

ORIGINAL ARTICLE

Team strategies and tools to enhance performance and patient safety training: The effect of training on both nursing staff perceptions regarding physician behaviors and patient satisfaction scores in the ED

Shari I. Brand*¹, Kristen M. Slee¹, Yu-Hui Chang², Meng-Ru Cheng², Christopher A. Lipinski¹, Rick R. Arnold¹, Stephen J. Traub¹

¹Department of Emergency Medicine, Mayo Clinic Hospital, Phoenix, Arizona, United States

²Research Biostatistics, Mayo Clinic, Scottsdale, Arizona, United States

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Abstract

Introduction: Background: Program used to enhance teamwork and communication among health professionals to improve patient safety and employee satisfaction. Objective: We hypothesized that Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) training would improve communication between physicians and nurses and between physicians and their patients and family members, and that it would improve patient perceptions of emergency department teamwork.

Methods: Design: Before and after prospective observational study. Setting: Tertiary Care Hospital Emergency Department. Participants/Subjects: Twelve core physicians and 43 nurses underwent two, 4-hour TeamSTEPPS training sessions in July 2011 and July 2012. The first session consisted of didactic instruction using the TeamSTEPPS material. The second session was comprised of simulations focusing on the content of the initial training course. Nurses were asked to rate individual physicians on five distinct aspects of communication, both before and after the training sessions. Statistical Methods: Survey results were compared using the Wilcoxon signed rank test. Patient satisfaction survey questions regarding teamwork (4th Quarters 2010 and 2011) were analyzed using two-sample *t*-tests.

Results: TeamSTEPPS improved nurse's perception regarding physician communication with patients and their families (post: 4.28 ± 0.37 vs. pre: 4.16 ± 0.42 , $p = .0479$), with a trend towards improvement in nurse's perception of physician's communication with nursing staff regarding changes in patient care plans (post: 3.94 ± 0.38 vs. pre: 3.81 ± 0.5 , $p = .0942$). TeamSTEPPS was also associated with a significant improvement in patient's rating of teamwork between doctors and nurses as "excellent" (post: 62.9% vs. pre: 48.3%, $p = .0132$).

Conclusions: Team training with the TeamSTEPPS program improved selected aspects of nursing and patient perceptions of teamwork and communication between emergency department physicians and nurses.

Key Words: Teamwork, Team training, Communication, Patient safety, Healthcare

*Correspondence: Shari I. Brand; Email: Brand.shari@mayo.edu; Address: 5777 E. Mayo Blvd. Scottsdale, United States.

1 Introduction

It is well documented that poor communication is one of the main factors leading to medical errors and bad patient outcomes. Communication failure can frequently lead to medication errors, delays in treatment, and even inadvertent deaths. This was highlighted in 1999, when The Institute of Medicine (IOM) released its pivotal document "To Err is Human" which reported that up to 98,000 deaths annually were the result of medical errors.^[1] Communication errors have also been documented to be the leading cause of medical care-related death outside the US.^[2,3] Williamson *et al.* noted that 70%-80% of 2,000 critical incidents of giving or almost giving the wrong medication were due to interpersonal interaction issues.^[4,5] In response to the IOM report, numerous patient safety programs that train personnel to work in teams and promote team functioning have been implemented.^[6]

The emergency department (ED) is an area where good communication is imperative, as miscommunication can have catastrophic consequences. This has been well studied in other organizational environments, including the military, aviation, and nuclear power industries. Teamwork training has been shown to enhance healthcare providers' perception of team-based behaviors and safety awareness.^[7-9] Environments with strong teamwork and collaborative efforts exhibit higher ratings of job satisfaction and overall perception of improved patient quality of care.^[5,10] Reductions in clinical errors and improvement in clinical work leads to a positive impact on patient safety, clinical outcomes, and quality of care.^[3,5,9,11,12] Castner *et al.* reported that when assessing nurse perception of teamwork skills and behaviors, communication was observed to be the strongest component.^[13]

One of the medical training programs developed and implemented in response to the IOM report is called TeamSTEPPS: Team Strategies and Tools to Enhance Performance and Patient Safety. TeamSTEPPS is a systematic approach that was developed in a collaborative effort by the Agency for Healthcare Research and Quality and the Department of Defense.^[14] It is based on 25 years of research obtained from high reliability organizations in high risk, high stakes environments related to teamwork, team training, and culture change, such as the military, nuclear power, and aviation health care. It focuses on knowledge, skills, and attitudes that have been shown to be invaluable to high functioning teams, and it provides the framework for organizations to effectively implement this tool. The TeamSTEPPS process helps to define a team, what comprises teamwork, and how to manage performance. The TeamSTEPPS core competencies/skills are leadership, situation monitoring, mutual support, and communication, and these yield a shared awareness about the status of the team, promotes positive attitudes, and allows for easier adaptations to changes in patient care, thus improving efficiency and pa-

tient safety.

