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Implementation and Evaluation of a Team Simulation Training Program

Yvonne Rice
Eastern Kentucky University, yvonne_rice1@mymail.eku.edu

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By

Yvonne Rice

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Abstract

Trauma care, characterized by complex, shifting priorities, presents many challenges to providers. Traditionally, immediate trauma care has been provided in emergency departments. It has recently been recognized that severely injured patients receive better care with improved outcomes when they bypass the emergency department and are admitted directly to the trauma surgical intensive care unit (TSICU). To assure that TSICU nurses and interprofessional staff are prepared to handle such patients, all new registered nurses in the TSICU of a Level I Trauma Center participate in a one-day Trauma Boot Camp. Originally, the focus of the Trauma Boot Camp was solely on direct patient care. Recognition by The Joint Commission and the Institute of Medicine that successful teamwork is critical for positive patient outcomes; a team-training component was added to the Trauma Boot Camp curriculum and evaluation. The purpose of this capstone project was to implement a simulation-based team-training (SBTT) component as part of a comprehensive trauma nurse-training program. Evaluation of the team training included knowledge, nurse satisfaction, nurse self-confidence, and simulated team performance. Seven registered nurses in the TSICU received teamwork training during the Trauma Boot Camp. Total teamwork perceptions and attitudes scores improved ($p=.041$ and $p=.021$ respectively) after the training. Participants agreed or strongly agreed when rating satisfaction and self-confidence in learning after the SBTT. Observed team performance improved after the SBTT. The results indicate favorable outcomes for use of SBTT.

Key words: team training, simulation training, trauma, health care

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By

Yvonne Rice

Capstone Advisor	Date
Capstone Project Committee Member	Date
Capstone Project Committee Member	Date
DNP Coordinator	Date
Dept. of Baccalaureate & Graduate Nursing Chair	Date

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Background and Significance

Problem Identification

In the trauma surgical intensive care unit (TSICU) at the University of Kentucky Albert B. Chandler Hospital (UK Hospital), teamwork is of utmost importance for early intervention and definitive treatment of newly injured trauma patients. The importance of early treatment is not a new concept. As early as 1918, Marquis reported that mortality rates of injured soldiers increased with time to treatment. Soldiers treated within one hour of injury had a 10% mortality rate, soldiers treated within five hours of injury had a 36% mortality rate and soldiers treated within ten hours of injury had a 75% mortality rate. In the 1970s, Cowley coined the phrase the "Golden Hour" for trauma care, stating that early initiation of definitive care is a key factor in the survival and improved outcomes of trauma victims (Cowley, Hudson & Scanlon, 1973).

Scope of the Problem

Trauma is the leading cause of mortality and morbidity for individuals younger than 40 years of age (Centers for Disease Control, 2014). Each year, trauma accounts for 41 million emergency department visits and 2.3 million hospital admissions nationwide (CDC, 2014). In 2013, the Centers for Disease Control (CDC, 2014) (http://www.cdc.gov/nchs/fastats/accidental-injury.htm) reported all unintentional injuries as the fifth leading cause of death, accounting for at 126,438 mortalities. More specifically, there were 27,483 unintentional fall deaths and 33,783 motor vehicle traffic deaths. The economic burden of these injuries was estimated at $406 billion a year with life years lost calculated at 30% (CDC, 2014).

In 2008, the leading causes of injury in Kentucky were falls and motor vehicle crashes (University of Kentucky, 2014). Other injury-causing events included all-terrain vehicle (ATV)

accidents, gunshot wounds, motorcycle crashes, stabbings, burns and assaults (University of Kentucky, 2014, http://www.mc.UKHospital.edu/traumaservices/2008traumareport.pdf. In 2014, UK Hospital evaluated approximately 5,000 trauma victims, admitting close to 3,000 of those patients (University of Kentucky, 2014, http://www.mc.UKHospital.edu/traumaservices/).

