Strategies for Improving Patient Safety in Small Rural Hospitals

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Abstract

The Tennessee Rural Hospital Patient Safety Demonstration Project sought to improve patient safety in small rural facilities by strengthening their capacity to implement priority patient safety interventions. The project focused on interventions relevant to the core services and capacities of rural hospitals and was sensitive to their structure and processes. A process for assessing the status of hospital patient safety programs and providing technical assistance tools, and resources was developed. Organizational and clinical changes designed to prevent errors and improve safety were initiated. Eight participating hospitals completed a self-assessment tool to identify and prioritize rural hospital patient safety interventions. These hospitals implemented three interventions: assessment of patient safety culture and implementation of a safety culture plan, development and implementation of emergency department protocols, and use of personal digital assistant devices (PDAs) by clinicians at the point of care to decrease medication errors.

Introduction

Health care quality and safety improvement are critical to the viability of rural hospitals. National hospital patient safety initiatives promoted by purchasers and others do not always consider the unique characteristics of small rural hospitals. Current patient safety standards are based largely on research conducted in large urban settings. These institutions have resources with which to address patient safety challenges and a volume of incidents to examine and act upon. The results of these initiatives undertaken in larger hospitals may not be generalized to small rural hospitals due to differences in organization, staffing, financing, and other characteristics.[1, 2] As a result, rural hospitals historically have been exempt from patient safety expectations in areas such as computerized physician order entry (CPOE), evidenced-based hospital referrals, intensive care physician staffing standards, and other National Quality Forum-endorsed safe practices. However, exemption from current patient safety standards may inappropriately encourage the perception that rural health professionals deliver less safe care.

In 2005, the Tennessee Hospital Association (THA) received funding from the BlueCross BlueShield of Tennessee Health Foundation to demonstrate the feasibility and impact of implementing priority safety interventions in a group of eight rural hospitals. The goal was to improve patient safety in these small rural facilities by strengthening their capacity to implement patient safety interventions. This article describes the design and implementation of the demonstration and its impact on these facilities.

Background: The Tennessee Rural Hospital Patient Safety Demonstration

The Tennessee Rural Hospital Patient Safety Demonstration (the Demonstration) grew out of a desire by the THA and BlueCross BlueShield of Tennessee (BCBS), the State's largest insurer, to expand the capacity of small rural hospitals to undertake significant and visible safety and quality initiatives. Beyond providing critical financial and logistical support for the development and implementation of these initiatives, the Demonstration was seen as a vehicle to ensure strong continuing support for these facilities among the health plan's subscribers.

The Demonstration was conceived and undertaken in the context of a growing recognition of how the differences between urban and small rural hospitals affect what should be done to improve safety in these smaller facilities.[1, 3] Small rural hospitals differ from larger hospitals in several ways that are relevant to the patient safety discussion.

First, the smaller size and lower census in rural hospitals means that they do not experience a sufficient volume of events (e.g., unexpected deaths) necessary for using many quality improvement indicators and measures. Insufficient volume complicates reliable measurement of safety in many areas of the hospital.

Second, most rural hospitals provide only a subset of the services available at larger, urban facilities. For instance, rural hospitals rarely provide intensive surgical services, such as cardiovascular, neurologic, or pediatric surgeries that lend themselves to patient safety system interventions.

Third, smaller hospitals often do not have the information technology infrastructure and/or resources necessary to implement suggested patient safety practices, such as bar-coded systems for medications and patient identification and intensive medical record review.

Finally, the cultural communication norms at rural hospitals are different from larger hospitals. The communication structure in smaller organizations, where each individual serves in many roles, affects the openness of expected discussions. More open communication should improve the ability of an institution to address patient safety in a non-blame environment.[1]

In 2004, recognizing the need for "rural-relevant" patient safety interventions and measures, a consortium of university-based rural health research centers identified a set of evidence-based patient safety interventions that the majority of small rural hospitals could readily implement and that rural hospitals, purchasers, consumers, and others would find relevant and useful.[3] The study was designed to help rural hospitals prioritize their patient safety efforts to address safety problems related to medication errors, infections, and other core patient safety areas. The study identified a set of 26 priority interventions based on a comprehensive review of the literature, analysis of secondary data, and deliberations of a national expert panel, as well as a survey of rural hospital administrators and clinical quality improvement staff in 29 hospitals.[4]

In 2005, the THA identified the priority interventions in this study as a potential vehicle for mounting a rural hospital patient safety initiative. Specifically, the Association's Assistant Vice President for Rural Health Services and Workforce Initiatives saw the opportunity to design an initiative that would respond to the needs and circumstances of each hospital and, at the same time, promote collaboration and learning among the participating hospitals. He approached the authors of this study to enlist their assistance in the development of the Demonstration.

