Shared Learning and the Drive to Improve Patient Safety: Lessons Learned from the Pittsburgh Regional Healthcare Initiative

**Carl A. Sirio, Donna J. Keyser, Heidi Norman,
Robert J. Weber, Carlene A. Muto**

Abstract

Based on lessons learned through implementation of the Pittsburgh Regional Healthcare Initiative's regionwide shared learning model (Sirio CA, Segel KT, Keyser DJ, et al., Health Aff 2003;22(5):157–65), we have identified the environmental, cultural, and infrastructure changes in health care that will be necessary to achieve significant, widespread patient safety improvement. However, the issues that arise are (1) approaching patient safety as a systems problem, and (2) overcoming challenges that arise when working across 40 hospitals to improve medication safety and infection control through regionwide reporting, information sharing, and problem-solving. Despite regionwide advances in awareness, knowledge, and action regarding patient safety, limitations of current reporting systems and realities constraining their use inhibit widespread error reporting, timely and effective information sharing, and adoption of real-time practice changes that lead to improved patient outcomes. Achievement of improved patient safety requires enhanced health care leadership commitment and learning systems that enable everyone in an organization to identify and solve safety problems to their root cause in real time and share what is learned.

Introduction

In December 1997, with subsequent support from the Agency for Healthcare Research and Quality, the Pittsburgh Regional Healthcare Initiative (PRHI) and its 40 hospital partners across 11 counties in southwestern Pennsylvania launched a large-scale demonstration to explore whether a unique system of regional shared learning could make a difference in the Nation's pursuit of safer health care.[1] As part of the shared learning process, PRHI's hospital partners agreed to pursue a common set of goals for improving medication safety and infection control, and to adopt common reporting systems for identifying medication errors and infections. Around these systems, PRHI built a regional infrastructure to support information sharing and problem-solving within and across institutions.

During the several years since the PRHI demonstration began, numerous special committees convened by the Institute of Medicine and other national expert panels have documented both the extent of the safety problem in health care[2] and the need for a new health care delivery system that both prevents errors

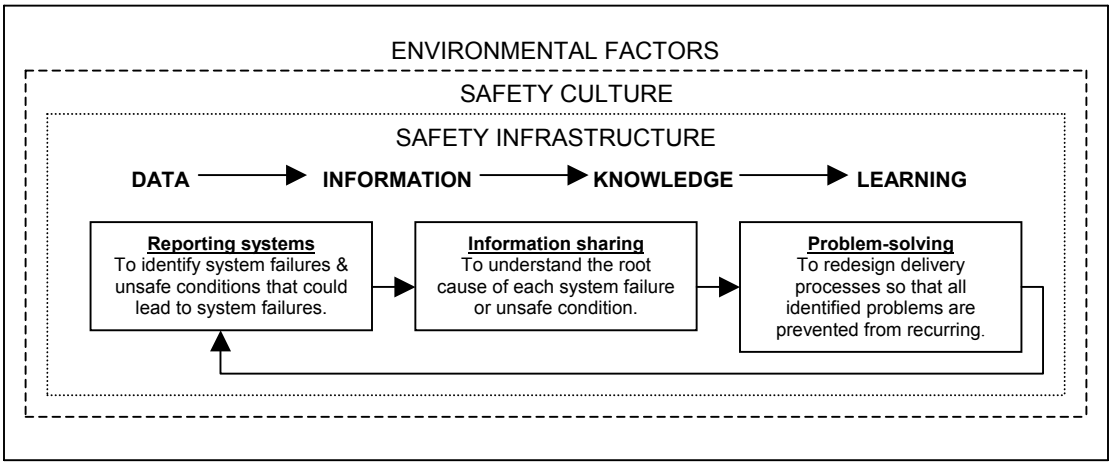
and learns from them as they occur.[3] Consequently, a variety of patient safety reporting systems have emerged in the U.S. health care arena, including those of Federal agencies, national accreditation bodies (e.g., the Joint Commission for Accreditation of Healthcare Organizations or JCAHO), States, hospitals, and the private sector. To date, however, the usefulness of these reporting systems for improving patient safety has been limited at best.[2]

Drawing on lessons learned through the implementation of the PRHI regionwide shared learning model, this paper provides important insights into why the current approach to error reporting has failed to achieve widespread patient safety improvement. We begin by describing the regionwide shared learning model and its environmental, cultural, and infrastructure components. Subsequent sections focus on PRHI's implementation of specific components of this model for improving medication safety and infection control, the barriers that have been encountered, and the lessons we have learned from them. We conclude with a set of actions that are required to achieve our vision—of everyone daily identifying and solving safety problems to their root cause and sharing what is learned.

