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14. ABSTRACT The purpose of this research was to develop a program of systematic, brief training in role appropriate team behaviors covering key communication, leadership, and team member behaviors for ad hoc emergency medical care teams and to determine whether training in these behaviors resulted in improved individual and team communication, leadership and team member performance in simulated emergency care situations regularly faced by trauma and emergency department medical care teams. Nine teams were trained. The teams included all junior and senior surgery and emergency medicine residents, 24% of emergency department nurses and 10% of emergency department and respiratory technicians. Fourteen out of 17 targeted team and leader behaviors significantly improved immediately following the training. There were seven areas with training effects that were sustained through the retention trial period. Four of these seven areas (efficiency, listened to information, orders were carried out, cooperation and communication) are all critical indicators of effective team performance. Outside the scope of the contract, 97% of the remaining emergency room nurses and technicians have now been trained

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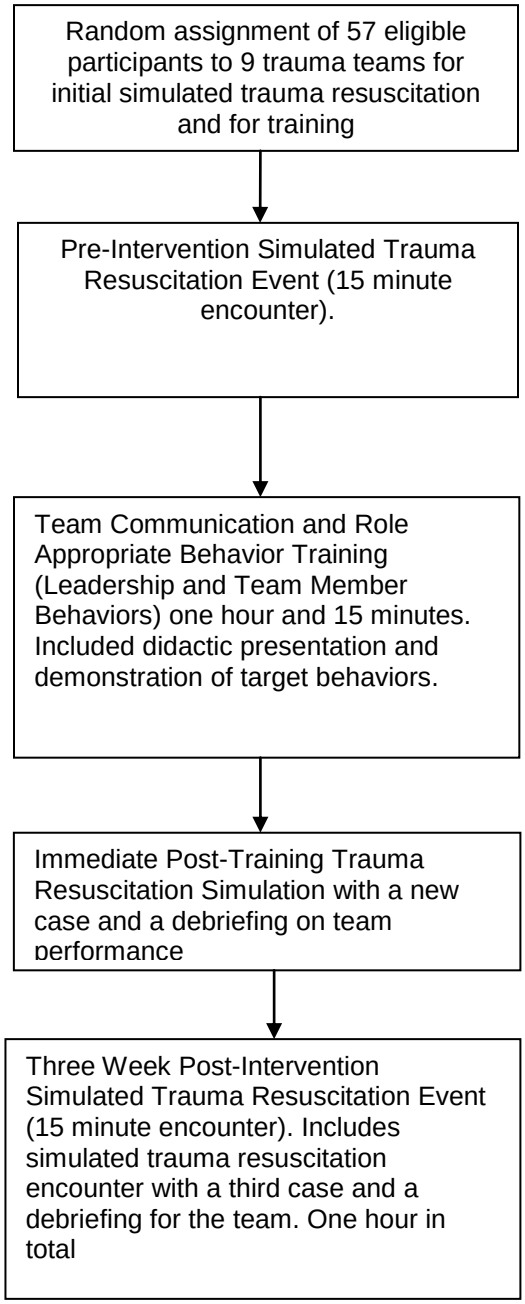
Introduction

Medical care is increasingly the responsibility of teams rather than individuals. This realization has led to increased team training of medical professionals with a focus on establishing role appropriate team behaviors emphasizing team communication, leadership and team member skills. Emergency departments and trauma centers are unusual care settings in that circumstances provide little time for deliberation and planning at the time of patient care due to the emergency nature of the cases. Furthermore, care is provided by ad hoc teams where the composition of the group responsible for delivery of care is not constant but the roles and responsibilities needed are invariant. Finally, members of the team may enter at various points as the case unfolds. These conditions require special team leadership, communication and team member skills. The purpose of this research is to develop a program of systematic, brief training in role appropriate team behaviors covering key communication, leadership, and team member behaviors for emergency medical care teams and to determine whether training in these behaviors will result in improved targeted individual and ad hoc team communication, leadership and team member behaviors in simulated emergency care situations such as those regularly faced by trauma and emergency department medical care teams.

During the second year we requested a change in research design and a no-cost extension of the project. This request for a research design change and an extension was granted on 21-Jul-2011. As a result, the revised date for completion of the project was changed to 30 Dec 2012. Figure 1 summarizes the approved modified design of the study. In the body of this final report we provide a description of project accomplishments broken down by the tasks and subtasks spelled out in the approved statement of work as reflected in the original proposal and in the approved request for a no-cost extension.

Figure 1 summarizes the modified design of the study.

Figure 1. Study Design



Body

Task 1. Develop the training module

a. Conduct an in-depth analysis of in-situ simulation results

An in-situ simulation of a trauma case was performed at Memorial Medical Center in July 2008 to test staff preparedness for addressing trauma cases and to uncover weaknesses that needed to be addressed. The results of this in-situ simulation were a stimulus for the current project and provided guidance for the proposal objectives. Core Training Planning and Development Group performed a more in-depth analysis of the in-situ simulation as a way of validating and refining the proposed primary focus for the planned training interventions. This group reaffirmed the weaknesses identified in the project proposal. Further the group concluded that a primary overarching problem was that the residents on the trauma team appeared to lack a clear understanding of their roles and that, during trauma cases, resident leadership of the team was never clearly established.

b. Conduct additional observation of emergency and trauma cases to establish the representativeness of in-situ findings and to provide additional information as needed

Project Investigators and the Core Training Planning and Development Group developed a role appropriate team behavior, communication and leadership checklist for use in observing trauma care at Memorial Medical Center. This checklist was developed with the assistance of physicians who work in the emergency department and trauma center at Memorial Medical Center. It was designed to be directly aligned with the planned target training behaviors developed for this project. In February 2010, members of the research team observed 15 trauma cases and completed the communication and leadership checklist for each case. The goal of this observation was to determine whether or not what we observed in the in-situ simulation occurred regularly in actual patient care situations. All members of the trauma and ED teams were notified of our activities. Two investigators were given trauma pagers and ID badges that allowed keyless access to the trauma bay area. All but two observed traumas took place during normal work hours. Each case was assigned a random number. There is no way to tie the random number to individual patients. No information about patient care was gathered, nor was any protected health information gathered.

Eleven of the fifteen cases were observed from a time prior to the patient's arrival through the primary and secondary survey, and through stabilization and imaging of the patient. For four of the cases, observation began after the patient had been delivered to the trauma bay.

The following tables provide observation frequency data for each item on the Communication and Leadership checklist. Items with an X in the upper left hand box are those where the standard practices we observed frequently deviated from the desired practices as delineated either in the literature and/or by the trauma/ED team members in our core training development group.

Did team members introduce themselves by role and by name?

x	Frequency	Percent	Valid Percent	Cumulative Percent
No	13	86.7	86.7	86.7
Not observed	2	13.3	13.3	100.0
Total	15	100.0	100.0	

Did an organized handoff occur between EMT and receiving team?

x	Frequency	Percent	Valid Percent	Cumulative Percent
No	10	66.7	66.7	66.7
Yes	4	26.7	26.7	93.3
Not applicable/ observed	1	6.7	6.7	100.0
Total	15	100.0	100.0	

Did an organized handoff occur between Emergency Medicine and Trauma teams?

