

Enhancing Patient Safety Through Teamwork Training

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Abstract

The effective reduction of medical errors depends on an environment of safety for patients in both clinically-based and systems-oriented arenas. Formal teamwork training is proposed as a systems approach that will achieve these ends. In a study conducted by (Dynamics Research Corporation,) weaknesses and error patterns in Emergency Department teamwork were assessed, and a prospective evaluation of a formal teamwork training intervention was conducted. Improvements were obtained in five key teamwork measures, and most importantly, clinical errors were significantly reduced.

Introduction

Patient safety initiatives are on the forefront of medicine and have mobilized healthcare personnel to identify and implement a multitude of strategies to improve patient outcomes and reduce error. A recent publication

by the Agency for Healthcare Research and Quality¹ has identified 79 clinical and systems-based strategies that offer hope of improvement. In the last decade, recognition of the contribution of systems components to the causal chain of medical errors has broadened the basis for incident investigation and solution identification. Solutions that have attracted recent attention, such as closed intensive care units and computerized physician order entry, fit well into the systems perspective because they help establish error avoidance and error capturing work environments for practitioners. Teamwork has also been identified as an effective, system-based intervention that has broad implications for patient safety.^{1,2}

The Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) recently published new patient safety standards³ that call for a number of initiatives, including standards for formal teamwork training that fosters a collaborative and interdisciplinary approach to the delivery of patient care. This paper will describe a structured teamwork infrastructure model that supports improved patient outcomes and error reduction. In addition, we will offer suggestions regarding how risk management practices may be facilitated and strengthened by including teamwork principles into investigative analysis and the development of improvement strategies.

A closed case study covering 4.7 million patient visits for an 11-year period ending in 1996 revealed that teamwork could have mitigated or prevented errors in 43% of the 68 closed claim cases that resulted in cash judgments or settlements to plaintiffs.⁸ Using conservative methods, DRC determined that \$3.45 of the cost of every ED patient visit was attributable to litigated cash payouts associated with poor teamwork.

Teamwork as an Infrastructure Upgrade

The word “team” often is used to describe a group of people working together in a related area or on a specific project. Most of these situations actually represent working groups, not teams. Working groups are different from teams in several ways. Groups rely on individual members’ contributions and information sharing, but they do not necessarily engage in complex, real-time decision-making. Teams learn to create a collective effort focusing on making judgments in complex situations, resulting in more effective outcomes than could be achieved by individual efforts.

According to Manion, Lorimer, and Leander,⁴ team interventions are most effective with tasks that require diverse responsibilities, high-level judgment, complex decision-making, high investment in and accountability for the outcomes.

Critical patient care requires these characteristics and teams are important in this setting. In healthcare, individuals work together every day with the common purpose of providing high quality patient care, yet often they

have little or no training in effective team behaviors that can improve patient safety outcomes.

Theoretical and Practical Bases for Teamwork

Teamwork theory has been refined during the last decade and research findings define the core competencies required for effective teamwork.⁵ While a discussion of various teamwork theories is beyond the scope of this article, teamwork theory development and practical applications have led to these considerations for teamwork training:

- Teams are distinguished from work groups.⁶
- Teamwork skills have been identified, and these skills are learnable, observable, and measurable.⁷
- While the same team behaviors apply across different teams and team structures, teamwork interventions need to be tailored to specific work environments.⁸
- Communication and monitoring are essential team actions used to generate, exchange, and verify information needed by the team.⁹
- Teams are especially well-suited to identify, capture, mitigate, and manage real-time human error.^{7,10}

These key considerations have guided the development of teamwork training for emergency department personnel, and appear to be applicable to other clinical environments.

A Case for Formal Teamwork Training: Lessons from Aviation

Since healthcare organizations operate with explicit or implicit staff teams, the opportunity exists for formal teamwork training and teamwork-based organizational changes to meet safety

needs not met by other system changes.⁹ However, effective teamwork does not spontaneously happen when individuals work together.¹¹ Rather, it requires long-term organizational and training investments.

