Improving patient safety across a large integrated health care delivery system

ALLAN FRANKEL1, TEJAL K. GANDHI2 AND DAVID W. BATES1,2

1Partners HealthCare System, Boston, MA, 2Brigham and Women’s Hospital, Boston, MA, USA

Abstract

Objective. Patient safety is moving up the list of priorities for hospitals and health care delivery systems, but improving safety across a large organization is challenging. We sought to create a common patient safety strategy for the Partners HealthCare system, a large, integrated, non-profit health care delivery system in the United States.

Design. Partners identified a central Patient Safety Officer, who then formed a Patient Safety Advisory Group with local expert members, as well as a Patient Safety Leaders Group comprised of personnel responsible for patient safety at each member institution. The latter group meets monthly to help determine future projects and to share the results of piloting and implementation. There was broad consensus that interventions should include the areas of culture change, process change, and process measurement.

Setting. A large, integrated health care delivery system in the Boston, Massachusetts, area.

Results. Key milestones to date include implementation of Executive WalkRounds, development of accountability principles, agreement to create a common system-wide adverse event reporting system, and agreement to implement computerized physician order entry in all hospitals. These efforts have heightened awareness of patient safety considerably within the network. The most influenced to date have been the senior leaders of the hospitals, which has resulted in substantial support for patient safety initiatives.

Conclusions. This loosely integrated delivery system represents a daunting landscape for the development and institution of patient safety concepts. Many projects aimed at different components of patient safety must occur at the same time for significant change, yet culture and care-related beliefs vary substantially within the system, and measurement is especially challenging. Moreover, with many potential interventions, and limited resources, prioritization and selection is difficult. Nonetheless, consensus about some issues has been reached, in particular because of a well delineated patient safety structure. We believe the net result will be substantial improvement in patient safety.

Keywords: culture, patient safety, quality improvement

Safety in health care has received substantial attention in the US since the 1999 Institute of Medicine report, To Err Is Human [1]. While that report described the magnitude of the problem in some detail, it provided only a high-level view of how organizations might change in order to improve the care they provide. In the 4 years since that report, organizations have struggled to develop coherent programs for improving safety, and these programs have varied substantially.

We believe that patient safety programs should include at least three areas of focus: culture change, process change, and process measurement. Changing culture is a new watchword in patient safety. There is a growing realization that the benefits of technological advances will be optimized only if health care providers approach delivery of care from the appropriate perspective [2], and that substantial improvement in safety may be possible even without changing technology [3]. The ultimate goal in culture change is system transparency, defined as a willingness of providers and patients to openly and comfortably express their concerns about the delivery of care in a manner that identifies flaws and leads to their elimination, mitigation, or appropriate management. Culture change, and the subsequent increase in event identification that it promotes, are essential in order to then be able to identify and improve systems of care such as medication delivery. Leadership understanding of safety concepts represents an essential component for this culture change [4–7]. Yet it is far from clear how best to build a culture of safety, especially across a large entity, or to know whether one has been achieved.

Processes need to be standardized and variation reduced to improve the quality of care and reduce error rates. In some
instances, this may involve implementation of technology, while in others it may not. Process and outcomes must be measured to know whether care has ultimately been improved. The objective of this paper is to delineate the components of a patient safety strategy, developed and implemented in one large integrated delivery system, to improve safety by catalyzing safety-based cultural changes, changing processes, and measuring outcomes.

**Study design**

**Study site**

Partners HealthCare is the largest integrated delivery system in the north-eastern United States. It was founded in 1994 by Brigham and Women’s Hospital and Massachusetts General Hospital, and has grown to include primary care and specialty physicians, community hospitals, the two founding academic medical centers, specialty facilities, community health centers, and other health-related entities. While researchers within Partners have long been leaders in patient safety research [8–13], Partners did not have a coherent, network-wide approach to patient safety before the Institute of Medicine’s report.

