



Chapter Title: Introduction and Background

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Book Author(s): Donna O. Farley, Melony E. Sorbero, Susan L. Lovejoy and Mary Salisbury

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Introduction and Background

Research Objectives

This study was designed to document and learn from the experiences and outcomes of five hospital labor and delivery (L&D) units as they implemented improvements in their teamwork practices over a one-year period. The study had the following objectives:

- *Objective 1:* Better understand the conditions and actions required for hospital L&D units to achieve effective and sustainable teamwork practices.
- *Objective 2:* Assess the extent to which successful adoption of teamwork practices may influence the experiences of staff working in the units and outcomes for patients.

It is well documented in the quality-improvement (QI) literature that successful implementation of new or improved health-care practices requires commitment and perseverance by the providers carrying out the implementation, coupled with well-designed intervention strategies (Kuperman et al., 1991; Messina, 1997; Larson, 2002; Lindenauer et al., 2004; Pronovost and Holzmueller, 2004). It also is understood that many patient-safety practices are system-level interventions that involve multiple actions functioning collectively to achieve effective practice adoption (Leape, Brennan, et al., 1991; Leape, Berwick, and Bates, 2002; Farley et al., 2007, Chapter Four).

Teamwork practices, also referred to as *team-based care*, represent one system-level patient-safety practice. Using a system theory model, team-based care encompasses team inputs, team processes, and team outputs, all of which occur over time. Team inputs include the characteristics of the tasks to be performed, the elements of the context in which work occurs, and the attitudes that its members bring to a situation involving teamwork. Team processes are team interactions and coordination necessary to achieve specific goals. Team outputs consist of products derived from the team's collective efforts (McGrath, 1984; Hackman, 1987; Ilgen, 1999).

To meet our research objectives, we designed this study to address both the multifaceted nature of team-based care and the known requirements for successful implementation. We sought to examine the underlying relationships between teamwork training provided to staff in the L&D units and the subsequent actions that the L&D units implemented to improve their teamwork practices (with the goal of achieving strong, team-based care). We specifically wanted to understand which aspects of the implementation strategies and actions appeared to be most important to achieve successful adoption of the teamwork practices, and to assess effects of those practices on relevant outcomes.

Background

The Value of Teamwork in Health-Care Delivery

Inadequate teamwork and communication during provision of health-care services have been identified as important factors in adverse events that occur for patients. For example, many adverse events are related to communication failures and errors in patient hand-offs (e.g., from one department to another during an inpatient stay, or from one provider to another in ambulatory care), which could be prevented by use of effective teamwork practices, including structured communication methods (Petersen et al., 1994; Kachalia et al., 2007; Arora et al., 2007).

Recognizing the importance of teamwork and communication in medical care and patient safety, and their omission from medical training, the Institute of Medicine (IOM) noted in its report *To Err Is Human: Building a Safer Health System* (Kohn, Corrigan, and Donaldson, 2000) that approaches to developing effective teams were an area needing the attention of the Agency for Healthcare Research and Quality (AHRQ) and private foundations. The IOM has also recommended establishing patient-safety programs that provide “interdisciplinary team training programs for providers that incorporate proven methods of team training, such as simulation.”

Teamwork is a sustained effort performed using a shared set of teamwork skills, although it does not require team members to work together permanently (Morey, Simon, Jay, Wears, et al., 2002). Installation of a team structure in an organization, however, does not automatically result in effective teamwork. Effective team performance requires that team members be willing to cooperate in pursuing a shared goal, such as patient safety. Effective teamwork also depends on effective communications within the team, adequate organizational resources and support, and shared acknowledgement of each participating member’s roles and abilities (McGrath, 1984; Campion, Medsker, and Higgs, 1993; Stevens and Campion, 1994).

Although numerous models of effective teamwork exist, recent models focus on the specific competencies that individual team members need to possess to engage successfully in teamwork (Cannon-Bowers et al., 1995). Three types of competencies have been identified as being critical for effective teamwork: (1) teamwork-related knowledge, (2) teamwork-related skills, and (3) teamwork-related attitudes (Cannon-Bowers et al., 1995; Stevens and Campion, 1994; O’Neil, Chung, and Brown, 1997).

An important reference point for health-care teamwork models has been the crew resource management (CRM) concept that has been widely used in aviation to improve flight safety. CRM is a training model that emphasizes the role of human factors in high-risk, high-stress environments, which can apply to many health-care situations. The scientific evidence for application of CRM teamwork principles to medicine was examined in the patient-safety evidence report *Making Health Care Safer: A Critical Analysis of Patient Safety Practices* (AHRQ, 2001), which evaluated current evidence regarding the effectiveness of a total of 79 patient-safety practices.

