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Promoting Action on Research Implementation in Health Services framework applied to TeamSTEPPS implementation in small rural hospitals

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Abstract

Background: A particularly useful model for examining implementation of quality improvement interventions in health care settings is the PARIHS (Promoting Action on Research Implementation in Health Services) framework developed by Kitson and colleagues. The PARIHS framework proposes three elements (evidence, context, and facilitation) that are related to successful implementation.

Purposes: An evidence-based program focused on quality enhancement in health care, termed TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety), has been widely promoted by the Agency for Healthcare Research and Quality, but research is needed to better understand its implementation. We apply the PARIHS framework in studying TeamSTEPPS implementation to identify elements that are most closely related to successful implementation.

Methodology/Approach: Quarterly interviews were conducted over a 9-month period in 13 small rural hospitals that implemented TeamSTEPPS. Interview quotes that were related to each of the PARIHS elements were identified using directed content analysis. Transcripts were also scored quantitatively, and bivariate regression analysis was employed to explore relationships between PARIHS elements and successful implementation related to planning activities.

Findings: The current findings provide support for the PARIHS framework and identified two of the three PARIHS elements (context and facilitation) as important contributors to successful implementation.

Practice Implications: This study applies the PARIHS framework to TeamSTEPPS, a widely used quality initiative focused on improving health care quality and patient safety. By focusing on small rural hospitals that undertook this quality improvement activity of their own accord, our findings represent effectiveness research in an understudied segment of the health care delivery system. By identifying context and facilitation as the most important contributors to successful

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implementation, these analyses provide a focus for efficient and effective sustainment of TeamSTEPPS efforts.

Keywords

critical access hospital; implementation science; PARIHS; quality improvement; TeamSTEPPS

Implementation science is a relatively new area of research aimed at identifying conceptual models, methods, and strategies best suited to facilitate the adoption and use of evidence-based interventions for performance improvement (Lobb & Colditz, 2013). In health care, a vast gap exists between research and practice, despite demonstrable benefits of many interventions, and our knowledge of what moves innovations from discovery to rigorous practice is still at its emerging stage (Glasgow et al., 2012). In this article, we build on an implementation science framework to study the implementation of TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety), a large and complex quality improvement intervention, in 13 hospitals. TeamSTEPPS is an evidence-based teamwork training system designed through collaboration between the Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense's Patient Safety Program that provides clear research-based content on which a patient safety initiative can be implemented (Clancy & Tornberg, 2007). However, from the perspective of implementation science, the extent to which the research-based content of TeamSTEPPS actually gets applied in practice is not well understood. We thus adopt the specific case of TeamSTEPPS initiatives to explore how different elements of the implementation science framework are manifest in the intervention process and how they are related to the success of a specific implementation project.

Conceptual Framework

A search for conceptual models in implementation science identifies a number of models that are applicable for studying quality and performance initiatives (Damschroder et al., 2009; Feldstein & Glasgow, 2008; Kilbourne, Neumann, Pincus, Bauer, & Stall, 2007; Kitson, Harvey, & McCormack, 1998). A particularly useful model for examining implementation of quality improvement interventions in health care settings is the PARIHS (Promoting Action on Research Implementation in Health Services) framework developed by Kitson and colleagues (Kitson et al., 1998; Rycroft-Malone et al., 2002; 2008). The primary elements of the PARIHS framework are three components or predictors of successful implementation—evidence, context, and facilitation. Evidence is defined as knowledge that supports the effectiveness of an intervention. Context is defined as the environment or setting in which the intervention is implemented. Facilitation is defined as the technique or process used by a person (i.e., the facilitator) to help others change their attitudes, skills, or behaviors and thereby improve the likelihood of success of the intervention (Kitson et al., 1998). A key function of facilitation is to assess the context of implementation and implement understanding and acceptance of the evidence and thus develop the most appropriate approach to transform the context and evidence elements from a poor condition (i.e., weak context and/or weak evidence) to a more favorable condition (i.e., strong context and strong evidence; Kitson et al., 2008).

A systematic literature review (Helfrich et al., 2010) examined 18 studies that applied the PARIHS framework and identified key areas for future research such as defining subelements and examining the nature of dynamic relationships among elements. Several conceptual and methodological limitations of the original PARIHS framework have also been the focus of recent efforts to extend this line of research. First, although the PARIHS framework has considerable face validity and conceptual relevance for implementation science, a challenge in applying the PARIHS framework is the limited research on how to define and measure successful implementation, the framework's dependent measure. Second, the adoption of interventions may occur at multiple levels in an organization (Kyratsis, Ahmad, & Holmes, 2012). Although recent research has refined the PARIHS framework for individual or task-level adoption of evidence-based practice (Stetler, Damschroder, Helfrich, & Hagedorn, 2011), there is still a lack of understanding about how elements of the PARIHS framework manifest and facilitate the adoption of interventions at the organizational level. An opportunity to apply the PARIHS framework to identify elements that are most closely related to successful implementation at the organizational level arose as we studied TeamSTEPPS.