To facilitate continuous operational improvement and promote a "culture of safety" in the Mayo Clinic Hospital ED, the effect of TeamSTEPPS on physician communication with nursing staff was studied. This paper discusses an organized educational approach to team building that resulted in improved communication between staff. Such approaches might be employed successfully to ensure a major factor resulting in medical errors - ineffective communication - is optimized and supports a safe care environment for patients.

2 Methods

This study was a before and after prospective observational study conducted between July 2011 and July 2012. It was set in a tertiary care hospital ED that sees approximately 30,000 patients per year.

A group of 10 staff members, consisting of one ED physician, two ED nurses, one interventional cardiologist, two cardiac cath nurses, one cardiac cath RT tech, one intensivist, one respiratory therapist, and one simulation specialist attended a 2.5 day TeamSTEPPS "Train the Trainer" course at Creighton University Medical Center in Omaha, Nebraska in May, 2010. The course was jointly funded by the Agency for Healthcare Research and Quality and the Mayo Clinic. With the full support of the Mayo Clinic administration, a mandatory 4-hour TeamSTEPPS Fundamentals Course was given to the ED staff including 12 core physicians and 43 nurses. Prior to starting the course, all staff completed a required TeamSTEPPS Teamwork Attitude Questionnaire (T-TAQ), which is a validated tool designed to measure individual attitudes related to the core components of teamwork that are taught within TeamSTEPPS. This tool provides a wider view of an organization's team climate, and can be used to assess specific needs within a unit or group and whether the TeamSTEPPS training produced any change in perceptions and attitudes.^[14] In addition, the physicians and nurses answered separate surveys regarding communication in the ED, with the nurses having additional questions regarding their perceptions of communication involving specific physicians.

The TeamSTEPPS Fundamentals Course was comprised of didactic instruction, as well as department-specific scenario-based training. The core competencies consisted of the trainable skills of leadership, situation monitoring, mutual support, and communication. The course has an emphasis on defining team skills and the tools and strategies to gain proficiency in the areas of performance, knowledge, and attitudinal outcomes. Although the course was taught in its entirety, the leadership team chose to specifically concentrate on the communication aspect for the study due to the nursing perceptions of poor communication with the physicians.

After the initial training session, the results of the surveys were reviewed. The specific physician results were released to only the associated physician and those individuals directly related to the study. The complete data set was otherwise anonymous. Monthly to bimonthly departmental TeamSTEPPS meetings were arranged to discuss ongoing communication issues and identify any new issues. The information and concerns were then brought back to the entire physician and nursing groups at their respective meetings.

In July 2012, one year after the initial TeamSTEPPS Fundamentals Course was held, the same T-TAQ nurse and physician surveys as those completed in July 2011 were re-administered as part of a follow-up course. This follow-up course was designed by the TeamSTEPPS leadership team to reinforce the initial information and skills from the first session, and to build upon those skills with use of department-specific simulation scenarios. This was done in a state-of-the-art simulation center with Laerdal SimMan 3-G mannequins with real-time feedback for decision-making. The scenarios were tailored for highlighting communication skills instead of medical performance, and all simulations were video recorded with a debriefing held immediately after each simulation was completed.

The second set of T-TAQ survey results, which were distributed to the appropriate parties in a similar manner as the first set, were compared to the initial T-TAQ results using the Wilcoxon signed rank test. Patient satisfaction survey questions regarding teamwork (Q4 2010 and Q4 2011) were also analyzed using two-sample *t*-tests.

3 Results

3.1 Description of the participating physician and nursing characteristics

All 12 of the core ED physicians (83 percent male, 17 percent female) were EM residency trained, board certified, and had been practicing an average of 22.5 years (Range 18-36 years). The average years of practice at the Mayo Clinic Hospital was 12.5 years (Range 6-15 years) and the majority of physicians averaged 124 work hours/month. The 43 participating nursing staff (88 percent female, 12 percent male) on average had been in practice 17.9 years (Range 5-38 years). The average years of practice at the Mayo Clinic Hospital was 8.5 years (Range 1-14 years) and the majority of nurses averaged 144 work hours/month in the department.

3.2 Physician and nurse responses indicated an awareness of the relationship between communication and medical errors

Surveys taken before the TeamSTEPPS training indicated that all physicians and nearly all nurses responded in agreement with questions pertaining to the importance of commu-

nication as it relates to risk for medical errors (see Figures 1 and 2). After the training, no substantial changes were observed. Thus, the data show that both physician and nursing staff in the ED acknowledge that communication is an important factor with regards to risk for medical errors and that TeamSTEPPS had no effect on changing that perspective.

