PRHI Executive Summary

Steps for eliminating central-line associated bloodstream infections in 90 days

Get Real!

The debate is over: hospital-acquired infections cause or hasten the deaths of as many as 100,000 Americans each year. Central line-associated bloodstream infections (CLABs) are among the most deadly, since central lines are generally inserted in the sickest patients.

The financial cost of hospital-acquired infections may be in the billions, but the human cost is incalculable. Progress in combating these infections has been painfully slow.

What if it were possible to wipe out CLABs in 90 days? In two units at Allegheny General Hospital (AGH), rapid process changes over a 3-month period have reduced CLABs to near-zero in their Medical and Cardiac Care Units (MICU and CCU).

How? A group led by Richard Shannon, MD, Chairman, Department of Medicine at AGH, first identified the common misconceptions that create inertia. Then they outlined and executed clear steps that led to rapid change and immediate results in reducing CLABS. Their work can be replicated in any hospital unit with the will to change.

Continued, page 2

FEBRUARY 2004

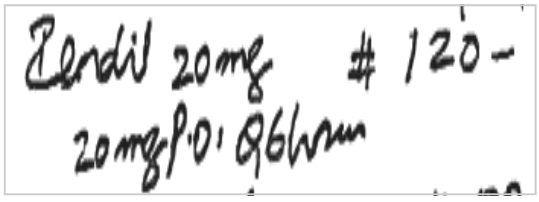
Inside:

Legibility and medication errors

Can Pittsburgh end "prescription roulette?"

The story of Ramon Vasquez, a 42-year-old heart patient, vividly demonstrates the problem inherent with illegible handwriting on prescriptions. This story is reprinted with permission from ***Internal Bleeding***, by Robert Wachter, MD, and Kaveh Shojania, MD, physicians at the University of California, San Francisco Medical Center. Although this story comes from Texas, it could just as easily have come from any American hospital or clinic.

After an episode of angina, Vasquez leaves the doctor's office *with a prescription for a new heart medicine. But what was this prescription for? Why don't you try your hand at 'prescription roulette': Look closely at Vasquez' actual prescription, reproduced here, and decide for yourself if the doctor is prescribing Plendil (a powerful calcium-channel blocking drug sometimes used to treat angina) or Isordil (a longer lasting version of the tiny nitroglycerin tablets heart patients slip under their tongues for temporary relief from angina.)*



If you had trouble deciding, welcome to the club. We asked 158 physician colleagues to interpret this prescription. Half thought it was for Plendil; about a third voted for Isordil. And the rest thought it was for a third drug, Zestril, a medication for high blood pressure. Even knowing Vasquez's diagnosis wouldn't be much help, since all three are used to treat heart

Continued, page 4

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.*

From page one

Get Real! Steps toward eliminating CLABs in 90 days

Step One: Leave old assumptions behind

Test your assumptions with this true-false quiz:

1. CLABS are unavoidable consequences of complex critical care. You just have to accept a certain number of them.

False. Hospital-acquired infections are preventable. Once you accept infections as inevitable, the motivation to work on them vanishes.

When the focus is on the data*

Mrs. E, a 54-year-old woman, was admitted with pneumonia. She was transferred from another hospital with a central line in place. Within three days, Mrs. E's blood test revealed that she had contracted a bloodstream infection. She received IV antibiotics, necessitating that she remain in the hospital for an additional 5 days. When she was released, Mrs. E was very weak. Although the pneumonia and the bloodstream infection had resolved, it was over a month before she was well enough to return to work.

The hospital reported Mrs. E's infection as required. Three months later, the Quality Committee tallied the number of central line infections. They did not tally bloodstream infections that resulted from femoral lines, but only from subclavian lines. The Quality Committee informed the CEO that the hospital had achieved a level of infection that was lower than the local competing hospital, which they were using as a benchmark.

2. To attack central line infection in a scientific way, you must first have an unambiguous definition of what constitutes a CLAB.

False. Bacteria don't care which agency defines them, or what kind of line they ride in to the patient. It is easier to broaden the definition to include ALL infections, and go after them one by one as they occur.

3. Tracking the infection rate is a job for the Quality Committee.

False. The work of infection prevention cannot be delegated to a few people on a committee who are not at the front line of care. Preventing infection must be everyone's business.

4. We can learn a lot from retrospective data.

False. With every passing moment, information is lost. As soon as a blood test is positive, practitioners need to go to the front line to examine the situation. Real-time data is the key to learning and putting measures into place to combat future problems. A notch on a chart three months hence is not useful.