PRHI's regionwide shared learning model

PRHI's regionwide shared learning model is premised on the recognition that patient safety is a systems problem resulting from a complex set of interrelated factors that operate at multiple levels of health care (Figure 1).

Figure 1. Regionwide shared learning model



Environmental factors

An intricate web of policies encompassing medical education and accreditation, public reporting, medical liability, and payment systems impact the ability of health care organizations and practitioners to work together to identify and solve patient safety problems. Providing safe care requires a learning environment in which practitioners are trained to identify and report errors and

improve processes of care; organizations and individuals attempting to uncover and resolve safety problems are protected through appropriate damage recovery legislation; and payment and reimbursement systems are reoriented to reward quality and performance improvement.

Safety culture

A safety culture is the product of individual and group values, attitudes, perceptions, competencies, and goals that determines the degree to which health care organizations seek to minimize patient harm.[4, 5] Embedded therein is a shared understanding about the importance of patient safety and the capacity to take action to change the system so that it works better. This capacity evolves from an explicit organizational vision to improve patient safety, a chief executive officer (CEO) and clinician focus and commitment to achieve specific patient safety goals, and a collaborative approach to patient safety improvement based on interdisciplinary training and teamwork with shared responsibility.

Safety infrastructure

Error reporting systems and associated information sharing and problem-solving processes support the ability of organizations and individuals to (1) identify and learn from past system failures and unsafe conditions that could lead to system failures, and (2) redesign care processes so that all identified problems are prevented from recurring. Reporting systems refer to the processes of inputting, analyzing, formatting, and reporting that translate data into usable information. Information sharing turns information into knowledge by putting the information into the hands of those who have the capacity to take effective action based upon it. Problem-solving transforms knowledge into learning through the creation of new standards, processes, and practices that lead to improved performance outcomes. The closer to real time these systems can operate, the more effective shared learning will be.

Achieving continuous improvements in patient safety within this complex set of systems dynamics requires a fundamental transformation of the health care environment, culture, and infrastructure as described elsewhere by PRHI and others.[1, 6, 7] PRHI's initial experience with implementing regionwide reporting, information sharing, and problem-solving highlights the systems changes that are necessary to support patient safety improvement.

Establishing regionwide patient safety goals

Similar to other regions across the Nation, southwestern Pennsylvania has a highly competitive health care environment. Each of the region's two major health care systems, several smaller systems, and numerous independent hospitals has its own organizational priorities, ongoing quality improvement programs, and internal reporting systems for complying with multiple error reporting requirements. Bringing together these diverse stakeholders around a regionwide patient safety initiative required months of formal and informal meetings to build

the foundation of trust, inclusiveness, and collaboration that allows people to develop meaningful relationships, transcend established modes of belief and practice, and adopt new approaches to solving complex systems problems.

The region's stakeholders agreed upon two patient safety goals: the complete elimination of medication errors and nosocomial (i.e., hospital-acquired) infections within individual hospitals and across the region. These goals were chosen because they underscore important systems problems associated with significant patient harm, are readily measurable, and illuminate opportunities for performance improvement on organizational and regional levels. The commitment of the region's major hospitals, employers, and health plans was formalized through their CEOs' endorsement of the PRHI charter documents.[8, 9] At present, PRHI's 40 hospital partners include 3 hospital systems, 8 large teaching hospitals, 20 medium- or small-sized nonteaching hospitals, and a number of community and specialty facilities.

Since the signing of the charter documents in late 1999 through early 2004, the region's health care leaders met on a quarterly basis to refine the regionwide patient safety strategy and to monitor the region's progress toward achieving its patient safety goals. Engagement of hospital CEOs has been highly variable across institutions and time, in large part reflecting the ongoing challenge of aligning long-term, strategic safety goals with short-term, operational priorities of individual institutions. Although evidence suggests that regionwide progress has been made in increasing medication error reporting and reducing nosocomial infections, it is clear that the region is still far from achieving its original goals. Moreover, tangible benefits to individual organizations that have engaged most fully in the initiative have not yet been substantiated. Under these circumstances, sustaining the interest, commitment, and support of senior hospital administrators and clinicians has been perhaps the single largest challenge to realizing the potential of regionwide shared learning.