	Frequency	Percent	Valid Percent	Cumulative Percent
No	6	40.0	40.0	40.0
Yes	5	33.3	33.3	73.3
Not applicable/ observed	4	26.7	26.7	100.0
Total	15	100.0	100.0	

Did an organized handoff occur between the Trauma team and the new care team at final disposition?

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	6	40.0	40.0	40.0
	Yes	3	20.0	20.0	60.0
	Not applicable/ observed	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

Was extraneous noise minimal and/or explicitly controlled?

x		Frequency	Percent	Valid Percent	Cumulative Percent
	No	9	60.0	60.0	60.0
	Yes	6	40.0	40.0	100.0
	Total	15	100.0	100.0	

How frequently did read backs of orders occur?

	x	Frequency	Percent	Valid Percent	Cumulative Percent
	Never	8	53.3	57.1	57.1
	Rarely	4	26.7	28.6	85.7
	Some of the time	1	6.7	7.1	92.9
	Most of the time	1	6.7	7.1	100.0
	Total	14	93.3	100.0	
Missing		1	6.7		
Total		15	100.0		

Did team members avoid walking on the communication of others?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	1	6.7	7.7	7.7
	Rarely	1	6.7	7.7	15.4
	Some of the time	4	26.7	30.8	46.2
	Most of the time	7	46.7	53.8	100.0
	Total	13	86.7	100.0	
Missing		2	13.3		
Total		15	100.0		

Was all care communicated and documented?

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	9	60.0	64.3	64.3
	Rarely	5	33.3	35.7	100.0
	Total	14	93.3	100.0	
Missing		1	6.7		
Total		15	100.0		

Number of SMARTT Stepbacks that occurred

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	13	86.7	86.7	86.7
	1	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

Were all team members included in SMARTT Stepbacks?

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	13	86.7	86.7	86.7
	Yes	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

Number of team members who spoke during SMARTT Stepbacks

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	13	86.7	86.7	86.7
	1 person only	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

Number of team members who listened during SMARTT Stepbacks

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Not Applicable	14	93.3	93.3	93.3
	Minority, but more than one	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

SMARTT Stepback element 1 was present: Current situation was discussed

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	100.0	100.0	100.0

SMARTT Stepback element 2 present: Direction (goals) were discussed

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	100.0	100.0	100.0

Stepback element 3 present: Velocity (urgency) was discussed

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	100.0	100.0	100.0

SMARTT Stepback element 4 present: Connections (resources needed) discussed

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	100.0	100.0	100.0

SMARTT Stepback element 5 present : Turbulence (Anticipated Problems) discussed

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	100.0	100.0	100.0

SMARTT Stepback element 6 present: Talk to Me (Team members explicitly encouraged to speak)

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	100.0	100.0	100.0

Team behavior reflected that roles of Attending (Supervising) Physician and Team Leader were understood

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	5	33.3	33.3	33.3
	Yes	10	66.7	66.7	100.0
	Total	15	100.0	100.0	

Team leader indicated role by taking position at foot of bed

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	15	100.0	100.0	100.0

Team leadership explicitly established (assigned or assumed) and communicated

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	7	46.7	46.7	46.7
	Yes	7	46.7	46.7	93.3
	Not applicable	1	6.7	6.7	100.0
	Total	15	100.0	100.0	

Team leader explicitly assigned and delegated responsibilities to other team members

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	73.3	73.3	73.3
	Yes	2	13.3	13.3	86.7
	Not applicable	2	13.3	13.3	100.0
	Total	15	100.0	100.0	

Transitions in team leadership were clear and explicit

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	11	73.3	73.3	73.3
	Not applicable	4	26.7	26.7	100.0
	Total	15	100.0	100.0	

It was clear who the team leader was at all times

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	7	46.7	46.7	46.7
	Yes	8	53.3	53.3	100.0
	Total	15	100.0	100.0	

Team leader and/or supervising physician managed noise appropriately

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	40.0	40.0	40.0
	Yes	6	40.0	40.0	80.0
	Not applicable	3	20.0	20.0	100.0
	Total	15	100.0	100.0	

Team leader and/or supervising physician explicitly directed care

	x	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	6	40.0	40.0	40.0
	Yes	9	60.0	60.0	100.0
	Total	15	100.0	100.0	

c. Review additional research reports and professional literature (e.g. TeamSTEPPS, American College of Surgeons, and Association of Program Directors in Surgery Curriculum) on team leadership and communication in emergency care settings.

Members of the research team reviewed numerous research reports regarding leadership and communication which have informed the further refinement of the target behaviors which will make up the focus of the training module. We also reviewed recommendations and curricula from various organizations (Association of Program Directors in Surgery Curriculum) and acquired policies and procedures regarding team performance, leadership, communication and care coordination from various other hospitals which have been helpful. We found the material provided to us by Vanderbilt University to be particularly helpful and have incorporated some of their ideas about emergency care policies and procedures into our work.

d. **Consult with representatives of hospital administration and various health professional constituencies regarding the focus of new training and its relationship to current and past training.**

The Program Advisory Committee for this project was made up of representatives of all affected professional constituencies. The program advisory committee met monthly and has been briefed regularly on proposed target training behaviors, training methods, and research methods. This group has participated and endorsed all decisions regarding these project developments.

Based on the results reported above, the Core Training Planning and Development Group and the Program Advisory Committee agreed that the primary focus for the interventions would be on training emergency and trauma team leaders and members to communicate more effectively and to function effectively as trauma team leaders and team members during trauma resuscitations. They also agreed that the proposed specific target training behaviors were reasonable targets to drive the training intervention for trauma team members.

Table 1. provides a listing of the team behaviors that were targeted for training.

Particular emphasis was placed on teaching trauma teams to use SMARTT Stepbacks. SMARTT Stepbacks are similar to the “huddle” in TeamSTEPPS. The SMARTT Stepbacks are designed to assure team shared awareness of the direction (where we are and where we are going with this patient) velocity or rapidity (How fast we need to go), priorities, obstacles and approaches to dealing with them, and anticipated developments (Things to “keep an eye on”). They are also designed to encourage two-way communication among team members. SMARTT Stepbacks are a way of establishing that all personnel involved have the same expectations for the patient outcome and for task urgency and priorities. While we envisioned that SMARTT Stepbacks normally will be used by the trauma team after the primary survey in the trauma bay, SMARTT Stepbacks can be used whenever the team leader feels they are needed.

e. Design and produce the necessary training module and supporting materials

One training module was developed and pilot tested. The training module included all target behaviors including 1) the SMARTT Stepback Communication portion (**situation; management; activity** –What needs to happen next; **rapidity** – what needs to be done first and how quickly; **troubleshoot** – what may go wrong and steps to correct; **talk to me** – what are your concerns, what has leader missed, what other pertinent information needs to be shared); 2) the leadership elements for trauma team leaders (explicit assignment of tasks to team members by name and/or function, explicit transitions of leadership when leadership is handed over to others, managing noise in the room, managing workload of team members, encouraging team members to volunteer key information) and 3) the role appropriate team behaviors for other team members (e.g. announce yourself by name and role when entering the trauma bay, volunteer important information, speak only when necessary for patient care, verbally confirm orders and report completion of tasks).