Context of the Problem

The current model of care for incoming trauma patients at UK Hospital is illustrated in Figure 1. Upon arrival, trauma patients are triaged in the Emergency Department (ED) for one of two immediate care options: (a) remaining in the ED, or (b) transfer to the TSICU. The Trauma Service plans to implement the proposed model of care, illustrated in Figure 2, in which incoming trauma patients are admitted directly to the TSICU. Trauma patients are categorized in the field by first responders into one of three levels: (a) trauma, (b) trauma alert and (c) trauma alert red. Trauma patients are stable with non-life threatening initial injuries. Trauma alert patients have defined parameters of urgency, e.g. hypotension, airway compromise, or unstable vital signs (Appendix A). Trauma alert red patients have life-threatening injuries or physiologic parameters and are earmarked for emergent operating room transfer.

UK Hospital is changing the process of care for trauma patients, most specifically, the trauma alert patients. Trauma alerts are designated for rapid transition from the ED with

admission to the TSICU (Figure 2). The goal is to improve safety, improve clinical outcomes, decrease morbidity and mortality, and decrease cost and length of stay of trauma patient.

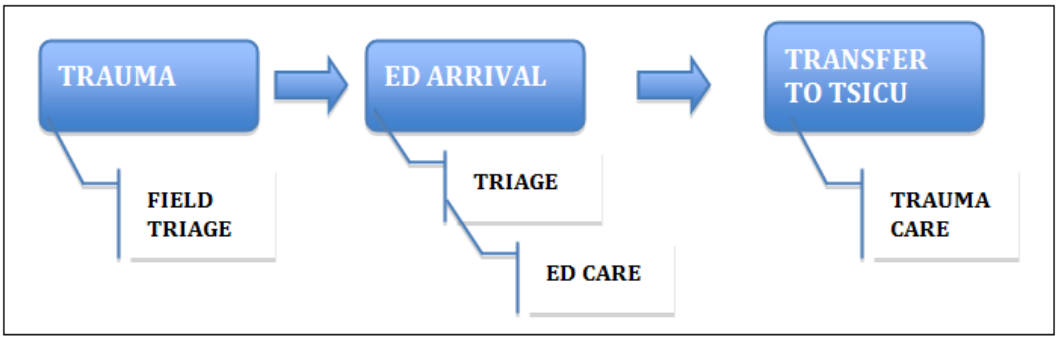

Figure 1. Current model of care for incoming trauma patients from injury site to ED to TSICU

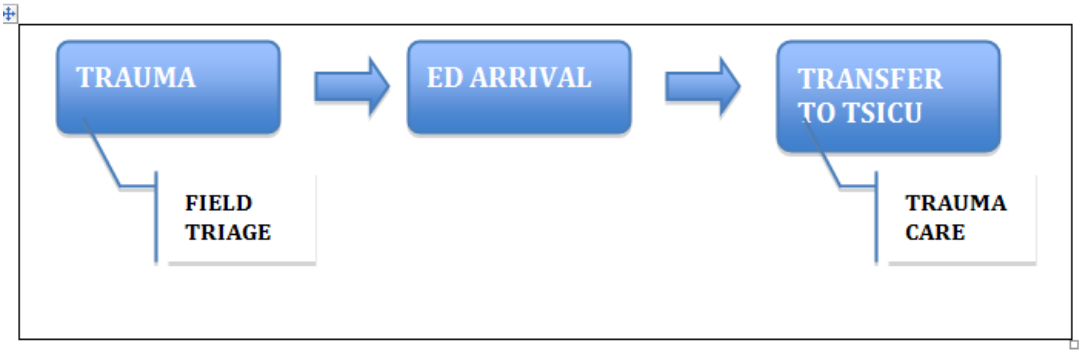

Figure 2. Proposed model of care for incoming trauma alert patients from injury site to TSICU

Proposed Evidence-based Intervention

In order for TSICU nursing staff to be competent in emergency care delivery, each new registered nurse attends a 4-5 hour intensive multi-faceted course. Entitled "Trauma Boot Camp," the course currently includes didactic and skills components of trauma care. Dr. Talley teaches the didactic portion of the Trauma Boot Camp. The focus of this capstone project was the implementation of the third component of the Trauma Boot Camp, simulated-based team

training. The training provides skills for nurses to function in teams for providing emergency trauma care, including role performance and effective communication (Figure 3).

