

Medical Team Training: An Initial Assessment and Future Directions

David P. Baker

J. Mathew Beaubien

Amy Holtzman

American Institutes for Research

Eduardo Salas

University of Central Florida

Paul Barach

University of Miami

Introduction

Patient safety is a top priority in health care. The Institute of Medicine's (IOM) publication, *To Err is Human*, concluded that medical errors cause up to 98,000 deaths annually (Kohn, Corrigan, & Donaldson, 1999). The IOM report brought national focus to this important issue and has now spawned significant research on the underlying causes of medical errors and the effectiveness of different strategies for improving patient safety. Although still in its infancy, research on strategies to improve patient safety appears to have a bright future.

The Quality Interagency Coordination Task Force (QuIC) was established by President Clinton to address a number of critical needs identified in the IOM report. The QuIC is composed of representatives from different Federal agencies including the Department of Health and Human Services (DHHS), Labor (DOL), Defense (DoD), and Veterans Affairs (VA), to name a few. The QuIC has identified 100 activities for improving patient safety. Among the QuIC's recommendations is the widespread adoption of human factors training, such as Crew Resource Management (CRM) training, for improving teamwork in health care (Agency for Healthcare Research and Quality, 2000). The QuIC believes that lessons learned from high-risk environments should be looked at when developing new patient safety practices.

Helmreich and Foushee concluded that the introduction of CRM has been one of the greatest success stories in aviation (Helmreich & Foushee, 1993). The efficacy of CRM has been established, in part, because CRM has been evaluated throughout its evolution. CRM training was developed interactively – introducing and testing the effectiveness of different strategies – which allowed for the best possible results (Gregorich & Wilhelm, 1993). CRM training is the gold standard for what can be produced when those interested in research and those interested in practice work cooperatively to achieve a common goal.

Perceived parallels between health care and aviation have led to a number of CRM-derived medical team training programs. Applications of CRM in medicine started with the introduction of Anesthesia Crisis Resource Management (ACRM) at Stanford University School of Medicine and the Anesthesiology Service at the Palo Alto Veteran Affairs Medical Center (Gaba, Howard, Fish, Smith, & Sowb, 2001). More recently, the Department of Defense (DoD) has funded several medical team training initiatives. MedTeams™ (Simon et al., 1998) has been implemented in Army and Navy hospitals, while Medical Team Management (Stone, 2000) has been introduced in the U.S. Air Force. However, these training programs have not undergone the same scrutiny as CRM. Some evaluation studies have been conducted on ACRM, MedTeams™, and MTM, but not with sufficient rigor to draw firm conclusions about each program's effectiveness as well as the relative effectiveness of different training strategies for promoting teamwork in health care and reducing negative patient outcomes.

The importance of training evaluation is unquestioned by instructional designers and training researchers; however, training is often designed and developed but not evaluated. Training evaluation has been defined as “the systematic collection of descriptive and judgmental

information necessary to make effective decisions related to ... various instructional activities” (Goldstein, 1993). These decisions include determining whether the goals and objectives of a program are appropriate to achieve the desired outcome, whether the content and methods in training will result in achievement of the overall program goals, and how to maximize training transfer. Although systematic training evaluation is not an easy task, it is the only way to ensure that training programs have the desired effect and are a worthwhile investment to an organization.

Purpose

The purpose of this investigation is to conduct a case study review of three medical team training (MTT) programs. Programs reviewed include MedTeams™, Medical Team Management (MTM), and Dynamics Outcomes Management® (DOM).

A case study approach was selected for this investigation because we did not have the access or the resources to conduct an empirically sound, comparative analysis. For example, convenience samples were relied upon when collecting data from program participants. This resulted in data being collected from MedTeams™ participants from a DoD facility, future MTM instructors, and DOM participants from a university medical center. Moreover, we only had access to the classroom (awareness phase) portion of each training program. All of the programs address the need for team skills practice and feedback through a variety of post-classroom activities, however we did not have access to observe these actions. Therefore, it is important to keep in mind several key characteristics of this investigation. First, this report describes case studies of three existing medical team training programs: MedTeams™, MTM, and DOM. Although data for each case study were described along the same set of dimensions, this information is *not comparable* because it was derived from different information sources with different levels of rigor. Second, the goal of this report was to provide unbiased information to the AHRQ about these programs as a whole. The program developers have conducted past investigations, and therefore this investigation was the first independent assessment. Finally, because we only had access to certain kinds of information, we refrain from making judgments about the “goodness” or “badness” of each program. Rather we provide comprehensive descriptive information.