The evidence report rated the evidence for teamwork practices as being at a level of lower impact or strength of evidence (the other three rating categories were highest, medium, or lowest impact or strength of evidence). It found that, as of 2001, most studies of CRM and other teamwork practices focused on the quality of teamwork training and that no evidence was available yet that linked improvements in team performance to better safety outcomes. The report also indicated that further research on teamwork practices was likely to be beneficial (the other category was likely to be highly beneficial) (AHRQ, 2001). Subsequent research

has generated additional findings that address teamwork practices, although evidence regarding teamwork's effects on improvements in patient-safety outcomes continues to be limited (Sorbero et al., 2008).

The National Quality Forum has identified team-based care as one of 30 practices included in its list of safe practices, which was first established in 2003 and has been updated twice since then (NQF, 2003, 2007, 2009), thus making such care a priority for implementation by U.S. health-care providers. In addition, AHRQ has developed a toolkit to support providers in implementing TeamSTEPPS, a model of teamwork originally developed by the U.S. Department of Defense (DoD) that has been used by hospitals across the United States (AHRQ, undated; Morey, Simon, Jay, and Rice, 2002; Morey, Simon, Jay, Wears, et al., 2002).

The MedTeams and TeamSTEPPS Systems

MedTeams and TeamSTEPPS are two generations of a health-care teamwork model developed based on CRM principles (Morey, Simon, Jay, and Rice, 2002; Morey, Simon, Jay, Wears, et al., 2002). The two models are closely similar, with TeamSTEPPS being a more-recent refinement of the MedTeams model. MedTeams/TeamSTEPPS is an evidence-based teamwork system to improve communication and teamwork skills among health-care professionals. Some of the L&D units participating in this study worked with the MedTeams model, which was in use at the time they first became involved in teamwork improvement, and others worked with the more-recent TeamSTEPPS model. The training provided to all the L&D units at the start of this study used the TeamSTEPPS model.

The model contents consist of a set of basic teamwork competency sets that should be in place in an organization, along with a set of specific teamwork practices through which the teamwork competencies can be achieved. The models are compared in Table 1.1, organized according to a set of criteria for effective teamwork training (Salas, Rhodenizer, and Bowers, 2000). The two models are similar, with only minor differences seen in their sets of key competencies and the specific teamwork practices.

We organized our data collection for the evaluation based on the TeamSTEPPS competencies and teamwork practices. The four basic competency sets of teamwork specified in TeamSTEPPS are defined as follows (DoD, 2005):

- *leadership*: the ability to direct and coordinate the activities of other team members
- *situation monitoring*: the process of actively scanning situational elements to gain awareness of the situation in which the team functions
- *mutual support*: the ability to anticipate and support other team members' needs through accurate knowledge about their responsibilities and workload
- *communication*: the process by which information is clearly and accurately exchanged among team members.

The teamwork practices to be applied to achieve successful performance in the four teamwork competencies are as follows (DoD, 2005):

- team huddle/brief
- status of patient, team members, environment, and progress (STEP)
- debriefs
- the two-challenge rule

Table 1.1
Comparison of TeamSTEPPS and MedTeams, Organized by Criteria for Assessing Teamwork Training Programs

Training Criterion	TeamSTEPPS	MedTeams
Behavior-based curriculum	4- to 5-hour training	6-hour training
Provides tools and approaches for measuring teamwork	Patient and staff satisfaction AHRQ surveys on patient-safety culture	Patient and staff satisfaction Team behavior observations
Utilizes scenario-based training	Real-case vignettes Videotaped vignettes	Real-case vignettes
Evaluates training	Course evaluation	Course evaluation
Instills principles of practice and feedback	Real-case vignettes Practical application activities Scenario-based role play and coaching practicum	Real-case vignettes Test-your-knowledge activities Scenario-based role play and coaching practicum
Utilizes an enterprise view of training effectiveness	Training and evaluation performed locally but monitored and managed centrally	Training and evaluation performed locally but monitored and managed centrally
Instills principles of teams and teamwork	Train-the-trainer model, CRM-based Key competencies: leadership, situation monitoring, mutual support, communication Teamwork practices: team huddle/brief, debriefs, STEP, two-challenge rule, DESC script, collaboration, SBAR, call-outs, check-backs, hand-off techniques	Train-the-trainer model, 11 CRM-based Key competencies: team structure and formation, planning and problem-solving, communication, workload management, improve team skills Teamwork practices: team structure and meeting, situation awareness, shared mental model, cross-monitoring, two-challenge rule, check-back, task assistance, teamwork review, situational teaching and learning, peer coaching

- describe, express, suggest, and consequences (DESC) script
- collaboration
- situation, background, assessment, and recommendation (SBAR)
- call-outs
- check-backs
- hand-off techniques.