5. Benchmarking is paramount. It's important to know how we compare regionally and nationally.

False. Our experience at AGH suggests that the infatuation with benchmarking must end. Once we accept that nobody who comes to our hospital for care should contract a CLAB, the only acceptable goal is zero. When zero is the goal, benchmarking becomes a way to find where the progress is, and where to go to learn.

6. To proceed in a scientific way means progress will be slow.

False. The scientific method can be applied quickly and continuously each time an infection is revealed. The new approach itself can be put into place quickly.

Step Two: Create a timeline for developing a different approach

1. Cultivate a champion. (3-4 days)

Identify a unit where the effort will begin. Engage the unit's medical and nursing leadership and house staff in the understanding that, "Things will be different."

2. Establish the current condition. (Week 1)

Thoroughly review 10 cases of documented CLABS that have occurred over the last 3-6 months. Tell the complete story…the good the bad and the ugly. Look for clues and common threads in the stories.

3. Investigate in real time the root cause of a CLAB as soon as it occurs. (First1-2 weeks)

Start as soon as you receive a positive blood culture on a patient with an indwelling intravenous catheter. Go and see the patient immediately. As you observe, consider:

- The location of the line
- The conditions under which the line was placed (emergent or with sterile technique or from an outside hospital)
- Whether the line has been manipulated (rewired).

4. Observe line placement techniques and dressing changes. (First 1-2 weeks)

PRHI can help teach staff members the techniques for this kind of close observation. There is no substitute for

*The "case studies" in the gray boxes in the left and right margins are hypothetical, and included only to illustrate *why* the patient must be at the center of care.

this on-the-ground, real-time learning.

5. Generate improvements based upon what the observations reveal. (Week 3)

PRHI can help you design these improvements. Here are some examples:

✧Use the subclavian approach whenever possible.

✧Remove femoral lines within 24 hours.

✧Avoid rewiring existing lines.

✧Remove all existing lines on patients transferred.

✧Find ways to communicate every change in process to the entire staff immediately.

Every improvement is likely to uncover a string of other questions and problems. Each one can be dealt with as an opportunity to learn, using the same real-time observations and techniques.

6. Standardize the process of line placement and dressings, and communicate it to staff immediately. (Week 4)

7. Commission each health care provider as patient guardian. (Week 4)

Each one is responsible for safeguarding their patients against a CLAB.

8. Monitor for CLABs daily. (Next 4 weeks)

Investigate any CLAB immediately. Look for new things to learn, as well as making sure new processes are followed. Use every circumstance as an opportunity to reinforce learning.

9. Celebrate and share the success each month. (Next 4 weeks)

Use posters and visuals to chronicle the progress.

Step 3: Share learning and progress with the community

Within 90 days of instituting these changes in the MICU and CCU in July at AGH, central-line associated bloodstream infections fell from an average of four to six per month to zero. Since then, the units have recorded two infections.

But here's the difference: each infection was investigated as soon as it occurred. In each case, the staff learned that infections occurred when a guideline was missed. In both cases the patients recovered. In both cases, the staff used what they learned to reinforce the importance of adhering to standardized practice. Everyone continues to learn.

Inevitably, the results have led to more questions. Why doesn't every ICU participate? Why doesn't the staff go after all infections, not just CLABs? At AGH, efforts are now under way to implement the 90-day program in all ICUs. They expect dramatic reductions in infections quickly, because they no longer accept infections as "inevitable," and they have put in place the mechanism for real-time learning.

Clearly, starting a small experiment in a unit or two can quickly create opportunities to take these initiatives institution-wide.

Dr. Shannon states, "Don't fear failure. Learn as you go. The only failure is in not trying."

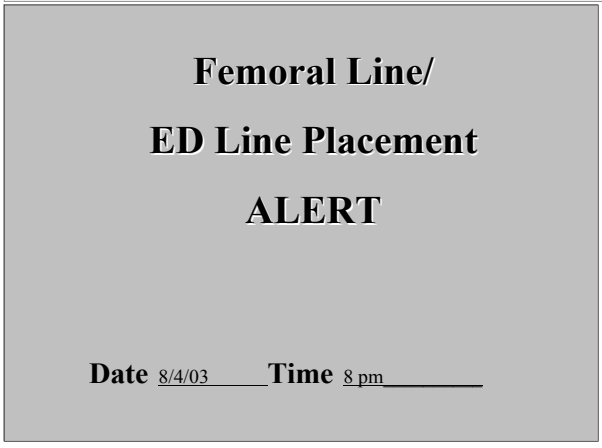
*When the focus is on the patient**

Mr. S, a 68-year-old man, was admitted with respiratory failure. He was incubated and ventilated. A right femoral line was placed to administer volume and antibiotics. Five days later, Mr. S became febrile and hypotensive and grew gram negative rods (*E. Coli*) from his blood and femoral line tip. The line was removed and notification went out immediately to the attending physician, the family, and the requisite reporting authority.