TeamSTEPPS stands for Team Strategies and Tools to Enhance Performance and Patient Safety. It is an evidence-based quality improvement intervention that emphasizes improving health care team performance through flexible training designed to enhance team knowledge, skills, and attitudes (King et al., 2008). TeamSTEPPS involves a comprehensive curriculum that spells out key actions for a culture change toward teamwork including team leadership, mutual performance monitoring, backup behaviors, adaptability, team/collective orientation, shared mental models, mutual trust, and closed-loop communication. AHRQ has been actively disseminating TeamSTEPPS since 2006. As a result, TeamSTEPPS has been implemented in many U.S. hospitals. These training programs have been linked to enhanced staff knowledge, skill, and attitudes (Jones, Podila, & Powers, 2013; Sawyer, Laubach, Hudak, Yamamura, & Pocrnich, 2013) as well as improved clinical outcomes (Capella et al., 2010; Spiva et al., 2014). Yet, evidence suggests that TeamSTEPPS interventions are not universally effective (Armour-Forse, Bramble, & McQuillan, 2011; Coburn & Gage-Croll, 2014; Sheppard, Williams, & Klein, 2013). One likely explanation for differences in effectiveness is variability in implementation.

Research concerning reasons why TeamSTEPPS is more effectively implemented in some settings than others is relatively scarce. TeamSTEPPS is a complex organization-level intervention, which creates challenges for organizations to adopt and sustain. Given the importance of TeamSTEPPS and its effort to enhance patient care quality and safety, knowledge of what facilitates its implementation into practice is needed to assist health care organizations to choose effective implementation strategies. In this article, we apply the PARIHS framework in studying TeamSTEPPS implementation in 13 small rural hospitals to identify elements that are most closely related to successful implementation. We extend research on the PARIHS framework by exploring the relationship among its subelements and how they relate to different aspects of successful implementation.

Methods

Design

The study used a prospective design.

Setting

Through the Iowa Department of Public Health, annual TeamSTEPPS master trainer training is offered free of charge to critical access hospitals, which are particularly small rural hospitals. We recruited all six hospitals that sent staff to these “train the trainer” sessions in 2011 and all eight hospitals that sent staff to training in 2012. One hospital suspended TeamSTEPPS activities after the first quarter, leaving 13 hospitals in our study sample.

Sample

We visited each participating hospital quarterly to gather information about implementation processes and outcomes. During each quarterly visit, semistructured interviews averaging 30–45 minutes were conducted with key personnel for the TeamSTEPPS implementation. This usually involved several staff who had attended TeamSTEPPS master trainer training plus an executive sponsor who supported the team in their efforts. Across the 13 hospitals and three quarters, 130 interviews were conducted with 73 individuals. The job positions of the interviewees in each of the 13 hospitals are shown in Table 1.

Data Collection/Instruments

Interviewers gathered information on how implementation events such as planning, training, and tool implementation were proceeding; facilitators and barriers; outcomes; and factors affecting progress. As shown in Table 2, the interview guide tracked progress generally and did not specifically probe about PARIHS framework content. All interviews were conducted by four faculty researchers with extensive experience in conducting interviews with health care personnel. Transcriptions of interview recordings were anonymized by masking all hospital and interviewee identities before analysis. The research protocol was approved by the University of Iowa Institutional Review Board.

We adopted a two-part approach to analyzing the data obtained through the interviews. First, to clarify the nature of the PARIHS elements related to TeamSTEPPS implementation in small rural hospitals, we identified exemplar quotes to capture thoughts and experiences. Second, to better understand patterns in the interview data, we coded constructs and enumerated relationships.

As shown in Tables 3, 4, and 5, we identified exemplar quotes for the three primary elements of the PARIHS framework—evidence, context, and facilitation—as well as the four subelements of each (Kitson et al., 2008). The table also provides a clear definition of each component. Exemplar quotes were specifically identified by a set of coders, consisting of one advanced undergraduate, two graduate students, and a staff researcher, who were trained to identify and extract relevant quotes for the 12 subelements using directed content analysis (Hsieh & Shannon, 2005). Two coders independently identified and compiled lists of quotes

for each subelement, and then two coauthors rated the quotes based on the richness of information they provided.