**Partners patient safety program structure**

In 2000, Partners Chief Medical Officer and Partners Chief Executive Officer decided to create the position of Partners Patient Safety Officer. The main task of the position was to devise strategies to reduce error in care delivery. A significant component of medical error reduction up to that point had been directed towards measurement and process change, particularly in terms of medication safety [11,14,15]. However, experiences in attempting to improve safety across a broad array of institutions suggested that combined tools that addressed cultural change and leadership as well as specific components of care delivery would be most successful [5]. The goals delineated for the Partners Patient Safety Officer position included specific efforts to change the culture of our hospitals—especially by educating hospital leadership—and to revise the hospitals’ methods of analyzing adverse events so that they measure and delineate system and process problems, pinpoint longstanding unsafe traditions, and delineate actions to address them.

Two groups were developed to support the Partners patient safety effort. A Partners Patient Safety Advisory Group was convened to meet two times per year to advise the Patient Safety Officer of national trends and to evaluate the efforts underway in the integrated delivery system. The individuals in the advisory group were chosen based on their work in areas related to patient safety, their knowledge of the national environment, and their stature within the Partners HealthCare System. In addition, a Partners Patient Safety Leaders Group was convened, made up of the individuals in each institution with the responsibility for patient safety. The Joint Commission on Accreditation of Healthcare Organizations’ mandate that hospitals identify a locus of responsibility for safety made identifying the participants for this group straightforward, as all the institutions had clearly delineated who was responsible for their patient safety efforts. Members of this group include physicians, nurses, and risk managers.

Initially, the Patient Safety Leaders Group was most powerful in educating its members about the good ideas and best practices of each institution. As the group has become more cohesive, over a period of 1 year, the members are beginning to think collaboratively about goals for the integrated delivery system in addition to each individual’s specific hospital goals. To develop the camaraderie necessary to achieve this, the group has met face-to-face for over a year. Because the integrated delivery system is spread across much of eastern Massachusetts, initial attempts to convene this group were done virtually—usually by telephone conference calls. It became apparent after a few months that the group was not functioning effectively, so face-to-face meetings were scheduled. The improvement in collaboration, camaraderie and congeniality was apparent within a few sessions. As a compromise, the meetings are scheduled monthly, alternating between virtual and face-to-face formats.

The group is beginning to tackle a variety of system-wide projects, some aimed at cultural change, such as promulgating the acceptance of executive WalkRounds to discuss safety issues and system-wide accountability principles. Others are process-specific, such as managing anticoagulation, improving the safety of central line insertions, and ensuring widespread implementation of computerized physician order entry. These projects were chosen because they address high-risk processes and could be used as paradigms for future projects relating to both medication delivery and invasive procedures in other areas.

In addition to the clinical care provided by Partners and non-Partners Harvard-affiliated organizations, these institutions have been leaders in patient safety research, and the research groups interact closely with the operational entities. The intent is to have the organizations serve as laboratories for improvement in patient safety, and in addition to rapidly disseminate beneficial changes throughout the organization.

**Results**

**Patient safety initiatives across an integrated health care system**

Integrated delivery system executive-level patient safety goals differ somewhat from those established at a hospital-based patient safety level. Projects that target transitions from one institution to another or require consensus across organizational boundaries will benefit from oversight at a high level. Coordinated anticoagulation management is an example. By contrast, initiatives that are wholly hospital based or contained within one organization or one administrative structure can be piloted and proven locally. Then other hospitals may benefit from the learning. However, hospital-based patient safety personnel tend to be, appropriately, inwardly focused and their time is filled with responsibilities from within their
own organization. As a result, the opportunity to learn from other organizations is limited to literature and an occasional national conference. Lack of collaboration across and within institutions is common. The strength of an integrated system is that its leaders can develop a framework for constant collaboration to occur. The Patient Safety Leaders Group has been an example of this. The relationships developed have facilitated large-scale projects as well as fostering numerous collegial interactions about smaller problems. Safety requires collaboration amongst clinical groups and should be a goal of all those responsible for patient safety.

