

REVIEWS

Interdisciplinary Teamwork in Hospitals: A Review and Practical Recommendations for Improvement

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Recognizing the importance of teamwork in hospitals, senior leadership from the American College of Physician Executives (ACPE), the American Hospital Association (AHA), the American Organization of Nurse Executives (AONE), and the Society of Hospital Medicine (SHM) established the High Performance Teams and the Hospital of the Future project. This collaborative learning effort aims to redesign care delivery to provide optimal value to hospitalized patients. With input from members of this initiative, we prepared this report which reviews the literature related to teamwork in hospitals. Teamwork is critically important to provide safe and effective hospital care. Hospitals with high teamwork ratings experience higher patient satisfaction, higher nurse retention, and lower hospital costs. Elements of effective teamwork have been defined and provide a framework for assessment and

improvement efforts in hospitals. Measurement of teamwork is essential to understand baseline performance, and to demonstrate the utility of resources invested to enhance it and the subsequent impact on patient care. Interventions designed to improve teamwork in hospitals include localization of physicians, daily goals of care forms and checklists, teamwork training, and interdisciplinary rounds. Though additional research is needed to evaluate the impact on patient outcomes, these interventions consistently result in improved teamwork knowledge, ratings of teamwork climate, and better understanding of patients' plans of care. The optimal approach is implementation of a combination of interventions, with adaptations to fit unique clinical settings and local culture. *Journal of Hospital Medicine* 2012;7:48–54. © 2011 Society of Hospital Medicine

Teamwork is important in providing high-quality hospital care. Despite tremendous efforts in the 10 years since publication of the Institute of Medicine's *To Err is Human* report,¹ hospitalized patients remain at risk for adverse events (AEs).² Although many AEs are not preventable, a large portion of those which are identified as preventable can be attributed to communication and teamwork failures.^{3–5} A Joint Commission study indicated that communication failures were the root cause for two-thirds of the 3548 sentinel events reported from 1995 to 2005.⁶ Another study, involving interviews of resident physicians about recent medical mishaps, found that communication failures contributed to 91% of the AEs they reported.⁵

Teamwork also plays an important role in other aspects of hospital care delivery. Patients' ratings of nurse-physician coordination correlate with their overall perception of the quality of care received.^{7,8} A study of Veterans Health Administration (VHA)

hospitals found that teamwork culture was significantly and positively associated with overall patient satisfaction.⁹ Another VHA study found that hospitals with higher teamwork culture ratings had lower nurse resignations rates.¹⁰ Furthermore, poor teamwork within hospitals may have an adverse effect on financial performance, as a result of inefficiencies in physician and nurse workflow.¹¹

Some organizations are capable of operating in complex, hazardous environments while maintaining exceptional performance over long periods of time. These *high reliability organizations* (HRO) include aircraft carriers, air traffic control systems, and nuclear power plants, and are characterized by their preoccupation with failure, reluctance to simplify interpretations, sensitivity to operations, commitment to resilience, and deference to expertise.^{12,13} Preoccupation with failure is manifested by an organization's efforts to avoid complacency and persist in the search for additional risks. Reluctance to simplify interpretations is exemplified by an interest in pursuing a deep understanding of the issues that arise. Sensitivity to operations is the close attention paid to input from front-line personnel and processes. Commitment to resilience relates to an organization's ability to contain errors once they occur and mitigate harm. Deference to expertise describes the practice of having authority migrate to the people with the most expertise,

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TABLE 1. Teamwork Components and Coordinating Mechanisms

Teamwork	Definition	Behavioral Examples
Component		
Team leadership	The leader directs and coordinates team members activities	Facilitate team problem solving; Provide performance expectations; Clarify team member roles; Assist in conflict resolution
Mutual performance monitoring	Team members are able to monitor one another's performance	Identify mistakes and lapses in other team member actions; Provide feedback to fellow team members to facilitate self-correction
Backup behavior	Team members anticipate and respond to one another's needs	Recognize workload distribution problem; Shift work responsibilities to underutilized members
Adaptability	The team adjusts strategies based on new information	Identify cues that change has occurred and develop plan to deal with changes; Remain vigilant to change in internal and external environment
Team orientation	Team members prioritize team goals above individual goals	Take into account alternate solutions by teammates; Increased task involvement, information sharing, and participatory goal setting
Coordinating mechanism		
Shared mental model	An organizing knowledge of the task of the team and how members will interact to achieve their goal	Anticipate and predict each other's needs; Identify changes in team, task, or teammates
Closed-loop communication	Acknowledgement and confirmation of information received	Follow up with team members to ensure message received; Acknowledge that message was received; Clarify information received
Mutual trust	Shared belief that team members will perform their roles	Share information; Willingly admit mistakes and accept feedback