The Tennessee Rural Hospital Patient Safety Demonstration was officially launched in January 2005 with funding support from the BlueCross BlueShield of Tennessee Health Foundation. In addition to the eight participating hospitals, the Demonstration included technical support for design and implementation from the THA, the University of Southern Maine's (USM) Muskie School of Public Service, and Q-Source, the Quality Improvement Organization in Tennessee. Rural health researchers from the University of Minnesota and the University of North Dakota evaluated the short-term impact of implementation on the organizational and clinical systems of the participating facilities to inform future rural patient safety initiatives.

Implementation of the Demonstration required that hospitals be solicited and selected to participate, the patient safety interventions be selected, and plans for implementation be designed. These components of the Demonstration are described below.

The Demonstration

Hospital Selection and Structure of the Demonstration

The THA and the rural health research team discussed and used a set of criteria for identifying and selecting hospitals to participate in the Demonstration. Although many potential criteria were discussed, the key factors considered included the support of senior leadership and administration for the Demonstration, the ability of key staff (e.g., director of nursing and/or quality improvement director) to actively participate in the project, and successful participation in previous quality improvement initiatives.

Each hospital was represented in the collaborative by one or more administrators. In all cases, one of the representatives was the individual at their institution most involved in patient safety activities. However, many hospitals also had their CEOs directly involved in the Demonstration. Each hospital agreed to commit to a 2-year demonstration and was provided a modest stipend to cover travel, meeting, and other expenses.

Prior to the Demonstration, the THA had organized and supported a network of the Critical Access Hospitals (CAHs) to identify and work on priority initiatives within the State's Rural Hospital Flexibility Grant Program. Although some of the hospitals in this Demonstration were not CAHs, the Association sought to create a similar network arrangement. The THA and the research team opted for an informal structure involving:

- Regular face-to-face networking and technical assistance.
- One-on-one technical assistance to the participating hospitals.
- Peer-to-peer collaboration and technical assistance among the hospitals.

The THA and the research team developed a 2-year work plan based on several individual and group conference calls and written communications with the hospital participants. This work plan included a schedule of monthly project conference calls and quarterly face-to-face, 1-day meetings at the THA offices in Nashville, TN.

Choosing the Interventions

Identifying the current status of each hospital's patient safety program relative to the 26 patient safety interventions was a key step in the development of the Demonstration. To accomplish this task, the research team from the USM developed a needs assessment process and self-assessment tool that gave each hospital the opportunity to describe which of the 26 interventions they had undertaken and to assess the extent to which they felt they were fully or partially implemented. Administrative teams at each of the hospitals were guided through the self-assessment process in which they ranked rural-relevant patient safety interventions in terms of status of implementation, internal value, external value, and feasibility. These individual self-assessments were then aggregated (Table 1) and discussed at a network meeting.

At this meeting, Demonstration participants agreed on a set of three interventions that each hospital felt would be important to them and that would represent initiatives that they had not fully implemented:

1. Assessment of patient safety culture and implementation of a safety culture plan.
2. Development and implementation of emergency department protocols.
3. Use of PDAs by clinicians at the point of care to decrease medication errors.

A decision was also made on the sequence and timelines for implementing these interventions.

Technical Assistance, Support, and Evaluation

Technical assistance played a key role in supporting each of the hospitals in the implementation of these interventions and in facilitating the collaborative work of the Demonstration participants. A variety of organizations provided support to the Demonstration, including the THA, the universities' rural health research centers, and the Tennessee Quality Improvement Organization – Q-Source. The THA was principally responsible for managing the Demonstration, including communications with each of the hospitals and with external constituencies. THA staff also coordinated the distribution and training associated with the PDA intervention. Overall coordination of the project activities was achieved through significant and cooperative efforts of the THA vice president and a single project director from the research team (USM).