Method

Case Study Approach

We relied upon Kirkpatrick’s model, and more recent innovative adaptations of it (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997; Alliger & Janak, 1989; Kraiger, Ford, & Salas, 1993) to structure our approach to each case study. Specifically, we collected Level I data from MedTeams™ (N=200), MTM (N=30), and DOM (N=50) participants. Unlike most Level I measures that focus on trainee affective reactions, our focus was on the utility of training.

Unlike affective reactions, Alliger et al. (1997) found the utility reactions predict the degree to which training will transfer to the job environment.

In addition to Level I outcome data, we collected data on contextual and pre-training factors. Based on the work of Baldwin & Magjuka, (1997), we collected data on the extent to which a safety culture existed within each of the facilities in which team training was implemented. A positive safety culture has been shown to be a prerequisite for training transfer (Helmreich, 2003). These data were collected through questionnaires, interviews, and small group discussions with MedTeams (N=12), MTM (N=7), and DOM (N=2) trainers. We also collected information regarding trainees' past experiences. Smith-Jentsch, Jentsch, Payne, & Salas, (1997) found that prior negative experiences influenced trainee motivation to learn and subsequent post-training performance. Collectively these data were used to determine if the participants across the three training programs were equivalent. Even though our goal was not to compare training programs, identifying significant differences on specific pre-training factors could be used to explain any post-training differences on our Level 1 measure.

Finally, we examined the course materials for MedTeamsTM, MTM, and DOM and reviewed the procedures by which each course was developed. Well-accepted methods exist for developing sound instructional strategies for teamwork (Cannon-Bowers, Tannenbaum, Salas, & Volpe, 1995; Salas, Cannon-Bowers, & Blickensderfer, 1993). Based on this research, we created a set of criteria for reviewing each medical team training program.

Description of the Participants

MedTeamsTM participants, MTM participants; and DOM participants completed pre-training assessments and post-training reaction measures. All samples included physicians, nurses, technicians and other hospital staff. In addition, when available, we conduct interviews with course instructors. Below we describe our findings from the pre-training assessment, which were used to determine if participants were similar across MedTeamsTM, MTM, and DOM training.

The pre-training results highlight some interesting similarities among the three groups of respondents (see Table 1). We began by reviewing their motivation to participate in medical team training. With the exception of one question (question #3), nearly 50% or more of all participants had personally witnessed a breakdown in teamwork that could have compromised patient safety. In all cases, the two most frequently cited problems involved not learning from prior mistakes (question #4), and poor preparation (question #5). Fortunately, the participants did not report feeling pressured to perform procedures which they were not comfortable doing

Insert Table 1 About Here

(question #3). To empirically assess the similarity across the MedTeams™, MTM, and DOM participants, we ranked the percentage of agreement responses (within each program) and calculated the mean correlation across the three programs using Spearman's correlation for ranked data (r_s). The average correlation was .69, indicating a moderate degree of similarity among participants.

We found similar results with regard to the participants' respective organizational cultures. In all cases, over 50% of the participants in each program agreed that their respective organizations promoted a positive safety culture (see Table 2). Participants in all three programs generally agreed that disruptions in patient care were the greatest detriments to patient safety (question #8). However, they were uniformly less likely to agree that team members in their

Insert Table 2 About Here

departments know each others' responsibilities (question #9). Again, we calculated the mean correlation across the three programs using Spearman's correlation for ranked data (r_s). The average correlation was .46, which is somewhat lower than their pre-training motivation levels, but not unexpected, given that each facility is expected to have its own unique culture.