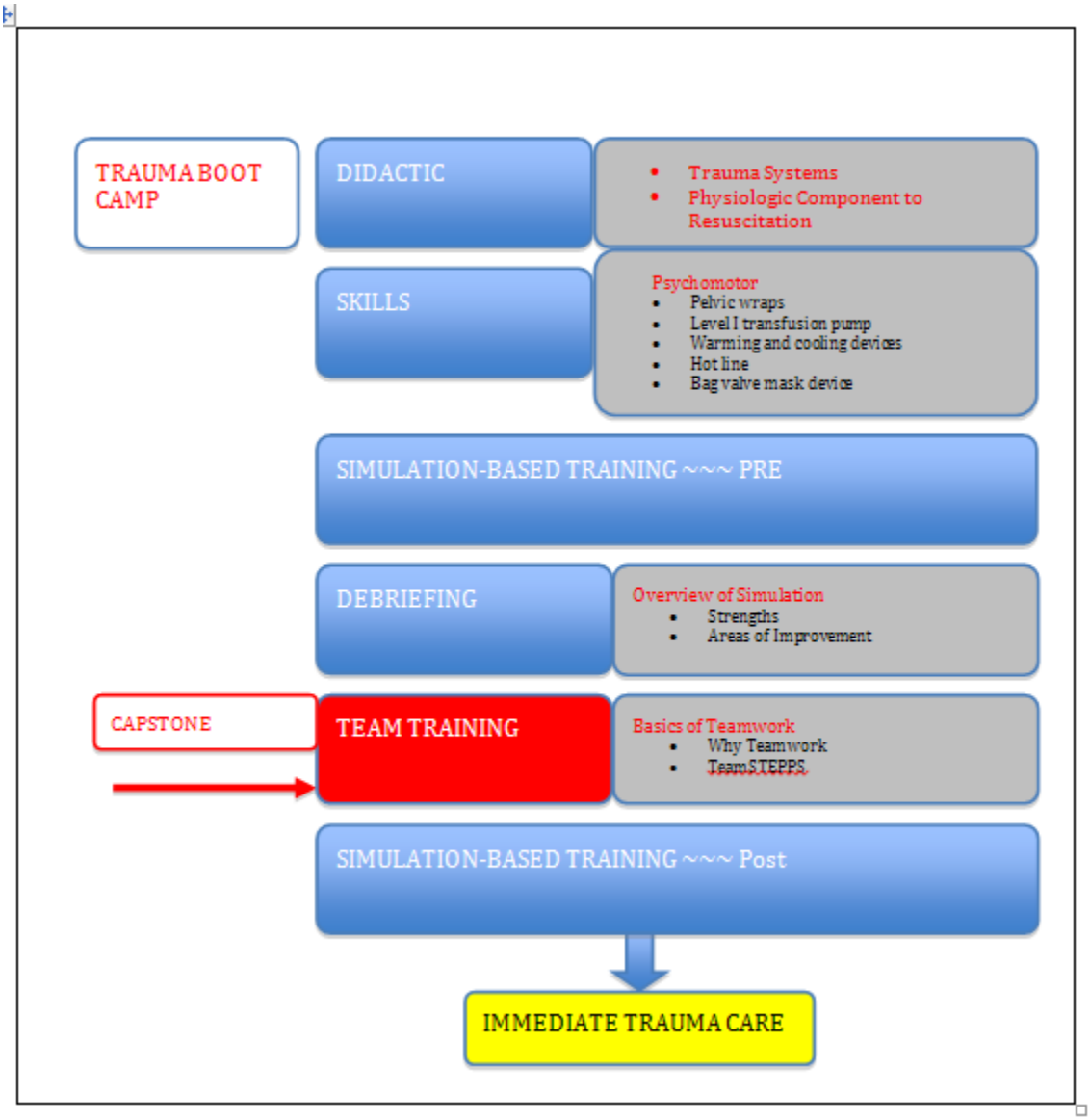

Figure 3. Trauma Boot Camp with Simulation-Based Team Training

To accomplish these goals, trauma teams must function at a very high skill level in both trauma care and team functioning. This level of functioning was achieved through a Trauma Boot camp, a simulation-based team-training program.