The aim of the new Partners-wide safety goals was to achieve a culture change, and to revise the hospitals’ methods of analyzing adverse events to include process change and process measurement. To accomplish these goals, our approach has been initially to pilot an intervention at one institution with the goal of eventual rollout across the entire delivery system. The interventions that have been piloted and/or implemented in the system have included executive WalkRounds™, the development of accountability principles, Web-based reporting systems, and process-specific initiatives. Separately, they are modestly useful. Combined, however, these initiatives are a significant force. Table 1 outlines some of our current and potential patient safety initiatives; the challenge is determining the priority for implementation of each of these initiatives.

**Culture change: executive WalkRounds™**

Executive WalkRounds™ were conceptualized initially in the Idealized Design of Medications Systems Design Group at the Institute of Healthcare Improvement in 1999 [16]. The Institute for Healthcare Improvement (IHI) is a not-for-profit organization created to help lead the improvement of health care systems and to promote continuous increase of their quality and value [17]. The IHI has conducted many year-long multi-hospital collaboratives to develop and spread best practices. In these collaboratives, up to 140 hospitals over a period of 1 year undertake similar projects aimed at improving health care, and convene periodically to discuss and compare their progress. The WalkRound™ tool was designed to connect senior leadership to patient safety and to inculcate a culture of safety into the health care system. It was also postulated that the information elicited during the WalkRounds™, if effectively analyzed, might be used to drive safety-based changes by creating a cycle of information–analysis–action–feedback. The end result would be a self-sustaining process that would continue to engage leadership, educate clinicians and managers, and lead to continuous improvement.

The WalkRounds™ were initiated with the following objectives: (i) to increase awareness of safety issues by all clinicians; (ii) to make safety a high priority for senior leadership; (iii) to educate staff about patient safety concepts such as non-punitive reporting; and (iv) to obtain and act upon information elicited from staff about safety problems or issues.

WalkRounds™ was piloted at one hospital in January 2001. The Chief Executive Officer, Chief Operating Officer, Chief Medical Officer, and Chief Nursing Officer agreed to participate in weekly safety walk rounds. Other participants in the WalkRounds™ include the patient safety director, patient safety manager, and research assistant. WalkRounds™ are held weekly and visit different areas of the hospital, including the medical/surgical/obstetrical wards, emergency room, pharmacy, and operating suites. During the WalkRounds™, specific questions are asked of the staff nurses, residents, and staff pharmacists on duty, such as ‘Were you able to care for your patients this week as safely as possible? If not, why not?’ and ‘What could this unit do on a regular basis to improve safety?’ (Figure 1). At the end of the rounds those who were questioned are educated about patient safety concepts such as the importance of reporting near misses and how thinking about human factors can influence decision making. These participants are e-mailed a transcript of the conversation later that day to thank them for their participation and so that they may review their comments. Events that are captured in these rounds are put into a database and classified according to the contributing factors that influenced the event. Each event is assigned a score based on its severity or its potential for patient harm.

The list of events requiring active response is prioritized by level of severity and brought to the responsible leadership, and ownership of the issues is assigned. Each quarter, the leadership provides updates to those who participated in the rounds on progress towards resolution or a statement of the rationale for not taking action. Informing them of the actions taken closes the communication loop with the WalkRound™ participants. We have informally surveyed staff and leadership about these walk rounds. Leadership have been extremely engaged and feel the rounds have great value. The staff overall have been pleased to see leadership commitment to safety with these rounds, and have been pleased with