Videos demonstrating the target behaviors were planned and then filmed on 9 June 2011. The demonstration videos were edited and incorporated into the Powerpoint presentation used in the training intervention.

Task 2. Development of Simulation Scenarios

After reviewing the 30 simulation cases in the METI Disaster Medical Readiness and Emergency Medical Services Learning Modules, cases developed locally and team training cases developed for the Association of Program Directors in Surgery curriculum under the leadership of Gary Dunnington, MD, at Southern Illinois University School of Medicine, members of the Core Training Planning and Development Group developed four simulated trauma resuscitation scenarios for use in the training. This involved developing: a. the educational rationale and the learning objectives for the simulation scenarios, b. the case stem for the learners (pertinent patient and scenario information – task, location, physician/help availability, equipment availability, c. background and briefing information for facilitators and coordinators (patient data background and baseline patient state, baseline simulator state), d. supporting files (chest x-ray, echo, assessment, handouts etc.), e. a list of alterations that will occur during the simulation, f. the trigger to move to the next state, g. the expected learner actions, and h. the teaching points for the debriefing.

One case was used exclusively for demonstrating the target behaviors as part of the training intervention. The other three were alternated for use as 1.) pre-intervention exercises designed to determine the rate of team target behaviors prior to training, 2) opportunities to practice using the target behaviors at the end of the training session and 3) retention simulation exercises to document retention of the target behaviors approximately three weeks after training.

The practice simulation exercise and the post intervention retention exercise were followed by team debriefing sessions designed to cement the desired target behaviors and to correct target behaviors performed incorrectly. The debriefing protocol (Appendix 1) was designed by the research team. Debriefing was done by two trauma surgeons (Jarrod Wall, MD and John Sutyak, MD) and two emergency department physicians (David Griffen, MD and Christopher McDowell, MD) who were trained by Reed Williams, Ph.D. using Appendix 1 as a training aid.

Task 3. Data collection and interpretation plan for analyzing individual and team performance data during simulation scenarios

The plan for data collection and interpretation was completed in the 1 March 2011 to 31 May 2011 Quarter. Details will become apparent when reading the project results (See Task 8)

Task 4. Acquire and install the simulators, and medical equipment and supplies needed to make the simulation center resemble as closely as possible the trauma bay and the emergency department.

All simulation equipment, recording equipment, supporting medical equipment and supplies was acquired and installed. Our goal in selecting and acquiring simulation and medical equipment was to enable us to accurately simulate clinical working environments in both the simulation laboratory and the trauma bay and to record trainee performance on simulations for debriefing purposes and for documentation of training effectiveness. For training purposes both the simulation laboratory and one trauma bay were utilized. The recording equipment acquired allowed the research group to perform an in depth analysis of the performance of the learners and evaluation of the curriculum. It was also used for training purposes, demonstrating gold standard behavior as well as allowing for team and self analysis of performances.

During the initial year we experienced substantial reliability issues with iSTAN. As a result we conducted a thorough investigation of simulators offered by other vendors and of alternative simulators available through METI. Based on our investigation we decided to substitute the METI Man Simulator, for iSTAN. We concluded that the METI Man Simulator: 1) was less expensive, 2) was less sophisticated but more durable for multiple users, and 3) served the purposes of this grant and our needs better.

Task 5. Training interventions and the associated simulation scenarios pilot tested. (Milestone Completion Date: 31 August 2011)

The training intervention was pilot tested on 9 September, 2011 with John Sutyak, MD, Director of the Trauma Center, providing the training. A nurse (Cathy Schwind, RN), a general surgery resident with advanced training as a surgical education fellow (Michael Kim, MD) and a learning psychologist (Reed Williams, Ph.D.) were present. Suggestions were made and changes were made in the presentation as needed.

The three simulation scenarios were pilot tested on 22-23 June 2011. The pilot testing was conducted by two nurse educators (Cathy Schwind, RN, Margaret Boehler, RN) two trauma nurses (Linda Riesman, RN, Becky O'Sullivan, RN) a trauma surgeon (Christopher Wohltmann, MD) and a technician from the simulation center (Chris Reavis). The focus of the pilot test was to assure that the simulator functioned effectively, and to assure that the simulations were realistic representations of actual trauma cases.

Task 6 and 7. Training Intervention Completed for All Participants (Milestone Completion Date: 30 September 2011). Pre, Post and Three week post simulation scenarios (Simulated Trauma Encounters or STEs) administered to all participants (Milestone Completion Date: 30 September 2012)

Training was completed for all participants. Participants included 57 medical hospital staff (emergency department nurses specially trained in trauma care, emergency medical technicians, respiratory therapists) and physicians (general surgery and emergency medicine residents) who worked in trauma teams in the emergency department and the Level One trauma center at Memorial Medical Center. Third to fifth year general surgery residents served as team leaders. First, second, and, on occasion. third year residents served as supporting physician members of the teams. These individuals were randomly assigned to teams for simulated trauma resuscitations. This method mirrored the way that ad-hoc teams are formed to provide emergency care in the emergency department and trauma center. An Emergency Medical Technician (EMT) who was not a study participant was trained to present the case in a standard manner. As mentioned earlier, Figure 1 summarizes the revised design of the study and Table 1 provides a description of the behaviors targeted for training.

The pretest simulated trauma encounter (STE) utilized high fidelity inanimate computer driven simulators and took approximately 15 minutes to complete. These pre–intervention data were used to estimate baseline performance The STEs were video and audio recorded to allow analysis of targeted individual and team behaviors.

After the baseline STE, team members participated in team training designed to develop the team leader and member behaviors chosen to improve team communication, leadership and other role appropriate team behaviors. The training concluded with team practice with a second STE which was also used to measure acquisition of target behaviors. The teams were debriefed after this post-training STE to help cement desired behaviors and to correct undesirable behaviors.