Finally, we reviewed the participants' belief in the importance of teamwork. The participants uniformly agreed that teamwork was important for ensuring patient safety. In fact, the percentage agreement for these items was generally greater than 80% and never went below 73% (see Table 3). Prior to participating in their respective MTT programs, the participants were uniformly confident in their ability to work effectively in a team environment (question

Insert Table 3 About Here

#12) and in their belief that people with strong teamwork skills are likely to be successful in health care (question #14). Again, we calculated the mean correlation among the three programs using Spearman's correlation for ranked data (r_s). The average correlation was .73, indicating a moderate degree of similarity among participants.

In summary, although the results did differ slightly, there was a common pattern of responses across MedTeams™, MTM, and DOM participants. Regardless of the institution in which training was delivered, nearly half of all participants had witnessed a breakdown in teamwork that could have compromised patient safety (see Table 1). Despite this, many felt that their organizations exhibited elements of positive safety culture (see Table 2) and that teamwork

skills are important for maintaining patient safety (see Table 3). Therefore, we conclude that participants in MedTeams™, MTM, and DOM possessed similar motivation to participate in training and learn the material. With that in mind, we present our results from our analysis.

Results

Because we conducted independent case studies of each training program using somewhat unique data in each case, we present our results for each program separately. Furthermore, because we drew on many data sources – course materials review, observations, trainee utility reactions, etc. – we provide a summary of our findings. Detailed results can be found in a soon-to-be-release technical report published by AHRQ (Baker, Beaubien, & Holtzman, 2003). Below we first provide a brief description and then summarize the strengths and weaknesses of MedTeams™, MTM, and DOM.

MedTeams™

Description. The primary purpose of MedTeams™ is to reduce medical errors through interdisciplinary teamwork. MedTeams™ was developed by Dynamics Research Corporation (DRC) on the premise that most errors result from breakdowns in systems-level defenses that occur over time (Simon et al., 2000). According to the MedTeams™ curriculum, each team member has a vested interest in maintaining patient safety and is expected to take an assertive role in breaking the error chain. MedTeams™ defines a core team as a group of 3-10 (average = 6) medical personnel who work interdependently during a shift and who have been trained to use specific teamwork behaviors to coordinate their clinical interactions. Each core team includes at least one physician and one nurse. Several core teams are managed by a coordinating team that assigns new patients to the core teams and provides additional resources as necessary.

MedTeams™ uses a train-the-trainer approach to implement the training. Individuals designated by their facility receive comprehensive training on how to teach MedTeams™. The course itself consists of a brief background on teams and an introduction to DoD Patient Safety initiatives. In addition, detailed information on six substantive modules was presented. Each module was structured around specific learning objectives. These objectives were likely derived from the results of the needs analysis but we could uncover no evidence to support this hypothesis. Finally, modules did not include any in-class assessments to ensure that participants had achieved the stated learning objectives. The six modules were as follows: (1) Maintain Team Structure and Climate, (2) Plan and Problem Solve, (3) Communicate with the Team, (4) Manage Workload, (5) Improve Team Skills, and (6) Integration Unit.

Strengths. Our review of the literature, observations of the classroom phase, instructor interviews and post training assessment suggest that MedTeams™ has a number of desirable qualities. First, the original courseware for the Emergency Department (ED) based on a thorough up-front needs analysis. This analysis resulted in the five-core dimensions on which MedTeams™ training is based. Second, MedTeams™ employs a very practical system for

implementing the training. Designated staff members from a specific facility are trained and certified as MedTeams™ instructors, and then these staff members conduct MedTeams™ training at their facilities (i.e., a train-the-trainer strategy). Moreover, our review of the Labor & Delivery (L&D) Team Coordination Course for instructors suggests that instructor training is comprehensive and thorough. Third, our independent collection of post-training reactions suggests that participants had positive reactions to MedTeams™ training. Participants indicated that the training was well organized, and they felt that they could use many of the strategies discussed during training upon returning to their jobs (see Table 4). Finally, the MedTeams™ developers have made the most extensive efforts to

Insert Table 4 About Here

collect Level II and III data to demonstrate the effectiveness of MedTeams™ (Morey et al., 2002; Dynamics Research Corporation, 2002). Although the initial investigation suffered several design flaws, which make the results somewhat tentative, it was one of the few efforts in the academic literature to link team process to health outcomes.