<table>
<thead>
<tr>
<th>Table 1 Partners current and potential patient safety initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Culture change</strong></td>
</tr>
<tr>
<td>Executive WalkRounds™</td>
</tr>
<tr>
<td>Accountability principles or commitments</td>
</tr>
<tr>
<td>Education: orientation, competencies, credentialing</td>
</tr>
<tr>
<td>Safety briefings</td>
</tr>
<tr>
<td><strong>Core process</strong></td>
</tr>
<tr>
<td>Intelligent Information Technology: computerized physician order entry, electronic medical records, computerized medication administration records, bar-coding</td>
</tr>
<tr>
<td>Simulation: teamwork and communication</td>
</tr>
<tr>
<td>Flow: unit-based assessment</td>
</tr>
<tr>
<td>Protocols: clinical practice guidelines by evidence and consensus</td>
</tr>
<tr>
<td>Hardware standardization</td>
</tr>
<tr>
<td><strong>Measurement</strong></td>
</tr>
<tr>
<td>Reporting systems</td>
</tr>
<tr>
<td>Pharmacy interventions</td>
</tr>
<tr>
<td>Computerized monitoring for adverse events</td>
</tr>
<tr>
<td>Protocols and clinical practice guidelines</td>
</tr>
<tr>
<td>Attitudinal surveys (clinician and patient)</td>
</tr>
</tbody>
</table>
A. Frankel et al.

the follow-up actions they see based on their comments. Since the initial pilot, WalkRounds™ have been successfully implemented at four additional Partners institutions. The plan for further spread to other institutions is under discussion, as is a standardized analysis of the impact of the WalkRounds™. In addition, a study is underway to evaluate the WalkRounds in 10 other Massachusetts hospitals over the next 2 years.

**Culture change: accountability principles**

Accountability principles or commitments to safety derive from attempts to clearly enunciate a non-punitive or blame-free reporting policy towards health care providers who report adverse events or episodes of patient harm. The purpose of improving reporting is to elucidate flaws in the health care delivery system that may then lead to the development and implementation of system remedies. The Aviation Safety Reporting System (ASRS) is an example of this successful approach applied to the airline industry [18].

Currently, reporting of adverse events frequently does not occur, at least in part because individuals believe that they will be blamed or sanctioned (regardless of whether the individual or the system is at fault) [19]. Most blame-free policies attempt to balance the desire to increase reporting with the desire not to limit sanctions. This is usually done by promising protection to those who report in a timely fashion and exempting cases of misconduct. Many are fashioned from the ASRS reporting procedures that have for over 25 years offered immunity if reports are obtained within 5 days of the event, exempted criminal actions, and afforded the reporter confidentiality, followed 30 days later by anonymity. The ASRS system works on a national scale, but does not offer to the individual airlines an analysis of airline-specific problems. To address this, airlines have built Aviation Safety Action

---

**Figure 1** WalkRounds™ flow diagram.
Plans that tend to offer confidentiality but not anonymity and that facilitate in-depth root-cause analysis.

Anonymity and confidentiality in a hospital or health care system is much harder, sometimes impossible, to achieve. Rather than simply address the protection afforded to individuals for reporting, a set of principles that outlines expectations of all the stakeholders regarding system-versus-individual responsibility may be what is needed. If written intelligently, a set of principles or policies about reporting harm does not require health care institutions to compromise their ability to police employees or appropriately prosecute misconduct.

The Partners Healthcare System has been developing this set of principles with the hope that every member institution supports them and fosters a similar attitude regarding culture, reporting, and accountability. The Partners Patient Safety Officer and Patient Safety Leaders Group initially drafted the accountability principles by performing a search of the literature to find non-punitive policies currently in use in health care. ‘Whistle-blower’ statutes were reviewed and state-specific issues about peer review protection identified. The Patient Safety Leaders Group reviewed the principles, followed by risk management and human resources representatives from each Partners institution as well as by Chief Medical and Chief Nursing Officers. In addition, hospital lawyers and human resource departments piloted the initial drafts by applying them to selected cases to ensure that they did not conflict with appropriate hospital actions. Newer drafts were evaluated in a similar way. An appendix to this paper shows the version of the principles approved by all the Partners institutions.

**Culture change: future initiatives**

The Executive WalkRounds™ and accountability principles represent the foundation for cultural change. Educational modules about safety, ‘Safety Briefings’, and attitudinal surveys are other building blocks under consideration for implementation. Safety Briefings involve frontline staff, and are simple and brief interchanges usually conducted during transitions in care—either as patients are transferred or as health care providers change shifts. These briefings identify specific areas of risk at the time of the briefing and should be conducted in a relaxed but formalized fashion.

