Team Training for Medical Military Teams: Using Simulation to Improve Teamwork

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ABSTRACT

Within healthcare, there is growing evidence regarding the impact of simulation-based team training (SBTT) on important outcomes (Gaba et al., 2001; Sica, 1999; Wallin et al., 2007). The high cost of SBTT in terms of both operations and staffing resources are often barriers to reaping the benefits of such immersive training technology. It is not uncommon for trainees to only experience one SBTT scenario per year, limiting opportunities for directed practice and targeted feedback. The instructional design and training literatures underscore the importance of multiple opportunities for practice, quality feedback, and psychological fidelity in achieving transfer of trained skills to the performance environment (Aguinis & Kraiger, 2009; Salas & Rosen, 2008).

Our study examined whether participating in an SBTT session prior to didactic classroom-training significantly improves team performance in a follow-up simulation scenario. Simulation-based training is commonly conducted following a didactic, lecture-based training session. The purpose of the current study was to determine whether using SBTT as an advanced organizer prior to classroom instruction helps to develop higher levels of team performance. Specifically, teams who participate in SBTT *prior* to classroom training have the opportunity to diagnose performance issues early, helping to pinpoint opportunities for improvement.

Data were collected on US Forward Surgical Teams (FSTs), the US Army's highly mobile surgical asset designed to provide surgery in the far forward battle area, who participated in a 14-day pre-deployment training program. Simulation data were collected across several large FST training classes who completed the simulation sessions as part of 11 smaller sub-teams (5 trainees per team) in order to mirror the true conditions of deployment operations. Teams who participated in an SBT scenario before didactic training demonstrated significantly better communication and leadership. Additionally, teams who completed an SBTT session prior to classroom training demonstrated significant performance improvements over time.

ABOUT THE AUTHORS

Sallie J. Weaver is a doctoral student in the Industrial and Organizational Psychology program at The University of Central Florida (UCF). She earned a B.S. in Psychology with a certificate in Performance Management from The Florida State University and an M.S. in Industrial/Organizational Psychology from UCF. Sallie is a graduate research associate at the Institute for Simulation and Training where her research interests include individual and team training, simulation, performance measurement, decision-making/adaptation, and motivation, with an emphasis in healthcare. She is student scientific lead on several major projects dedicated to training development and evaluation specifically related to teams working in complex environments and simulation-based training. Her work to date includes 7 peer reviewed articles (4 published, 3 in press), 5 book chapters, and over 20 presentations/posters at professional conferences. She is the recipient of the 2009 Thayer & Joyce Graduate Fellowship awarded by the Society for Industrial/Organizational Psychology and the 2009 Doctoral Scholarship awarded by the National Training and Simulation Association via the Interservice/Industry Training, Simulation, and Education Conference. Sallie also designs content and learning tools for MedAxiom Synergistic Healthcare Solutions.

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Modern insurgency warfare demands not only a new approach to combat operations, but also an effective, immediate approach to the care of wounded soldiers. Compared to the majority of 20th century engagements in which adversaries, roles, and rules of engagement were clearly defined, today's military faces constantly shifting conditions requiring unprecedented levels of flexibility and adaptation in the provision of medical care during combat operations (Vandergriff, 2008; Wong, 2004). Reports from recent conflicts demonstrate that more injuries occur per patient, that these injuries are more severe and complex, and that a significant percentage of wounded are too injured to survive the trip to operating rooms traditionally located at the division rear areas in combat support hospitals (CSH) or mobile Army surgical hospitals (MASH) (Brethauer et al., 2008; Gwande, 2004; Stinger & Rush, 2003). The modern battlefield demands surgical care close to the front lines.

