facility and watched several types of simulations:

- John Schaefer, M.D, Assistant Director of Anesthesia and Director of WISER, conducted the difficult airway simulation in a room flanked with curtains that simulated a Pittsburgh street corner.
- Michael Mohr, MD, Visiting Instructor of Anesthesiology, displayed the various torso simulators used to practice aseptic insertion of central lines (IV lines leading directly to the heart). Practicing this procedure is important because of the potential serious risks to patients of errant punctures and infections.
- Michael DeVita, MD, Associate Professor of Critical Care Medicine, simulated a crisis team training session.

In this session, the Sim Patient goes into cardiac arrest, triggering a "Code Blue." Sundry staff members from all over the hospital run to the room to help. These staffers may be colleagues, or they may never have met, but their charge at that moment is to form a cohesive team and resuscitate this person. The Code is choreographed as to where each person stands, who takes charge and so on. Having the chance to rehearse not only the procedures, but the team-building, is invaluable.

✧ Lying in another bed down the hall is a very small SimBaby, a pediatric simulator. Melinda Fiedor, MD, NRSA Fellow and Clinical Instructor for Critical Care Medicine, demonstrates the intricacy of safely opening an airway in an infant. Babies, she reminds onlookers, are not small adults.



A physician attempts to open a difficult airway in the SimMan. In the very realistic world of medical simulations, the "patient" has vital signs, pulse, blood pressure, tissues that can swell, and even skin that feels "human."

In a sentiment often echoed by people who tour the facility, O'Neill said, "Once you've seen the WISER Center, you never want anyone working on you who hasn't gone through these simulations."

Guest editorial, from Page One

Hospital quality: What's the next step?

challenge leaders of institutions and the medical profession:

1. It is common wisdom in the quality and safety movement that leaders must establish quality and safety as priorities. We don't think that goes far enough. They must be preconditions – non-arguable ingredients of how we care for patients. Priority implies that safety is one of a number of institutional objectives and might

change, perhaps in the next fiscal crunch. We have seen elements of that no compromise thinking, such as our local Jefferson Health System's commitment to absorb the costs of any care day denied reimbursement if their clinicians believed a patient needed to remain in the hospital. But how much further could we take this principle, and to how much greater yield from our workforce?

2. We have seen great power in setting goals at the theoretical limit – perfection or as close to it as scientifically possible. It defuses defensiveness and excuses, keeps the pressure on for breakthroughs, and lays the

groundwork for a cycle of escalating quality. "It isn't an issue of 'good' or 'bad,' just what's the next thing we have to do to get closer to the ideal."

3. To have a chance at closing the gap between here and the ideal, leaders must embrace the notion that they are responsible for everything that occurs in their institutions, especially things gone wrong. Everything. Today, it is difficult to find hospital leaders – clinical or administrative – that truly accept this notion. Lucian Leape, MD, notes that first observation of a safety sciences expert viewing a typical hospital would be "No one's in charge."
4. Once a leader accepts that responsibility, the next question is whether we are telling ourselves the truth,

every day, about each thing gone wrong?

Here's a test for executives. Work on a nursing unit for a morning, as one of us did regularly as CEO. Note how many times a nurse needs to seek clarification of a medication order from a physician. Then go down to the pharmacy and see how many times the order entry pharmacist needs to clarify an order, or fill an incomplete order. Then ask yourself how many days, months, and years these "small" problems have gone on, and on. Why haven't they been addressed? And how many other kinds of problems like these occur every day in other parts of the organization?

How to evoke the truth in a way that supports the most rapid possible improvement? Ask yourself, do our employees and colleagues capture everything that has gone wrong, investigate a cause, take action to address the root cause, and share all of that essential information across the enterprise within twenty four hours? Leaders can use such "real time" tools not as a means to find fault, but to assess on a daily basis how well their institutions support problem solving and improvement on the front lines, and to allow people on the front lines to learn from each other.

At one partner hospital, they are acting on a commitment to eliminate every unsafe condition. Over a year, they have gone from reporting 3.2 incidents or problems a day to an average of 37, and assessing whether they are solving each problem to root cause. After lots of practice, they are solving 6% of their problems to root cause each day, compared to near zero percent previously. The gap between the number of problems and the number they are solving is driving them crazy, fueling their determination to close the gap.

5. Use of such a problem-solving system soon calls the question of what structure best supports excellence, especially in an organization as complex as a hospital. The study recognizes that the featured hospitals have avoided the fatal flaw of most organizations: to assign "quality" to a "quality department" or safety to a "safety officer" but instead to have those experts serve as "technical assistance," with everyone expected to "own" the work of improvement. Risk management is no longer assigned to isolated specialists. The experts

Leaders can use "real time" tools not as a means to find fault, but to assess on a daily basis how well their institutions support problem solving and improvement on the front lines.

focus on letting the facts empower folks who do the work to make change. We applaud this focus, and have seen the power of this approach play out on a community scale, through the kind of collaborative registry pioneered by the Northern New England Cardiovascular Disease Study Group.