Approximately three weeks later, participants were assigned to new teams, reassembled, and asked to participate in a third, different, high fidelity STE to measure post-intervention leader and team member behaviors. These STEs were also video and audio recorded for analysis and followed by a team debriefing session. The STEs were randomly distributed amongst the pre-intervention, immediate post-intervention and three week post intervention conditions to control for possible differences in case difficulty

Task 8. Team performance During Pre, Immediate Post and Three Week Post Intervention STEs were analyzed and interpreted. (Milestone Completion Date: 31 March 2012)

Outcomes and Measurements. We used Kirkpatrick's Hierarchy (KH) of evaluation (1) to guide our choice of outcome measures. The primary outcome for the study was changes in individual and team behaviors (KH level 3). These changes were measured by comparing video records of pre intervention, immediate post intervention and delayed post-intervention STEs. We investigated coded frequencies of trained behaviors and quality of those performances using the criteria specified in the training.
Secondary outcomes included:

- Percent who completed training and views on the learning experience, its organization, presentation, content, teaching methods (KH 1)
- Intention to apply knowledge and skills learned (KH 3)
- Other attitudes regarding the knowledge and skills learned (KH 3)

Raters. A surgeon and a nurse who were blinded to the study group independently rated each audio/video record Raters blindly rated five of the audio video records twice with new video

record IDs, which allowed us to test within rater agreement. We trained the raters by introducing and talking about the rating form, which we modified based on their suggestions. We then reviewed a video and rated it together, then viewed a second video and allowed the raters to rate it and discuss their ratings and perceptions.

Data Analysis. We documented the impact on the trainees by determining attitudes toward the program, clarity and nature of expressed intentions to change personal work behavior, and clarity and nature of expressed intentions to advocate for changes in work practices of the department and organization. Additionally we analyzed differences in ad-hoc individual and team performance on the STEs in each study group. The unit of measurement was the performance of the team rather than that of the individuals in the group.

Statistical Analysis. Within rater agreement was determined using both the relative ranking and absolute agreement models of intraclass correlation coefficients. The first determines the degree to which the rankings of the targeted video were similar on the first and second evaluations. The second determines the degree to which the absolute rating assigned on both rating occasions agreed. Attitudes toward the course and toward the targeted training behaviors were analyzed by determining the number and percent of respondents choosing each response option. Comparisons between pre training, immediate post training and three week retention video records of team performances were compared using one-way analysis of variance. Selected target behaviors and combinations of target behaviors (e.g. SMARTT Stepback behaviors) were also singled out for analyses. In these cases the frequencies of occurrences and percent of occasions where the behaviors occurred were determined. All analyses were performed using Statistical Package for the Social Sciences Software (SPSS) version 19 (IBM SPSS, Chicago, Illinois).

Results

Table 2 provides the results of the within rater agreement analyses broken down by rater (surgeon, nurse) and by scale. The conventionally accepted standard for reliability correlations is 0.80 and above though this standard is often not obtained when using human raters. Our findings demonstrated that the nurse rater achieved this 0.80 standard of consistency in most of the measurements included in Table 2 regardless of the model being used. The surgeon rater's results were lower than those of the nurse rater. For subsequent analyses we combined the surgeon and nurse rater's ratings.

Table 3 provides a summary of participant responses to the post-training questionnaire regarding their perceptions of the training. Forty five participants (79%) completed the post-training questionnaire. Two participants did not identify their medical role. Their responses are included in the Total columns. The first six items established participants' perceptions about the process and content of the training. The predominant response for all items was "strongly agree" with the exception of the item regarding "training being a good use of the respondents' time". Within these six questions, there were six "undecided" responses. Four of them were responses to the questions about being a good use of the respondents' time. The undecided responses were fairly evenly distributed among the three groups of professionals.

Questions 7 through 11 asked the participants for their opinions regarding the potential benefits of the target training behaviors for the quality and efficiency of patient care and patient outcomes. For all five questions the majority of participants strongly agreed that the training had the potential to improve patient safety, care efficiency, team functioning, clarity regarding team leadership, better communication, situation awareness, and mutual support. Item 12 asked participants to indicate whether they intended to apply the skills learned in their work environments. Again the predominant response was "strongly agree".

Across these 12 items, physician respondents were more positive about the benefits of the training and the potential quality and care outcomes than were nurses and medical technicians although all responded favorably with the exception of the one nurse mentioned earlier. The final item on the post-training questionnaire asked the participants to indicate whether they had already used any or all of the trained skills in their work environment. Twenty six participants (58%) indicated they had used some of the trained skills already. Two indicated they had not and 16 said they had not had an opportunity to use the trained skills yet due to the fact that at the time of training the Level One trauma center was at the other teaching hospital in Springfield.

Table 4 provides a summary of the team results. Cells highlighted in light grey indicate statistically significant differences in team and leader behaviors that suggest the training had desired training effects. Cells highlighted in dark grey indicate statistically significant differences in team behavior that indicate a significant reduction in desired team and leader behaviors at the three week retention endpoint compared to the immediate post-training endpoint.

As can be seen in Table 4, 14 out of 17 targeted team and leader behaviors significantly improved immediately following the training. One area where team and leader behaviors did not improve included team member efforts to clarify ambiguous orders. It is not clear whether this result reflects situations with ambiguous orders where team members did not attempt to clarify the ambiguity or the finding reflects the lack of ambiguous orders and thus the opportunity and need to seek clarity. We believe the former is the more accurate explanation. The second area where improvements were not observed involved whether the team leader was clearly identifiable. As can be seen in the pre-training simulation results, the judges' ratings indicate that the team leader was easily identified prior to training. This result may indicate the lack of a need for training in this specific area. The third area where training effects were not manifested in the results involved team leader management of noise. Anecdotally observers independently commented on the fact that there was less extraneous noise in these STEs than is normally true in trauma events. This artifact may explain the lack of significant differences observed.

Comparing the pre-training with three week retention results indicates that seven areas had lasting training effects. Moreover, four of these seven areas (efficiency, listened to information, orders were carried out, cooperation and communication) are all critical indicators of effective team performance. One area where there was a critical relapse in team behavior was team member confirmation when they completed tasks. This area requires additional attention.

Table 5 indicates the number of team members who introduced themselves to the scribe upon arrival. As can be seen by inspecting the table, the number of team members who announced themselves before training was virtually zero and this was true regardless of profession. The rate of introductions improved immediately after training and was maintained at a slightly lower rate after three weeks. However the rate is still not 100%.

Table 6 summarizes the number of teams where at least one coordinated, complete SMARTT Stepback occurred during the training simulation. For this Table we recorded that a SMARTT Stepback occurred only if all six components occurred at a single time. As can be seen the frequency of SMARTT Stepbacks increased after training and the rate was sustained after three weeks. However the rate was still less than the desired 100%. Table 7 indicates the number of SMARTT Stepback component behaviors that occurred at some point during each simulation, a much less restrictive indication of training success. In this table a frequency of 9 in a cell would indicate that this behavior occurred one time in that simulation event. As can be seen, the two raters appeared to use a different rating strategy for the pretraining. Their frequencies for the immediate post-training and three weeks retention post training are more similar. Raters

recorded that each element occurred close to once per simulation event except in the pre-training phase of the study.

Discussion

The in-situ simulation that we conducted showed that residents were not clear on who was leading resuscitations and this resulted in a shifting leadership focus among the residents throughout the trauma resuscitation. Communication was fragmented, incomplete, and frequently interrupted thus requiring repetition. The trauma bay was noisy with several people often talking at once. These findings were confirmed subsequently in observations of actual trauma resuscitations in the trauma bay.

Our training intervention was developed specifically to determine whether a brief training program would lead to changes in team member behaviors that would improve team performance in these areas.