Within an hour, the physician was at Mr. S's bedside to examine him and survey the entire situation. She determined that the infection occurred because the femoral line had been left in longer than the recommended 96 hours. She ordered the appropriate antibiotics for Mr. S, who recovered.

As soon as the cause of Mr. S's infection was determined, the physician began working together with the nurses to devise a sticker system, so that when a femoral line is placed, it is sure to be removed within the appropriate time frame. Looking at prior data, they also discovered that femoral lines were being inserted often, when other types of lines might be just as effective and less prone to infection. At the next medical Grand Rounds, the issue was discussed with the entire hospital staff.

In the 6 months since the institution of the sticker system and Grand Rounds discussion, no patient on that unit has contracted a bloodstream infection caused by a femoral line.



Stickers like this have become part of AGH's low-cost, low-tech approach to infection control in ICUs. They give an unmistakable signal to other caregivers when the line must be removed.

From page one

Can Pittsburgh end "prescription roulette?"

patients.

Ramon Vasquez's doctor actually intended to prescribe 120 tablets of Isordil, at its typical dose of 20 milligrams (mg) by mouth (po) every (Q) six hours. Tragically, like the majority of our colleagues, Vasquez's local pharmacist also 'flunked' this test, sending him home with a bottle of Plendil. The instructions told him to take 20 mg at breakfast, lunch, dinner and bedtime—a total of 80 mg a day.

Even more tragically, the usual and safe dose of Plendil is 10 mg a day."

> ***"If the doctors don't change their writing, then it could happen again with my kids, or even me."***
>
> *Widow of Ramon Vasquez*
> *From* ***Internal Bleeding***

The story goes on to recount the death of Ramon Vasquez from a massive overdose of Plendil and his widow's subsequent malpractice award of $450,000—the full amount she'd asked for.

*One juror later said that if Mrs. Vasquez had asked for a bigger award, they would have gladly granted it. After the trial, Mrs. Vasquez explained that she had taken legal action less for the money than 'because if the doctors don't change their writing, then it could happen again with my kids, or even me.**

Waiting for Godot?

Computerized physician order entry (CPOE), when instituted, will surely cut these kinds of interpretation errors, even as they potentially introduce a new set of "glitches." The case for CPOE at Children's Hospital was compelling.

In a report for the Commonwealth Fund, Artemis March writes, "Children's small size makes them unforgiving of prescription errors that can be tolerated by adults... In diagnosing drugs for children, [pediatricians] often have to perform calculations and work with fractional amounts, leaving room for error."

Mandated from the highest levels of hospital administration and Board, no staff member would be allowed to opt out of CPOE. Safety for children was the central, indisputable message reiterated from leadership.

"It wasn't about convenience. It wasn't about saving money," said Jocelyn Benes, Executive Director of Quality and Care Management. "It was only about safety for the children who are our patients."

Since the roll-out of CPOE at Children's Hospital in October 2002, handwritten orders and transcription errors have ceased. Trainers were on hand 24 hours a day to make sure everyone on staff knew how to use the system. Reluctance was overcome in several ways:

✧Continuous communication of the administration's unwavering commitment to keeping children safe;

✧The commitment to face problems frankly during implementation;

Dramatic advantages quickly became apparent.

✧Delivery time has been halved.

✧Children's continues to make medication error reporting easy for staff, offering a 24-hour anonymous hotline and staff availability. But since CPOE was introduced, medication error reporting has increased by a third.

✧Medication errors involving harm to the patient have decreased by 50%.

Physicians continue to be impressed by the power of the CPOE clinical decision support capabilities. More are becoming "super-users," acquainted with program capabilities that allows physicians to monitor current lab results, blood pressure, temperature, weight—everything about the patient, right at the bedside. The program also includes a weight-based dosing calculator, extremely important for children. The computer prompts with questions about weight, dose, allergies, interactions and the like.