Each of the practices is mapped to one of the four basic teamwork competencies, thus providing an implementation structure for health-care providers. These specific teamwork practices are described in Appendix A.

A Clinical Trial That Tested Teamwork Practices

The need for additional evidence regarding the effectiveness of team-based care was addressed in a cluster-randomized control trial conducted from 2002 through 2004. This study assessed the effects of teamwork training for L&D teams on patient safety and other outcomes for mothers and their newly delivered infants (Nielsen et al., 2007).

That study was performed to validate the MedTeams teamwork training system in the L&D setting. DoD, Beth Israel Deaconess Medical Center (BIDMC), and Controlled Risk Insurance Company/Risk Management Foundation (CRICO/RMF) funded the study. L&D units in 15 civilian and military hospitals participated in the study, with the units being randomly assigned to intervention and control groups. L&D staff in the intervention group were trained using a standardized teamwork-training curriculum based on CRM that emphasized communication and team structure. Those in the control group did not receive this training.

This training intervention did not have a detectable effect on the patient outcomes or most of the process outcomes measured in the study (Nielsen et al., 2007). Although the design of this study originally included both outcome analysis and assessment of the teamwork implementation process, the process assessment was dropped due to cutbacks in study funding. Therefore, the study could not assess how the participating hospitals implemented the teamwork practices in which they were trained. As a result, the authors did not have the information they needed in order to explore which factors might be related to the negative outcomes.

Nielsen et al. considered several possible explanations for these negative results, including ineffectiveness of the training, need for more-intensive training, inadequate time allowed for implementation of the practices learned, and inadequate timeline for observing outcome effects. Their subsequent experience in implementing teamwork indicated that nine to 12 months may be required before a significant decline in patient outcomes would be observable (Nielsen et al., 2007).

A central issue of the clinical trial study was that the intervention defined for the study was only the initial teamwork training (with no subsequent implementation support for the L&D units). This issue led to the following specific study design issues:

- After the teamwork training was completed, the intervention sites were left on their own to implement teamwork practices, with no training or support on the QI methods required to make improved teamwork a reality.
- The initial training also was not followed by any subsequent coaching or refresher training on the teamwork practices as the L&D units worked on implementing teamwork improvements.
- The absence of a process evaluation prevented the study team from observing and documenting the extent to which the intervention sites actually implemented teamwork practices following their training.
- Other possible outcomes were not examined, such as changes in care processes, efficiencies, or staff experiences.
- Trends in outcome measures tracked during the study were quite short, so they might not have captured changes in outcomes that require more time to become observable.

Overview of the Evaluation

The evaluation study presented in this report was designed to address the issues that may have contributed to the negative findings of the earlier study. The first three issues are related to the implementation work involved in achieving adoption of improved teamwork practices—lack of support as hospitals implemented teamwork practices, no coaching or refresher training, and absence of a process evaluation. The other two issues relate to limitations of the outcome

analysis of effects of teamwork practices—outcome measures limited to patient outcomes and use of a short timeline for assessing changes in outcomes.

Quality-Improvement Framework

Our evaluation design was based on a QI framework. According to this framework, effective quality improvement comes about through regular, incremental changes in the practices of interest, guided by measurement, monitoring, and feedback on performance (Imai, 1986). Hundreds of articles have been published about specific QI applications for health-care services, which had varying levels of success in achieving their goals. Examples include applications in obstetric care, prescription drugs, primary-care services, emergency departments, radiology, and surgical care (Solberg et al., 1998; Cox, Wilcock, and Young, 1999; Glezerman et al., 1999; Schwab et al., 1999; Gandhi et al., 2000; Harris et al., 2000; Laurila et al., 2001). These experiences have shown consistently that effective implementation is the key to achieving performance improvements. A QI program needs to motivate the staff at each delivery site to plan, execute, and evaluate organizational change.

We combined the QI framework with a case-study approach that allowed us to embrace the natural variation in implementation activities across the participating L&D units, rather than attempting to have the L&D units implement the same intervention. The goal was for all the L&D units to fully implement all the practices included in the teamwork model. However, they were not “locked in” to a uniform set of steps for implementing the model and its specific teamwork practices. Each unit developed and carried out an implementation strategy that it felt worked best for its unit and team, one that would reflect its situation and performance issues.