The mission of Army Forward Surgical Teams (FSTs) is to fill this need by deploying operating room capability directly within the Brigade Support Area (BSA). FSTs are highly mobile surgical assets designed to provide surgical care in the far forward battle area, thus ensuring lifesaving care for patients whose injuries are too severe to survive transport. As noted by Thomas (2006), FSTs provide "good medicine in bad places." These teams are equipped to perform up to 30 lifesaving operations within 72 hours (Stinger & Rush, 2006). These highly trained 20 person teams are comprised of surgeons, certified nurse anesthetists, medics, technicians, practical nurses, and an operations officer. While each FST is comprised of 20 individuals, actual daily operations are performed in shifts so that care is provided in smaller 5 person teams which include (1) the team leader, (2) a primary nurse, (3) an anesthesia provider, (4) a right medic and (5) a left medic.

Prior to deployment these teams participate in an intensive 14-day simulation-based team training program provided by the Army Trauma Training Center (ATTC), Ryder Trauma Center, Jackson Memorial Hospital in Miami, Florida. The joint military-civilian program is designed to develop the knowledge, skills, and attitudes necessary to engage in high levels of team performance under the intensive, stressful conditions of far forward medical care. The program integrates both clinical trauma skills and teamwork skills vital to effective medical care. Simulation-based team training (SBTT) provides vital opportunities for practice under realistic stress and time-pressures to facilitate acquisition of team skills.

While there is growing evidence of the positive effects of SBTT on team effectiveness in healthcare (e.g. (Gaba et al., 2001; Sica, 1999; Wallin et al., 2007), the high cost of SBTT in terms of both operations and staffing are often barriers to the benefits of such immersive training technology. Despite calls from the instructional design literature for multiple opportunities for active, engaging practice, practical experience tells us that it is not uncommon for trainees in civilian medical training programs to only experience one SBTT scenario per year, thus limiting opportunities for directed practice and targeted feedback.

The purpose of our study was to investigate the impact of participating in SBTT prior to didactic classroom-training on team performance of FST's. Simulation-based training is commonly conducted only after a didactic, lecture-based training session. Based on theories of instructional design and adult learning, we suggest that using SBTT as an advanced organizer prior to classroom instruction may help develop higher levels of team performance. To this end, we first provide a brief review of the science behind SBTT in healthcare and draw a foundation in instructional design theory. We then present the results of a study designed to compare the team performance of FSTs who participated in pre-classroom SBTT sessions to FSTs who did not.

Simulation-Based Team Training (SBTT) in Healthcare

Considering the complex and dynamic environment in which medical care occurs, as well as the increasing complexities of injury and illness, healthcare requires teamwork. Providers must not only be clinical experts, but must also be expert team members in order to provide quality care. Teamwork has been directly associated with both the quality and process of medical care (e.g. Deeter-Schmelz & Kennedy, 2003), as well as patient outcomes (e.g. Paige et al., 2009; Wheelan, Burchill, & Tilin, 2003).

One mechanism for optimizing teamwork in healthcare is team training. Team training has been found to have significant positive effects on team performance across a wide variety of complex tasks (Salas et al., 2008). A recent RAND report (Sorbero et al., 2008) demonstrates that team training has been linked with improvements in care quality and patient outcomes. Qualitative analyses of team training programs in healthcare also underscore their growing prevalence and the integration of technologically based opportunities for practice using simulation (e.g. Salas, DiazGranados, & Weaver, 2008).

The main purpose of simulation-based training (SBT), as defined by Fritzsche, Stagl, Salas, & Burke (2006), is to "facilitate learning by closely linking job-knowledge, skills, attitudes, requisite training objectives, scenarios, training performance, and feedback" (p. 303). SBT provides numerous advantages over other training methods, such as standard classrooms or authentic field work. SBT can differ widely in the extent of the simulation, ranging from standardized patients (actors) to entire environment simulations, thus, allowing teams to practice certain tasks or procedures that can have dire consequences for the patient in a consequence-free learning oriented environment. Simulation allows the trainees to commit errors, start over, watch video of their work in order to analyze and improve, practice working with a team, and experience the function of the team in response to challenges in low volume high risk situations, all while having no real-world risks, such as patient death or injury (Sato & Hanscom, 2006).