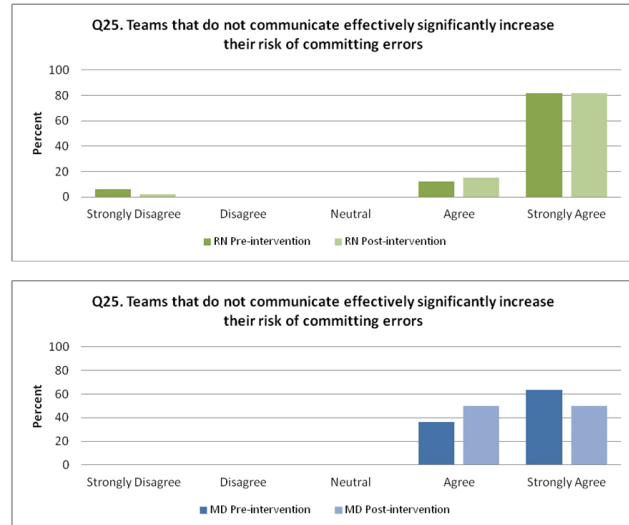


Figure 1: T-TAQ survey (Question 25)

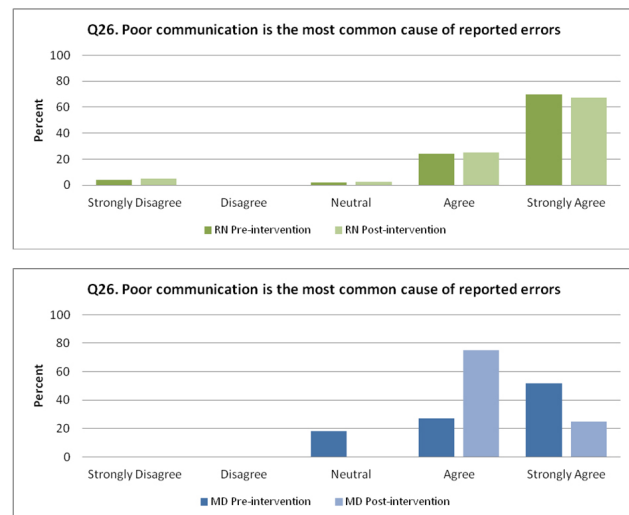


Figure 2: T-TAQ survey (Question 26)

3.3 Assessment of nursing opinions regarding teamwork and work-flow related behaviors of ED physicians

Assessment of nursing opinions as they relate to several team and work flow related behaviors of ED physicians were assessed by comparison of pre- and post-testing surveys. The categorical responses given by nurses for each physician (n = 12) were compared using the Wilcoxon signed

rank test, a non-parametric version of paired *t*-test more appropriate for studies with smaller sample size. Of the survey questions posed, the TeamSTEPPS training appeared to im-

prove the nurses' perception regarding physician communication with patients and their families (4.16 ± 0.42 vs. 4.28 ± 0.37 , $p = .0479$) (see Table 1).

Table 1: ED nurse surveys

	Pre-Test			Post-Test			P-Value*
	Mean	SD	Median	Mean	SD	Median	
Q1	3.90	0.56	4.11	4.03	0.39	4.07	.3396
Q2	3.81	0.50	3.93	3.94	0.38	3.98	.0942
Q3	4.16	0.42	4.27	4.28	0.37	4.35	.0479
Q4	4.34	0.54	4.49	4.43	0.39	4.56	.6221

Note. SD – Standard deviation; * Wilcoxon signed rank test was used to compare the pre and post scores; The analysis was restricted to the physicians with both pre and post scores (n = 13).

Questions from survey: Q1. Communicates with you/ED team after his/her initial assessment of the patient? Q2. Communicates with you/ED team when there are changes to the initial plan of care? Q3. Communicates with the patient/family regarding the plan of care? Q4. Is approachable/amenable to nursing concerns regarding ED plan of care?

Table 2: ED physician surveys

	Pre-Test				Post-Test				P-Value*	P-Value#
	N	Mean	SD	Median	N	Mean	SD	Median		
Q1	11	3.73	0.90	4	12	4.00	0.85	4	.3911	.5625
Q2	11	3.73	1.01	4	12	3.83	0.72	4	.8213	1.0000
Q3	11	3.82	0.98	4	12	4.25	0.45	4	.1377	.2500
Q4	11	4.36	0.67	4	12	4.67	0.49	5	.0816	.2500

Note. * Paired student's t-test; # Wilcoxon signed rank test.

Questions from survey:

Q1. Do you feel you communicate with your nurse/ED team following your initial assessment of the patient? Q2. Do you feel you communicate with your nurse/ED team when there are changes to the initial plan of care? Q3. Do you feel you communicate with the patient/family regarding the plan of care? Q4. Do you feel you are approachable by the nursing/ED staff?