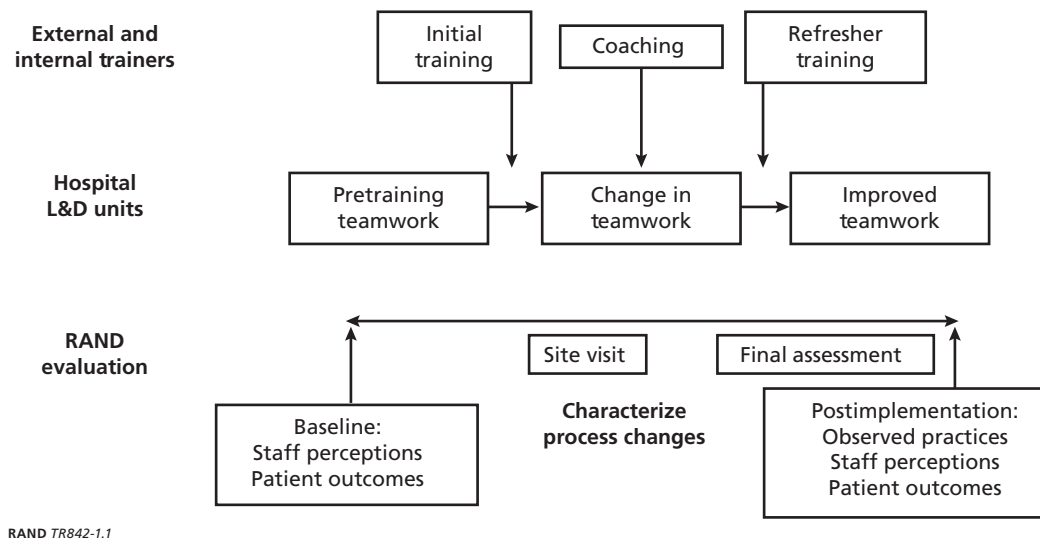
In addition, we chose for participation in the study five L&D units that had made an explicit commitment to improving teamwork practices. We do not believe that this prevented us from examining the generalizability of the evaluation results to other L&D units. Rather, the reference group for generalizability consists of other units that also are committed to these changes. Our rationale is based on the general recognition in QI science that successful adoption of a new practice takes work and perseverance (Kuperman et al., 1991; Larson, 2002; Pronovost and Holzmueller, 2004), and those that do not persevere tend not to achieve improvements.

Relationship Between the Teamwork Implementation and Our Evaluation

We made a distinction between the implementation activities of the participating L&D units and the evaluation we conducted to learn from their experiences. The logic model in Figure 1.1 identifies the steps taken by the hospitals in implementing teamwork improvements and shows how our evaluation related to those activities. The middle row of the model (Hospital L&D units) represents a three-step sequence of teamwork status, starting with baseline status, moving to change in teamwork practices resulting from improvement activities, and ultimately leading to improved team-based care. The top row of the model represents the training provided, including the initial training of unit staff, follow-up coaching, and refresher training over time. Finally, the bottom row of the model represents the approach and data-collection schedule for our evaluation of the implementation process.

For our evaluation, we identified four research questions, two of which addressed each study objective (noted earlier at the beginning of this chapter and repeated below). The first

Figure 1.1
Evaluation Components for the Labor and Delivery Teamwork Implementation Study



objective was addressed by the process evaluation, and the second objective was addressed by the outcome evaluation.

- *Objective 1:* Better understand the conditions and actions required for hospital L&D units to achieve effective and sustainable teamwork practices, by asking the following research questions:
 - What training and actions are required to achieve a high level of teamwork in the L&D process?
 - How strongly do self-reported experiences in implementing teamwork improvements correlate with actual levels of teamwork as measured by direct observation of the L&D process?
- *Objective 2:* Assess the extent to which successful adoption of teamwork practices may influence the experiences of staff working in the units and outcomes for patients, by asking the following research questions:
 - How does achieving effective teamwork affect the perceptions and experiences of staff working in L&D units?
 - What effects does effective teamwork have on L&D outcomes for mothers and newborn infants?

A more detailed description of our study approach and methods appears in Chapter Two.

Organization of This Report

The remaining chapters of this report present the methods (Chapter Two), results (Chapters Three and Four), and conclusions (Chapter Five) of our evaluation. The process-evaluation results are presented in Chapter Three, and the outcome-evaluation results are presented in Chapter Four. The outcome-evaluation results include effects of teamwork implementation on

staff working in the units, and effects on patient outcomes. Chapter Five presents a discussion of our results, draws conclusions from the study, and explores their implications.