Through the use of SBT, healthcare practitioners become better prepared for demanding situations and more capable at handling their daily work. Sato and Hanscom (2006) argue that this can lead to a reduction in mistakes involving errors in judgment, lapses in physical technique, or both.

SBT can be used to train both clinical skills and teamwork skills. Simulation-based team training (SBTT) in healthcare, such as the classic example the of the Anesthesia Crew Resource Management SBTT program developed by Gaba, Howard and colleagues, has been linked with increases in care quality and patient outcomes (e.g. Gaba et al., 2001; Jha et al., 2001)

Instructional Design & SBTT

In order to reap the benefits of SBTT it is vital to ensure that the training program is systematically designed and built upon the science of adult learning and instructional design (Gange et al., 2007; Salas & Rosen, 2008; Salas, Wilson, et al., 2008). Collectively, these models support a systematic design and implementation process for SBTT programs. The first step to systematic design is to conduct a skills inventory and training need analysis in order to pinpoint core skills and to determine measurable learning objectives. Objectives must clearly reflect core competencies necessary for team tasks to be effective and safe. Once learning objectives are established, instructors and researchers must compose carefully crafted scenarios, varying in levels of difficulty, to be infused into multiple points of training. Training objectives should be salient to trainees and simulation scenarios framed as opportunities for consequence-free learning. Most importantly, simulation scenarios should be paired with well developed, diagnostic performance measures. These performance measures should be the foundation of feedback and learning opportunities once the simulation scenario is completed. Providing feedback in a timely manner will ensure that the objective behaviors are being encouraged and the ineffective behaviors are being corrected.

SBTT offers a unique, educationally rich opportunity for diagnostic feedback, a vital component of team learning and improvement. Teams who experience multiple simulation scenarios have more opportunities to receive such feedback, develop optimal task strategies, and develop emergent properties important for team success such as psychological safety and cohesion. Teams who experience multiple simulation scenarios should outperform teams who only experience one simulation scenario considering that they have more opportunities for practice and feedback (Ericsson, 2000)

Our hypothesis was tested using data from 11 FST sub teams, the smaller 5 person care teams charged with individual combat casualty care, participating in the 14-day ATTC Pre-Deployment Training Program. We hypothesized that teams who participated in two mannequin training scenarios would demonstrate significantly better teamwork, specifically, higher quality (1) exchange of information, (2) phraseology, (3) adaptability, and (4) leadership compared to teams who only experienced one SBTT scenario.

METHODS

The ATTC Pre-Deployment Training Program

The ATTC pre-deployment training is a rigorous 14-day program, in which trainees participate in 3 hours of didactic classroom training on teamwork as well as 11 days in clinical skills labs and in hospital clinical experience, and 2 days in simulation practice sessions. The culmination of their training consists of integrating into the daily operations of a civilian Level I trauma center.

While each large FST is comprised of approximately 20 trainees, this large group is broken down into several small 5 person teams for the training simulation exercises in order to more closely mirror the actual configurations they will be working with in theater. The members of these smaller teams worked as a unit in one of the five specific Army Trauma Teamwork roles (i.e., team leader, primary nurse, anesthesia, right medic, left medic) in order to complete each simulation scenario. Each of these smaller teams was video recorded via the two way mirror as they participated in the mannequin simulation scenarios.

The simulation sessions consisted of a mannequin-based patient simulator. The simulated scenario was a respiratory failure event in which trigger events are embedded during the 20 to 25 minute scenario. The scenario was designed to allow Teams of 5 to perform in one room, at one operating table. During their simulation, instructors were situated behind a two way mirror, in the control room, operating the mannequin and implementing the trigger events embedded in the scenario.

TABLE 1. Key Teamwork Processes Stressed in ATTC Didactic Classroom Training

1. Communication
2. Leadership
3. Mutual Support
4. Situation Monitoring

Participants

All data was collected under approval of the Institutional Review Boards (IRB) of the Department of Defense, University of Miami, and University of Central Florida. Participation was completely voluntary and all participants signed consent forms.