We assessed patterns in the interview results through additional coding. Coding forms were derived, which listed constructs and definitions for each subelement, as shown in the first column of Tables 3, 4, and 5. A separate set of coders, consisting of three advanced undergraduates, one graduate student, and one nurse consultant, were trained to examine the interview transcripts and identify evidence of the PARIHS framework using directed content analysis and quantizing (Hsieh & Shannon, 2005; Sandelowski, 2001; Sandelowski, Voils, & Knafl, 2009). For each hospital, three coders independently assigned a score ranging from 0 (*no evidence*) to 4 (*high evidence*) for each of the 12 subelements of the PARIHS framework. A higher score indicates that a subelement is highly evident in a hospital's experience with TeamSTEPPS implementation as reflected in the interviews. Scores were averaged across the three coders.

We also coded the outcome element of the PARIHS framework—successful implementation. The originators of the PARIHS framework have been relatively mute on how to measure successful implementation, but Stetler and colleagues developed a guide for measuring this element for evidence-based practice implementations (Stetler et al., 2011). Consistent with their suggestion that successful implementation involves development of an implementation plan, TeamSTEPPS requires implementation teams to develop a TeamSTEPPS Action Plan and specifies 10 steps the plan should include (TeamSTEPPS Implementation Guide, 2015). Thus, for successful implementation, coders independently scored each hospital on its planning activities. To do so, the 10 steps of the TeamSTEPPS Action Plan were broken down into 16 specific items, spanning four planning phases, which constituted the subelements for planning activities. The four subelements were problem identification (why the interventions chosen are needed), intervention design (what specifically will be done and how it will be measured), implementation strategy (how it will be done), and reinforcement plan (how to communicate and engage key people). Scores of 1 for “yes” or 0 for “no” were assigned to each item indicating whether a planning activity was completed. Item scores were then summed to create subelement scores, ranging from 0 to 4. The summary planning activities score was calculated as an average of subelement scores.

Validity and Reliability

Standards for evaluating and scoring subelements of the PARIHS framework were discussed among the coauthors and coders, and coders worked independently once agreement to standards was ascertained. Coders met weekly with the coauthors to review coding agreement and discuss issues that arose. The coauthors reviewed and reconciled differences in data with the coders to assure that the coding accurately reflected the framework constructs. Intraclass correlations (LeBreton & Senter, 2008) were computed between pairs of coders and ranged from .51 to .90 with summary score values of .83, .78, .85, and .89 for evidence, context, facilitation, and planning activities, respectively.

Analysis

Scores for the three PARIHS elements (evidence, context, and facilitation) and successful implementation (planning activities) were analyzed with descriptive statistics, and then relationships between predictor and dependent variables were identified with bivariate regression analysis using SAS Version 9.3. Because of the small sample size ($N=13$) and clearly expected positive relationships, one-tailed tests with $p < .05$ were accepted as evidence of a connection.

Findings

The distribution of scores indicated a range of values across the sample of 13 hospitals. The means and standard deviations across hospitals for each of the PARIHS primary elements (reflected in summary scores) and subelements are shown in Table 6. For PARIHS elements, the summary scores from the interview content indicated the highest level for facilitation (2.52), followed by context (2.27), and lowest for evidence (1.77). For successful implementation, the planning activities scores showed considerable variability across subelements. In particular, problem identification (3.32) had the highest score followed by intervention design (2.12), whereas implementation strategies and reinforcement plan were scored considerably lower (0.96 and 0.65, respectively).

As shown in Table 7, bivariate regression analysis yielded a number of relationships between descriptions of the PARIHS elements and descriptions of successful implementation. Among the three PARIHS elements, both facilitation and context showed significant relationships with planning activities, but none emerged for evidence. In particular, for context, the leadership subelement was related to the need subelement of planning activities, and the context summary score was related to the intervention design subelement of planning activities. For facilitation, multiple relationships were identified between facilitation subelements and planning activities subelements, particularly the problem identification and intervention design subelements. Likewise, the facilitation summary score and the planning activities summary score were related to each other and to multiple subelements.

Discussion

Research findings about what facilitates the implementation of evidence-based quality improvement interventions are needed to assist health care organizations in developing implementation strategies. The PARIHS framework (Kitson et al., 1998, Rycroft-Malone et al., 2002; 2008) has considerable face validity and conceptual relevance for examining implementation of quality improvement interventions in health care settings. The three predictors of successful implementation—evidence, context, and facilitation—in the PARIHS framework were identified from a considerable body of theory and research. However, as summarized in a systematic literature review (Helfrich et al., 2010), evidence directly testing the PARIHS framework is limited and indeed difficult to obtain given that samples of multiple settings undertaking a common intervention are rare.