NOTE: Adapted from Baker et al.²²

regardless of rank. Collectively, these qualities produce a state of *mindfulness*, allowing teams to anticipate and become aware of unexpected events, yet also quickly contain and learn from them. Recent publications have highlighted the need for hospitals to learn from HROs and the teams within them.^{14,15}

Recognizing the importance of teamwork in hospitals, senior leadership from the American College of Physician Executives (ACPE), the American Hospital Association (AHA), the American Organization of Nurse Executives (AONE), and the Society of Hospital Medicine (SHM) established the High Performance Teams and the Hospital of the Future project. This collaborative learning effort aims to redesign care delivery to provide optimal value to hospitalized patients. As an initial step, the High Performance Teams and the Hospital of the Future project team completed a literature review related to teamwork in hospitals. The purpose of this report is to summarize the current understanding of teamwork, describe interventions designed to improve teamwork, and make practical recommendations for hospitals to assess and improve teamwork-related performance. We approach teamwork from the hospitalized patient's perspective, and restrict our discussion to interactions occurring among healthcare professionals within the hospital. We recognize the importance of teamwork at all points in the continuum of patient care. Highly functional inpatient teams should be integrated into an overall system of coordinated and collaborative care.

TEAMWORK: DEFINITION AND CONSTRUCTS

Physicians, nurses, and other healthcare professionals spend a great deal of their time on communication

and coordination of care activities.^{16–18} In spite of this and the patient safety concerns previously noted, interpersonal communication skills and teamwork have been historically underemphasized in professional training.^{19–22} A team is defined as 2 or more individuals with specified roles interacting adaptively, interdependently, and dynamically toward a shared and common goal.²³ Elements of effective teamwork have been identified through research conducted in aviation, the military, and more recently, healthcare. Salas and colleagues have synthesized this research into 5 core components: team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation (see Table 1).²³ Additionally, 3 supporting and coordinating mechanisms are essential for effective teamwork: shared mental model, closed-loop communication, and mutual trust (see Table 1).²³ High-performing teams use these elements to develop a culture for “speaking up,” and *situational awareness* among team members. Situational awareness refers to a person's perception and understanding of their dynamic environment, and human errors often result from a lack of such awareness.²⁴ These teamwork constructs provide the foundational basis for understanding how hospitals can identify teamwork challenges, assess team performance, and design effective interventions.

CHALLENGES TO EFFECTIVE TEAMWORK

Several important and unique barriers to teamwork exist in hospitals. Teams are large and formed in an ad hoc fashion. On a given day, a patient's hospital team might include a hospitalist, a nurse, a case manager, a pharmacist, and 1 or more consulting physicians and therapists. Team members in each respective

discipline care for multiple patients at the same time, yet few hospitals align team membership (ie, patient assignment). Therefore, a nurse caring for 4 patients may interact with 4 different hospitalists. Similarly, a hospitalist caring for 14 patients may interact with multiple nurses in a given day. Team membership is ever changing because hospital professionals work in shifts and rotations. Finally, team members are seldom in the same place at the same time because physicians often care for patients on multiple units and floors, while nurses and other team members are often unit-based. Salas and others have noted that team size, instability, and geographic dispersion of membership serve as important barriers to improving teamwork.^{25,26} As a result of these barriers, nurses and physicians do not communicate consistently, and often disagree on the daily plan of care for their patients.^{27,28} When communication does occur, clinicians may overestimate how well their messages are understood by other team members, reflecting a phenomenon well known in communication psychology related to egocentric thought processes.^{29,30}

The traditionally steep hierarchy within medicine may also serve as a barrier to teamwork. Studies in intensive care units (ICUs), operating rooms, and general medical units reveal widely discrepant views on the quality of collaboration and communication between healthcare professionals.³¹⁻³³ Although physicians generally give high ratings to the quality of collaboration with nurses, nurses consistently rate the quality of collaboration with physicians as poor. Similarly, specialist physicians rate collaboration with hospitalists higher than hospitalists rate collaboration with specialists.³³ Effective teams in other high-risk industries, like aviation, strive to flatten hierarchy so that team members feel comfortable raising concerns and engaging in open and respectful communications.³⁴