Adopting regionwide reporting systems

Prior to PRHI, no shared systems for reporting medication errors and infections existed among the region's 40 major hospitals. Every hospital used an internal standard for tracking these events, and methods varied. Although hospital leaders had signed onto the PRHI charter documents formalizing their support of the regionwide patient safety initiative, they had not explicitly contracted to adopt a common set of reporting systems. It took several years for PRHI staff, working with each individual institution, to overcome the initial reluctance of hospital CEOs and administrators to adopt yet another layer of infrastructure that would add to the already substantial reporting burden imposed by the external regulatory environment. Approximately one quarter of PRHI partners still have not adopted either one or both of the regional reporting platforms.

At present, just over 30 of the 40 hospitals are using the U.S. Pharmacopeia's (USP) MEDMARX^{SM} program to report medication errors; and just over 30 (not all the same ones) are using the Centers for Disease Control and Prevention's (CDC) National Nosocomial Infection Surveillance (NNIS) system, or an

adaptation of that system, to track nosocomial infections. The MEDMARX[SM] program is an online reporting system that collects data on the types, processes associated with, and causes of medication errors using standard terms and definitions developed by the National Coordinating Council for Medication Error Reporting and Prevention.[10] MEDMARX[SM] ranks among the most credible voluntary programs for reporting medication errors in the Nation and is used by more than 400 hospitals.[3, 11] The NNIS system is the premier national source of systematic retrospective surveillance data on hospital-acquired infections, reported by 300 hospitals through standardized case definitions and data collection methods, as well as computerized data entry and analysis.[12] Special arrangements negotiated between CDC and PRHI have enabled smaller hospitals in the region to report and share data using an NNIS-like methodology. Drawing on data provided voluntarily by hospital partners to these two systems, PRHI develops quarterly reports on medication error trends and infection rates and distributes them to each participating hospital. These reports include data specific to the organization, as well as regional and national data.

Periodic surveys of PRHI hospital partners and increased reporting activity within individual hospitals suggest that the establishment of regionwide reporting systems has heightened awareness of the importance of error reporting and has helped focus hospitals' attention on strengthening and improving their internal reporting infrastructures. In addition, health systems and hospitals have been able to collaborate on important issues such as error and severity definitions, standardization of rates, data collection and reporting methodologies, and understanding the pros and cons of reporting systems so that they can be improved. At the same time, lack of staff time and training, the inherent limitations of the systems themselves, and the difficulties of adapting them to current realities have resulted in considerable barriers to progress.

Data collection

Both the MEDMARX[SM] and NNIS systems track errors and infections through individual computerized or handwritten reports based on monitoring patient progress or retrospective review of patient records, making reporting a cumbersome, costly, and sporadic exercise.

For MEDMARX[SM], the methods used to identify potential medication errors vary across hospitals. Additional data collection and expert verification are required to determine appropriate categories and classifications of information. Data entry into MEDMARX[SM] of types of medication errors and additional nonrequired information is not consistent across hospitals. Some hospitals also keep separate, customized medication error databases, while other hospitals use risk management databases and/or software. Finally, there is a high degree of informal error reporting that is not captured by any system.

For NNIS, the sophistication of methods used to identify nosocomial infections varies significantly across hospitals. Most hospitals identify and collect data on targeted infections, targeted populations, or units, while a few attempt to capture data on all nosocomial infections. There is also cross-hospital variation in

the frequency of analysis of hospital data to identify nosocomial infections. In all hospitals, there are very few staff who are dedicated to the identification of nosocomial infections.

Report creation

Both the MEDMARX[SM] and NNIS systems have been traditionally used for report creation on an annual basis, but PRHI hospitals wanted quarterly reports, including both regional and national data. After several months of negotiation, USP offered a MEDMARX[SM] Multifacility Module that enabled PRHI to produce reports with regional and national data on a quarterly basis and with greater accuracy.

Since the NNIS system was not programmed to be responsive to fast turnaround demands, a great deal of time-consuming work was required by CDC staff to create the quarterly reports, which became available in the third quarter of 2001. The lack of an effective direct connection between the CDC and PRHI hospital partners for resolution of NNIS data reporting problems also resulted in a tangled web of issues that could not be resolved until a new process was negotiated and implemented in late 2003.