For the current study, the PARIHS framework was applied to studying the process by which 13 small rural hospitals implemented TeamSTEPPS. The first step in our analysis examined

the extent to which each of the PARIHS framework elements was discussed by those involved in TeamSTEPPS as evident in their hospital's implementation experience. Our analysis indicated that the implementation of TeamSTEPPS in small rural hospitals reflected all three predictor elements, although these hospitals exhibited greater discussion of facilitation and context and less discussion of evidence in promoting implementation. An analysis of subelements showed that all components of facilitation and context were rated relatively high, but for evidence, the subelement of research was rated low compared with other subelements. This lack of reliance on evidence may have resulted from the nature of TeamSTEPPS, which (a) was built on largely nonclinical evidence (i.e., teamwork and change management) that is beyond the implementation teams' expertise and (b) was established by national institutions such as AHRQ and accepted by the hospitals as an "evidence-based" approach. Thus, establishing and assessing research evidence supporting its usage were not the focus of the implementation teams. The prominent presence of facilitation and context elements in the implementation of TeamSTEPPS is partly because of the unique environment in which small and rural hospitals operate their quality improvement initiatives. Small and rural hospitals often have inadequate infrastructures and resources to support quality improvement activities (Casey & Moscovice, 2004; Paez, Schur, Zhao, & Lucado, 2013). For a large, complex intervention like TeamSTEPPS, these hospitals' implementation context is uniformly weak. Thus, facilitation activities that transform the weak context into a strong context are particularly important for successful implementation in this environment (Kitson et al., 2008).

A particular challenge in examining the PARIHS framework is the limited research on how to define and measure successful implementation, the framework's dependent variable. We adopted a guide published recently (Stetler et al., 2011) to capture successful implementation, breaking it into planning activities components using the TeamSTEPPS Action Plan as a guide. Planning activities codes showed considerable variability across subelements, with low scores for some subelements indicating that hospitals engaged in some initial planning steps but few hospitals showed evidence of more sustained planning. Shortcomings in planning have been particularly acknowledged in previous studies using the PARIHS framework (Sharp, Pineros, Hsu, Starks, & Sales, 2004). Further research using the PARIHS framework needs to provide clear definitions of how successful implementation is conceptualized, although it is likely to vary across studies depending on the type of quality improvement activity that is implemented.

A second aspect of our analyses examined patterns of relationships in the interview data. We specifically identified multiple components of the PARIHS framework that were related to successful implementation of TeamSTEPPS planning activities. In their systematic literature review of studies using the PARIHS framework, Helfrich et al. (2010) identified only a few studies that examined the nature of dynamic relationships among components. In two case studies, Rycroft-Malone et al. (2004) found support for all three PARIHS components. Two studies examining nursing utilization of research found that both context and facilitation played a role in promoting implementation (Cummings, Estabrooks, Midodzi, Wallin, & Hayduk, 2007; Estabrooks, Midodzi, Cummings, & Wallin, 2007) as did a study of implementing evidence-based practice (Ellis, Howard, Larson, & Robertson, 2005). Sharp et al. (2004), in their study of six Veterans Health Administration medical centers, found that

context was the strongest component predicting successful implementation. Thus, previous research has found support for all three components separately, with the strongest previous support for context and facilitation, as we also observed.

The importance of facilitation in implementation has been supported by previous research (Ellis et al., 2005; Harvey et al., 2002; Kitson et al., 1998; Rycroft-Malone et al., 2004; Sharp et al., 2004). In the PARIHS model, facilitation is placed on a continuum from being task-oriented to being holistic. It is often equated with identifying clinical practice champions as content experts; however, facilitators in our hospitals more frequently took on project management roles. Sharp et al. (2004) studied barriers to implementation and recommended that a recognized leader be assigned the responsibility for coordinating activities and facilitating communication. Consistent with this recommendation, hospitals in our study that showed progress in implementing TeamSTEPPS often had designated facilitators who operated as coordinators.