The educational component of culture change occurs during orientation of new employees, and during re-credentialing and competency training of all health care providers. The education will include: (i) human factors—how humans interact with their environment [20]; (ii) cognitive psychology—how humans think and how we make errors [20,21]; (iii) how innovative ideas diffuse [22]; and (iv) ethics and accountability—the logic in making complex systems transparent [23]. We are currently planning a curriculum for all new employees (in particular clinicians) to focus on these issues.

Attitudinal surveys offer another opportunity to measure the degree of transparency and open communication being fostered by patient safety projects in an institution. Surveys used in this fashion are commonplace in the airline industry [24,25]. They have shown a direct relationship between pilot attitude and unsafe flying conditions. These surveys have been modified for use in health care and there are clear indications that provider attitude may be correlated with patient morbidity and mortality [25,26]. We are planning to use these types of surveys to measure the cultural impact of WalkRounds™ and Safety Briefings.

**Process change: high risk processes**

Standardization and simplification of care through intelligent protocols and clinical practice guidelines has been a staple of quality improvement for a few decades in health care [5], but has had variable and often poor penetration. The relationship between complexity and error, delineated in human factors research in many industries, has led to increased vigor on the part of health care safety advocates to implement process standardization, including through the use of protocols. The major efforts of the Partners Patient Safety Officer have targeted anticoagulation management, the placement of central venous catheters, and computerization of physician ordering in the in-patient setting.

**Anticoagulation**

Perhaps the most compelling evidence supporting the importance of protocols is in the management of anticoagulants, especially heparin and warfarin [27]. All of the Partners hospitals currently use some form of a heparin weight-based protocol for at least some patients and we have numerous warfarin clinics within our loosely integrated delivery system. However, many patients on warfarin are not managed in a clinic setting, and a system-wide program for warfarin management has been lacking. Systematic warfarin management is necessary to provide effective care to patients during transitions from one level of care to another.

To improve these processes, we convened a group of interested individuals and experts including physicians, nurses, pharmacists, information technology specialists, in-patient discharge planners, home care specialists, office business managers and outpatient anticoagulation service providers. The mission of this group is to: (i) centralize information about patients and their anticoagulation status while supporting local control and management; and (ii) decrease the number of steps necessary to manage anticoagulation, thereby decreasing the likelihood of error. To accomplish these goals, the group is currently designing software to serve a dual purpose: to assist large warfarin clinics that primarily manage laboratory data and drug dosages, and also to support small office-based clinics who see patients face-to-face. The needs of these two types of clinics differ, but they have a common requirement: anticoagulation information should be readily available from anywhere in the delivery system.

The second goal, to decrease the steps in management, may be accomplished by using point-of-care blood testing devices to measure the international normalized ratio (INR) rather than the standard mechanism, i.e. obtaining a vial of blood and sending it to a laboratory for INR analysis. The group is also evaluating supports for physicians and patients...
who are not attached to current office and hospital anticoagulation clinics. A model for geographically diverse care that manages patient transitions well is the visiting nurse association (VNA). Partners HealthCare system is looking to these groups to develop ambulatory clinic-based models to manage anticoagulation using point-of-care testing devices.

Measurement of current effectiveness is underway, with plans to audit process measures (percent of patients with therapeutic INRs) and outcome measures (bleeding- and clot-related complications). Independent physician groups are particularly difficult to monitor as each maintains its own databases, often on paper, and they have not been required to collect or maintain this information. A one-time audit suggested that the percentage of patients maintained in therapeutic INRs by the groups ranged from 45 to 75%. We believe that 75% of patients in therapeutic INR is an appropriate goal for each physician group; our plan is to ask each group to collect the information in the manner easiest for them.