Report content

In an effort to make the NNIS and MEDMARX[SM] reports as useful as possible to all hospital partners, PRHI staff members have redesigned the reports numerous times. Reaching a consensus on the content of reports that would be useful to more than 30 hospitals was difficult, and possibly made the reports less than optimal for many institutions. Simply put, it is hard to provide the data each institution needs in one common report. As presently configured, the MEDMARX[SM] quarterly report does not give hospitals any new information. With NNIS, some important types of data (e.g., bacterial isolates and sensitivities) are collected by hospital staff and sent to the CDC, but these data are not included in the current reports.

Adaptability of systems

USP has invested significant resources in the development of MEDMARX[SM], creating the richest databank and learning system on medication errors in the Nation. Nevertheless, in the current configuration, hospitals are unable to use the MEDMARX[SM] system to input, problem solve, and share solutions in anything approaching real time. Unless more MEDMARX[SM] users begin to demand such changes, the utility of the system for supporting widespread improvements in patient safety will remain limited.

The CDC has also invested heavily in improving the NNIS system. The CDC's Web-based National Healthcare Safety Network (NHSN), which will enable many more hospitals to participate in real-time reporting of processes and outcomes related to infections, was piloted in eight PRHI hospitals in early 2004. However, during the development phase of the NHSN, all modifications to the

existing NNIS system were frozen. As a result, PRHI was not able to negotiate changes to the existing infrastructure that would enhance rapid, disseminated root-cause problem-solving. In addition, the NHSN took longer than anticipated to prepare for initial piloting with hospitals, and in the face of conflicting external exigencies, plans for studying and improving that system have been deferred.

Implementing regionwide information sharing

The ability of health care organizations to use reporting systems to improve patient safety depends largely on the ways in which they share and learn from the reported information. As described below, PRHI has employed a variety of mechanisms to share the information provided by the MEDMARX^{SM} and NNIS systems across the region's hospitals and health care practitioners. Overall, these mechanisms appear to have been useful for fostering a regional safety culture in which error reporting is viewed as an opportunity to learn, increasing a general awareness of errors as systems problems, and identifying common problems and potential solutions across organizations. However, without formal feedback mechanisms at multiple levels across organizations, including the CEO and other senior administrators and clinicians, they have been less useful for overcoming the existing inertia to change that is required to translate learning into knowledge and sustain practice improvement.

Report dissemination and use

Dissemination of quarterly reports across the region began with mailings to PRHI work group members and has evolved into password-protected and encrypted e-mail attachments for faster and more secure delivery. The outcomes of this dissemination strategy have been highly variable, with different committees and individuals receiving the reports at each institution. In many cases, the reports are not broadly distributed because members of hospital staffs are already receiving similar information from other sources. There is also some concern that the information in the reports will be misinterpreted.

The use of the reports within organizations also varies. Some hospitals have relied entirely on them for their institution's patient safety meetings, some have abstracted information and compiled it into new reports, and others have hardly used the reports. For some hospitals that have required more timely and/or additional data, PRHI has been able to facilitate the use of the MEDMARX^{SM} and NNIS systems for creating customized reports closer to real time. In these cases, hospitals have used PRHI quarterly reports to gauge their progress and their internal customized reports as the basis for decisionmaking and change.

Advisory committees and work groups

PRHI formed two advisory committees—the Infection Control Advisory Committee, which was created in April 2000, and the Medication Safety Advisory Committee, created in August 2001—to help promote regionwide information sharing and learning based on the data provided by the reporting systems. These

committees have brought together staff members from participating PRHI hospitals on a monthly basis to report on shared learning and to develop regionwide strategies for achieving patient safety goals. Both committees were further reorganized into smaller work groups to foster stronger collegial connections and to allow members to review evidence, create consensus, and make recommendations on specific areas of work.

The efficacy of the advisory committees and work groups remains uncertain. Although there have been pockets of incredible communication and learning across organizational boundaries, PRHI has not yet hit upon an effective format or timing mechanism for quickly translating information into knowledge across the board. For the most part, committee and work group members have had limited authority or resources to effectively disseminate the information and learning beyond these forums.