The Institute of Medicine (2000) recommended that the health care industry employ measures to enhance patient safety. Among these recommendations was to conduct training for teamwork. Evidence suggests that teamwork results in fewer patient errors than when tasks are conducted by individuals working independently. (Manser, 2009, Capella et al., 2011, Deering et al., 2011, Salas, Gregory & Hill, 2011 and Salas et al., 2007). The same evidence suggests that poor team dynamics contributes to less than optimal patient outcomes. Investigators (Laird-Fick et al., 2010 & Manser, 2009) have identified communication and teamwork issues as two of the contributing factors associated with adverse events. Poorly functioning teams are related to decreased patient safety (Laird-Fick, et al., 2010). Up to 70% of fatal and other serious medical errors have been traced to poor communication among team members (Laird-Fick, et al., 2010).

The Joint Commission (TJC) (2005) also recommended enhancing teamwork, with simulation used as an adjunct method of education. A trauma team approach, where all the individuals are knowledgeable about their specific roles in the delivery of resuscitation for an acute traumatic event, was imperative for achieving the desired patient and institutional outcomes (Manser, 2009).

Purpose of the Project

The purpose of this capstone project was to implement a simulation-based team-training (SBTT) component as part of a comprehensive trauma nurse-training program. Evaluation of the team training included knowledge, nurse satisfaction, nurse self-confidence, and simulated team performance.

Theoretical Framework

Education and mentoring was needed for the nurses of the TSICU while undertaking a rapid access admission. Leadership aided in the rapid access admission by having a framework for the change of care. Transformational leadership guided the educational process, e.g. the Trauma Boot Camp, for the change of care.

Transformational leadership theory was originally proposed by James MacGregor Burns in the early 1990s in response to lagging success with transactional leadership style, and was further developed by Bass in 1990. While transactional leadership focuses on the role of supervision and obtaining compliance through rewards and punishments, transformational leadership enhances the motivation, morale, and job performance by simulating intellectual curiosity, individualizing consideration of employees, and inspiring motivation. Inspiring and motivating the TSICU staff to embrace team training and change the current delivery of care required a motivating leadership style.

Delivery of high quality patient care depends on competent workers and an environment that supports excellence. Positive personal and environmental factors increase worker engagement (Salanova, Lorente, Chambel, & Martinez, 2011), which in turn increases extra-role performance. Transformational leadership provided the context in which self-efficacy and worker engagement can flourish. Transformational leaders provide increased levels of motivation, satisfaction and performance among followers (Salanova, Lorente, Chambel, & Martinez, 2011).

Transformational leadership can inspire positive changes in those who follow. Transformational leaders convey a clear vision of a groups goals, a passion for their work, and an ability to energize a group. The leadership group of the TSICU, including the charge nurse, the

assistant manager, the manager and the director, utilized a transformational style of leadership to encourage creativity, offer individual support, inspire motivation, and serve as role models to the trauma team.

Using this theory as a framework, the management team and the charge nurse of the TSICU promoted cognitive trust and collective efficacy within the transformational leadership-team performance relationship. Chou, Lin, Chang, and Chang (2013) report favorable outcomes when using transformational leadership to enhance trust among team members and leaders. Transformational leaders exert influence on team members by setting goals higher and providing members with the confidence to exceed minimal standards (Bass, 1990). Transformational leadership fosters members' cognitive trust in the team leader and a trust among team members.

Literature Review

Using a predefined strategy to extract the most current and relevant research articles from the existing literature, a comprehensive search of the Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medical Literature Analysis and Retrieval System Online (MEDline), and PUBMED databases was conducted using various combinations of the following key words: team training, simulation-based training, healthcare, trauma teams, intensive care unit, emergency department.