**Central venous catheter insertion**

Evaluation and spread of best practices in central venous catheter (CVC) insertions is a system-wide project undertaken by the Partners epidemiology leaders, the goal of which is to decrease complications, especially CVC-associated blood stream infections. Practice around CVC insertion varies widely from one intensive care unit to another, even though physicians rotate through the entire delivery system. During CVC insertions, having in attendance an unscrubbed assistant and an experienced attendant or fellow has been historically difficult to institute. Epidemiologists and intensivists have instituted and spread best practices using education, protocols, and audits. The focusing of attention combined with the pilot study facilitated spread of the best practices with excellent results. One organization with incomplete penetration of the suggested practices, after fully adopting these practices, decreased the central line blood stream infection (BSI) rate over a 12-month period from 162 to 120, yielding a calculated saving of $2.5 million. The rates placed the institution in the top quartile of organizations compared with the Centers for Disease Control and Prevention benchmark rates.

**Computerized physician order entry**

Computerized physician order entry (CPOE) has been found to substantially decrease the rate of serious medication errors [14,15], and appears to be one of the most potent technological changes for improving patient safety [28]. While CPOE is in place in the two large teaching hospitals in the Partners network, it has not yet been implemented in the smaller hospitals. Because of the recommendations of the Partners Patient Safety Advisory Group regarding the substantial safety benefits of CPOE, the Partners leadership has made a commitment to the implementation of CPOE in all inpatient institutions over the next few years. The Patient Safety Leaders Group will be an important entity for sharing information about successes and barriers as CPOE moves forward.

**Process change: future initiatives**

Core process changes include the intelligent structuring of information technologies, simulation, standardization, and simplification of care delivery through protocols and clinical practice guidelines, streamlined patient flow with fewer delays, and hardware standardization. Into this final category falls CPOE, standardizing warfarin management during transitions of care, and protocols for safe central venous catheter placement.

Other projects in this category are also being evaluated. Boston has been a stronghold of simulation research spearheaded by the Center for Medical Simulation. In the simulator, models of patients’ rooms or invasive suites and operating rooms are combined with computer-driven monitors and manikins to simulate real-life problems. Students have the opportunity to learn and test their skills in a safe environment where patients cannot be harmed and actions can be critiqued. Simulators are available relatively inexpensively for placement in every hospital, and have the potential to dramatically improve teamwork, open communication and provider education. Partners and the Center for Medical Simulation are embarking on many projects that will impact each institution. For example, anesthesia residents are all undergoing simulation training in return for which their malpractice insurance premiums have been reduced. Under discussion is further development of in-hospital simulators for use in teamwork and skill-based training.

In addition to CPOE, information technologies such as electronic medical records, automated medication administration records and bar coding are all currently in use in some Partners settings and are becoming more widespread throughout Partners Healthcare System. However, having a logical strategy for implementation is the key to acceptance of these new technologies, and Partners Information Systems is putting significant effort into creating a common information technology structure for the entire network.

Patient flow is another possible area of intervention. Given our current nursing and pharmacist shortage, empowering nurse managers and frontline nurses to control patient flow based on safety is imperative. This may be accomplished using innovative strategies such as the unit assessment tool used by Luther Middlefort Hospital in Eau Claire Wisconsin, in which frontline nurses use a traffic light concept to delineate the state of safety on their unit. Hospital workers use red, green, and yellow colors to identify the level of risk they perceive in their area based on parameters such as nursepatient ratios and patient acuity. The colors are broadcast through the institution as the screen-saver on the hospital computers and determine where patients are admitted and transferred. Resources are diverted to aid those areas in the ‘red’ zones [29].

Finally, standards are necessary that direct hardware purchases based on safety. Medication infusion pumps are a sentinel example in this category. Testing for human factor problems should determine the choice of pumps, favoring
those that have ‘intelligent’ but simple redundancies to alert the care provider. There are currently numerous pilot tests underway in the Partners Healthcare System to evaluate and standardize these technologies.