Staff from the USM Rural Health Research Center were responsible for coordinating and providing technical assistance resources to the hospitals. For example, all the hospitals received a binder of pertinent patient safety resources at the start of the Demonstration, as well as intervention-related resources throughout the project period. USM staff also designed and oversaw the survey of patient safety culture, including data entry and analysis,

Table 1. Patient safety intervention self-assessment results

Patient safety interventions		Participating hospital							
		1	2	3	4	5	6	7	8
1	Patient identifiers								x
2	24-hour pharmacist				x		x	x	x
3	Personal digital assistant (PDA)	x	x	x	x	x	x	x	x
4	Pharmacist-managed IV				x		x	x	x
5	Prescription software	x			x	x	x	x	x
6	“Read back” orders								
7	Drug abbreviations/dose standards	x					x		x
8	Look-alike/sound-alike drugs								
9	Admission medication list			x			x		
10	Transfer medication list						x		
11	Patient informed consent	x			x				
12	Hand hygiene								
13	Antimicrobial prophylaxis	x		x					x
14	Infection control program							x	
15	Specialized transport team								
16	Patient data communication	x	x		x		x		
17	Emergency Department protocols	x	x		x	x	x		
18	Emergency Department advanced training		x		x		x		x
19	Transfer protocols	x	x						x
20	Clinical information reporting	x							
21	Risk for falls								x
22	Patient safety program				x				

X = Not fully implemented at participating hospital

production of reports, and coaching around the dissemination of results. USM conducted and analyzed a survey of the PDA users and identified and coordinated additional outside sources of

support for the interventions, particularly the PDA intervention. Q-Source participated in all of the Demonstration meetings and was principally responsible for managing the collection and distribution of the ER protocols and working with the hospitals to assess and modify their protocols. The funder, BCBS of Tennessee, remained an active and interested partner in group meetings. Members of the research team from the Upper Midwest Rural Health Research Center were responsible for designing and carrying out the evaluation of the Demonstration.

Implementation

Patient Safety Culture Intervention

Each of the participating hospitals recognized the importance of safety culture as part of a comprehensive patient safety initiative and agreed to participate in the Agency for Healthcare Research and Quality's (AHRQ) Patient Safety Culture Survey.[5] Measuring and benchmarking culture over time and communicating the results to the hospital board and others represents a core strategy for identifying target areas for building safety culture. In 2005, AHRQ developed this tool to measure patient safety culture. It can be used to assess the safety culture of a hospital, as well as to track changes in patient safety over time and evaluate the impact of patient safety interventions. National benchmarks for the AHRQ survey were published at the time of the start, as well as the end of the Demonstration.[6, 7] This intervention was selected as a "kick-off" initiative to establish a baseline for the Demonstration and to guide the identification of appropriate hospital-specific improvement activities. The survey activity provided an opportunity for the group to share a common language and experience and to benchmark blinded individual hospital data.

Participating hospitals completed three rounds of the AHRQ Patient Safety Culture Survey over the 2-year project period. The survey helps each hospital assess the extent to which it emphasizes the importance of patient safety, facilitates open discussion of error, encourages error reporting, and creates an atmosphere of continuous learning and improvement. Each participating hospital learned to use the tool, database, and results to identify targets for culture improvement and to measure the impact of safety culture improvement activities. The research team coached the hospitals in the survey process and suggested methods to optimize survey response rates. All hospitals actively solicited staff participation including nondirect patient care staff in an effort to provide a more comprehensive view of hospital patient safety culture. Aggregate survey response rates were remarkable and averaged 74 percent over the three surveys.

After each round of surveys, the results were shared at both the individual hospital and the aggregate project level and compared to the AHRQ benchmarks. At quarterly participant meetings, the USM research staff modeled the results presentation using presentation tools (the survey report feedback template) available from AHRQ.[5] In addition, each hospital received a packet containing both electronic and hard copies of their individual hospital level results, presentation materials, aggregate results, and benchmarks. Each hospital then shared these results with its board, staff, and community. Hospital staff reported back to the research team and project peers regarding this dissemination process.

The hospitals then developed action plans based on the areas of weakness identified in the survey. For example, one hospital initiated system changes for error-reporting by soliciting employee suggestions to create a new culture of nonpunitive communication. Another hospital emphasized organizational learning by sharing survey results and action plans at their employee fair and through a frank discussion of patient safety in the local newspaper. At monthly conference calls (2 hours) and quarterly face-to-face, day-long meetings, Demonstration participants shared both activities and resources as they worked on various improvement activities related to patient safety culture and the two other interventions. The meeting format provided structure, a reporting mechanism, peer communication, support and engagement, and an opportunity for technical assistance by the hospital association, quality improvement organization, and research team.

The impact of this component of the Demonstration appears to have been significant. Over the three surveys, there were significant improvements in the aggregate scores from baseline in 9 of the 12 dimensions of patient safety culture identified in the AHRQ survey (Table 2). The improvement in the Demonstration hospitals compared favorably with published AHRQ benchmarks in which improvement is noted in 5 of the 12 dimensions over a 3-year period.