Weaknesses. Nevertheless, MedTeams™ does have its limitations. First, although a comprehensive needs analysis was performed to develop the ED curriculum, no subsequent in-depth needs analyses were conducted to develop the L&D and Operating Room (OR) courses. Essentially, subject matter experts (SMEs) reviewed the training materials and customized the case studies and other examples when appropriate. We question this approach, because a panel of leading experts in the field, that was convened by American Institutes for Research in January 2003, suggested the team knowledge, skills, and attitudes are likely to vary by medical specialty as well as other factors. Second, we were surprised by the variation in which classroom phase was administered by trained, certified MedTeams™ instructors. Classes ranged from three to seven hours and the quality of this instruction varied greatly. Despite the MedTeams™ developers best efforts to ensure consistency of instruction, consistency was lacking. Also, while one of the main objectives of MedTeams™ is to develop team skills, much of the classroom instruction focused on mastering declarative and some procedural knowledge. There was substantially less time devoted to skills practice. Third, MedTeams™ did not employ a cultural assessment/evaluation component prior to implementing the training. As a result, it is entirely possible that MedTeams™ is effective only in hospitals that have already made a commitment to teamwork, secured upper-level management support, established an open, non-punitive atmosphere that embraces errors as an opportunity for learning, and recognized the need for change. It is interesting to note that results from our pre-training assessment suggest that this particular Naval Medical Center has a culture that supports teamwork. Fourth, trainee reactions to MedTeams™ were positive despite the tremendous variability in instruction. However, and quite to the contrary of the positive reactions, several of the individuals we interviewed said that

there was only a 40-50% chance of this training being successful when implemented. Finally, one of the limitations of MedTeams™ is the delay in which the actual strategies are implemented. All departmental staff must receive the classroom phase before implementation. Although this appears to be a reasonable approach, especially when training a large number of people, there can be considerable delay between classroom training and implementation. For example, we visited the Naval Medical Center again in early July 2003. At that time, OR staff training had not been completed. Such a delay could result in a decay of important knowledge and strategies that were developed during training.

Summary. In conclusion, the MedTeams™ course was well received. The content covered the basics of teamwork, and for the most part, students and instructors felt that it delivered a good message: teamwork is important! The course met students' expectations, and most would recommend the class to co-workers. The frustration exercise was identified as the most popular activity in the class. Both students and instructors liked the interaction between physicians, nurses, and medical technicians that resulted from the exercise. They felt that it was a good way to raise awareness about issues and concerns from different health care professionals' perspectives. It also tied in nicely with the modules of the course, as many of the concerns were addressed in the modules. However, instructor unreliability plagued the actual conduct of the training. Moreover, many attendees were frustrated by the length of the course as well as the over reliance on lecture as the primary instructional strategy. Many would prefer to break the lecture portion up with more videos, case scenarios, and group discussions. In addition, many wanted more examples that were directly relevant to the OR.

Medical Team Management

Description. The primary purpose of Medical Team Management (MTM) is to reduce medical errors through interdisciplinary team training. MTM – which was modeled on the U.S. Air Force's CRM training program for fighter pilots – was developed after poor teamwork was identified as the root cause of a medical event that led to a catastrophic patient outcome.

The MTM training program has two major components: a three-day train-the-trainer course and a medical treatment facility course. Upon completing the train-the-trainer course, graduates return to their respective medical facilities to train the remaining staff in teamwork principles (Searles, 2002). The MTM curriculum includes an introduction to the program, overviews of key patient safety and CRM issues, and specific modules for seven foundational elements (leadership, workload performance, policy and regulations, situational awareness, available resources, communication, and operating strategy), obstacles to effective teamwork, and tools (behaviors) for improved teamwork and communication. Case studies, vignettes, and tools (e.g., the “two attempt” rule) are interspersed throughout the curriculum to reinforce the importance of effective teamwork.