3.4 ED physician self-assessment regarding teamwork and work-flow related behaviors

A total of 12 ED physicians were surveyed, and paired analysis was used for significance testing. Both Student's *t*-test and Wilcoxon signed rank test showed that there were no statistically significant differences between pre and post surveys (see Table 2).

3.5 More patients rated ED staff communication as "excellent" following TeamSTEPPS training

Patient satisfaction is typically assessed quarterly for benchmarking perceived quality of care. To determine the effect of TeamSTEPPS training on patient perception of care, the percentage of those patients rating their care as "excellent" was compared between consecutive quarters, and the same quarter from the previous year, using two-sample *t*-tests. Survey data obtained between Q2 2009 and Q1 2012

were available for analysis. There was a statistically significant increase in "excellent" rating observed in Q4 2011 (quarter following initial TeamSTEPPS training) versus Q4 2010 (prior to TeamSTEPPS training) (62.9% vs. 48.3%, $p = .0132$) (see Figure 3). All other quarters showed no measurable change.

4 Discussion

The importance of communication and its role in improving safety measures has been well validated. It has been proven that communication between individuals involved in high-risk job tasks is a key factor in minimizing human error.^[15] The ultimate goal in any healthcare organization is that of improving patient outcomes.

There is evidence that TeamSTEPPS training has a positive effect on patient outcomes. This has been previously illustrated in numerous studies, in both civilian and mili-

tary venues. Deering *et al.* demonstrated a decrease in communication related errors during the war in Iraq following implementation of TeamSTEPPS.^[16] Capella *et al.* documented significant improvement in team performance during trauma resuscitations, in addition to decreased time to CT scanner, endotracheal intubation, and the operating room following TeamSTEPPS training.^[17]

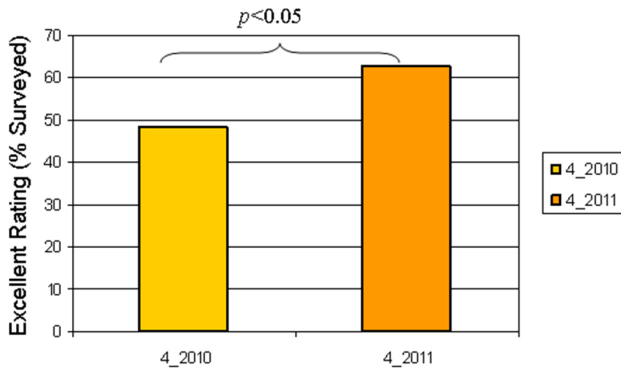


Figure 3: Patient satisfaction score

In light of the communication problems experienced in the Mayo Clinic Hospital ED, a teamwork initiative such as TeamSTEPPS was a reasonable starting point to address these issues. Overall, the training experience was very positive, giving staff a framework and mechanism to discuss issues and develop successful conflict resolution strategies.

Following implementation of the Team STEPPS program, improvements in nursing opinions on several team and work flow behaviors of ED physicians related to communication with patients and their families were observed (pre 4.16 ± 0.42 vs. post 4.28 ± 0.37 , $p = .0479$). In addition, a trend toward improvement in nursing perception of physician communication regarding patient care plans was also observed (pre 3.81 ± 0.5 vs. post 3.94 ± 0.38 ; $p = .0942$). More importantly, patient satisfaction surveys independently showed a significant improvement, with an increase in the “excellent” rating compared to the year prior to TeamSTEPPS implementation, when asked about the patient’s perception of ED staff teamwork.

There were a number of limitations and external factors, which may have contributed to the results and why a more statistically significant improvement wasn’t observed as expected. The ED is a unique setting where it is very important to maintain an equilibrium with as few changes as possible. During the time frame of the study, numerous changes occurred. First, the entire computer system was changed to a new platform, which affected everyone who worked in the hospital. Next, there was a major change in both the physician and nursing administration, in addition to an above average turnover rate of staff during the same time period. These changes were very disruptive to the normal functioning of the ED, and this led to communication issues for a variety of reasons including workflow techniques and interpersonal and professional relationships with new people.

Other limitations of this analysis included the inability to blind the nurses to the physicians they were scoring, as it was necessary for them to be able to openly rate each physician individually. Truly paired samples for the nurses were unable to be used as they were not initially paired and there was turnover throughout the study period. In future studies, it would be best to pair the pre and post questionnaires. Finally, only the Q4 results for the patient satisfaction scores could be validated during this timeframe because the survey company was changed so no further analysis could be completed.

5 Conclusions

Team training with the TeamSTEPPS program improved selected aspects of nursing and patient perceptions of teamwork and communication between ED physicians and nurses, as well as patient satisfaction regarding staff teamwork. It is believed that the TeamSTEPPS training program was meaningful in terms of seeing operational benefits in the ED, although various biases made it difficult to show these changes through statistical methods.

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