Recently two other studies have addressed similar training needs for ad hoc trauma team members (2, 3). Both of those training interventions involved more training time on the part of participants, compared with our study. Likewise both studies included changes in traditional trauma outcome parameters as well as changes in team behaviors whereas our study focused exclusively on changes in targeted team behaviors manifested in simulated trauma resuscitations. Finally, both studies included attending physicians as participants while our study excluded attending physicians. The primary value that our study adds to the findings of these two studies lies in two areas. First and perhaps most important, our study used expert judges who were blinded to the stage of training for participants. Our raters reviewed audio-video records of all teams performing all trauma simulations at every stage of training. The audio-video records were randomly ordered and the rater did not know the training stage for the performing team. Second, our study added the three week post-training simulation to measure team retention of targeted team and individual behaviors. All three studies demonstrated that relatively brief training episodes can lead to changes in targeted team leadership, communication and coordination behaviors.

In our study all behaviors were observed in STEs where participants knew what behaviors were being observed and recorded which may raise a question about whether the trained behaviors will persist in the actual trauma environment with real patients. However, the results from the Capella et al (3) and Steinemann et al (3) studies provide some evidence to support transfer of training to real trauma cases. Our study does strengthen the collective knowledge from the three studies by blinding the raters to stage of training and thus minimizing the possibility that raters' judgments are influenced by their knowledge of the training stage. Our results are also conservative in that the retention outcome measure occurs prior to the impact of the second debriefing.

While the results of our study provide evidence that the training produced intended results, it is clear that the effect was not robust. The targeted behaviors were not present in all teams and the sporadic team behavioral characteristics remind us that the behaviors are likely to fade absent practice and continued hospital leadership support in the form of policies and role modeling. For example inspection of Tables 6 and 7 indicate that, at most, two thirds of the team leaders initiated a complete SMARTT Stepback event during the simulations occurring after training. However many of the elements of a SMARTT Stepback occurred during each post training simulation. This suggests partial success in this portion of the training but certainly also indicates that more training and reinforcement of these coordinated behaviors will be needed if SMARTT Stepbacks are expected to occur on a regular basis.

All team leaders and prospective team leaders were trained and were given opportunity to practice these behaviors as a part of this project. A nucleus group of nursing and emergency department technicians also received the training including the practice simulated trauma resuscitations. All other trauma team members are receiving the didactic training but will not have the opportunity to practice using the simulated trauma resuscitations. The trauma leadership, hospital leadership and emergency medicine leadership are committed to encouraging all team members to incorporate these behaviors into their individual and team practices by providing mandatory training to the remaining trauma nurses and technicians and to the new general surgery and emergency department residents.

Finally we want to echo the views of the investigators in the Capella et al study(3) that the logistics of providing training to teams made up of health care providers from different professions was one of the most challenging aspects of this project. Coordinating the scheduling of these training exercises involved working with five different hospital and residency program administrative bodies. It is no surprise to us that there is a great deal of talk about the desirability of multi-professional team training but the number of examples of such training in hospital settings is limited.

Key Research Accomplishments

- Respondents strongly agreed that the process and content of the training was worthwhile.
- Respondents strongly agreed that the training had the potential to improve patient safety, care efficiency, team functioning, clarity regarding team leadership, better communication, situation awareness, and mutual support.
- Twenty six participants (58%) indicated they had used some of the trained skills already. Two indicated they had not and 16 said they had not had an opportunity to use the trained skills yet due to the fact that, at the time of training, the Level One trauma center was at the other teaching hospital in Springfield.
- Physician respondents were more positive about the benefits of the training and the potential quality and care outcomes than were nurses and medical technicians although all but one responded favorably.
- 14 out of 17 targeted team and leader behaviors significantly improved immediately following the training. One area where team and leader behaviors did not improve included team member efforts to clarify ambiguous orders. The second area where improvements were not observed involved whether the team leader was clearly identifiable. As can be seen in the pre-training simulation results, the judges' ratings indicate that the team leader was easily identified prior to training. This result may indicate the lack of a need for training in this specific area.
- The third area where training effects were not manifested in the results involved team leader management of noise. Anecdotally, observers independently commented on the fact that there was less extraneous noise in these simulated trauma events than is normally true in trauma settings. This artifact may explain the lack of significant differences observed.
- Three week retention results indicate that seven areas had lasting training effects. Moreover, four of these seven areas (efficiency, listened to information, orders were carried out, cooperation and communication) are all critical indicators of effective team performance. One area where there was a critical relapse in team behavior was team member confirmation when they completed tasks. This area requires additional attention.

- The frequency of complete SMARTT Stepback events increased after training and the rate was sustained after three weeks. However the rate was still less than the desired 100%. The frequency of SMARTT Stepback elements used in isolation did improve.

Reportable Outcomes

Aspects of our findings have been presented in poster form at the:

- Association of American Medical Colleges Central Group on Educational Affairs Annual Meetings held in Saint Louis, Missouri on March 29-31, 2012
- Emergency Medicine Council of Emergency Medicine Residency Program Directors Annual Meetings held in Atlanta, Georgia on April 1 - April 4, 2012
- American Association for the Surgery of Trauma Annual Meetings held from September 12-15, 2012 in in Kauai, Hawaii.
- A paper has been submitted for Presentation at the 2013 Annual Meetings of the Association for Surgical Education which is a joint meeting with the Association of Program Directors in Surgery. A manuscript describing this research and the findings has been prepared and will be submitted for consideration to be published in the American Journal of Surgery.

Conclusion

While the results of our study provide evidence that the training is producing intended results, it is clear that the effects are not strong enough to instill confidence that the behaviors will be sustained without practice and continued hospital leadership support in the form of policies, procedures and role modeling. The targeted behaviors are not present in all teams and are sporadic in others. For example inspection of Tables 6 and 7 indicate that, at most, two thirds of the team leaders initiated a complete SMARTT Stepback event during the simulations occurring after training. However many of the elements of a SMARTT Stepback occurred during each post training simulation. This suggests partial success in this portion of the training but certainly also indicates that more training and reinforcement of these coordinated behaviors will be needed if SMARTT Stepbacks are expected to occur on a regular basis.

All team leaders and prospective team leaders were trained and were given opportunity to practice these behaviors as a part of this project. A nucleus group of nursing and emergency department technicians also received the training including the practice simulated trauma resuscitations. All other trauma team members are receiving the didactic training but will not have the opportunity to practice using the simulated trauma resuscitations. The trauma leadership, hospital leadership and emergency medicine leadership are committed to encouraging all team members to incorporate these behaviors into their individual and team practices by providing mandatory training to the remaining trauma nurses and technicians and to the new general surgery and emergency department residents.

Finally we want to echo the views of the investigators in the Capella et al study(3) that the logistics of providing training to teams made up of health care providers from different professions was one of the most challenging aspects of this project. Coordinating the scheduling of these training exercises involved working with five different hospital and residency program administrative bodies. It is no surprise to us that there is a great deal of talk about the desirability of multi-professional team training but the number of examples of such training in hospital settings is limited.