The goal of this review was to identify published clinical research to support the effectiveness of simulation-based team training. Inclusion criteria were as follows: full text, peer reviewed nursing or healthcare journal articles published in English after the year 2000. The selected studies included randomized controlled trials and pre/post-test studies. Articles extracted from the database search were systematically reviewed for applicability, and ultimately included if they were from peer-reviewed journals and specifically related to the topic of team (Appendix

B) and/or simulation training (Appendix C) in the health care field. The database search ultimately resulted in the selection of 21 research-based articles from medical and nursing literature. The major topic areas identified as outcomes of team training were: team performance, participant' satisfaction with training modality, and patient outcomes. The major topic areas identified as outcomes of simulation training were: efficacy, confidence gain, satisfaction, and perception of training modality.

Team Training

Poor communication is one of the leading causes of medical errors in the United States (ARQH, 2010). In order for the trauma team to respond effectively to emergencies, coordination of care and communication are critical components. Key components of a team approach include: assuring all staff members know all other team members, having each team member's role explicitly defined, and working with a team that was educated and prepared prior to the admission of the trauma patient (Rosen et al., 2010).

Many investigators have evaluated the effect of team training on team performance and satisfaction. The benefits of team training included increased communication resulting in improved performance, improved patient safety, improved team cognition, standardized roles, and improved business performance. Numerous authors have reported that formal team training improved team performance, participants reported satisfaction with the teaching modality, and that there are improved patient outcomes (Capella et al., 2010; Colacchio, Johnson, Zigmont, Kappus, and Sudikoff, 2012; Deering et al., 2011; DeVita, Schaefer, Lutz, Wang, and Dongilli, 2005; Edwards, Seggie, and Murphy, 2012; Figuero, Sepanski, Goldberg, Shah, 2012; Frengley et al., 2011; Fouilloux, Bsell, Lebel, Keritmann, Berdah, 2013; Laird-Fick et al., 2010; Mayer et al., 2011; Maxson et al., 2011; Morey et al., 2002; Riley et al., 2011; Siassakos, Fox, et al.,

2010; Siassakos et al., 2009; Shapiro et al., 2004; Strasser et al., 2008; Undre et al., 2007; Wallin, Meurling, Hedman, Hedegard, and Fellander-Tsai, 2007; and Wheelan, Burchill, and Tilin, 2003.

Performance. Many investigators (Capella et al., 2010; Deering et al., 2011; Figueroa, Sepanski, Goldberg, Shah, 2012; Fouilloux, Bsell, Lebel, Keritmann, Berdah, 2013; Frengley et al., 2011; Laird-Fick et al., 2010; Mayer et al., 2011; Morey et al., 2002; Siassakos et al., 2010; Shapiro et al., 2004; and Undre et al., 2007), have documented the effects of team training on team performance in real world situations.

In a quasi-experimental pre/posttest design, Morey et al (2002) provided formal team training and evaluated team behavior and performance in an ED. Data were collected from 684 clinical staff members in nine hospitals. Using the NASA Task Load Index, the authors reported significant improvement in quality of team behaviors (p=. 012), error rate (decreased from 30.9% to 4.4 %), staff attitudes (p=. 047) and staff's view of institutional support (p=. 040). Using paired t tests, the authors reported significant improvement in the experimental group as compared with the control group (p=0.012). Teamwork training was successful in increasing teamwork behaviors and indicated an effect of reducing clinical errors and enhancing staff attitudes toward teamwork.

Shapiro et al. (2004) used a prospective blinded and controlled observational pre/post-test design to evaluate whether high fidelity SBTT for ED teams consisting of nurses, technicians, residents, and attending physicians improved clinical team performance. ED staff that had recently received didactic training in the Emergency Team Coordination Course (ETCC) also received an eight-hour intensive simulation experience. A comparison group, also ETCC trained, but without the simulation experience, was assigned to work together in the ED. Observations

occurred in a 700-bed, Level I Trauma Center. Teams consisted of ED physicians and nurses (n=20). The authors used the Team Dimensions Rating Form (validated in aviation studies) and the MedTeams Project Tool. There were no significant differences between experimental and comparison groups at baseline (Wilkes' lambda=0.44, F (5, 10)=2.56, p=0.10). The experimental team showed a trend towards improvement in the quality of team behavior (Wilkes' lambda=0.62, F (5,200=2.43, p = 0.07); the comparison group showed no change in team behavior during the two observation periods (Wilkes' lambda=0.83 F (5, 20)=0.82, p = 0.55). The authors concluded that multi-patient simulation-based training offered the opportunity to integrate task and teamwork skills in an environment that closely represents clinical care.