The effect of technology on communication practices and teamwork is complex and incompletely understood. The implementation of electronic health records and computerized provider order entry systems fundamentally changes work-flow, and may result in less synchronization and feedback during nurse-physician collaboration.³⁵ Similarly, the expanded use of text messages delivered via alphanumeric paging or mobile phone results in a transition toward asynchronous modes of communication. These asynchronous modes allow healthcare professionals to review and respond to messages at their convenience, and may reduce unnecessary interruptions. Research shows that these systems are popular among clinicians.³⁶⁻³⁸ However, receipt and understanding of the intended message may not be confirmed with the use of asynchronous modes of communication. Moreover, important face-to-face communication elements (tone of voice, expression, gesture, eye contact)^{39,40} are lacking. One promising approach is a system which sends low-priority messages to a Web-based task list

for periodic review, while allowing higher priority messages to pass through to an alphanumeric pager and interrupt the intended recipient.⁴¹ Another common frustration in hospitals, despite advancing technology, is difficulty identifying the correct physician(s) and nurse(s) caring for a particular patient at a given point in time.³³ Wong and colleagues found that 14% of pages in their hospital were initially sent to the wrong physician.⁴²

ASSESSMENT OF TEAMWORK

One of the challenges in improving teamwork is the difficulty in measuring it. Teamwork assessment entails measuring the performance of teams composed of multiple individuals. Methods of teamwork assessment can be broadly categorized as self assessment, peer assessment, direct observation, survey of team climate or culture, and measurement of the outcome of effective teamwork. While self-report tools are easy to administer and can capture affective components influencing team performance, they may not reflect actual skills on the part of individuals or teams. Peer assessment includes the use of 360-degree evaluations or multisource feedback, and provides an evaluation of individual performance.⁴³⁻⁴⁷

Direct observation provides a more accurate assessment of team-related behaviors using trained observers. Observers use checklists and/or behaviorally anchored rating scales (BARS) to evaluate individual and team performance. A number of BARS have been developed and validated for the evaluation of team performance.⁴⁸⁻⁵² Of note, direct observation may be difficult in settings in which team members are not in the same place at the same time. An alternative method, which may be better suited for general medical units, is the use of survey instruments designed to assess attitudes and teamwork climate.⁵³⁻⁵⁵ Importantly, higher survey ratings of collaboration and teamwork have been associated with better patient outcomes in observational studies.⁵⁶⁻⁵⁸

The ultimate goal of teamwork efforts is to improve patient outcomes. Because patient outcomes are affected by a number of factors and because hospitals frequently engage in multiple, simultaneous efforts to improve care, it is often difficult to clearly link improved outcomes with teamwork interventions. Continued efforts to rigorously evaluate teamwork interventions should remain a priority, particularly as the cost of these interventions must be weighed against other interventions and investments.

EXAMPLES OF SUCCESSFUL INTERVENTIONS

A number of interventions have been used to improve teamwork in hospitals (see Table 2).

TABLE 2. Interventions to Improve Teamwork in Hospitals

Intervention	Advantages	Disadvantages
Localization of physicians	Increases frequency of nurse-physician communication; provides foundation for additional interventions	Insufficient in creating a shared mental model; does not specifically enhance communication skills
Daily goals-of-care forms and checklists	Provides structure to interdisciplinary discussions and ensures input from all team members	May be completed in a perfunctory manner and may not be updated as plans of care evolve
Teamwork training	Emphasizes improved communication behaviors relevant across a range of team member interactions	Requires time and deliberate practice of new skills; effect may be attenuated if members are dispersed.
Interdisciplinary rounds	Provides a forum for regular interdisciplinary communication	Requires leadership to organize discussion and does not address need for updates as plans of care evolve

Geographic Localization of Physicians

As mentioned earlier, physicians in large hospitals may care for patients on multiple units or floors. Designating certain physicians to care for patients admitted to specific units may improve efficiency and communication among healthcare professionals. One study recently reported on the effect of localization of hospital physicians to specific patient care units. Localization resulted in an increase in the rate of nurse-physician communication, but did not improve providers' shared understanding of the plan of care.⁵⁶ Notably, localizing physicians may improve the feasibility of additional interventions, like teamwork training and interdisciplinary rounds.

Daily Goals of Care and Surgery Safety Checklists

In ICU and operating room settings, physicians and nurses work in proximity, allowing interdisciplinary discussions to occur at the bedside. The finding that professionals in ICUs and operating rooms have widely discrepant views on the quality of collaboration^{31,32} indicates that proximity, alone, is not sufficient for effective communication. Pronovost et al. used a daily goals form for bedside ICU rounds in an effort to standardize communication about the daily plan of care.⁵⁷ The form defined essential goals of care for patients, and its use resulted in a significant improvement in the team's understanding of the daily goals. Narasimhan et al. performed a similar study using a daily goals worksheet during ICU rounds,⁵⁸ and also found a significant improvement in physicians' and nurses' ratings of their understanding of the goals of care. The forms used in these studies provided structure to the interdisciplinary conversations during rounds to create a shared understanding of patients' plans of care.

Haynes and colleagues recently reported on the use of a surgical safety checklist in a large, multicenter pre-post study.⁵⁹ The checklist consisted of verbal confirmation of the completion of basic steps essential to safe care in the operating room, and provided structure to communication among surgical team members to ensure a shared understanding of the operative plan. The intervention resulted in a significant reduction in inpatient complications and mortality.