Data from 11 FST sub-teams, was collected between April 2008 and December 2008. As noted earlier, these sub teams are comprised of 5 individuals: (1) team leader, (2) primary nurse, (3) an anesthesiology provider, (4) a right medic, and (5) a left medic. From this sample, two teams completed only the final mannequin simulation scenario after their classroom training (Condition 1), while 9 teams completed a mannequin simulation scenario before their classroom training, in addition to the final mannequin simulation session after classroom training (Condition 2).

The Simulation Scenarios

Both simulation scenarios were completed using a Meti™ Human Patient Simulator in a dedicated operating room environment designed to mirror realistic battlefield conditions. Both scenarios included a 22 year old male soldier seriously injured while in the field. In Scenario A, the patient's injuries resulted from the impact of an Improvised Explosive Device (IED) on the armored vehicle that he was riding in. While in the care of medics he was initially conscious and complaining of pain in his lower extremities and shortness of breath; however, the patient had fallen unconscious by the time he reached the care unit. In Scenario B, the patient suffered injuries due to firefight at the Syrian border. When he is taken into the care unit he is conscious and complaining of abdominal shoulder and back pain. The medics also note that he cannot move his lower extremities. Prior to the simulation, each team went through a mannequin orientation session, introducing them to the capabilities of the mannequin and simulation environment.

Criterion Measure: Team Performance

Team performance during the final mannequin training scenario was utilized as the criterion measure in this study. Team performance was rated using a behaviorally-based observation form developed by UCF and ATTC for this study. A four-hour rater training was provided to two raters who behaviorally coded the SBTT scenarios. This training session provided raters with opportunities to view sample videos of the simulation scenarios and practice rating these scenarios, as well as a didactic-lecture component which provided an overview of the competencies covered during the ATTC lecture on teamwork process. Furthermore, the training covered common errors made by raters and the use of the rating form.

The behavioral observation form consists of 4 dimensions of teamwork: information exchange, phraseology, situation monitoring, and leadership. Within each dimension, behavioral markers were rated using a three point Likert scale (1 = poor/not done with safety implications, 2 = marginal/performed but needs improvement, and 3 = satisfactory/met standards). Behavioral markers for *information exchange* included: (1) actively and freely sharing critical information and (2) the use of closed loop communication (α = .54). *Phraseology* included: (1) use of proper phraseology (e.g. no jargon), (2) concise communication, (3) use of respectful communication, (4) using keywords and phrases to promote listening (α = .66). *Situation Monitoring* included: (1) observing the behavior and actions of all team members and (2) requesting assistance (α = .83). *Leadership* included: (1) establishing a clear chain of command and (2) holding team members accountable (α = .68).

Each rater was blind to the hypotheses and independently rated each SBTT scenario. Once individual ratings were completed the two raters met to review the simulations a second time. Discrepancies among ratings were discussed and a consensus was reached among both raters. Therefore, inter-rater reliability was 100%.

RESULTS

To compare the effects of participating in one simulation after classroom training versus completing a scenario before and after classroom training, one-tailed independent-samples t-tests were conducted at both the dimension and behavioral marker level. Dimension level scores were created by taking the mean of the scores on each question included in each particular dimension. For example, the dimension level score for leadership was created by averaging the ratings on : (1) establishing a clear chain of command and (2) holding team members accountable. Figure 1 displays the means between the two groups at the dimension level.

At the dimension level, as hypothesized, teams in condition two performed more high quality information exchange ($t(9)$ = 1.87, p = .05) and more high quality leadership ($t(9)$ = 4.27, p = .002). Contrary to hypothesis however, results suggested that teams in condition one scored significantly higher on the dimension of adaptability ($t(9)$ = -3.43 p = .005). These relationships are demonstrated in Figure 1, with dark stars indicating significant relationships in the hypothesized directions and light stars indicating significant non-hypothesized relationships.