One model for improving teamwork in healthcare is drawn from crew resource management (CRM) training introduced by the commercial aviation industry in the 1980s. At the time, aircraft accident investigations had revealed that 80% of accidents were based on “human error,” but further investigation indicated that a significant portion of human error was in fact attributable to teamwork failures primarily associated with inadequate communication and coordination.¹² Now, the specific behaviors associated with communicating and coordinating the task work of flying an aircraft are taught in fifth generation CRM programs offered to commercial and military aviators.¹³

Two programs that have adapted aviation CRM processes to healthcare are anesthesia crisis management training¹⁴ and the MedTeams system developed by Dynamics Research Corporation (DRC) for hospital Emergency Departments (EDs).^{7,15} Whereas the anesthesia program focuses exclusively on training the single anesthesia provider on the operating room team, the MedTeams approach focuses on training all ED staff in a common set of teamwork behaviors. Experience with the ED intervention suggests the applicability of teamwork training to other clinical environments as well.

Application of Formal Teamwork Behaviors

To assess the likelihood that teamwork training could improve patient safety, DRC examined current weaknesses and

error patterns in emergency care teamwork using malpractice case files. This analysis projected the potential impacts of improved teamwork on emergency care cost and performance. A closed case study covering 4.7 million patient visits for an 11-year period ending in 1996 revealed that teamwork could have mitigated or prevented errors in 43% of the 68 closed claim cases that resulted in cash judgments or settlements to plaintiffs.⁸ Using conservative methods, DRC determined that \$3.45 of the cost of every ED patient visit was attributable to litigated cash payouts associated with poor teamwork. In addition to the liability costs of poor teamwork, the analysis revealed specific recurring teamwork failures. Examples of the most frequent and costly team breakdowns were: (a) failure to identify an established protocol for patient care, or even to develop a treatment plan, (b) failure to advocate and assert an alternative plan or corrective course of action when a question arose about the patient’s care, (c) failure to prioritize caregiver tasks for the patient, and (d) failure to cross-monitor actions of other team members. Other specific teamwork failures were shown to contribute to medical misadventures in the ED, but they did so less frequently.

DRC and ED researchers conducted a prospective evaluation of the training intervention called MedTeams from May 1998 to March 1999 using a quasi-experimental, untreated control group design with one pre-test and two post-test observation periods. Challenges that had to be resolved in developing a practical teamwork training system centered on (a) defining team membership and structure, (b) identifying applicable teamwork behaviors, (c) implementing techniques for effective communication, and (d) developing the team-oriented

Teamwork Behavior Matrix (Figure 1)

TD #	Team Dimension	Primary Descriptors	Teamwork Actions
1	Maintain Team Structure and Climate	Organize the Team	a) Establish the leader b) Assemble the team c) Designate roles and responsibilities d) Communicate essential team information
		Cultivate Team Climate	e) Acknowledge the contributions of team members to team performance f) Demonstrate mutual respect in all communication g) Hold each other accountable for team outcomes
		Resolve Conflicts	h) Address professional concerns directly i) Resolve conflicts constructively
2	Plan and Problem Solve	Conduct Situational Planning	a) Engage team members in planning process b) Identify established protocol to be used or develop a plan c) Communicate the plan to teammates
		Apply Decision Making Methods	d) Engage team members in decision-making process
		Engage in Error-Management Actions	e) Alert team to potential biases and errors f) Report slips, lapses, and mistakes to team g) Cross-monitor actions of team members h) Advocate and assert a position or corrective action i) Invoke the Two-Challenge Rule when necessary
3	Communicate with the Team	Maintain Situation Awareness (SA)	a) Request situation awareness updates b) Provide situation awareness updates
		Use Standards of Effective Communication	c) Use ED common terminology in all communications d) Call out critical information during emergent events e) Use check-backs to verify information transfer f) Systematically hand off responsibilities during team transitions
		Offer Information to Team	g) Offer information to support planning and decision making h) Communicate decisions and actions to team members
		Request Information from Team	i) Seek information for planning and decision making
4	Manage Workload	Conduct Secondary Triage	a) Integrate individual assessments of patient needs b) Re-prioritize patients in response to overall caseload of team c) Prioritize tasks for individual patients d) Execute team-established plan
		Manage Team Resources	e) Balance workload within the team f) Request assistance for task overload g) Offer assistance for task overload h) Constructively use periods of low workload
5	Improve Team Skills	Engage in Informal Team Improvement Strategies	a) Engage in situational learning and teaching with the team b) Engage in coaching with team members c) Conduct event reviews d) Conduct shift reviews

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operational and management leadership actions necessary to implement the system. The training and evaluation was based on five Teamwork Dimensions with 41 associated behaviors (see Figure 1) that focus on structure, process and outcomes of teamwork. For example, key behaviors included callouts, checkbacks and cross monitoring.