Team Training

Formalized team training, based on crew resource management, has been studied as a potential method to improve teamwork in a variety of medical settings.^{60–62} Training emphasizes the core components of successful teamwork and essential coordinating mechanisms previously mentioned.²³ Team training appears to positively influence culture, as assessed by teamwork and patient safety climate survey instruments.⁶⁰ Based on these findings and extensive research demonstrating the success of teamwork training in aviation,⁶³ the Agency for Healthcare Research and Quality (AHRQ) and the Department of Defense (DoD) have partnered in offering the Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) program, designed to improve teamwork skills for healthcare professionals.^{64,65}

Only a handful of studies have evaluated the effectiveness of teamwork training programs on patient outcomes, and the results are mixed.⁶⁶ Morey et al. found a reduction in the rate of observed errors as a result of teamwork training in emergency departments, but observers in the study were not blinded with regard to whether teams had undergone training.⁶¹ A research group in the United Kingdom evaluated the benefit of simulation-based team training on outcomes in an obstetrical setting.^{67,68} Training included management of specific complications, including shoulder dystocia and uterine cord prolapse. Using retrospective chart review, the investigators found a significant reduction in the proportion of babies born with an obstetric brachial palsy injury and a reduction in the time from diagnosis of uterine cord prolapse to infant delivery. Nielsen and colleagues also evaluated the use of teamwork training in an obstetric setting.⁶² In a cluster randomized controlled trial, the investigators found no reduction in the rate of adverse outcomes. Differences in the duration of teamwork training and the degree of emphasis on deliberate practice of new skills (eg, with the use of simulation-based training) likely explains the lack of consistent results.

Very little research has evaluated teamwork training in the general medical environment.^{69,70} Sehgal and colleagues recently published an evaluation of the effect of teamwork training delivered to internal

medicine residents, hospitalists, nurses, pharmacists, case managers, and social workers on medical services in 3 Northern California hospitals.⁶⁹ The 4-hour training sessions covered topical areas of safety culture, teamwork, and communication through didactics, videos, facilitated discussions, and small group role plays to practice new skills and behaviors. The intervention was rated highly among participants,⁶⁹ and the training along with subsequent follow-up interventions resulted in improved patient perceptions of teamwork and communication but had no impact on key patient outcomes.⁷¹

Interdisciplinary Rounds

Interdisciplinary rounds (IDR) have been used for many years as a means to assemble team members in a single location,^{72–75} and the use of IDR has been associated with lower mortality among ICU patients.⁷⁶ Interdisciplinary rounds may be particularly useful for clinical settings in which team members are traditionally dispersed in time and place, such as medical-surgical units. Recent studies have evaluated the effect of structured inter-disciplinary rounds (SIDR),^{77,78} which combine a structured format for communication, similar to a daily goals-of-care form, with a forum for daily interdisciplinary meetings. Though no effect was seen on length of stay or cost, SIDR resulted in significantly higher ratings of the quality of collaboration and teamwork climate, and a reduction in the rate of AEs.⁷⁹ Importantly, the majority of clinicians in the studies agreed that SIDR improved the efficiency of their work day, and expressed a desire that SIDR continue indefinitely. Many investigators have emphasized the importance of leadership during IDR, often by a medical director, nurse manager, or both.^{74,77,78}

Summary of Interventions to Improve Teamwork

Localization of physicians increases the frequency of nurse-physician communication, but is insufficient in creating a shared understanding of patients' plans of care. Providing structure for the discussion among team members (eg, daily goals of care forms and checklists) ensures that critical elements of the plan of care are communicated. Teamwork training is based upon a strong foundation of research both inside and outside of healthcare, and has demonstrated improved knowledge of teamwork principles, attitudes about the importance of teamwork, and overall safety climate. Creating a forum for team members to assemble and discuss their patients (eg, IDR) can overcome some of the unique barriers to collaboration in settings where members are dispersed in time and space. Leaders wishing to improve interdisciplinary teamwork should consider implementing a combination of complementary interventions. For example, localization may increase the frequency of team member interactions, the quality of which may be enhanced with teamwork training and reinforced with the use

of structured communication tools and IDR. Future research should evaluate the effect of these combined interventions.

CONCLUSIONS

In summary, teamwork is critically important to provide safe and effective care. Important and unique barriers to teamwork exist in hospitals. We recommend the use of survey instruments, such as those mentioned earlier, as the most feasible method to assess teamwork in the general medical setting. Because each intervention addresses only a portion of the barriers to optimal teamwork, we encourage leaders to use a multifaceted approach. We recommend the implementation of a combination of interventions with adaptations to fit unique clinical settings and local culture.

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