Strengths. To summarize, MTM offers a number of advantages. First, it uses a series of active learning techniques – including didactic lectures, behavioral modeling, and case studies –

to develop trainees' teamwork-related knowledge, skills, and attitudes. Second, it leverages known principles from human-factors research. For example, MTM training (1) explicitly distinguishes between destructive and constructive conflict resolution, (2) recognizes that the workload-performance relationship is curvilinear, and (3) distinguishes between authority (which is based on rank) and leadership (which is based on skills). Third, MTM training is interdisciplinary in nature, thereby teaching physicians, nurses, technicians and other key constituencies to work together. Fourth, like MedTeams™ post-training reaction data were positive. Participants indicated that the training was well organized, and they felt that they could use many of the strategies discussed during training upon returning to their jobs (see Table 5).

Insert Table 5 About Here

Finally, it provides a reference list that allows participants to continue refining their teamwork skills after they have completed the training.

Weaknesses. Nevertheless, like the other two programs, MTM carries disadvantages. First, far more of the training time is devoted to providing factual information than to practicing actual skills with instructor feedback; the skills practice that is provided primarily involves low-fidelity techniques such as case studies. Second, although MTM provides trainees with a variety of “tools” to reinforce and sustain their teamwork skills, many of these aids are not tools in the strictest sense of the word. More often than not, the MTM materials consist of best practices or procedures (e.g., briefings, cross-checks), but not tangible tools (e.g., checklists, quick reference cards, etc.) that trainees can physically take with them. Third, even though MTM is based on the “train the trainer” paradigm, it does not appear to include mechanisms for preventing performance degradation among trainers. Finally, there does not appear to be a formal recurrency module for ensuring the maintenance of trained knowledge and skills.

Summary. In conclusion, attendees enjoyed the MTM course. It made them more aware of teamwork issues and taught them valuable skills. The most common suggestion for improvement that attendees made was to include more vignettes and case studies and even cut down the lecture if necessary. Finally, participants also highlighted the importance of U.S. Air Force leadership support to ensure that MTM is successful.

Dynamic Outcomes Management®

Description. The primary purpose of DOM is to increase patient safety, reduce medical errors, and improve the quality of health care (www.cti-crm.com/dom/about/). DOM achieves this by improving trainees' skills in team-building, recognizing adverse situations, counteracting the effects of stress and fatigue, communication, and decision-making (www.cti-crm.com/dom/register). DOM provides inter-disciplinary team training to surgeons, nurses, and

anesthesiologists. DOM draws heavily on Crew Resource Management (CRM) training from aviation (Rivers, Swain, & Nixon, 2003), and was developed by Crew Training International (CTI), which offers specialized training programs for aviation, construction, general business practice, and the medical industry.

Strengths. Our review of the literature, observations of the classroom phase, and post training assessment suggest that participants had positive reactions to this training. Participants indicated that the training was well organized, and they felt that they could use many of the strategies discussed during training upon returning to their jobs (see Table 6). Second, DOM

Insert Table 6 About Here

instructors were extremely professional and conducted high-quality training. Although not necessarily the most practical approach to implementing training throughout a large-scale organization, using professional instructors from the course vendor resulted in significantly better and consistent instruction. Third, DOM staff relayed to us that there was no delay (like MedTeamsTM) between the classroom phase of DOM and when the safety tools are implemented. Therefore, skill decay with this program is less likely. Finally, the DOM developers are beginning to make efforts to collect additional data on DOM effectiveness beyond trainee reactions. Pre and post attitude data are currently being collected and discussions with the developer indicated that future studies are planned to examine DOM effectiveness.

