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# TECHNICAL REPORT

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## Achieving Strong Teamwork Practices in Hospital Labor and Delivery Units

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Prepared for the Office of the Secretary of Defense

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## Summary

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This study of teamwork-improvement initiatives in hospital labor and delivery (L&D) units was designed to document and learn from the experiences and outcomes of five 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 L&D staff and patient outcomes.

## Background

Inadequate teamwork and communication during health-care delivery contributes to adverse patient events (Petersen et al., 1994; Kachalia et al., 2007; Arora et al., 2007). Teamwork is a sustained effort using shared skills (Morey, Simon, Jay, Wears, et al., 2002). Installing a team structure in an organization, however, does not automatically result in effective teamwork. Effective team performance requires cooperation among team members in pursuing a shared goal, effective communications within the team, adequate organizational resources and support, and shared acknowledgement of participating members' roles and abilities (McGrath, 1984; Campion, Medsker, and Higgs, 1993; Stevens and Campion, 1994).

MedTeams™ and TeamSTEPPS are two generations of a health-care teamwork model based on crew resource management (CRM) (Morey, Simon, Jay, and Rice, 2002; Morey, Simon, Jay, Wears, et al., 2002). The two models are similar, with TeamSTEPPS being a more-recent refinement of the MedTeams model. Both are evidence-based systems to improve teamwork among health-care professionals. These models consist of four teamwork competency sets, along with a set of specific teamwork skills or practices (to which we refer as *practices* in this report). The four competency sets (DoD, 2005) are as follows:

- *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.

## Study Approach and Design

### Basic Study Design

The study design was based on a quality improvement (QI) framework. According to the QI model, effective quality improvement comes about through regular, incremental changes in the practices of interest, guided by measurement, monitoring, and feedback on performance. A successful QI initiative will motivate staff to plan, execute, and evaluate organizational change (Imai, 1986; 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).

The use of the QI framework and a case-study approach allowed us to take advantage of the natural variation in implementation activities across five participating L&D sites. The ultimate goal was for all the L&D units to fully implement all the practices in the teamwork model, regardless of which model (MedTeams or TeamSTEPPS) they chose. Each unit developed and carried out an implementation strategy that it felt worked best for its unit and team and reflected its situation and performance issues. This approach acknowledges that each organization has unique circumstances and needs and, therefore, will be most effective by pursuing a QI strategy that responds to its unique situation.

The study design included a process evaluation, through which we explored, as case studies, the multiple factors involved in the implementation processes of the five participating L&D units. The longitudinal design for the process evaluation enabled us to observe the L&D units for a year and to gain an understanding of (1) changes in the experiences of the L&D units in implementing teamwork-practice improvements and (2) the evolution of their implementation activities over time in response to those experiences. The design also included an outcome evaluation, in which we used a before-and-after design for analysis of effects on staff perceptions and knowledge and a time-series design for analysis of effects on patient outcomes.

### Participating Labor and Delivery Units

Five hospitals participated in this study: two military and three civilian hospitals. We selected these L&D units for participation because they had made an explicit commitment to improving teamwork practices.

- *Site 1:* This site is a large L&D unit in a community hospital with no medical residency program. The unit had not acted to implement teamwork improvements until the start of this study. When work began, it was with a strong sense of urgency because the hospital board of directors had made teamwork a high priority and was pushing for fast action. Its basic approach was structured and strongly proactive.
- *Site 2:* This site is an academic medical center in an urban area and is a referral center for other hospitals (many of them difficult-delivery cases). The unit had begun teamwork improvement in the year before this study started, but its momentum had eroded. It used this study to inject new energy into the work to further its progress. The L&D unit took an approach of pursuing incremental progress by implementing subsets of teamwork practices over time, rather than working with many practices at once.
- *Site 3:* This site is a large L&D unit in a suburban hospital with a medical residency program. Although it had been an intervention site in the original L&D teamwork study, the site had not previously implemented most aspects of teamwork practices. Its approach was to work on a variety of specific practices using a flexible strategy.