To more fully understand these patterns at the dimension level, analyses were also conducted for each behavioral marker. Figure 2 displays the means at the individual behavioral marker level. Within the dimension of information exchange, results indicated that teams in condition two were more active and free in their sharing of critical information ($t(9)$ = 2.83, p = .01). Under the dimension of phraseology, results indicated that teams in condition two used significantly more concise communication ($t(9)$ = 2.53, p = .02). Additionally, within the dimension of leadership, teams in condition 2 demonstrated a significantly more clear chain of command ($t(8)$ = 4.00, p = .002) and demonstrated significantly better accountability ($t(8)$ = 2.8, p = .01).

Within the dimension of situation monitoring, however, teams in condition one scored significantly higher in terms of observing each other's actions ($t(8)$ = -2.53, p =.02) and in requesting assistance from others ($t(8)$ = -3.16, p = .007).

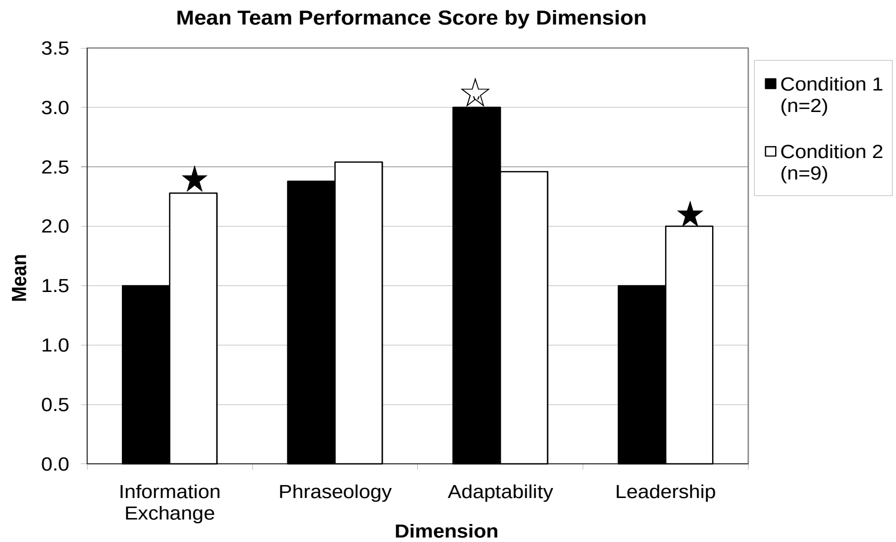

Figure 1. Mean Team Performance Scores by Dimension.

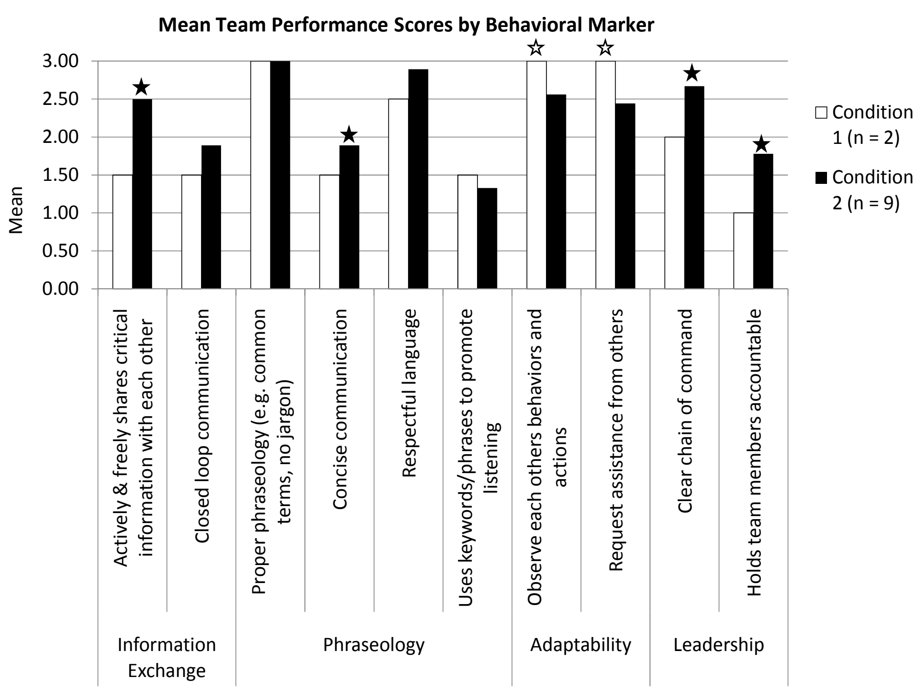

Figure 2. Mean Team Performance Scores by Dimension.