Weaknesses. Nevertheless, DOM, like the other programs, does have its limitations. First, we could uncover no evidence that the results of an in-depth pre-training needs analysis drove the development of DOM. It is our impression that the course developer exacted this information from CRM training and SMEs customized the materials to health care. CTI staff then visit the hospital in which training will be implemented to make any additional modifications to the courseware that is required. Second, like MedTeamsTM and MTM, a primary objective of DOM training is to develop team skills. However, most of the classroom instruction focused on mastering declarative and some procedural knowledge. There wasn't much time devoted to skills practice. Third, DOM did not employ a cultural assessment/evaluation component prior to implementing the training. As a result, it is entirely possible that DOM is effective only in hospitals that have already made a commitment to patient safety. The kickoff by the Associate Dean emphasized the medical center's commitment to DOM and patient safety. Also, the pre-training data suggested that the organization has a culture that supports teamwork. Finally, although we did not specifically collect this data, the costs of implementing DOM are likely to be higher than MedTeamsTM and MTM. This is primarily a function of the fact that CTI relies on its own cadre of instructors to conduct training and a full array of consultative services. While this produces reliable, high quality instructor, we question

the viability of such a strategy when training must be delivered in a timely fashion to multiple hospitals.

Summary. In conclusion, the DOM course was extremely well received. There was great support for DOM training and a strong commitment to patient safety by that organization. The content covered important aspects of teamwork and presented similar strategies to those discussed during MedTeams™ and MTM training. In our opinion, the quality of instruction was perhaps the best of the three programs we reviewed, however, there are many practical limitations with using vendor instructors when introducing medical team training in the DoD. Finally, we could not uncover much information about how the DOM course was developed, which caused us some concern. There was no evidence to suggest that DOM was in fact targeting the right skills for development or that the training objectives were appropriate.

Conclusions

In conclusion this report presents an in-depth case study analysis of three medical team training programs, MedTeams™, Medical Team Management, and Dynamic Outcomes Management®. This was the first independent assessment of these programs. The case study approach allowed us to collect detailed, comprehensive information on each program, which we reported along a common set of variables. Although this study was qualitative in nature, it is the first effort to capture that state-of-the art in medical team training.

AHRQ's Evidence Report 43 suggested that future research on medical team training is likely to be beneficial and have a significant impact on patient safety. We view the results presented in this investigation as a starting point for future studies on medical team training. Here, we have provided information on current objectives, strategies and successes of existing programs as well as where opportunities for improvements exist. We have also delineated several areas where future research is most warranted. However, empirically-based research will require a mandate from program sponsors, federal agencies, or the health services research community; greater access to health care workers and patients to collect both process and outcome data; and significant resources in terms of time, money, and personnel. Nonetheless, we believe that such investments are worthwhile, because few would dispute the relation between team performance and safety. The challenge is to show irrefutable evidence that substantiates the relation between teamwork in health care and the ultimate outcome, a reduction in errors, since the medical error rate, although unacceptably high, has a relatively low base rate. We believe that this can be accomplished under the right conditions and point to the on-going L&D study as an example of the kind of investigations that are required.

Reference List

- Agency for Healthcare Research and Quality (2000). *Doing what counts for patient safety: Federal actions to reduce medical errors and their impact*. Rockville, MD: Author.
- Alliger, G. M. & Janak, E. A. (1989). Kirkpatrick's levels of training criteria: Thirty years later. *Personnel Psychology, 42*, 331-342.
- Alliger, G. M., Tannenbaum, S. I., Bennett, W., Traver, H., & Shotland, A. (1997). A meta-analysis of the relations among training criteria. *Personnel Psychology, 50*, 341-358.
- Baker, D. P., Beaubien, J. M., & Holtzman, A. K. (2003). *DoD medical team training programs: An independent case study analysis*. Washington, DC, American Institutes for Research.
- Cannon-Bowers, J. A., Tannenbaum, S. I., Salas, E., & Volpe, C. E. (1995). Defining competencies and establishing team training requirements. In R.A.Guzzo, E. Salas, & Associates (Eds.), *Team effectiveness and decision-making in organizations* (pp. 333-380). San Francisco: Jossey-Bass.
- Dynamics Research Corporation (2002). *MedTeams: Labor and delivery measures guide*. Andover, MA: Author.
- Gaba, D. M., Howard, S. K., Fish, K. J., Smith, B. E., & Sowb, Y. A. (2001). Simulation-based training in anesthesia crisis resource management (ACRM): A decade of experience. *Simulation & Gaming, 32*, 175-193.
- Goldstein, I. (1993). *Training in organizations: Needs assessment, development, and evaluation*. (3rd ed.) Pacific Grove, CA: Books/Cole.
- Gregorich, S. E. & Wilhelm, J. A. (1993). Crew resource management training assessment. In E.L.Weiner, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 173-198). San Diego: Academic Press.
- Helmreich, R. L. (2003). Culture, threat, and error: Assessing system safety. In *Safety in aviation: The management commitment* (pp. x). London: Royal Aeronautical Society.
- Helmreich, R. L. & Foushee, H. C. (1993). Why crew resource management? Empirical and theoretical bases of human factors training in aviation. In E.L.Weiner, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 3-45). San Diego: Academic Press.
- Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (1999). *To err is human*. Washington, DC: National Academy Press.
- Kraiger, K., Ford, J. K., & Salas, E. (1993). Application of cognitive, skill-based and affective theories of learning to new methods of training evaluation. *Journal of Applied Psychology, 78*, 311-328.