Undre et al. (2007) developed and evaluated a team training module for OR crisis management for non-technical skills in different professions via a simulated environment. Twenty teams consisting of two surgeons, anesthetist, and scrub nurse participated (n=80, of which 20 were surgeons, 20 anesthetists, 20 scrub nurses, and 20 operating departmental practitioners). The authors used a variety of evaluative tools: Objective Structured Assessment of Surgical Skills (OSATS), the Imperial College Assessment of Technical Skills for Nurses (ICATS-N), the Non-Technical Skills) (NOTECHS) and the Participant Evaluation of Training Questionnaire (PETQ). The skills assessed were leadership, decision-making, vigilance, teamwork, and communication using the NOTECHS. Assessment was conducted using a number of 6-point Likert scales (1 represented "not done" and 6 represented "done very well"). Data on the results were analyzed with a mixed-model ANOVA. Most of the team skills were scored above 4.0. Results showed that the main effect, as determined by ANOVA, was Skill (F (4, 568) = 24.04; p < 0.001), such that leadership and decision-making were scored lower than the other three skills. In addition, the analysis yielded a main effect of Specialty (F (3, 142) =

4.85; $p < 0.01$), such that nurses scored higher overall than surgeons ($p < 0.01$) and anesthetists ($p < 0.05$). These effects, however, were qualified by a significant Skill ·Specialty interaction that the analysis also revealed ($F(12\ 568) = 2.36$; $p < 0.01$).

Capella et al. (2010) evaluated the effects of trauma resuscitation teams at a Level I trauma center on clinical outcomes. The authors identified three team performance skills: leadership, mutual support, and communication. They used the Team Strategies and Tools to Enhance performance and Patient Safety (TeamSTEPPS™) teamwork system, a teamwork design developed by the Department of Defense and AHRQ for their Patient Safety Program (AHRQ, 2011). The trauma team performance observation tool was utilized pre- and post-team training to evaluate whether team training improved team performance. A sample of 73 (33-pre training and 40 post-training) trauma resuscitations was evaluated, along with surveys of team members (n=114). Comparing pre-training and post-training resuscitations, the authors calculated means, standard deviations, and p-values for teamwork ratings and clinical parameters, and determined significance using the independent samples t-test. Team performance (evaluated using TeamSTEPPS™ training tools) improved significantly across all non-technical skills (leadership, p=0.003, situation monitoring, as determined by the p=0.009, mutual support, p=0.004 and communication, p=0.001). Clinical outcomes evaluated included time from arrival to ED to CT scanner, time to endotracheal intubation, and time to the operating room. The times from arrival to the CT scanner (26.4-22.1 minutes, p <0.005), endotracheal intubation (10.1-6.6 minutes, p <0.49) and the operating room (130.1-94.5 minutes, p <0.021) were decreased significantly after the training.

Laird-Fick, et al. (2010) used a pre/post-test format to evaluate training of residents and nurses to work together in a patient-centered team. The study was conducted on a 32-bed ward in

a university setting (n=28 nurses, n=20 residents). Nurses showed significant improvement in knowledge ($p = 0.02$) and self-efficacy ($p = 0.001$) from baseline to 6 months post-training. There was no significant change for residents ($p = 0.15$) or nurses ($p = 0.28$) on the Team Performance Survey. A limitation to this study was lack of observation of the residents and nurses. The possibility exists that the participants did not effectively deploy the intervention.

Siassakos et al. (2010) conducted a cross sectional analysis of data from the previous Simulation and Fire-drill Evaluation randomized-control trial. The setting, an obstetrical unit, was used to evaluate whether team performance in a simulated emergency was related to teamwork skills and behaviors. The setting was six British secondary and tertiary maternity units. Participants (n=140) were grouped into 24 teams. The teams comprised two doctors and four hospital midwives. There was significant positive improvement in clinical efficiency and teamwork scores across all three dimensions; skills (Kendall's taub = 0.54, $p < 0.001$), behaviors (taub = 0.41, p = 0.001), and overall score (taub = 0.51, $p < 0.001$). It was noted that well performing teams administered the essential drug a mean of two minutes more quickly (Mann–Whitney U, $p < 0.001$). The authors reported a significant positive correlation between clinical efficiency and teamwork scores.