Improvement over Time

Analyses were also conducted on the nine teams who participated in both simulation sessions in order to assess performance improvement over time. One-tailed, paired-samples t-tests were conducted at both the dimension and behavioral marker level.

Figure 3 displays mean performance across all nine teams on each dimension during simulation one compared to performance during simulation two. The nine teams in condition 2 significantly improved the quality of their information exchange ($t(8) = -2.44$, $p = .02$) and leadership ($t(8) = -2.36$, $p = .02$) over time. However, no significant changes were seen in the dimensions of phraseology or adaptability ($p > .05$).

At the behavioral marker level, Figure 4 shows the mean for each question. Teams who participated in both simulation sessions significantly increased their use of closed loop communication ($t(8) = -2.8$, $p = .01$) and their use of proper phraseology ($t(9) = -2.93$, $p = .004$). Additionally, these teams significantly increased the degree to which they demonstrated a clear chain of command ($t(8) = -2.00$, $p = .04$).

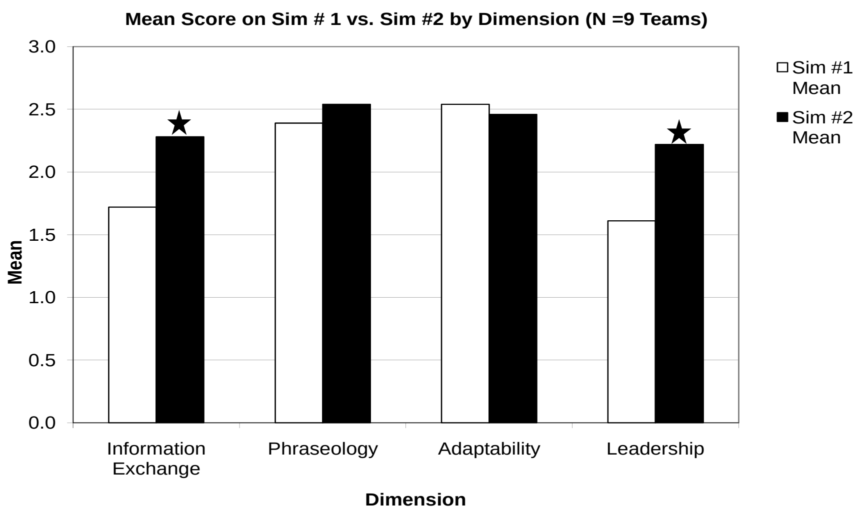

Figure 3. Mean Team Performance Scores by Dimension over Time.