"It's not a cookbook that tells you what to do," said Eugene Wiener, M.D., Medical Director. "Instead it asks you to consider: 'Did you know this? Did you think about that?' The nurse gets same messages. It allows people to stop and think."

Training continues. With such a powerful program,

* Excerpted by permission from *Internal Bleeding: the Truth Behind America's Terrifying Epidemic of Medical Mistakes*, by Robert M. Wachter, MD, and Kaveh G. Shojania, MD. Rugged Land Publishers, to be released February 2004. *ISBN 1590710169*. (Reviewed by Atul Gawande, author of *Complications*.)

learning takes place in layers, with professional trainers and "super-users" showing others. With every upgrade comes a new round of training. An informal newsletter shares the snags, along with handy tricks.

The Heritage Valley System has also been preparing its staff for the introduction of CPOE. Like most hospitals now implementing this program, Heritage Valley knows that CPOE is no panacea. Leadership is still required to address the necessary behavioral changes. Nevertheless, those who have successfully implemented CPOE believe that the benefits do outweigh the risks.

Wachter and Shojania cite other successful roll-outs of CPOE: at Brigham and Women's Hospital in Boston, it "keeps track of a patient's kidney function by monitoring a lab test called creatinine, alerting the doctor to adjust the dose of any of the many medicines that are excreted by the kidney when it detects evidence that the organ is failing. The Department of Veterans Affairs now has a national system—online at every VA hospital—that can tell a doctor in San Francisco what medications a patient received during his last visit to the VA's outpatient clinic in San Antonio. Salt Lake City's LDS Hospital keeps track of which antibiotics work best against certain organisms, taking into account the local bugs' unique an ever-changing antibiotic resistance patterns, giving physicians better tools for fighting infections."

But can we wait for an expensive, sophisticated, high-tech system to be up and running in every hospital before tackling medication errors?

Back to basics

A study Wachter and Shojania cite in the *British Medical Journal* screened the handwriting of 209 doctors, managers and health care executives, giving each 10 seconds to write the same sentence. Judges did not know the writer's profession. "It turned out that the physicians' handwriting was terrible, scoring 7.1 out of a possible 13 points, leaving lots of room for improvement. But the non-physicians' notes were nearly as indecipherable."

It may be that hurried, harried people write poorly. However, an illegible order communicates an unmistakable disrespect on the part of the person issuing it: somebody down the line has to read it. The consequences of illegibility include potential threat to a patient's health or life. And as drug names themselves become more similar and confusing, it's not enough for a certain pharmacist to be able to decipher the scribbles of a certain physician.

One hospital's approach

One hospital in our region is tackling medication errors of all kinds, in real time. UPMC Northwest is in the midst of implementing an ambitious program, with some guidance from PRHI, to track each potential medication error. The idea is to track each problem to its root cause, and find a way to fix it.

Clarifying illegible orders is estimated to take about 19.7 hours per day in one hospital—the equivalent of 2.5 full time employees.

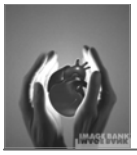
Already CEO Neil Todhunter has drawn one line in the sand: the pharmacy will not process any illegible order. This makes for a lot of phone calls to clarify orders—in fact, the clarification process is estimated to consume up to 19.7 hours per day, or the equivalent of 2.5 full time employees (FTEs). But by moving the problem upstream, to the person issuing the order, UPMC Northwest hopes ultimately to free the time of these employees to work on other areas of medication safety.

Todhunter stood for a morning in one unit, observing handwriting and asking questions about orders. Part of the problem is that those submitting prescriptions cannot tell whether their writing will be deemed readable. If an employee could read prescriptions the moment they were written, immediately letting the writer know whether it could be read, the root causes of the problem could be immediately exposed and dealt with. A new experiment is being formulated to give immediate feedback on legibility. UPMC Northwest's pursuit of this one-by-one, "yes-no" approach is promising.

An illegible order communicates an unmistakable disrespect on the part of the person issuing it: somebody down the line has to read it.

Physicians themselves are getting into the act now, experimenting with ways to help remove the guesswork. It's a start.

Hospitals will continue to confront medication errors—many stemming from illegibility. PRHI looks forward to sharing ideas about dealing with them.