Table 2. Comparison of Tennessee hospital composite scores for 12 AHRQ culture survey dimensions

Dimension	March 2005 (%)	Dec 2006 (%)	AHRQ benchmark 2004[b] (%)	AHRQ benchmark 2007[c] (%)
Overall perceptions of safety	56	69[a]	56	63
Frequency of events reported	51	69[a]	52	59
Supervisor/manager expectations & actions promoting patient safety	72	80[a]	71	74
Organizational learning, continuous improvement	76	77	71	69
Teamwork within areas	68	83[a]	74	78
Communication openness	50	67[a]	61	61
Feedback & communication about error	53	68[a]	52	62
Nonpunitive response to error	35	50[a]	43	43
Staffing	46	52[a]	50	55
Hospital management support for patient safety	72	78[a]	60	69
Teamwork across hospital areas	60	64	53	57
Hospital handoffs and transitions	48	49	48	45

a Significantly different from March 2005 survey.

b Sorra J, Nieva V. Hospital survey on patient safety culture. AHRQ Publication No. 04-0041. Prepared by Westat under Contract No. 290-96-0004. Rockville, MD: Agency for Health Care Research and Quality; September 2004.

c Sorra J, Nieva V, Famolaro T, et al. Hospital survey on patient safety culture: 2007 comparative database report. AHRQ Publication No. 07-0025. Prepared by Westat under Contract No. 233-02-0087. Rockville, MD: Agency for Health Care Research and Quality; 2007.

Benchmarking the results after each survey and sharing blinded individual hospital results provided motivation for improvement activities. Movement in the scores over time reinforced the work of the improvement activities or facilitated focus on areas for improvement. The hospitals concentrated on improvement activities, such as increasing error/event reporting, nonpunitive response to error, and open communication. The hospitals embarked on new quality and safety improvement techniques, such as leadership walk-arounds, medication management tools, hand-off reviews, patient safety staff training, and orientation sessions, as well as new strategies to increase event reporting and feedback.

PDA Intervention: Information Technology at the Point of Care

The safe management of medications in a hospital involves careful attention to the use of the right amount of the right medication at the right time. As the volume and complexity of medication prescribing have grown, health care providers have increasingly sought technical support to manage medication prescribing and administration. Most patient safety standards recognize that essential drug information should be readily available in useful form and considered when ordering, dispensing, and administering medications. Yet, many rural hospitals are challenged by medication safety and lack access to computerized drug information systems, which include current protocols, guidelines, dosing scales, checklists for high-alert drugs, and information about herbal and alternative medicines.[8]

In this intervention, participating hospitals identified appropriate clinical staff to receive a PDA device and requisite training. Project funds covered the cost of the 190 PDAs, software, training, and technical assistance. These devices were preloaded with a drug database software program (Epocrates®) that enables the user to quickly check drug information, such as dosing, drug-drug interactions, adverse reactions, and formulary and pricing information. In addition, the software provides many clinical tools, including diagnostics, such as lab reference values, clinical tables and guidelines, symptom assessment, disease and condition compendium, medical calculators, and tools.

A team comprising staff from the THA, medical librarians from East Tennessee University, and research staff from USM trained the PDA users. Each participating rural hospital sent several staff to a train-the-trainer session. A local physician "champion" at each hospital was available to assist clinicians in their own training and rollout. Ongoing technical assistance was provided, including site visits and conference calls. Support from THA staff and the medical librarians was a key factor in the success of the intervention at the local level and contributed strongly to physician adoption of the technology.

The USM staff surveyed the new PDA users to measure the impact of the intervention using a slightly modified version of a tool from previous research on the use of PDAs in a clinical setting.[9, 10] The survey served as quantitative measurement of behavior change, in addition to reinforcing the intervention training. A 96 percent survey response rate was achieved. The majority (71 percent) of the clinicians reported not using a PDA prior to the project period. The results indicated an increase in practice efficiency and provider knowledge, improved drug-related decisionmaking, and prevention of adverse drug events.[11] Immediate access to necessary

drug information was reported as a key benefit of the hand-held device. More than 80 percent of PDA users reported that it took them less than one minute to find the medication information they were seeking. Nearly all (95 percent) reduced their use of prior sources of drug information (often potentially out-of-date text references) through use of the drug database software.