Shared learning sessions

Since the start of the patient safety initiative, PRHI has organized a series of shared learning sessions focused on specific regionwide strategies for reducing errors and infections. These sessions have typically involved 80 to 100 health care practitioners from participating PRHI hospitals, including physicians, nurses, pharmacists, risk managers, infection control practitioners, and administrators. While these sessions have played an important role in focusing institutions on targeted regionwide goals and building a consensus around practice changes that might result in the achievement of those goals, they have played less of a role in actually mobilizing a wide range of health care leaders and practitioners to take effective action. In most cases, hospital CEOs and senior clinicians have neither officially endorsed nor actively participated in these sessions, and hospital partners have not been held accountable for moving forward the initiatives that have been developed through them.

Implementing regionwide problem-solving

PRHI has supported regionwide problem-solving through the development and implementation of targeted safety initiatives that help hospital staff across institutions develop new ways to translate evidence into regionwide knowledge and practice. In medication safety, regionwide practice targets have been established and implemented in three cross-cutting, high-risk areas: the safe prescribing of fentanyl transdermal patches; eliminating the use of seven unsafe abbreviations in prescription writing; and the safe use of patient-controlled analgesia. In infection control, evidence-based practice targets have been established for insertion and care of central lines, and procedures have been developed to link processes with outcomes.

The process includes advisory committee review of the regionwide data and identification of specific areas for improvement, expert panel development and/or agreement on best practice guidelines and appropriate performance indicators, and relevant medical and hospital staff approval of the proposed initiatives. PRHI

assists hospitals in implementing the initiatives by providing educational and promotional materials, designing data collection methods, and enlisting health care leadership support. Hospital staff members collect relevant performance indicator data for their institution and send it to PRHI for storage and analysis. Standard statistics are used to determine improvements in safe practices compared with baseline performance measures. The PRHI regional data collection facility prepares quarterly reports that contain baseline and monthly compliance data for each institution and regionally.

Both types of regionwide problem-solving strategies have energized action to improve patient safety within and across institutions, and accelerated the process of systematically applying evidence-based practice to improve the care delivery process. At the same time, the lack of hospital leadership commitment, the inefficiencies of working by committee, the suboptimal use of resources, and the inability of current reporting systems to support effective action and analysis have so far precluded widespread improvements in patient outcomes.

Active commitment and participation by hospital leaders

Changing behavior and daily work processes across staff silos is hampered considerably unless everyone involved sees the value of, and is committed to, change for the purpose of improving patient outcomes. Significant leadership commitment, from the CEO on down, is required to involve and focus everyone in the hospital on this goal. Physicians in particular often refuse to change their practice, even if the best evidence available warrants it or their professional colleagues have demonstrated significantly better results using new techniques. As a result, physician buy-in is hard to achieve and hardly ever universal. Learning from experience, PRHI has reoriented its approach to elicit commitment from hospital CEOs and senior medical staff prior to actively pursuing problem-solving strategies.

Working by committee

The committee approval process can be very slow—especially if the committee only meets periodically and is composed of hospital representatives who are myopically focused on their own vested interests, rather than the broader goal of patient safety. Input from all groups is necessary to gain consensus and share learning; however, immediate and effective action rarely results from periodic committee meetings. Hospital-based committees controlled by physicians are especially difficult to predict and persuade because they tend to base decisions on their own methods and practices, and not necessarily on research and evidence. At present, PRHI and some hospitals are experimenting with reducing the number of committee meetings in favor of taking action at the bedside. Some patient safety and medical executive committees are moving their interactions out of the boardroom and into patient units, where they can work with frontline staff to solve problems in real time.

Availability of resources

Suboptimal allocation of resources to patient safety is apparent at every level. Often hospital staff members simply do not have enough time to dedicate to the implementation or tracking of specific patient safety initiatives. Infection control practitioners, as one example, are already responsible for hospital infection surveillance, department management, daily issues on the floors, reportable outbreaks, as well as research and policy development. Financial resources to implement initiatives, both initially and over the course of a pilot demonstration, are also scarce. Leverage for encouraging continual improvement is necessary, but nonexistent in many places. PRHI hypothesizes that elimination of waste in the system (e.g., rework, clarifying phone calls, searching for supplies/materials, and illegible orders) will result in recovered human and financial resources that are currently under (or inefficiently) utilized.