Morey, J. C., Simon, R., Jay, G. D., Wears, R., Salisbury, M., Dukes, K. A. et al. (2002). Error reduction and performance improvement in the emergency department through formal teamwork training: Evaluation results of the MedTeams project. *Health Services Research, 37*, 1553-1581.

Rivers, R. M., Swain, D., & Nixon, W. R. (2003). Using aviation safety measures to enhance patient outcomes. *Association of Perioperative Registered Nurses (AORN) Journal, 77*, 158-162.

Salas, E., Cannon-Bowers, J. A., & Blickensderfer, E. L. (1993). Team performance and training research: Emerging principles. *Journal of the Washington Academy of Sciences, 83*, 81-106.

Searles, R. B. (2002). Patient safety program educating medical community.

Simon, R., Langford, V., Locke, A., Morey, J. C., Risser, D., & Salisbury, M. (2000). A successful transfer of lessons learned in aviation psychology and flight safety to health care: The MedTeams system. In *Patient Safety Initiative 2000-Spotlighting Strategies, Sharing Solutions* (pp. 45-49). Chicago: National Patient Safety Foundation.

Simon, R., Morey, J. C., Rice, M. M., Rogers, L., Jay, G. D., Salisbury, M. et al. (1998). Reducing errors in emergency medicine through team performance: The MedTeams project. In A.L.Scheffler & L. Zipperer (Eds.), *Enhancing Patient Safety and Reducing Errors in Health Care* (pp. 142-146). Chicago: National Patient Safety Foundation.

Stone, F. P. (2000). *Medical team management: Improving patient safety through human factors training*. (Rep. No. *Military Health System Health Care Reengineering*. HCR Reference Number: 00080.).

TABLE 1. PRE-TRAINING MOTIVATION (% “YES” RESPONSES)			
	<i>MedTeamsTM</i> (n=223)	<i>MTM</i> (n=26)	<i>DOM</i> (n=77)
1. Have you ever worked in a medical team where you did not feel comfortable voicing your professional opinion?	46%	58%	68%
2. Have you ever worked in a medical team where there was no clearly designated leader?	48%	46%	64%
3. Have you ever felt pressured to perform a medical procedure that you felt uncomfortable doing?	33%	46%	56%
4. Have you ever witnessed an actual or potential mishap that could have been prevented if the team had learned from their previous mistakes?	58%	63%	86%
5. Have you ever witnessed a routine medical procedure that went wrong because the team did not adequately prepare beforehand?	60%	50%	77%

TABLE 2. ORGANIZATIONAL CULTURE (% AGREEMENT)

<i>Item</i>	<i>MedTeamsTM</i> <i>(n=223)</i>	<i>MTM</i> <i>(n=26)</i>	<i>DOM</i> <i>(n=77)</i>
6. The culture in our dept. makes it easy to learn from the mistakes of others.	68%	81%	51%
7. Our doctors, nurses, enlisted personnel, and other team members work together as a well-coordinated team.	57%	52%	63%
8. Disruptions in patient care can be detrimental to patient safety.	76%	88%	69%
9. Physicians, nurses, enlisted personnel, and other team members in this department know and understand each others' respective responsibilities.	53%	52%	54%
10. My department does a good job of training new personnel.	53%	58%	51%