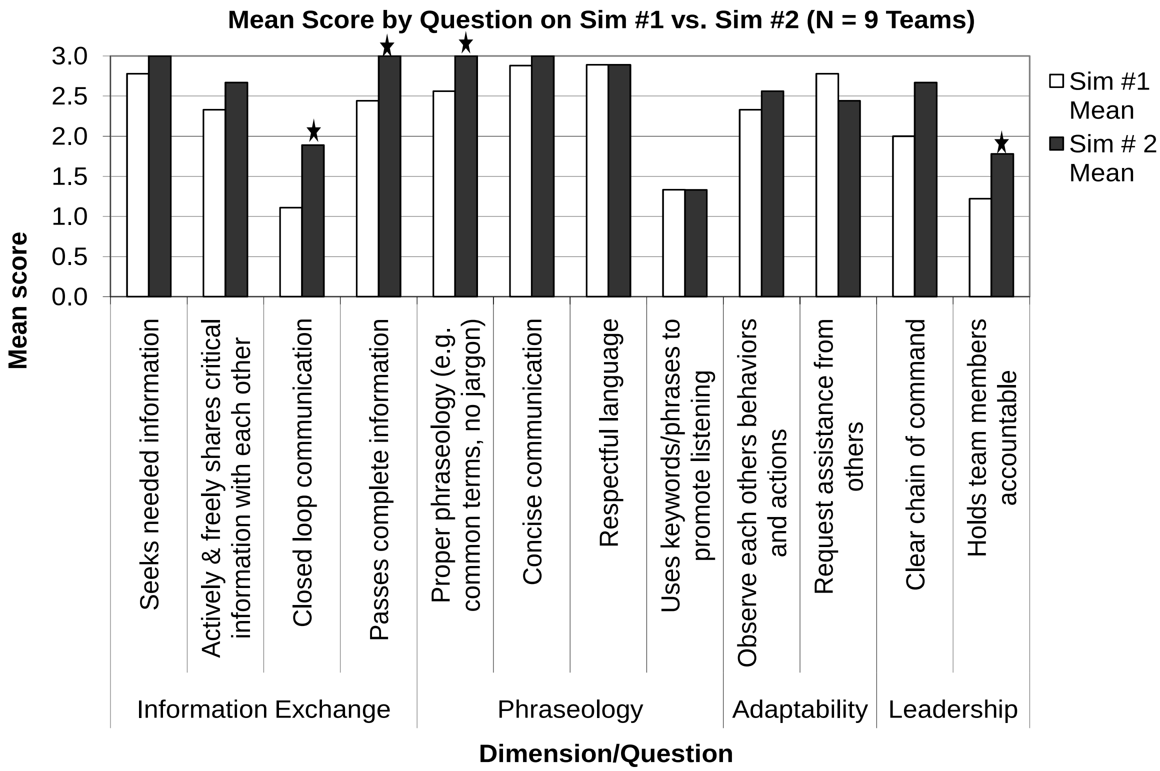

Figure 4. Mean Team Performance Scores by Dimension over Time.
(see method section for full behavioral marker descriptions)

DISCUSSION & CONCLUSIONS

The results of this study support the notion that FSTs benefit from the opportunity to engage in multiple SBTT scenarios. When compared to the two teams who only had the opportunity to engage in one mannequin-based SBTT scenario, the nine teams who participated in two scenarios demonstrated significantly high quality communication and leadership, two core components of effective teamwork.

The results suggest that on the dimension of adaptability those teams which participated in one simulation out preformed those teams which participated in two simulations. We acknowledge that these findings should be interpreted with caution; however, it is worth discussing potential alternative explanations for these findings.

The dimension of adaptability focused specifically on behaviors related to requesting assistance and mutual performance monitoring. One possible interpretation is that teams which only participated in one simulation were unsure how to perform in the simulation therefore, they engaged in more frequent requests of assistance from each other as well as engaging in more observations of other team members' behaviors and actions.

Interpretation of these results, however, must be tempered with consideration of the small sample size. Small sample size reduces the power of the statistical tests, making it nearly impossible to detect true effects. Despite low to non-existent power, however, effects were still detected. This suggests that our results could potentially provide an underestimate of the true magnitude of the effects of the ATTC training program. Data collection will continue in order to add statistical power and to facilitate an in-depth, multi-level evaluation of the training program.

Coupled with previous research demonstrating that the ATTC training program significantly impacts important affective team processes, such as psychological safety and collective efficacy (DiazGranados, Rosen, Lyons et al., 2008; DiazGranados, Rosen, Weaver et al., 2008), the current study provides evidence of the impact that the training program has on actual medical team behavior in situations which mirror the high stress, dynamic conditions they will face in the war zone.

In conclusion, this study goes beyond traditional training evaluation studies which only reflect on the reactions of trainees (e.g. how useful they thought the training would be, how much they like it). These results begin to provide objective support for SBTT as an effective method for improving actual team behavior and that exposure to SBTT may be additive—meaning that opportunities to participate in multiple SBTT are worth the added cost and result in the greatest gains in the quality of teamwork behaviors. From a practical perspective, these findings suggest that program designers and developers should strive to incorporate multiple opportunities for trainees to participate in rich SBTT scenarios, not simply conceptualize SBTT as a didactic lecture followed by a single SBTT scenario.