Practice Implications

These findings hold important implications for small rural hospitals. First, the originators of the PARIHS framework indicate that all three components must be present for successful implementation to take place. Our findings suggest that this is not necessarily true. In particular, our analyses indicated that none of the facets of successful implementation were related to evidence. This is potentially important for small rural hospitals that may face extra challenges in establishing evidence, which involves deriving knowledge from a variety of tested and credible sources that support the effectiveness of the intervention. Staff in small hospitals often lack time and skills to evaluate the evidence base of the intervention by themselves (Ellis et al., 2005; Milner, Estabrooks, & Myrick, 2005; Rycroft-Malone et al., 2004). Our findings strongly indicate that, in hospitals with a less supportive evidence base, good facilitation can help overcome weak organizational resources for establishing evidence. Carefully selected facilitators with the right knowledge and skills, such as nurse educators (Milner et al., 2005), can help bridge the gaps between research and practice. Although it takes time and effort to change the elements of context, a well-developed facilitation approach can both drive the change process as well as contribute to transformation of the organization. Finally, with facilitation also playing an important role for sustaining the efforts (Conklin & Stolee, 2008), it is important to consider the implication of turnover among facilitators.

The findings from the current study show considerable support for the PARIHS framework; however, limitations must be recognized. First, successful implementation has not been clearly defined by the originators of the PARIHS framework and is thus subject to variation in how it is operationalized across studies. Second, how components of the framework are analyzed in qualitative research is always subject to judgment. Third, implementation studies often involve relatively small samples, which in our study, limited power for statistical analysis. Balancing these limitations are several strengths in the current study. First, the use of a clear conceptual framework permitted relationships to be explored and linked to existing research. Second, the sample size of 73 interviewees at 13 hospitals provided a wealth of data for analysis. Third, the implementation being examined—TeamSTEPPS—is being

widely promoted for enhancing patient safety, which increases the significance of the findings presented here. Finally, studying factors that promote implementation in hospitals that are motivated to undertake quality initiatives have ready applicability in health care practice.

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Table 1

Characteristics of interviewees at the 13 hospitals studied

Hospital	Total number of interviews	Interviewees with executive positions	Interviewees with nonexecutive positions
1	3 single interviews	1 Patient Care Coordinator	1 Registered Nurse
2	3 interviews: 3 group interviews (9 interviewees)	1 Director of Nursing 1 Director of Senior Services 1 Director of Emergency Services 1 Director of Quality	1 Registered Nurse 1 Radiology Technician 1 Operating Room Manager 1 Clinic Support Services 1 Radiology Services 1 Surgical Services 1 Medical/Surgical 1 Registered Nurse
3	8 single interviews	1 Director of Nursing	
4	8 interviews: 1 group interview (4 interviewees) and 7 single interviews		
5	9 single interviews	1 Chief Executive Officer 1 Director of Nursing 1 Director of Quality 1 Director of Laboratory	
6	9 interviews: 2 group interviews (4 interviewees) and 7 single interviews	1 Director of Nursing 1 Director of Clinical Quality 1 Director of Laboratory	2 Registered Nurses 1 Respiratory Therapist
7	10 single interviews	1 Director of Inpatient Services 1 Director of Outpatient Services	2 Quality Services
8	10 interviews: 1 group interview (2 interviewees) and 9 single interviews	1 Director of Quality	1 Emergency Department/Services and Satellite Clinic Manager 1 Patient Safety/Infection Control
9	13 single interviews	1 Director of Quality and Patient Safety 1 Assistant Director of Quality 1 Director of Professional Development	2 Registered Nurses 1 Licensed Practical Nurse
10	13 interviews: 4 group interviews (5 interviewees) and 9 single interviews	1 Director of Nursing	2 Registered Nurses 1 Medical Records 1 Quality/Utilization Review 2 Registered Nurses
11	13 interviews: 2 group interviews (6 interviewees) and 11 single interviews	1 Chief Executive Officer	

Hospital	Total number of interviews	Interviewees with executive positions	Interviewees with nonexecutive positions
12	13 interviews: 2 group interviews (8 interviewees) and 11 single interviews	1 Director of Nursing	1 Emergency Room Manager 1 Operating Room Manager 4 Registered Nurses 4 Nonclinical Services 2 Quality Specialists 2 Pharmacy 2 Diagnostic Imaging 1 Medical Records 4 Registered Nurses
13	19 single interviews	1 Chief Clinical Officer 1 Quality Coordinator 1 Outpatient Surgery Center Coordinator	