All revised milestones have been achieved. All key players from the emergency department and the trauma center played active roles in the final design and development of the training and

training materials. They also played key, visible roles in delivering the training and debriefing the teams after simulated trauma resuscitations. Further, while outside the goals of this contract, the didactic portion of this training has now been delivered to 97% of health care professionals who provide trauma care at Memorial Medical Center with the goal of training them all. All new general surgery and emergency medicine residents have also received the training and previously trained residents also participated in these sessions as a form of refresher training. The Director of the Trauma Center has informed all health care personnel that his expectations are that the trained procedures will be used routinely in all trauma care situations in this hospital. The project has been finished ahead of the revised schedule and below budget. Memorial Medical Center provided $6,647.23 in unreimbursed, in-kind personnel costs in support of this project.

References

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3. Capella J, Smith S, Philp A, Putnam T, Gilbert C, Fry W, et al. Teamwork training improves the clinical care of trauma patients. J Surg Educ. 2010;67(6):439-43. Epub 2010/12/16.

Table 1. Team Behaviors Targeted for Training

Team Leader Behaviors	Decide what needs to be done and priorities
	Direct orders to specific people by name and or role (e.g. nurse, respiratory technician)
	Issue short, clear orders
	Explicit transitions in team leadership
	Manage noise in the trauma bay
	Manage workload to achieve team balance
	Ensure that team members adhere to orders and protocol
	Encourage all members to volunteer key information
Team Member Behaviors	Introduce self by name and function to the scribe and other team members
	Carry out orders issued by the managing physician and standing orders appropriate to role
	Communicate critical information to all members of the team
	Speak only when necessary for patient care. Minimize unnecessary noise/distraction/talk
	Listen to information provided by other team members
	Verbally confirm orders and completion of tasks
	Seek clarification regarding who is the managing physician when ambiguity exists
Communication Behaviors - SMARTT Stepback (Led by team leader)	Situation (Patient description, injury, status, circumstances)
	Management (Treatment performed)
	Activity (What needs to happen next?)
	Rapidity (What needs to be done first and how quickly?)
	Troubleshoot (What may go wrong and steps to correct or prevent)
	Talk to Me (Encourage all team members to volunteer key information, ask clarifying questions, etc).

Table 2. Within Rater Agreement for Five Repeated Cases (Blindly Rated)

Scale	Within Rater Agreement (Intra-class correlation coefficient)			
	Surgeon Rater		Nurse Rater	
	Relative Ranking	Absolute Agreement	Relative Ranking	Absolute Agreement
Professionals Announced	0.12	0.12	0.84	0.85
SMARTT Step Back (Dichotomous Items)	0.50	0.50	0.84	0.83
SMARTT Step Back (Quality Scale)	0.60	0.57	0.94	0.94
Team Behavior Scale	0.74	0.74	0.85	0.78
Team Leadership Scale	0.54	0.54	0.79	0.77
Trauma NoTechs Scale	0.60	0.58	0.74	0.75
Average	0.52	0.51	0.83	0.82

Table 3. Participant views on the learning experience, broken down by medical role of respondents (One nurse respondent who responded “strongly disagree” to all items is excluded from the table to simplify the table)

Training Characteristic	Medical Technician (n = 3)			Nurse (n = 13)			Physician (n = 26)			Total (n = 44*)		
	U	A	SA	U	A	SA	U	A	SA	U	A	SA
1. Training well organized	0	2	1	0	6	7	0	8	18	0	18	26
2. Understood training content	0	2	1	0	7	6	0	8	18	0	19	25
3. Can perform skills that were trained	0	1	2	0	9	4	0	10	16	0	22	22
4. Training was good use of time	1	2	0	1	7	5	2	14	10	4	25	15
5. Skills seem easy to use	0	3	0	0	6	7	1	10	15	1	21	22
6. Content appropriate	0	1	2	0	5	8	1	4	21	1	12	31
7. Use could improve patient safety	0	0	3	0	4	9	0	6	20	0	12	32
8. Use could improve care efficiency	0	0	3	0	5	8	0	6	20	0	12	32
9. Use should improve clarity regarding team leadership	0	0	3	0	4	9	0	3	23	0	8	36
10. Use should result in better communication, situation awareness, and mutual support	0	0	3	0	5	8	0	4	22	0	10	34
11. Use should result in improved team functioning	0	2	1	0	5	8	1	6	19	1	15	28
12. I intend to apply the learned skills in my work environment	0	0	3	0	4	9	0	11	15	0	16	28
Total	1	13	22	1	67	88	5	90	217	7	190	345

*Two respondents did not indicate their medical role. U = Undecided, A = Agree, SA = Strongly Agree

Table 4. Mean ratings (and standard deviations) of targeted and trained ad-hoc trauma team behaviors during simulated trauma resuscitations at each stage in the team training cycle.

Category (Best Possible Score)	**Pretraining**	**Immediate Post Training**	**3 Week Retention**	**Pretraining vs Immediate Post Training**	**Pretraining vs 3 wk Retention**	**Immediate Post Training vs 3 wk Retention**
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	**p**	**p**	**p**
Organized (5)	2.67 (0.66)	3.67 (0.35)	3.67 (0.50)	0.001	0.001	NS
Efficiency (5)	3.00 (0.67)	3.78 (0.36)	3.78 (0.51)	0.01	0.01	NS
Supportive (5)	3.00 (0.50)	3.67 (0.25)	3.44 (0.46)	0.007	NS	NS
Volunteered Important Information (5)	2.61 (0.55)	3.89 (0.22)	3.28 (0.69)	0.00	NS	NS
Listened to Information (5)	3.06 (0.58)	3.83 (0.25)	3.67 (0.25)	0.001	0.008	NS
Instructions performed (5)	3.17 (0.35)	3.78 (0.26)	3.61 (0.33)	0.001	0.018	NS
Clarified ambiguous orders (5)	1.89 (0.82)	3.00 (1.20)	2.50 (1.04)	NS	NS	NS
Confirmed completion of tasks (5)	1.89 (0.33)	3.06 (0.68)	2.39 (0.55)	0.00	NS	0.03
Leader clearly identifiable (5)	3.78 (0.51)	4.0 (0)	3.83 (0.35)	NS	NS	NS
Leader assigned tasks to team members by name or role (5)	3.11 (0.65)	3.89(0.22)	3.28 (0.67)	0.02	NS	NS
Leader managed noise	2.41 (1.20)	3.50 (0.84)	3.43 (0.79)	NS	NS	NS