- *Site 4:* This site is a large L&D unit in a regional referral center with a medical residency program. It had been an intervention site in the original L&D teamwork study, and it had already implemented many aspects of teamwork practices. As a result, it took a gradual, incremental approach to working with specific teamwork practices during the study, focusing on refining and reinforcing individual practices.
- *Site 5:* This site also is a large L&D unit in a regional referral center with a medical residency program. The unit had not acted to implement teamwork improvements until the start of this study. It took an incremental approach to working with specific teamwork practices, taking time to reinforce those being implemented at each time.

The participating hospitals applied two basic strategies for implementing improved teamwork practices: (1) training for staff in the skills and practices involved in team-based care and (2) carrying out a variety of actions to encourage L&D staff to adopt teamwork practices as part of their care processes.

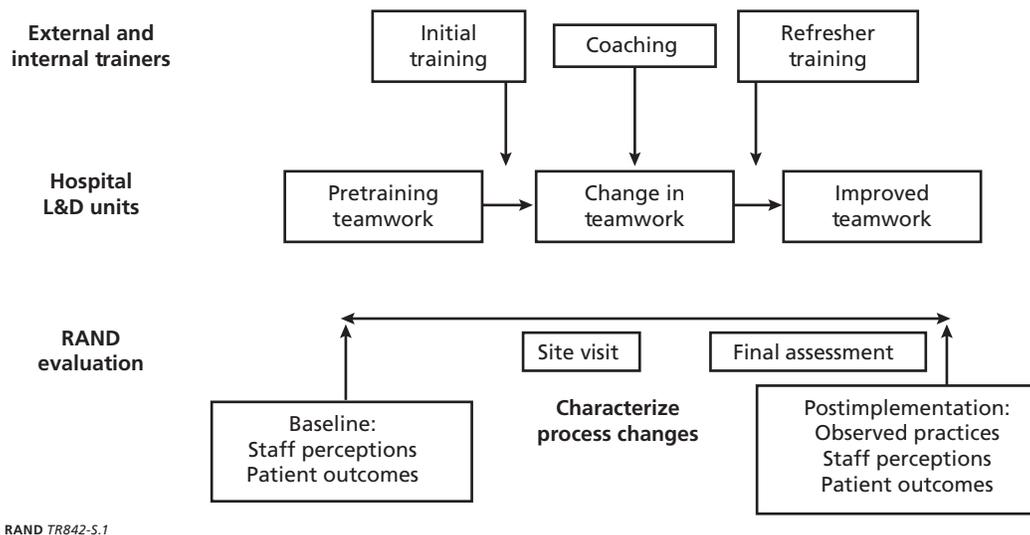
### Research Questions for the Study

The evaluation was designed to address its two objectives and four associated research questions, two of which addressed each study objective, as summarized in this section. The first objective was addressed by the process evaluation, and the second objective 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? (Note that, in order to examine the extent to which the sites had strengthened their teamwork practices, we used a combination of qualitative, self-reported interview data and observation data. Because we did not have baseline observation data [due to budget constraints], we could not directly examine changes in observed practices from baseline to the end of the study.)
- *Objective 2:* Assess the extent to which successful adoption of teamwork practices may influence staff experiences and patient outcomes, 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?

The logic model in Figure S.1 identifies the steps taken by the hospitals in implementing teamwork improvements and shows how the evaluation interfaced with 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 changes in teamwork practices resulting from improvement activities, and ultimately leading to improved team-based care. The top row of

**Figure S.1**  
**Evaluation Components for the Labor and Delivery Teamwork Training Study**



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.

### Data Collection

**Process Evaluation.** We collected data for the process evaluation to document the evolution of the L&D units' teamwork-improvement activities, successes achieved, challenges encountered, and the pace at which they adopted the specific teamwork practices delineated in either the MedTeams or TeamSTEPPS curriculum. We gathered data on the extent to which they implemented teamwork training, took advantage of coaching, initiated other initiatives, or experienced disruptions that might affect process and outcome measures.

**Outcome Evaluation.** Data for measuring changes in staff perceptions and knowledge over time were collected in a staff survey conducted twice during the study period. To estimate effects on patients, we used the Adverse Outcome Index (AOI) and the Weighted Adverse Outcome Score (WAOS), which are L&D outcome measures developed as part of the previous L&D clinical trial funded by DoD (Mann et al., 2006). The AOI is a measure of the frequency of adverse delivery outcomes divided by the total number of deliveries. The WAOS captures the severity of these outcomes by weighting each outcome measure by a weight that represents the severity of the outcome. The National Perinatal Information Center (NPIC) calculated hospital-level rates for these measures on a quarterly basis, using hospital discharge data provided to it by the participating hospitals.