Reporting systems needed to support action and analysis

Most reporting systems used in health care today, MEDMARX^{SM} among them, are deployed to support the more traditional retrospective trend analysis of outcomes used by patient safety and medical executive committees. However, PRHI has determined that many of these same systems can also be used by health care workers to identify problems at the point of patient care; solve those problems in the course of their work; and share what is learned across hospitals, institutions, and beyond. Although PRHI has been aggressive in discussing the potential value of using existing reporting systems in these new and innovative ways, the response has not been overwhelmingly positive from vendors, providers, or practitioners. There is an urgent need to promote the development of real-time reporting systems through a realignment of market forces or other mechanisms of financial support.

Conclusions

Like all system models, regionwide shared learning is an ideal—a vision in which health care organizations and practitioners at all levels, individually and collectively, are continually increasing their capacity to make patient care safe. By attempting to build a regionwide safety culture and infrastructure, PRHI has begun to chip away the illusion that errors are inevitable and safe patient care is out of our reach, and in its place has forged a path for hospitals and health care practitioners to work together to share sensitive error information, identify important safety problems, understand their causes, and redesign practices and processes to better reflect evidence-based care. In all of these respects, regionwide shared learning has made a real and lasting difference.

At the same time, PRHI has encountered major and, at times, insurmountable barriers in the course of implementing this model. As detailed above, these barriers have surfaced at all stages of the process—reporting, information sharing, and problem-solving. PRHI is dealing with these systems challenges by

countering them with a continuous enthusiasm to experiment. PRHI has recently modified its shared learning approach, placing a more explicit emphasis on garnering a stronger commitment to patient safety from hospital leaders and supporting institutional-level strategies for solving safety problems in real time.

Ultimately, for these efforts and others like them to be successful, a radical transformation in the patient safety environment, culture, and infrastructure must be achieved. First, health care leaders must make patient safety *the* priority in their organizations, and reinforce this commitment by

- Setting clear expectations through publicized organizational goals.
- Investing in knowledge and training focused on safe patient practices.
- Allocating appropriate human, financial, and technological resources to patient safety.
- Building a credible infrastructure for identifying and analyzing system failures and unsafe conditions that could lead to system failures.
- Providing protection and rewards for individuals who report errors.
- Designing and implementing improved processes of care.

Second, the patient safety learning system must facilitate identification and resolution of problems by every health care worker and enable immediate sharing of what is learned. This requires

- Involving everyone in the process of identifying and solving problems.
- Creating a safe environment for workers to expose and report errors, incidents, or unsafe conditions.
- Implementing rapid root-cause problem-solving at all levels of an organization.
- Publicizing the risks and achievements in order to share what is learned.

Third, the patient safety learning system must link clinical processes to patient outcomes. This requires

- Hospital staff tracking information for all systems failures and unsafe conditions that could lead to systems failures.
- Mining data and using actionable information to assist clinicians in changing their practices to achieve the best possible patient outcomes.
- Real-time reporting systems that offer the flexibility to add data elements as needed by clinicians for scientifically testing improvement methodologies, and that afford all hospitals the opportunity to participate.
- Timely information that can be shared across units, unit types, and hospitals, as well as the region, State, and Nation.

In systems thinking, there is no such thing as a complete theory, and all models will reach their inevitable limitations. As we come to the end of this phase of PRHI's shared learning experiment, many in our community and beyond have asked, "Does it take a region to improve patient safety?" We have one unequivocal response: "It takes a region, and more."

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Author affiliations

Critical Care Medicine, Medicine and Pharmacy Therapeutics, University of Pittsburgh Schools of Medicine and Pharmacy (CAS). RAND-University of Pittsburgh Health Institute, The RAND Corporation, Pittsburgh (DJK). University of Pittsburgh School of Medicine, Pittsburgh Regional Healthcare Initiative (HN). University of Pittsburgh School of Pharmacy, University of Pittsburgh Medical Center Health System (RJW). Division of Hospital Epidemiology and Infection Control, Presbyterian Hospital, University of Pittsburgh Medical Center Health System (CAM).

Address correspondence to: Donna J. Keyser, RAND-University of Pittsburgh Health Institute, The RAND Corporation, 201 North Craig, Suite 202, Pittsburgh, PA 15213; phone: 412-683-2300, ext. 4928; e-mail: keyser@rand.org.

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