Category (Best Possible Score)	Pretraining	Immediate Post Training	3 Week Retention	Pretraining vs Immediate Post Training	Pretraining vs 3 wk Retention	Immediate Post Training vs 3 wk Retention
	Mean (SD)	Mean (SD)	Mean (SD)	p	p	p
appropriately (5)						
Leader coordinated communication and team activity effectively (5)	2.33 (0.75)	3.44 (0.46)	2.72 (0.67)	0.003	NS	NS
Leader encouraged team members to volunteer key information during SMARTT Step-Back (5)	1.50 (0.71)	3.58 (0.58)	3.25 (1.17)	0.04	NS	NS
TRAUMA NOTECHS						
Leadership (5)	3.72 (0.36)	4.67 (0.43)	4.22 (0.67)	0.002	NS	NS
Cooperation (5)	2.89 (0.65)	4.61 (0.42)	3.94 (0.92)	0.000	0.01	NS
Communication (5)	2.56 (0.46)	4.06 (0.39)	3.50 (0.97)	0.000	0.015	NS
Decision Making (5)	3.67 (0.71)	4.61 (0.70)	4.17 (0.97)	0.05	NS	NS
Situation Awareness Coping with Stress (5)	3.67 (0.71)	4.67 (0.35)	4.39 (0.70)	0.005	0.05	NS

Table 5. Team Members Who Were Announced upon Arrival Broken Down by Profession and by Reporting Rater

	Rater	Chief Resident (n = 9)	ER Technician (n = 6)	Bedside Nurse (n = 18)	Junior Resident (n = 18)	Respiratory Therapist (n = 5)	Total
Pre Training	1	1	0	0	1	0	2
	2	0	0	0	0	0	0
Immediate Post Training	1	7	0	3	3	0	13
	2	9	5	7	8	5	34
Three Weeks Post Training	1	5	0	1	4	1	11
	2	6	5	4	6	1	22

Table 6. Number (Percent) of Simulations where a SMARTT Stepback Occurred as a Coordinated Event (All components occurred at same time) Broken Down by Time and by Rater

Time	Rater One – Frequency (Percent)	Rater Two – Frequency (Percent)
Pre Training	0 (0)	0 (0)
Immediate Post Training	3 (33)	6 (67)
Three Weeks Post Training	5 (56)	6 (67)

Table 7. SMARTT Stepback Components that Occurred During the Simulation Broken Down by Time and By Rater (A single performance which included one instance of the behavior would have a frequency of 9 in each cell)

Time	Rater	Situation	Management	Activity	Rapidity	Troubleshoot	Talk to Me
Pre Training	1	8	8	7	2	2	6
	2	0	0	0	0	0	0
Immediate Post Training	1	9	9	9	8	8	9
	2	6	6	6	6	5	5
Three Weeks Post Training	1	8	8	7	6	4	6
	2	7	8	8	5	6	7

Appendix 1
Protocol for Debriefing Participants After Practice Trauma Resuscitation Sessions

The training intervention for members of the trauma team is targeted toward changing the SMARTT Stepback, Communication, Leadership and Teamwork Behaviors described on the following pages. After the training session, team members will be assigned to a trauma team and asked to resuscitate a patient while focusing on incorporating the behaviors targeted in the training session. The trauma resuscitation will take approximately 10-15 minutes. Immediately following the trauma resuscitation practice session, the team members will sit down with you to discuss the trauma resuscitation experience.
Tell the team members you are going to play the video of the team's performance. You should initiate discussion along the way to discuss elements of the team's performance either at your initiation or upon request from a team member.
Tell the team members that the goals of the debriefing session are to provide an opportunity to discuss:

- what targeted training behaviors worked
- what training behaviors didn't work, or were hard to implement
- how to make that aspect work better in the future
- Remind them that the focus of the conversation should be on the SMARTT Stepback, Communication, Leadership and Teamwork Behaviors learned during the training not clinical care

You should also offer your own observations and suggestions about the team's performance including:

- Identifying positive SMARTT Stepback, Communication, Leadership and Teamwork Behaviors exhibited by the team.
- Gaps in team performance related to the target behaviors
- Specific suggestions on how to change those behaviors the next time

Wrap up the debriefing by

- Reinforcing key learning points identified by learners
- Adding learning points of your own (Take home messages)
- Providing a few specific suggestions that can be applied to future trauma team practice.

We think the debriefing will be most productive if you:

- Focus on the behavior of the group not on the clinical performances of individuals
- Create a psychologically safe environment for participants
- Make sure all participants actively contribute to the discussion and self-reflect upon what happened
- Use a non-threatening but honest approach understanding some learners may be unhappy with the training
- Give specific suggestions and relate to trauma team experience.
- Keep the debriefing as short as possible

Supporting Data

Meeting Abstracts

Nicole K. Roberts, PhD, John Sutyak, MD, Christopher McDowell, MD, David Griffen, MD, Jarrod Wall, MD, Cathy Schwind, RN, MS, Reed G. Williams, PhD, *Be SMARTT about Trauma: An Interdisciplinary Educational Intervention for the Trauma Bay*, presented at the Association of American Medical Colleges Central Group on Educational Affairs Annual Meetings held in Saint Louis, Missouri on March 29-31, 2012.

Background: Patient care outcomes are adversely affected by poor teamwork and communication. Trauma teams, which tend to be constituted on an ad hoc basis, are particularly prone to communication problems and an absence of overt leadership behaviors. This project was developed to improve leadership behaviors and communication in ad hoc teams.

Method: We performed and videotaped an in-situ trauma simulation to explore how trauma resuscitations were currently performed. A team of trauma physicians, Emergency Medicine physicians and educators reviewed the video and analyzed the problems with teamwork and communication exposed there. The in-situ observation was augmented by observations in the trauma bay. Based on the observations and discussion with trauma and emergency room personnel (including nurses, technicians and physicians) we developed an interprofessional educational intervention to address deficits in teamwork and communication.

We delineated desired team behaviors and team leader behaviors. We also created a structured approach to communication in the trauma bay. Emergency Medicine and Trauma surgeons taught the behaviors to the Trauma health care team: EM and Surgery residents, EM techs, Trauma nurses, and Respiratory therapists. The communication module, called the SMARTT Stepback, consists of the following: Situation, Management, Activity, Rapidity, Troubleshooting, Talk to Me. This approach to communication ensures that all members of the health care team have a shared understanding of the patient's status, and have a controlled opportunity to offer their observations. The training session consisted of a pre-test simulated trauma resuscitation, a brief didactic session delivered by a Trauma surgeon, and a post-training simulated trauma resuscitation where participants were allowed to practice the skills they learned. The post training session was followed by a debriefing by Trauma surgeon or an Emergency Medicine physician

Results: Forty four of 49 participants (92%) filled out a brief evaluation of the educational intervention. Of special note, all participants (except one nurse who marked Strongly Disagree for all statements) agreed or strongly agreed that using the model could lead to improved care efficiency, improved patient safety, and better communication, situation awareness, and mutual support. Participants noted that the debriefing was especially effective in opening lines of communication among the professions. Observations of debriefing revealed discussions focused on creating and maintaining role clarity and on seeing the value of all team members.

Conclusions: Deliberate education on team behavior, leadership, and a structured model for communication that ensures shared understanding among all team members is likely to lead to better patient care.