**Outcome measurement: a common reporting system**

Another key to a culture of safety is having an easily available and simple way for health care workers and patients to report adverse events. Critical components of a safety improvement program in a large delivery system are the adoption of a common language for reporting errors and near misses, and an ability among hospital staff members to learn from each other. The goal of Partners is to create a common reporting system for all member institutions, so that information can be rendered anonymous and shared confidentially to promote measurement, learning, and benchmarking. To accomplish this, Partners has opted to promote the use of a Web-based reporting system, and has been evaluating those commercially available [30]. The usefulness of these kinds of systems relies on the simplicity of the data entry method, the system’s ability to receive and store a large volume of data in a secure environment, and the breadth of analysis and ad hoc reporting available to the site manager [31].

Our main criteria for application selection are security, ease of use, and speed, since these are major barriers to staff reporting. We are evaluating the breadth of scope of the product (Does it include near misses? Does it include ambulatory care? Does it have detailed modules for more than just medications and slips/falls?). In addition, we are evaluating the coding taxonomy to make sure it would collect enough systems-related information. We require a follow-up module where the appropriate leaders could edit/modify the report once follow-up was complete. We require an ability to integrate into our network e-mail system so that appropriate leadership would get e-mail notification of the filing of the report. We are looking at the system’s capacity to generate reports or export data into databases for our own report generation. Finally, adequate customer support is essential. A system is currently in a pilot phase and nursing staff have been very pleased with the speed and ease of use. We have seen increases in reporting in the pilot areas, particularly in areas that had extremely low reporting rates previously. In addition, we have seen increases in reports from physicians, which we attribute to the speed of the system.

The Patient Safety Leaders Group is given regular updates on experience with the pilot and the impact of this on a plan for larger rollout. The ultimate goal is for all the Partners institutions to use this common reporting system so that hospitals can then share information about certain common event types and learn from each other about systems improvements. Issues such as medication errors and adverse drug events can be discussed using common terminology, and rare but serious events can be measured jointly so that hospitals can learn from the experiences of others.

**Process measurement: adverse drug event monitor**

Patient safety will be improved further by the implementation of routine measurement across a variety of domains. The common reporting system will be a vital tool in this regard. However, spontaneous reporting detects only a small minority of events [32,33], and we believe that automated detection methods will be useful in improving routine detection of safety issues [34–36]. A computerized Adverse Drug Event Monitor that searches for signs of an adverse event and sends this information to a pharmacist for follow-up is now in routine use at one hospital [37]. The monitor is a program (consisting of >30 triggers) that searches the patient’s computerized medication and laboratory test profiles for evidence of adverse drug events and generates alerts. An example of an alert would be a patient whose creatinine is rising taking an aminoglycoside. The monitor generates a daily list of these alerts and the hospital pharmacists review the alerts for their patients and make interventions. Most interventions involve calling the physician to discontinue or change the dosage of a medication; the goal is to intervene before the adverse drug event becomes serious or prolonged. This also promotes a culture of safety within pharmacy by actively involving the pharmacists in event prevention. The Adverse Drug Event Monitor won the Institute for Safe Medication Practices Cheers Award in 2002 for its excellence in proactively identifying potential adverse drug events. These kinds of proactive monitoring will eventually be used at other institutions within the network to supplement spontaneous reporting.

**Process measurement: future initiatives**

Vital components of safety measurement include ascertaining provider willingness to report problems and conducting audits looking for adverse events and near misses. Surveying provider attitude and tracking the use of spontaneous reporting systems will elucidate whether willingness to report events improves. Web-based reporting systems will improve our ability to evaluate both of these. Adverse events and near misses can be monitored in many ways. For example, in one of our hospitals, pharmacy interventions are used to identify areas of knowledge deficiency on the part of house staff, and a medication competency exam has been developed based on these interventions. The exam is given to incoming interns and then again as their internship ends. The exam results are monitored to evaluate how effective pharmacy education has been during the year. The competency exam is modified each year based on the previous year’s pharmacy interventions.

As noted earlier, another hospital has implemented a computerized monitoring program in which an event monitor screens the computerized database and sends alerts daily to pharmacists who can then review them and make interventions. This generic approach will likely eventually be suitable for screening other sources (such as discharge summaries) for adverse events [38].