Table 2

Interview guide

Initial quarter interview guide	
1	Can you share with us how your hospital decided to engage TeamSTEPPS?
2	How was the decision made about who would represent the hospital at the TeamSTEPPS training?
3	What were the goals/expectations as plans were developed for TeamSTEPPS?
4	What planning activities occurred prior to the TeamSTEPPS training?
5	What planning activities occurred since the TeamSTEPPS training?
6	What implementation plans have been identified for TeamSTEPPS?
7	What has been the extent of progress/activity since the team returned from TeamSTEPPS training?
8	What is the level of administrative support for TeamSTEPPS?
Follow-up quarterly interview guide	
1	Have the goals or expectations related to TeamSTEPPS changed in the past 3 months?
2	What planning activities have occurred since our last visit?
3	Has any (additional) TeamSTEPPS training occurred in the hospital? If so, what and when?
4	What implementation activities have occurred since our last visit?
5	Have evaluation activities occurred?
6	What has been the extent of progress/activity since our last visit?
7	Has TeamSTEPPS spread or been sustained?
8	What is the level of administrative support for TeamSTEPPS?
9	Has the vision for TeamSTEPPS changed, if so how?

Table 3

Selection of exemplar quotes for the evidence subelement of the PARIHS framework

Evidence: knowledge derived from a variety of sources that have been subjected to testing and have been found to be credible	
Research	Exemplar quotes
Concept and components	
• Well-conceived, designed, and executed research appropriate to the research question	• "TeamSTEPPS gives us the framework to build on the science behind the reason so that's really where it fit into our plan, from an organizational standpoint, because there's nothing else that is good, solid, science-based performance improvement for an entire facility."
• Lack of certainty acknowledged	• "[TeamSTEPPS] really gives us the science that we need to prove to the clinicians that it works because we've tried to get hourly rounding up and going and some of the fall prevention things from a clinical standpoint and they're very tough sells because there's no science behind it."
• Social construction acknowledged	
Specific items related to concept	
• The research evidence is of sufficiently high quality.	
• The research evidence fits with my understanding of the issue and is useful in thinking about the issue.	
• There is consensus among my colleagues about the usefulness of this research to this issue.	
Clinical experience	
Concept and components	
• High levels of consensus	• "It's called service of safety round table and what I asked the PI to do was get some volunteers that were just staff people, to take on the responsibility to meet every month and bring to the table where they identify safety issues within the facility from either a patient perspective or a staff perspective."
• Clinical experience and expertise reflected on, tested by individuals and groups	• "One of the things that you would have to measure is staff satisfaction. You've got to make sure that there's a balance. You might think it's a great program, but if staff hate it, so you know you've got to have them on board."
• Judged as relevant	
Specific items related to concept	
• Staff have shared and critically reviewed clinical experience in relation to this issue.	
• There is a consensus of (clinical) experience about this issue.	
• The consensus of clinical experience fits with staff understanding of the issue and is useful in thinking about the issue.	
Patient experience	
Concept and components	
• Valued as evidence	• "And then we do an internal customer satisfaction and that's through the roof as well so it's all about the customer here. It's all about the patient here so that's a different feel just in and of itself."
• Multiple biographies used	

Evidence: knowledge derived from a variety of sources that have been subjected to testing and have been found to be credible		
Research	Exemplar quotes	
<ul style="list-style-type: none">Partnerships with health care professionals	<ul style="list-style-type: none">“I’ve seen the patient calls increase. I’m having greater participation. The other thing, our patient satisfaction, you can see exactly when we did it, our scores just shot straight up.”	
Specific items related to concept		
<ul style="list-style-type: none">Staff routinely (and systematically) collect users’/patients’ experiences about this particular issue.		
<ul style="list-style-type: none">The evidence of patients’ experiences fits our understanding of the issues and is useful in thinking about the issue.		
<ul style="list-style-type: none">There is a consensus among staff about the usefulness of patient experiences to this issue.		
Information/data from local context		
Concept and components		When we did the Patient Safety Culture Survey that reaffirmed what we thought was the case. The two areas that we scored the lowest in were teamwork and communication, so we’re on track with that.”
<ul style="list-style-type: none">Valued as evidence	<ul style="list-style-type: none">	“I think we’ve done a better job about auditing and being sure that what we put in place stays in place, or at least that we modify it to even fit better than our original thoughts.”
<ul style="list-style-type: none">Collected and analyzed systematically and rigorously evaluated and reflected on	<ul style="list-style-type: none">	
Specific items related to concept		
<ul style="list-style-type: none">Data/information is routinely (and systematically) collected about this issue.		
<ul style="list-style-type: none">The data/information from the local context fits with our understanding of the issue(s) and is useful in thinking about the issue.		
<ul style="list-style-type: none">There is a consensus among staff about the usefulness of the information/data from the local context for this issue.		