For many physicians, this was their first experience with clinical support software, and for some, it represented a "gateway" use of technology. Following the success of the initial training, project funds were tapped to equip and train a second round of PDA users, primarily nursing staff. The hospitals reported significant interest in point-of-care technology via handhelds at nursing stations, hospital pharmacies, emergency departments, off-site clinics, and at the bedside.

Emergency Department Protocols Intervention

The research team and the THA recognized that this intervention might involve a stretch into areas of tension. By reviewing and modifying emergency department (ED) protocols, hospitals were asked to examine clinical processes that come with "baggage," including organizational history, individual physician preferences, long-held clinical turf issues, and relationships with parent health systems or other tertiary care centers. For some hospitals, resistance to protocol development and adoption is a significant barrier. A common barrier in protocol development and implementation is a resistance to change by ED staff, including physicians, nurses, and administrators. This intervention required the hospital quality officer to recruit physician "champions" to achieve engagement in the process and eventual acceptance of the new protocol(s).

Participating hospitals completed an inventory of current ED protocols in their own facilities, while Q-Source compiled the inventory on a disk for all participants to share. Q-Source provided technical assistance for this intervention by sharing of best practices and coaching to develop intervention plans and activities. All eight facilities worked within their own teams to decide which protocols to adopt, adapt, approve, or implement. A number of the hospitals indicated some resistance to change from nurses and physicians but found buy-in through the review process and ED staff champions. The review process was "jump-started" by the shared protocols, and each hospital review team was able to update, add to, or tweak the protocol to fit local needs and preferences. These protocols were adapted first by the smaller group of ED leadership and then vetted through various hospital committees prior to implementation. Six hospitals have implemented or are in the process of implementing a total of 24 protocols.

Participants reported substantial benefit of the protocols to standardize treatment across shifts in order to reduce staff variances and improve patient flow, hand-offs, and transfers. Protocols become even more necessary at small facilities with low frequency of certain clinical events, but the protocols continue to be viewed as double-edged swords. While participants agree that protocols are valuable—particularly for small-volume facilities in optimum management of infrequent clinical events—there remains a resistance to "cookie-cutter" protocols.

In addition, the small hospitals in this Demonstration described the complications involved in coordinating protocols with a hospital system or with transfer hospitals. While this coordination prolongs the process time to implementation, it may increase the likelihood of successful

implementation in the long run. Many of the project hospitals intend to address this important next step. ED protocols are a long-term investment in patient safety and improvement and the collaborative process among hospital systems, emergency medical services, and transfer hospitals.

Conclusion

During the 2 years of this Demonstration, the hospitals assessed and identified needs for patient safety improvement. Three significant efforts were undertaken with the assistance of the THA, Q-Source, and the research team. The network of hospitals provided a forum for collaborative activity, information sharing, and collective learning. During the final months of the project, it became clear that process structure, clear action steps, and attention to a timeline were key factors in the successful results.

Beginning the formal improvement activities with hospital self-assessments afforded crucial hospital-level engagement. Consensus in the choice of interventions also promoted a sense of collaboration. The "kick-off" activity of the Patient Safety Culture Survey turned out to be a helpful and natural starting point for working together. Not only did the joint activity allow for a shared experience, common language, and group learning, but the results of the survey process were very useful at the local level and provided a link between collaborative goals and individual hospital needs. Substantial assistance with survey administration at the start of the project pushed all the hospitals forward in the same direction and provided a strong baseline for future work.

Quantitative measures collected in two of the three interventions suggest that organizational change and improvement in culture and processes are key elements to patient safety. Although the impact of the third intervention (ED protocols) was not quantitatively measured, reports from the hospitals indicate progress in protocol development and adoption.

The financial support provided by the funder and the hospital association enabled significant technical assistance, evaluation activities, and modest stipends for participating hospitals. The size of the working group was large enough to gain economy of scale, yet small enough for individual engagement and productive activity. After evaluating the results of the three interventions, it became clear that small rural hospitals can produce change in short periods of time.[11] Hospital participants recognized this phenomenon as they assessed the relative ease with which they were able to implement administrative and clinical changes.

This Demonstration shows that the implementation of patient safety initiatives is feasible and effective in rural hospitals and that rural hospitals are interested in and willing to invest in patient safety initiatives. The study provides a model of collaboration between providers, a payer, a hospital association, a quality improvement organization, and academic institutions to efficiently and effectively support patient safety activities in rural hospitals.

It is not known whether the individual hospitals are sustaining the improvement without the benefit of the collaborative. Sustainability should be enhanced by a new Patient Safety Center, which the THA has established with funding from BCBS of Tennessee, due in part to the success of this Demonstration.

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