- **Improving patient safety**
Conclusions

As the concepts underlying patient safety mature, it is becoming possible to develop a cohesive and broad patient-safety strategy. We have described the path we have taken, although other alternatives might have been chosen, and in addition to the efforts described, each hospital has numerous individual projects underway. A broad patient-safety strategy may be divided into three categories: cultural change, core process change, and process measurement. Our initial efforts across the Partners integrated health care system include initiatives in each of these areas. We have many additional projects that we are considering in each category, including both technology-related and non-technology-related interventions.

Conceptual models for the future

Theoretical concepts determined the initial framework for our patient safety strategy. Further construction was based on hospital interests and the efforts of those invested in each project. Two years later, collaborative efforts by all have helped refine patient safety theory. Hospitals and integrated delivery systems just beginning to formulate a patient safety plan can build on work done and may develop a more solid framework for themselves. While still mostly theoretical and unproven, safety in overview is becoming clearer and should help re framing the efforts described, each hospital has numerous individual projects undertaken, and in addition to the strategies described, many other projects in these areas are being evaluated and considered for pilot testing. Clearly, there is no right answer as to which projects an integrated delivery system or hospital should undertake, and there are numerous possibilities from which to choose. Some of the strategies involve technology but many do not. Decisions need to be based on measured need, leadership support, interest, and resources. However, we feel that an emphasis on culture, process, and measurement makes the most sense for both short-term and long-term safety improvements.

Acknowledgements

We acknowledge support from Partners HealthCare (see page i40).

References


17. Institute for Healthcare Improvement [Internet homepage]. Available at: http://www.ihi.org/ (last accessed on July 12, 2002).

18. NASA. Aviation Safety Reporting System [Internet homepage]. Available at: http://www.asrs.arc.nasa.gov/ (last accessed on July 12, 2002).


Accepted for publication 21 July 2003
FIRST AND FOREMOST WE STRIVE TO DELIVER EVER SAFER AND MORE EFFECTIVE CARE.

WE SUPPORT THE EFFORTS OF EVERY MEMBER OF THE HEALTHCARE TEAM TO DELIVER THE BEST CARE POSSIBLE

- We view accountability for patient harm or potential harm in the context of individual and system influences.
- We commit to supporting simplification, standardization, effective teamwork and open communication in order to foster an environment to minimize error.
- We believe that individuals are accountable for their own performance but should not carry the burden for system flaws.

WE PROMOTE OPEN DISCUSSION within our organizations to learn about adverse events and potential causes of patient harm.

- We commit to developing and maintaining easily accessible and constructive ways for healthcare workers and patients to discuss adverse events and concerns about the safety of care delivery.
- We encourage sharing what we learn within the Partners organizations because this information helps lead us to actions that improve the healthcare environment.

WE PROMOTE INTERDISCIPLINARY DISCUSSION and analysis of adverse events and potential patient harm.

- We commit to eliciting different points-of-view to identify sources of patient harm and to use the information to improve safe delivery of care.
- We believe that patient input is indispensable to the delivery of safe care and we commit to promoting patient participation on our care delivery teams.
- We commit to analyzing episodes of patient harm or potential harm in an unbiased fashion to determine the contribution of system and individual factors.
- We commit to fostering a team approach to the analysis of adverse events and potential patient harm and the actions taken to address them.

WE WILL ACT TO IMPROVE SAFETY by implementing changes based on our analysis of adverse events and potential patient harm.

- We commit to identifying actions designed to address the causes of adverse events.
- We commit to assigning responsibility for implementing actions to specific individuals or groups.

WE WILL INFORM PATIENTS AND FAMILY MEMBERS, HEALTHCARE PROVIDERS, LEADERSHIP AND TRUSTEES ABOUT ACTIONS that have been taken to improve patient safety.

- We commit to fostering an environment that is concerned with safety through continuous education, reminders and leadership.
- We commit to ensuring that our leaders and all healthcare workers are cognizant of the complexities of delivering safe patient care and support the efforts to address those complexities.

WE WILL MEASURE OUR SUCCESS IN PROMOTING AN ENVIRONMENT OF PATIENT SAFETY.