### Findings: Teamwork Implementation

The results of the process evaluation highlighted that, whereas the L&D units used a diversity of implementation approaches, several key factors appear to be required for achieving

teamwork improvements. Here, we summarize our results for each of the research questions addressed by the process evaluation.

### **What Training and Actions Are Required to Achieve a High Level of Teamwork in the Labor and Delivery Process?**

The key factors required for successful implementation appear to be early emphasis on the teamwork competency of communication, along with effective training and coaching, support of a facilitator to keep the process on track, and perseverance in working toward practice adoption by staff working on the unit. The other three teamwork competencies—leadership, situation awareness, and mutual support—also are important to achieve, and they were addressed successfully using a variety of approaches. For choices regarding introduction of the specific teamwork practices, the team huddle/brief (a tool for reinforcing the plans already in place for the treatment of patients, assessing the need to change plans, and developing a shared understanding of the plan of care among team members) is an important practice to adopt early in the implementation process. It appears that the remaining practices can be addressed in the order that each unit finds to be most appropriate. (See Appendix A for a complete list and definitions of the specific team practices.)

The sites came to recognize the importance of providing initial teamwork training for all staff. Several of the sites did initial training for only part of their staff because of budget constraints or operational trade-offs. All of these sites stated that this led to slower staff buy-in and delays in adoption of practices. The sites also reported substantial difficulties in getting staff trained later using coaching or informal training.

Typical challenges the sites experienced from external sources included staff shortages, construction projects, and competing initiatives. A common internal challenge was initial staff resistance to teamwork improvement. Such resistance tended to decline with time as staff gained experience with teamwork and saw its benefits. Tension between physicians and nurses can also be expected early in the implementation process.

### **How Strongly Do Self-Reported Experiences in Implementing Teamwork Improvements Correlate with Actual Levels of Teamwork as Measured by Direct Observation of the Labor and Delivery Process?**

The observation scores for teamwork performance varied across sites, across time periods within sites, and across teamwork aspects within sites. The levels and variations in teamwork scores for each site were consistent with self-reported implementation status as of the end of the study. These results highlight the potential value of using observational studies to track progress as teams try to improve teamwork practices. Observations by an external expert can provide objective data to identify issues and guide subsequent implementation actions.

## **Findings: Effects of Teamwork Improvement on Staff and Patients**

The outcome-evaluation results suggested that the teamwork implementation efforts of the participating L&D units influenced staff experiences working in the units, but effects for maternal and newborn outcomes were observable only for site 2. We summarize here what we learned regarding each of the research questions addressed by the outcome evaluation.

### **How Does Achieving Effective Teamwork Affect the Perceptions and Experiences of Staff Working in Labor and Delivery Units?**

We found improvements in staff perceptions of teamwork, especially for domains closest to teamwork in the L&D units—teamwork practices, communication openness, and teamwork climate—as well as for quality of work-life and teamwork knowledge. However, the sites varied with respect to the domains for which staff perceptions improved, ranging from improvements for all five domains for site 1 to improvement in only one domain for site 3.

We also found significant relationships between improvements in L&D unit staff perceptions and two of the three measures for implementation actions identified as potentially important—coaching and extent of initial training and facilitator support during the teamwork implementation process. Their effects varied across the domains of staff perceptions. Staff perceptions did not appear to be affected by how many of the specific teamwork practices the units had actually implemented. These results suggest that successful adoption of a large number of the specific teamwork practices may not be an important factor in changing staff perceptions and knowledge of teamwork in the L&D units.

### **What Effects Does Effective Teamwork Have on Labor and Delivery Outcomes for Mothers and Newborn Infants?**

The only effect found for maternal and newborn outcomes was a reduction in the AOI for site 2 during the teamwork implementation period. Although the AOI trend for site 2 declined, its WAOS trend did not change, nor were there changes in WAOS trends for the other sites. These results suggest that site 2 might have reduced the frequency of less-severe patient events but not total overall severity. This interpretation was supported by the site lead, who reported that the team continued to experience infrequent, high-severity events, even though overall event frequency had declined.