Christopher McDowell MD, Nicole K. Roberts PhD, John Sutyak MD, David Griffen MD PhD, Jarrod Wall MD, Cathy Schwind RN MS, Reed G. Williams PhD, *Be SMARTT About Trauma: An Interdisciplinary Educational Approach to Improving Teamwork in the Trauma Bay,* presented at Emergency Medicine Council of Emergency Medicine Residency Program Directors Annual Meetings held in Atlanta, Georgia on April 1 - April 4, 2012.

Background: Patient care outcomes are adversely affected by poor teamwork. Trauma teams with their ad hoc constitution are particularly prone to communication problems and an absence of overt leadership behaviors.

Objective: This project was developed to improve leadership behaviors and communication in ad hoc trauma teams.
Method: We performed and videotaped an in-situ trauma simulation to explore how trauma resuscitations were currently performed. This simulation was augmented by observations of actual trauma resuscitations. A team of trauma surgeons, EM physicians and educators reviewed the video and analyzed the exposed problems with teamwork and communication. Based on the observations and discussion with trauma team members, we developed an interprofessional educational intervention to address deficits in teamwork and communication. We delineated desired team behaviors and team leader behaviors. We also created a structured approach to communication in the trauma bay. EM physicians and Trauma surgeons taught the behaviors to the Trauma team: EM and Surgery residents, EM techs, Trauma nurses, and Respiratory therapists. The communication module, called the SMARTT Stepback, consists of the following: Situation, Management, Activity, Rapidity, Troubleshooting, Talk to Me. The training consisted of a pre-test simulated trauma resuscitation, a brief didactic session delivered by a Trauma surgeon, and a post-training simulated trauma resuscitation where participants were allowed to practice the skills they learned. The post training session was followed by a debriefing by Trauma surgeon or an EM physician.

Results: 44 of 49 participants (92%) evaluated the educational intervention. All participants (except one nurse who marked Strongly Disagree for all statements) agreed or strongly agreed that using the SMARTT model could improve efficiency, patient safety, communication, situation awareness, and mutual support. Participants noted the debriefing was especially effective in opening lines of communication among the professions. Debriefing discussions focused on creating and maintaining role clarity and on seeing the value of all team members.

Conclusions: Deliberate education on team behavior, leadership, and a structured model for communication that ensures shared understanding among all team members is likely to lead to better patient care.

John Sutyak*, M.D., Nicole Roberts, Cathy Schwind, Christopher McDowell, David Griffin, Jarrod Wall, Christopher D. Wohltmann*, M.D., Hilary Sanfey, M.D., Audra Chestnut, Reed Williams, Ph.D., Southern Illinois University School of Medicine, *SMARTT Team Training Improves Ad-Hoc Trauma Team Dynamics, presented* at American Association for the Surgery of Trauma Annual Meetings held from September 12-15, 2012 in Kauai, Hawaii.

Introduction: Trauma teams frequently form ad hoc, with limited familiarity among members, creating a milieu for communication lapses. This study created & analyzed a brief communication and leadership intervention.

Methods: Analysis of simulated & real team activities revealed gaps in organization, efficiency & information exchange. The SMARTT Step Back (Situation, Management, Activity, Rapidity, Troubleshoot, Talk to me) communication protocol was created for information exchange. PGY 3-5 GS residents lead 9 teams with PGY 1-2 GS & EM residents, ED RN's, EMT's & RT's. Each group attended a didactic program between pre and post-test simulations. Retention post test occurred at 3 wks. Two independent blinded raters scored videos using a 5 point Likert scale covering surgical NOTECHS items & other team activity. 49 participants were own controls. Statistical analysis: ANOVA, t-test, Chi square, significance $p \leq 0.05$.

Results: 43 of 44 responding participants agreed SMARTT improved efficiency, safety, communication, awareness and support, Team improvements & SMARTT usage were maintained over 3 weeks (p=NS for 3 wks vs. Post 1).

Category	Post1 v Pre	3 Wks v. Pre
Organized	<0.001	0.001
Efficiency	0.005	0.013
Supportive	0.01	0.12
Listened to Info	0.005	0.03
Instructions Performed	0.003	0.04
NOTECHS		
Leadership	<0.01	0.26
Cooperation	<0.001	0.02
Communication	<0.001	0.02
Decision Making	0.09	NS
Awareness/Stress	0.02	0.12

Conclusions: Teams significantly improved on a majority of aspects, including: communication, mutual support, information transfer, & leadership following a brief training activity. Institution of the SMARTT Step-Back is easy & significantly improves ad hoc team communication.

Nicole K. Roberts, Reed G. Williams, Cathy J. Schwind, John A. Sutyak, Christopher McDowell, David Griffen, Jarrod Wall, Hilary Sanfey, Audra Chestnut, Andreas Meier, Christopher Wohltmann, Ted R. Clark, Nathaniel Wetter-Taylor, *The impact of brief team communication, leadership and team behavior training on ad hoc team performance in trauma care settings*, to be presented at the 2013 Annual Meetings of the Association for Surgical Education.

Abstract

Background

Communication breakdowns and care coordination problems often cause preventable adverse patient care events, which can be especially acute in the trauma setting where ad hoc teams have little time for advanced planning. Existing teamwork curricula do not address the particular issues associated with ad hoc emergency teams providing trauma care.

Methods

Ad hoc trauma teams completed a pre-instruction simulated trauma encounter (STE) and were provided instruction on appropriate team behaviors and team communication. Teams completed a post-instruction STE immediately and three weeks later, then completed a questionnaire. Blinded raters rated videotapes of the simulations

Results

Participants expressed high levels of satisfaction and intent to change practice after the intervention. Participants changed teamwork and communication behavior in the post test and changes were sustained after a three week interval, though there was some loss of retention. See table 1.

Conclusions

Brief training exercises can change teamwork and communication behaviors in ad hoc trauma teams.

List of Paid Project Personnel

Staff Member	Role
Reed G. Williams, PhD	Principal Investigator
Cathy Schwind, RN, MS	Project Coordinator
Nicole Roberts, PhD	Education Specialist
Drew M. Early, MHSA	Emergency Dept/Trauma Liaison
Audra Chestnut, RN, BSN	Manager, Employee Development Simulation Center Director Blind Rater, Team Performances
Marsha Prater, RN, EdD	Executive Project Sponsor
Mitchell Johnson	Senior Vice President and Chief Strategy Officer, Administrative Contact for Project
Clay Bahlow	Grant Accountant and Staff Assistant, Financial Support for the Project
Paula Gramley	Community Benefits Coordinator, Administrative Support for Project
Mike Taylor	Audiovisual Production and Support
Chris Reavis, MS	Simulation Support
Jennifer,Boyer, RN, MBA	Emergency Dept/Trauma Liaison
John Sutyak, MD	Teaching, Debriefing (Paid as Consultant)
Jarrod Wall, MD	Debriefing (Paid as Consultant)
David Griffen, MD	Debriefing (Paid as Consultant)
Christopher McDowell, MD	Debriefing (Paid as Consultant)
Hilary Sanfey, MB, BCh	Blinded Rater, Team Performances (Paid as Consultant)