The story of Pittsburgh's Cardiac Registry:
and what it promises for SWPA's heart patients

"[The surgeons of the Northern New England (NNE) Cardiovascular Disease Study Group], instead of hiding their data on variation in outcomes and retreating into competitive behaviors, these dedicated professionals chose to work together to understand why they differed and to learn from each other, through visiting, reflection, and exchange, how they might improve the entire process of cardiovascular surgery."

—Don Berwick, MD, Director of the Institute for Healthcare Improvement

In the early 1990s, individual cardiac surgeons in New Hampshire received a federal HCFA "report card," telling them whether their patients' mortality rates following coronary artery bypass graft (CABG) surgery were at, above, or below expectations. Surgeons could only react to the report.

Several prominent, conscientious cardiac surgeons conferred about the data. The surgeons represented six hospitals widely spaced throughout New England, and not thought to be "competitors." Unable to believe the data, they challenged it openly.

Eventually, however, they came to understand that the variations in outcomes were real. They decided to work together to improve patient outcomes.

But what, exactly, should they do? How ever accurate, the data were old and not actionable. No enlightenment could be gleaned without the ability to look at the *why* of the data, in a proactive way.

Northern New England and the birth of the cardiac registry

The New England surgeons hit upon an idea: why not create a registry of CABG surgery data that could track not only patient outcomes, but the processes of care that led to them. Over time, the physicians of the Northern New England Cardiovascular Study Group (NNE) gained enough information to publish its findings in peer-reviewed journals.

Four simple, inexpensive care processes seem to improve patient outcomes. They are:

1. **Encourage pre-operative aspirin use**. Make sure patients remain on low-dose aspirin to within five days of surgery.
2. **Adequately control heart rate, through use of beta blockers**. Patients with heart rates below 80 beats per minute demonstrate decreased risk of mortality.
3. **Use internal mammary artery, when available**. Use of the saphenous (leg) veins has been common, but results improve when the mammary artery is used.
4. **Avoid hemodilution while patient is on heart bypass pump**. The perfusionist on the cardiac team can help ensure that the patient does not become anemic during surgery.

These simple, low-tech processes cost less than $3 per patient. In NNE hospitals, following them has lowered the in-hospital mortality following CABG surgery *five-fold*.

A Pittsburgh model?

Could Pittsburgh create a regional cardiac registry similar to NNE's? Could they take the journey, described in the opening quote by Don Berwick, from competition to cooperation? By the fall of 1999, several physicians were interested investigating it, under the auspices of the newly formed Pittsburgh Regional Healthcare Initiative (PRHI). Cardiac surgeons and infectious disease specialists from Pittsburgh-area hospitals attended a NNE meeting together, and were inspired.

However, the competitive atmosphere in the Pittsburgh market was far more intense than in New England. And the region has 13 cardiac surgery centers, not just 6.

"When we began, if you stood on the roof at West Penn Hospital, you could see five cardiovascular surgery centers within a one-mile radius.," said Dennis Schilling, PharmD, PRHI's Clinical Coordinator. The competition had become so great that the collegial meetings among the region's cardiac surgeons had been suspended.

Participants: Allegheny General Hospital, Dubois Regional Medical Center, Jefferson Hospital, Mercy Hospital of Pittsburgh, St. Clair Hospital, The Medical Center of Beaver, UPMC Passavant, UPMC Presbyterian, UPMC Shadyside, Washington Hospital, West Penn Hospital, Westmoreland Regional

Then there was the denial. At PRHI's request, the Pennsylvania Health Care Cost Containment Council (PHC4) prepared a report on CABG outcomes in the Pittsburgh region. The numbers varied widely throughout the region. Initially, cardiac surgeons and institutions believed that the data were invalid—that their patients were older, sicker or faced more risk factors. The drawback to the PHC4 report was the same as it had been in New Hampshire: the data came without any sort of description about what led to the outcomes.

From competition to collegiality: turning it around

Readmission data in the PHC4 report did provide some excellent learning. A typical hospital in metropolitan Pittsburgh had reason to believe that the rate of readmission following CABG surgery stood at about 5%. After all, that's how many patients were being readmitted to their hospital. However, PHC4 tracks patients across all institutions in the commonwealth—something few states do. The report surprised some by suggesting that, while many people outside the metropolitan area might travel to Pittsburgh for surgery, they would be readmitted to their local hospitals. When those patients were accounted for, readmission rates hovered closer to 20%.