These generally null findings may reflect the nature of the outcome measures used. Most of them are very low-frequency adverse events, for which stable trends are difficult to establish. The successes reported by the participating L&D units during the study suggested that their work was having effects on their care delivery for patients, which pointed to other possible candidate measures. For example, sites reported that they affected emergency Cesarean sections (C-sections), C-section infection rates, and customer satisfaction.

## **Synthesis of Findings**

This longitudinal study provided rich information about the processes and dynamics of improving teamwork practices. The study also revealed the complexities of these processes, which require a major cultural change within the L&D units and cannot be done quickly. To assess the relationships between the L&D units' implementation processes and their associated outcomes, we combined the results from the process evaluation and outcome evaluation. In Table S.1, we delineate the implementation methods used by each L&D unit, characterize the unit's progress in adopting teamwork practices, and list effects on outcomes. We group the sites according to whether they had pursued teamwork improvements before the study began.

The experiences of these L&D units indicate that substantial progress is possible in one year of implementing teamwork practices and that proximal outcomes, such as staff knowledge and perceptions, can be improved. More than a year of implementation effort is required

**Table S.1**  
**Summary of Results Regarding Implementation Progress and Outcome Changes, by Site**

Progress	No Previous Work on Teamwork			Previously Worked on Teamwork	
	Site 1	Site 3	Site 5	Site 2	Site 4
Baseline status	No work	No work	No work	Work	Work
Implementation action					
Proactive strategy <sup>a</sup>	xxx	x	xx	xx	x
Active implementation team <sup>a</sup>	xxx	xx	xx	xx	x
Had a facilitator	x			x	
Trained all staff	x			x	
Used ongoing coaching	x	x		x	
Practices implemented <sup>b</sup>	8	3	3	4	3
Observed teamwork practices <sup>c</sup>	3.3–4.0	2.8–3.0	3.4–3.9	3.7–4.1	4.5–4.6
Outcome changes					
Staff perceptions improved	5	1	4	3	3
Reduction in AOI				x	

<sup>a</sup> x = weak. xx = moderate. xxx = strong.

<sup>b</sup> Of a total of nine teamwork practices.

<sup>c</sup> Observed at the end of the study; average scores out of a total of 5 points.

to achieve a high level of performance on teamwork practices. At the end of the study, all of the sites reported that their work was not done and that they intended to continue working on teamwork improvements. The scores the five sites received in the observation study support this premise. The two sites that had worked on teamwork prior to the study had higher scores than the other three sites.

These results suggest that two dynamics might be involved in later years of implementation. First, momentum from the first year might continue into later years, such that subsequent implementation might reinforce continued improvement. This premise is supported by the high performance scores of sites 2 and 4. Second, it might not be possible to sustain high intensity in implementation beyond the first year. Thus, the less-intense strategies of these two sites might represent expected levels of activity for later implementation years.

## Implications

The study results reinforce the importance of developing and implementing a well-crafted strategy by training staff in the L&D units, working with staff to introduce practices, and providing coaching on effective use of those practices. We see this in the summary of results from the process evaluation. We also hear these messages in the retrospective assessments by the participating L&D units, including the importance of persevering in the pursuit of their strategy over time (summarized in Chapter Three). These findings are consistent with the guidance

provided by the Agency for Healthcare Research and Quality (AHRQ) on its TeamSTEPPS website (AHRQ, undated).

The study identified some key factors required by any given strategy for teamwork improvement, but it did not point to a standard template for implementation. This result implies that there may not be one fixed “intervention” that could be tested in comparative-control studies to develop further evidence for teamwork practices.

We selected L&D units for the study that had committed to achieving teamwork improvement. We made this selection based on published evidence that successful adoption of new practices requires hard work and perseverance. This premise was supported by the insights obtained from the participating L&D units, all of which highlighted the need for such commitment to make progress. Therefore, we identify the reference group for generalizability as being other L&D units that also are committed to making such improvements. It is possible that, if other L&D units were observed as additional case studies, different factors or strategies might emerge that also influence implementation success. We encourage further work in this area to test these findings with additional case studies, which could help build a depth of evidence across a larger number of organizations.