TABLE 3. BELIEF IN THE IMPORTANCE OF TEAMWORK (% AGREEMENT)

<i>Item</i>	<i>MedTeamsTM</i> (n=223)	<i>MTM</i> (n=26)	<i>DOM</i> (n=77)
11. Teamwork deserves more attention in health care.	81%	92%	97%
12. I am confident about my ability to work effectively in a team.	97%	96%	96%
13. Teamwork is one of the most important skills in the OR.	92%	92%	87%
14. People with strong teamwork skills are more likely to be successful in health care.	94%	100%	99%
15. It is impossible to function in health care without being a good team player.	73%	77%	81%

TABLE 4. POST-TRAINING OPINIONS ABOUT MEDTEAMS™

	<i>TOTAL (n=218)</i>				
<i>Item</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Percentage Agreement</i>	<i>Percentage Neutral</i>	<i>Percentage Disagreement</i>
The training was well-organized.	4.4	.68	96%	2%	2%
I am confident that I can perform the tasks that were trained.	4.4	.58	96%	3%	1%
I am confident that I understood the training content.	4.5	.60	96%	3%	1%
I am confident that I can use the knowledge that I learned on the job.	4.4	.69	94%	5%	1%
The training content was appropriate for my department.	4.3	.72	92%	6%	2%
Training will help my department improve patient safety.	4.1	.81	83%	14%	3%
As a result of this training, I feel more confident about my ability to work effectively in a team.	4.1	.83	80%	17%	3%
Training prepared me to work effectively in my job.	4.0	.82	78%	18%	4%
Training was an effective use of my time.	3.9	.95	77%	14%	9%

TABLE 5. POST-TRAINING OPINIONS ABOUT MTM

TABLE 5. POST-TRAINING OPINIONS ABOUT MTM					
	<i>TOTAL (n=26)</i>				
<i>Item</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Percentage Agreement</i>	<i>Percentage Neutral</i>	<i>Percentage Disagreement</i>
The training was well-organized.	4.6	.49	100%	-	-
I am confident that I understood the training content.	4.5	.59	96%	4%	-
I am confident that I can perform the tasks that were trained.	4.2	.72	92%	4%	4%
I am confident that I can use the knowledge that I learned on the job.	4.3	.80	88%	8%	4%
As a result of this training, I feel more confident about my ability to work effectively in a team.	4.2	.65	88%	12%	-
The training content was appropriate for my department.	4.2	.75	88%	8%	4%
Training will help my department improve patient safety.	4.1	.60	88%	12%	-
Training was an effective use of my time.	4.1	.70	88%	8%	4%
Training prepared me to work effectively in my job.	4.0	.71	76%	24%	-

TABLE 6. POST-TRAINING OPINIONS ABOUT DOM

TABLE 6. POST-TRAINING OPINIONS ABOUT DOM					
	<i>TOTAL (n=78)</i>				
<i>Item</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Percentage Agreement</i>	<i>Percentage Neutral</i>	<i>Percentage Disagreement</i>
I am confident that I understood the training content.	4.6	.65	98%	1%	1%
The training was well-organized.	4.7	.72	97%	-	3%
I am confident that I can use the knowledge that I learned on the job.	4.6	.68	96%	3%	1%
I am confident that I can perform the tasks that were trained.	4.4	.70	95%	4%	1%
As a result of this training, I feel more confident about my ability to work effectively in a team.	4.5	.73	92%	7%	1%
The training content was appropriate for my department.	4.4	.83	91%	6%	3%
Training prepared me to work effectively in my job.	4.4	.78	88%	11%	1%
Training was an effective use of my time.	4.4	.86	88%	9%	3%
Training will help my department improve patient safety.	4.4	.83	87%	10%	3%