A few dedicated cardiac surgeons dug deeply to validate the data. Once they were able to explain that the data were indeed adjusted for risk, and that the variations and high readmissions occurred independent of case mix, physicians were stunned. They began to realize that, in a profession where they do not control reimbursements, work hours and other business aspects—they have 100% control over the processes of care they employ. Here was an opportunity to perfect the processes of care for one of the most complex surgeries in medicine.

When representatives from NNE came to Pittsburgh in late 2000 to describe the power of a regional cardiac registry, surgeons sat together and listened. At the following meeting in early 2001, when the power failed, the surgeons grabbed flashlights and candles out of enthusiasm to continue learning.

The power of regional learning

"The average cardiac surgeon does about 200 coronary bypasses per year, with eight to 10 readmissions and perhaps four deaths. From that, it's hard to learn how to improve," says Jon Lloyd, MD, PRHI's Medical Advisor. "If they had their choice between looking at 200 cases versus looking at 5000 case (every case in Southwestern Pennsylvania), any scientist would choose the latter. The Cardiac Registry gives surgeons an opportunity to share data and experience, and from that comes an awareness of what works and what doesn't. The Registry also creates an opportunity for surgeons to hold one other accountable to emulate those processes that work best."

Dr. Schilling consulted "eyeball to eyeball" with the NNE as he developed a model to use in Pittsburgh. While NNE has gone on to pursue nine processes of care, PRHI decided to start with the initial four—use of aspirin, adequate beta blockade, use of left internal mammary artery and anemia control during bypass.

To date, 12 of the region's 13 cardiac surgery units have signed on and begun collecting data. The data collection mechanism is designed not to be onerous, but to be part of what they already do. Participating hospitals are or will soon be submitting data confidentially to PRHI for analysis. The system is still getting up and running, but preliminary findings are generating enthusiasm. Attendance at the quarterly PRHI Cardiac Forum, where results are discussed, is increasing.

So far, the data from PRHI's cardiac registry validates what NNE learned about the four simple care processes. Where they are used, mortality and readmissions go down. NNE has expanded to nine target areas: Pittsburgh physicians are eager to expand as well.

"This is not a prescriptive registry," says Dr. Lloyd. "We aren't telling people what to do. It's a descriptive registry, an opportunity to learn."

Any hospital staff member interested in learning more about the PRHI Cardiac Registry is invited to contact Dr. Dennis Schilling, PRHI Clinical Care Coordinator, 412-535-0292, ext 116, or ***dschilling@prhi.org***.

Calendar, February 2004

Monday, March 1	***Chronic Care Working Group***, Centre City Tower♦ Conference Center, 5th floor – Montour Room	5-7 pm
Tuesday, March 2	Infection Control Advisory Committee PRHI Offices, 21st floor, Centre City Tower	8—10 a
	PPC 101* Montour Room, 5th Floor, Centre City Tower	8 a—5 p
	Information Session,* PRHI Offices	6—9 p
Wednesday, March 3	*Go and See* Session* Allegheny General Hospital	8 a—noon
Mon-Fri, March 15-19	PPC University *Enroll now!**	8a-5p
Tuesday February 10	Medication Safety Advisory Committee, PRHI Offices	3—5 p
	Obstetrical Working Group, PRHI Offices	5:30—7p

PRHI's Diabetes and Depression Working Groups have been developing a chronic disease registry for the region (the Pittsburgh Health Information Network, or PHIN). Last month the groups agreed to officially merge into a single ***Chronic Care Working Group***. This group will move forward quickly with twin goals for 2004:

1. Bring the PHIN into reality by completing a pilot of the project, and
2. Develop a regional chronic care model for Pittsburgh that will guide on-the-ground, low-tech improvements in the delivery of care for all people with chronic illnesses.

Interested? Contact Tania Lyon at PRHI, ***tlyon@prhi.org***, 412-535-0292 x107.

Contact Us

Phone: 412-535-0292

Fax: 412-535-0295

Paul H. O'Neill, CEO

Ken Segel, Policy Director,
Special Assistant to the CEO
412-535-0292, ext. 104
ksegel@prhi.org

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

Please direct newsletter inquiries to:
Naida Grunden,
Director of Communications
412-535-0292, ext. 114
ngrunden@prhi.org

**CEUs and/or CMEs offered. For further information or to enroll, call Patience Celender, 412-535-0292, ext. 100*

Pittsburgh Regional Healthcare Initiative

650 Smithfield Street, Suite 2150
Pittsburgh, PA 15222

Check out our renewed web page:

www.prhi.org