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REFERENCES

Ericsson, K. A. (2002). Attaining excellence through deliberate practice: Insights from the study of expert performance. In M. Ferrari (Ed.) The pursuit of excellence through education. Lawrence Erlbaum Associates, Inc. Mahwah, NJ.

Brethauer, S. A., Chao, A., Chambers, L. W., Green, D. J., Brown, C., et al. (2008). Invasion vs. insurgency: US Navy/Marine Corps forward surgical care during Operation Iraqi Freedom. *Archives of Surgery, 143*(6), 564-569.

DiazGranados, D., Rosen, M. A., Lyons, R., Weaver, S. J., Salas, E., Wilson, K. A., Augenstein, J. S., Robinson, D. W., & King, H. (2009, January). Can simulation-based training in FSTs develop affective team competencies? *Poster presented at the 9th Annual International Meeting on Simulation in Healthcare, Lake Buena Vista, FL.*

DiazGranados, D., Rosen, M. A., Weaver, S. J., Lyons, R., Salas, E., Wilson, K. A., Augenstein, J. S., Robinson, D. W., & King, H. (2009, January). Effects on collective efficacy in Forward Surgical Teams: Does type of simulation matter? *Poster presented at the 9th Annual International Meeting on Simulation in Healthcare, Lake Buena Vista, FL.*

Gange, R. M., Wager, W. W., Golas, K, C., Keller, J. M., Russel, J. D. (2005). Principles of instructional design, 5th edition. Florence, KY: Wadsworth

Gwande, A. (2004). Casualties of war: Military care for the wounded in Iraq and Afghanistan. *New England Journal of Medicine, 351*, 2471-2475.

Jha, A, K., Duncan, B.W., & Bates, D.W. (2001). Simulator-based training and patient safety. In: R. M. Wachter et al., (Eds.). Making health care safer: A critical analysis of patient safety practices. Evidence (Report/Technology Assessment: Number 43). Rockville, MD: Agency for Healthcare Research and Quality.

Paige, J. T., Aaron, D. L., Yang, T., Howell, D. S., & Chavin, S. W. (2009). Improved operating room teamwork via SAFETY prep: A rural community hospital's experience. *World Journal of Surgery, 33*(6), 1181-1187.

Salas, E., DiazGranados, D., Klein, C. Burke, C. S., et al. (2008). Does team training improve team performance? A meta-analysis. *Human Factors, 50*(6), 903-933.

Salas, E., DiazGranados, D., & Weaver, S. J. (2008). Does team training work? Principles for healthcare. *Academic Emergency Medicine, 15*, 1-8.

Salas, E., & Rosen, M. A. (2008). Beyond the bells and whistles: When simulation-based team training works best. *Forum, 26*, 6-7.

Salas, E., Wilson, K. A., Lazzara, E., King, H. E., Augenstein, J. S. et al., (2008). Simulation-based training for patient safety: 10 priniciples that matter. *Journal of Patient Safety, 4*(1), 3-8.

Sorbero, M. E., Farley, D. O., Mattke, S., & Lovejoy, S. (2008). Outcome measures for effective teamwork in inpatient care. (RAND technical report TR-462-AHRQ). Arlington, VA.

Stinger, H. K., & Rush, R. M. (2003). The forward surgical team: The army's ultimate lifesaving force. Infantry Magazine, *92*, 11-13.

Stinger, H. K., & Rush, R. M. (2006). Army forward surgical team: Update and lessons learned, 1997-2004. *Military Medicine, 171*(4), 269-272.

Thomas, R. (2006). *Ensuring good medicine in bad places: Utilization of forward surgical teams in the battlefield*. Unpublished Master's Thesis, US Army War College, Carlisle, PA, USA.