Table 4

Selection of exemplar quotes for the context subelement of the PARIHS framework

Receptive context	Exemplar quotes
Context: the environment or setting in which the proposed change is to be implemented	
Concept and components	
• Boundaries clearly defined and acknowledged	• “We want to bring the TeamSTEPPS in as well to become part of our culture. We establish organizational goals every year. We want to focus on safety and quality and so TeamSTEPPS we believe will help us get there.”
• Human/financial/technological/equipment: resources appropriately allocated	• “We’ve thrown a lot of money into culture. If we’re going to alter our culture, we’ll be talking to the administration, they’re going to have to throw resources, maybe not straight out in dollars.”
• Initiative fits with strategic goals and is seen as a key priority	
Specific items related to concept	
• The organization provides access to the appropriate/useful professional networks, skills, and knowledge to implement this intervention successfully.	
• There are sufficient human resources, financial resources, and physical resources (location and equipment) to implement this intervention successfully.	
• The intervention fits with the strategic intent and goals of the organization.	
Culture	
Concept and components	
• Learning organization	• “I think that we really do have a quality driven culture. We want to do the best care that we can give. So TeamSTEPPS is a set of tools that it’s really easy to blend into our existing culture because we already have a culture of trying to be the best that we can be.”
• Values individual staff	• “So that’s where our culture, the foundation, is there. The work that we did over the years has really embedded a lot of the things in our culture and our performance.”
• Consistency of individual role/experience to value:	
– team work	
– power and authority	
– rewards/recognition	
Specific items related to concept	
• This organization values innovation and embraces change.	
• This organization values staff as individuals.	
• This organization values open communication and dialogue.	
• There is a culture of continuous improvement in this organization and with our immediate.	

Context: the environment or setting in which the proposed change is to be implemented	
Receptive context	Exemplar quotes
Leadership	
Concept and components	
<ul style="list-style-type: none"> • Role clarity, effective teamwork • Effective organizational structures • Democratic, inclusive decision making • Enabling/empowering approach to learning/teaching/managing 	<ul style="list-style-type: none"> • "We've identified some key players from other departments to be stakeholders or champions." • "We have a good mix of front-line staff, some management individuals, and of course, some administrators and then some medical staff. The five of us talked about who was engaged, who were leaders in the organization, who would role model the tools and help us implement them, support them."
Specific items related to concept	
<ul style="list-style-type: none"> • Staff are clear what their role is in the implementation of this initiative. • Staff work within an effective team. • Staff have been involved in determining how this initiative is going to be implemented. • Staff have been able to develop new skills through this process. 	
Evaluation	
Concept and components	
<ul style="list-style-type: none"> • Feedback on individual/team/system performance • Use of multiple sources of information on performance • Range of measures are collected by staff 	<ul style="list-style-type: none"> • "We've got a dashboard for the clinic, which is also included in the scorecard. It's board meetings, team leader meetings, and all-staff meetings once a month. We go through the balanced scorecard so people understand what we're measuring, what's important." • "That's what helps us. If you do this stuff and then you just go on, it falls off. If you do it, and you at least have some data to measure then we see we either are or aren't. If we're not, it just gives you something more tangible to feel like you are working with."
Specific items related to concept	
<ul style="list-style-type: none"> • Staff have routine mechanisms in place to collect data on individual performance, team performance, and system performance. • Multiple sources of evaluation are used routinely in my workplace. • This type of evaluative information is routinely used to improve and change practice. • The external data we collect are used by us to inform and improve our everyday practice. 	

Table 5

Selection of exemplar quotes for the facilitation subelement of the PARIHS framework

Facilitation: Facilitation refers to the process of enabling (making easier) the implementation of evidence into practice. Facilitation is a process that depends on the person (the facilitator) carrying out the role with the appropriate skills, personal attributes, and knowledge	
Role of facilitator	Exemplar quotes
Concept and components	
• Access	• “I probably am the resource person for our TeamSTEPPS. I have the time to go in and find the websites and find the information and then disseminate that out to them and then also helping them look at the quality portion of that and how do we work through that process?”
• Authority	• “We sat in one of our meetings and said what do you want your job to be to help roll this out? And without any pushing she said I will do unit meetings and introduce it to staff and so that was her role. I mean she chose that role.”
• Change agent	
• Successfully negotiated	
• Enabling others	
Specific items related to concept	
• An appointed activity played by an individual	
• An individual enacting a specified purpose relative to implementation, employing a broad spectrum of mechanisms.	
Goal and purpose	
Concept and components	
• Purpose	• “We’re looking for an easy win. Because then you get other people cheering you on and see it can work. So we want to start small and get a quick win and then go bigger.”
Specific items related to concept	• “We thought a lot about the teamwork building things everyone could benefit from. They’re aware that patient safety is something that needs to be focused on.”
• Task focused: providing help and support to achieve a goal -OR-	
• Holistic focused: enabling individuals and teams to analyze, reflect, and change their own attitudes, behaviors, and ways of working	
Characteristics and style	
Concept and components	
• Respect	• “Well, because I really want to be more of the coach. I really want them to empower themselves to make some of these changes. I really want them to start coming up with the ideas and implementing some of these things. I want them to say what do you think?”
• Empathy	• “So just to know that they have somebody backing them up, and try to teach them. Especially charge nurses, have their backside and they need to have your backside. It’s just somebody there for them.”
• Authenticity	
• Credibility	
• Range and flexibility of style	