Nine civilian and military hospital EDs were assigned to either the experimental and control group. A total of 684 physicians, nurses and technicians were trained in the experimental group and 374 physicians, nurses, and technicians were trained in the control group. The training intervention consisted of an 8-hour course and practicum. Three outcome

constructs were assessed: team behaviors, attitudes and opinions, and ED performance. The results, details of which may be found in Morey, Simon, Jay, and others,¹⁵ demonstrated the effectiveness of the teamwork training. Improvements were obtained in the experimental group for six out of the seven key measures assessed. The most important finding from the study was that clinical errors, defined as any clinical task that actually or potentially put a patient at risk, were substantially and significantly reduced. Other measures indicated that the quality of team behaviors improved, teamwork did not increase workload, staff attitudes towards teamwork were enhanced, preparation of patients for admission from the ED improved, and the proportion of highly satisfied patients increased.

Key Measures of Teamwork Effectiveness and Error Identification

An important measure of teamwork effectiveness used in the evaluation study was the Team Dimension Rating. In this measure, specially trained nurses and physicians observed teamwork functioning during high intensity situations such as cardiac arrest and in other acute episodes of care. Teamwork performance was rated on a seven-point scale for each of the five Team Dimensions. Each observation lasted 30 to 60 minutes. Observed errors were clinical errors that were recognized during the teamwork observation period and described on an Observed Error Record form. The study data revealed that teamwork performance improved and clinical errors were significantly reduced.

Consider the following example of an observed error: A burn patient received duplicate administrations of intravenous Morphine when two nurses independently administered the drug after a physician gave a verbal order.

The staff realized the overdose when the patient's breathing slowed, at which point they intervened. The patient recovered but there was clearly a teamwork failure. Systematic use of check backs and cross monitoring, teamwork behaviors taught in MedTeams, almost certainly would have prevented this overdose event.

In fact, mutual accountability is not a substitute for individual accountability, but represents a developmental step in professional accountability.

This example underscores the need for mutual accountability for all team members. Mutual accountability for outcomes is a central element in teams, and represents a significant shift in thinking for healthcare professionals, whose education and training have historically focused on fostering individual responsibility. In fact, mutual accountability is not a substitute for individual accountability, but represents a developmental step in professional accountability. In a high-reliability team, not only does each team member accept personal accountability, but he or she also becomes accountable for outcomes of the team's actions measured against established standards.^{4,16} This recognition of the team as a safety net, capable of catching individual clinician errors, is an important step in the effort to increase patient safety and reduce errors.

Usefulness of Team Concepts to Risk Management

When an institution uses a formal teamwork approach and teamwork is considered an element of the operational infrastructure, risk managers have an additional framework for

Potential Applications of Teamwork Failure Checklist (Figure 2)

	Uses	Focus	Description	Guidance
1	Sentinel Event Root Cause Analysis (RCA): Teamwork sub-analysis	Single case in own organization	Addresses teamwork failures that may have contributed to the sentinel event and generate proposed inputs to action plan	<ul style="list-style-type: none"> - Carefully consider access to and distribution of any such analysis; - Only reveal results to senior management unless otherwise authorized
2	Management Reviews	Single case in own organization	<ul style="list-style-type: none"> - Flag possible teamwork problem areas and alert management to the possible need for training and management actions; may trigger training requirement or need for further trend analysis - Feedback to teamwork sustainment training efforts to improve performance 	<ul style="list-style-type: none"> - Restrict access to such a review; - Only show to sr. mgmt and managers directly involved in creating and implementing practical solutions; - Coordinate with risk manager to determine if a more in-depth analysis is appropriate and possible given the claim files available
3	Institutional Trend Analysis to identify recurring teamwork problems unique to the organization	Multiple cases from own organization	Flag recurring teamwork problems and risks that exist in your own particular organization.	<ul style="list-style-type: none"> - Restrict distribution of findings to senior management; - Reports that contain only statements of the problem should have a very limited distribution; - Reports that state problems and planned solutions may be more widely distributed
4	Case for M & M Review: Example of teamwork failure with serious consequences	Single case in own organization	- Educate caregivers on specific teamwork failures that occurred and discuss important teamwork follow-through in future care management.	- Provided to both physician and nursing staff as a normal part of the peer review process; parties appropriately cautioned not to discuss after M&M meeting has adjourned.
5	Healthcare Research into the common teamwork failures that regularly occur in many organizations	Multiple cases from multiple organizations	<ul style="list-style-type: none"> - Pooled data from sentinel events and /or closed cases allows identification of common recurring teamwork failures associated with major errors and significant indemnity costs. (Reactive research) - Pooled data from risk cases allows identification of common recurring teamwork failures that are likely to trigger major litigation. (Proactive research) 	<ul style="list-style-type: none"> - Only release data to research efforts where 1) data from multiple organizations is pooled & 2) only aggregate results will be reported; de-identify any cases released; - Restrict access to individual cases to a very small set of researchers and their assistants; - Have all parties with access to individual interviews and completed checklists sign non-disclosure agreements