Here are some thoughts about how to push that thinking even further.

There is still a prevailing assumption that much of improvement has to occur through committees, whether established or “ad hoc.” Great organizations recognize that committees are mechanisms for codification and communication, but that improvement must occur in “real time” and in the course of regular work. In medicine, one of the giants of surgery, Frank Spencer, MD, has driven this point home in his capacity as patient safety officer at NYU Medical Center. When a problem occurs at NYU, a small team is immediately assigned and has a week to implement a “root cause” solution as close to the ground as possible. The relevant committees are informed of what changes were made; they aren’t asked for

permission. Two hospitals we work with are on the edge of disbanding their quality committees, in order to concentrate on getting to the floor and solving real problems.

Act on the specific, and act today.

We see evidence in our partners’ work that these ideas can generate levels of performance that most people consider to be utopian. Leaders establish “quality and safety” as preconditions of serving people and protecting the workforce. They accept responsibility for everything. They ask themselves whether they are getting information on everything gone wrong, every day, and ensuring that the front line troops have the permission and tools they need to solve each problem. And leaders ask ceaselessly: how far are we from the ideal and what’s the next improvement that will move us closer?



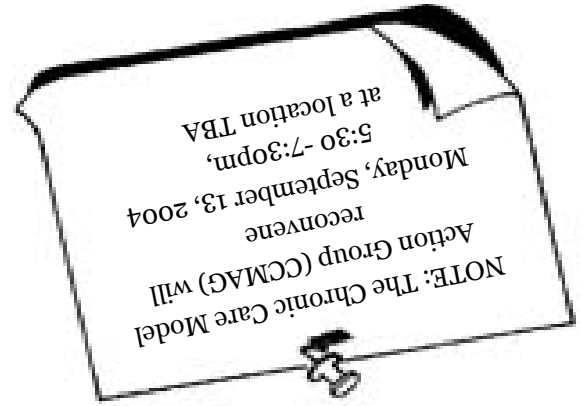
From page 3

More reimbursement stories

- In another case, new injectible heparin agents that allow patients recovering from deep vein thrombosis (DVT) to go home from the hospital days earlier than usual 5 days. These treatments are not covered for Medicare patients at home (though they will be with the new Medicare Rx bill in 2006). Many patients do not have prescription coverage for Lovenox (\$400-800 per patient.) The incentive is for the patient to stay in the hospital to avoid that expense. At least one local hospital has chosen to give the Lovenox to dozens of these patients who are otherwise ready for discharge. The hospital’s costs and reimbursement “even out” under the DRG system, but they question why incentives aren’t better aligned.
- A State moratorium on the approval of additional skilled nursing facility beds in some communities is resulting in longer hospital stays and inconvenience to patients and caregivers. As in many cases, the efforts of one entity to control costs result in a cost shift to others.
- Patients are frequently transferred from hospitals to specialty acute-care facilities in the late evening or at night. This is less than ideal for patient care, because of staffing levels (i.e. whether the pharmacy is fully staffed, the presence of medical staff) and other factors. Currently, under federal regulations, payments are calculated based on a census of patients at midnight. If the census were conducted at 6 PM, there would be an incentive to transfer patients at a “pro patient” time.
- Community health education and screening programs provided by hospitals are not reimbursed by payers. They are provided as part of charitable mission, but are not acknowledged as value-creators by the payment system. Of course, the question remains whether we are going to act as a community and nation to address the problem, and how. Look for provocative “straw person” thoughts in future issues.

We need your thoughts as well! Please send them to:

Ken Segel (ksegel@prhi.org)

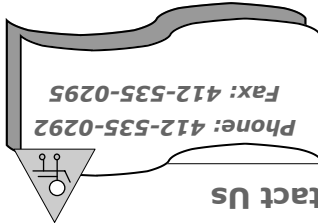


Tuesday, August 3 PPC 101, Centre City Tower, 5th floor 8a-5p
 Infection Control Advisory Committee,
 PRHI Offices, Centre City Tower, 21st floor 8-10 a
 Information Session, 5th floor 6-9p
 Wednesday, Aug. 4 Go and See, Allegheny General Hospital 8a-noon
 Tuesday August 10 Obstetrical Working Group, PRHI Offices 5:30-7p

Calendar, August 2004

PRHI Executive Summary is also posted monthly at www.prhi.org
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