Facilitation: Facilitation refers to the process of enabling (making easier) the implementation of evidence into practice. Facilitation is a process that depends on the person (the facilitator) carrying out the role with the appropriate skills, personal attributes, and knowledge		
Role of facilitator	Exemplar quotes	
<ul style="list-style-type: none">Consistency and appropriate presence and support		
Specific items related to concept		
<ul style="list-style-type: none">It is achieved by an individual carrying out a specific role (a facilitator), who aims to help others. This suggests that facilitators are individuals with the appropriate roles, skills, and knowledge to help individuals, teams, and organizations apply evidence into practice.		
Skills and attributes		
Concept and components		
<ul style="list-style-type: none">Authenticity, realness, opennessRespected and general credibilityResponsiveness and reliabilityOrganizing skillsProblem-solving skills	<ul style="list-style-type: none">• “She makes sure that these things are high priority on their list and that it gets done and she runs a good show back there. She’s it.”• “It’s important to validate because it gives you an opportunity to coach too. Gives you that follow through to check back with them and give them some feedback, both positive and maybe some constructive.”	
Specific items related to concept		
<ul style="list-style-type: none">The ability to perform required tasks and the possession of characteristics that enable implementation of role expectations and activities		

Table 6

Scores for PARIHS framework main elements and subelements in 13 hospitals

PARIHS framework elements (predictor variables)	Mean score (0–4)	Standard deviation
Evidence summary score	1.77	0.36
Research	0.81	0.78
Clinical experience	2.58	0.57
Patient experience	1.46	0.88
Information/data from local context	2.23	0.83
Context summary score	2.27	0.58
Receptive context	1.85	0.63
Culture	2.73	0.93
Leadership	2.25	0.88
Evaluation	2.23	0.81
Facilitation summary score	2.52	0.89
Role of facilitator	2.58	1.00
Goal/purpose	2.41	1.00
Characteristics/style	2.62	1.00
Skills/attributes	2.46	1.20
Planning activities (dependent variable)	Mean score (0–4)	Standard deviation
Planning activities summary score	1.76	0.73
Problem identification	3.32	1.09
Intervention design	2.12	0.85
Implementation strategy	0.96	1.14
Reinforcement plan	0.65	0.58

N = 13 hospitals. PARIHS = Promoting Action on Research Implementation in Health Services.

Table 7

Bivariate relationships between PARIHS framework predictor elements and successful implementation planning activities elements in 13 hospitals

	Planning activities subelements and summary score				
	Problem identification	Intervention design	Implementation strategy	Reinforcement plan	Planning summary score
Evidence					
Research	.326	.163	.201	-.145	.22
Clinical experience	.185	.454	.387	.24	.402
Patient experience	.289	-.162	-.23	.152	.001
Information/local data	-.435	.137	.141	-.093	-.086
Evidence summary score	.176	.251	.206	.056	.232
Context					
Receptive context	.232	.036	-.154	-.071	.023
Culture	.218	.442	.166	.321	.34
Leadership	.509*	.474	.247	.142	.455
Evaluation	.255	.355	.439	.261	.424
Context summary score	.432	.49*	.271	.254	.462
Facilitation					
Role of facilitator	.556**	.656**	.477*	.08	.604**
Goal/purpose	.291	.671**	.544*	.222	.564**
Character/style	.532*	.646**	.276	.177	.532*
Skills/attributes	.359	.519*	.257	.111	.409
Facilitation summary score	.51*	.731**	.452	.172	.617**

N = 13 hospitals. PARIHS = Promoting Action on Research Implementation in Health Services.

* $p < .10$, two tailed; $p < .05$, one tailed (cutoff $r > .476$).

** $p < .05$, two tailed; $p < .025$, one tailed (cutoff $r > .553$).