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evaluating events and proposing management changes. An evaluation instrument like the Teamwork Failure Checklist⁶ (see Appendix 1) can be used in a number of ways: as a teamwork failure sub-analysis tool in a root cause analysis, to support management reviews of team performance in specific units, to support institutional trend analysis regarding teamwork breakdowns and to flag important teamwork failures for reviews (see Figure 2).

With the implementation of a structured teamwork approach like MedTeams, the risk manager has the means to integrate a teamwork assessment into the root cause analysis. The five Team Dimensions provide the risk manager with a foundation for incident or sentinel event assessments and to highlight failures of teamwork behaviors. Overlaying the Team Dimensions on a traditional root cause analysis tool assists in the identification of behaviors that may have contributed to an adverse event. For example, when

mutual accountability for clinical outcomes is a behavioral expectation, shared by all team members, the focus of analysis will shift from what the individual did wrong to how team performance broke down. This broader view will reveal opportunities for interdisciplinary coordination strategies that have a more lasting impact on patient safety.

At the organizational level, the Risk Manager has a role in working with management to promote and maintain the concept of teamwork as an important infrastructure intervention for error reduction and overall mitigation of liability. Analyzing the trends related to team performance can identify teamwork and system weaknesses that need reinforcement through, for example, formal and informal educational sessions.

At the executive level, the Risk Manager also has a role in discussing with executive leaders the major occurrences and trend data that contribute to poor outcomes and increase the potential for liability. The teamwork perspective is an important element of analysis that will provide information for strategic initiatives.

Finally, at the healthcare system level, an opportunity exists to study and identify common teamwork failures across multiple organizations using de-identified, aggregate data drawn from closed case reviews. These analyses can identify weaknesses in teamwork skills that are causing harm across a wide set of healthcare organizations.

Conclusion

Although the benefits of teamwork seem intuitive to healthcare providers, little formal training of the required skills or assessment of the effectiveness of teamwork exists. Fully understanding and implementing a teamwork model is the basis for studying and understanding

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clinician error chains, and consequently providing a methodology for corrective actions for continuous quality improvement. It also helps to fulfill the intent of the JCAHO requirement that calls for teamwork training and effective communication in the patient care delivery process. Using a structured teamwork system enables senior leadership and members of the Board of Directors to track tangible and measurable indicators of teamwork improvement and assess patient care performance change.

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Appendix 1. Example of the Teamwork Failure Checklist (Team Dimension 1)

Case or Claim Code #

Reviewer Codes

Description of Incident or Error.....

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Part A – Assessment of Teamwork Failures That Contributed To The Error

Instructions: Thoroughly review the available facts of the case before beginning. For each Teamwork behavior answer each question by marking “Yes” or “No” with an X. Answer each of the four assessment questions in order from left to right until you make a no response or complete question 4. Then move to question 1 for the next team behavior and repeat the assessment process. Continue until all teamwork behaviors have been reviewed.

TD Code	Teamwork Behavior	Was the behavior appropriate for the situation?		Was there a teamwork behavior failure?		Did the failure contribute to the error?		Was the failure a primary contributor to the error?	
		No	Yes	No	Yes	No	Yes	No	Yes
1	a) Establish the leader		X→		→		→		→
	b) Assemble the team		X→		→		→		→
	c) Assign roles and responsibilities		X→		→		→		→
	d) Communicate essential team information		X→		→		→		→
	e) Acknowledge the contributions of team members to team goals		→		→		→		→
	f) Demonstrate mutual respect in all communication		X→		→		→		→
	g) Hold each other accountable for team outcomes		X→		→		→		→
	h) Address professional concerns directly		→		→		→		→
	i) Resolve conflicts constructively		→		→		→		→

Part B — Assessing the Impact of Effective Teamwork

What impact would effective teamwork have had on this case? (Circle one answer)

1. Would have prevented the error(s) from occurring.
2. Would have mitigated the impact of the error(s) but not have prevented it.
3. Would not have prevented the error(s) or mitigated the impact of the error(s).