Deering et al. (2011) evaluated team training using the TeamSTEPPS™ teamwork system; the investigators reviewed 153 patient safety reports (pre, n=94, post, n=59) to evaluate team leadership, situation monitoring, mutual support and communication, as well as patient safety. The specific TeamSTEPPS™ tools were evaluated for their value. Cross monitoring was the tool most frequently judged as useful, reported as being applicable in 35 of the 153 reports (23%). This was followed by handoffs (10% of cases or 16 of 153). Adverse events were identified as communication-related errors, medication and transfusion errors and needle stick

incidents. Following the training, there was a significant decrease from 5.2 adverse events per 1,000-inpatient days to 1.8 events post implementation (Pearson's chi-square test=5.54, $p<.05$) This represented a 65% decrease in the rate of incidents in which communication was deemed to be a major precipitating factor.

Frengley et al. (2011) utilized a randomized crossover design to evaluate the effect SBTT on critical care unit team's ability to manage airway and cardiac crises and to compare simulation-based learning and case-based learning on scores for performance. Clinical outcomes were not evaluated. Forty teams from critical care units, comprised of one doctor and three nurses, participated in the simulations at a university simulation center. Outcomes included improved teamwork, which was evaluated using the Teamwork Behavioral Rater Tool (TBR). Paired t-tests were used to measure the impact of the intervention on teamwork behavior and on clinical management for cardiac and airway. The authors reported significant improvement in overall teamwork, leadership and team coordination ($p<.002$) in verbalizing situational information ($p<.02$), and clinical management ($p<.003$). The conclusions support the effectiveness of a simulation-based intervention.

Mayer et al. (2011) used TeamSTEPPS™ teamwork system to evaluate surgical and pediatric intensive care units team performance within an academic medical center. TeamSTEPPS™ was customized specifically for this study. Physicians (n=12), nurses (n=14), and respiratory therapists (n=6) were evaluated on non-technical skills (communication, leadership, situation monitoring, mutual support, overall teamwork and overall leadership) using the Teamwork Evaluation of Non-Technical Skills (TENTS) observation tool. Paired t-tests demonstrated significantly improved team performance for leadership, mutual support, and overall leadership from baseline ($p < .05$, .03, and .002, respectively). The remaining three

elements—communication, situation monitoring and overall teamwork——were not significantly different from baseline. The mean TENTS ratings increased again during the 12-month observation and, except for situation monitoring (p = .08), were again significantly improved compared with baseline (p < .0001–. 0003). The authors report, without explanation, that observations at six months post implementation trended toward baseline.

Figueroa et al. (2012) utilized the TeamSTEPPS™ teamwork system approach and tools to determine whether participation in SBTT improved teamwork, confidence and communication in a pediatric ICU. The study had 37 participants, consisting of nurses, critical care residents and respiratory therapists. Following the SBTT, there was a significant increase (p<0.05) in communication, use of debriefing, and perception of mutual respect and sense of empowerment among the participants. Confidence and skill in the roles of team leader, advanced airway management, and cardioversion/defibrillation were significantly (p<0.05) improved immediately after training and three months later. A significant increase (p<0.05) also was observed in the use of Team STEPPS concepts immediately after training and 3 months later. This study showed SBTT to be effective in improving communication and increasing confidence among members of a multidisciplinary team during crisis scenarios.

Fouilloux et al. (2013) evaluated team performance in a cardiac program within an academic experimental operating room using live pig models. The objective was to assess the method of training and learning to optimize and improve team management and functioning. Four members of a cardiac surgery team performed a cardiac procedure with the cardiopulmonary bypass circuit set up to produce several adverse incidents. Four events (venous air lock, interruption of venous line, arterial air embolism and failure of oxygenator. Five training sessions were performed; with sessions 1-4 considered training and session 5 was used

to demonstrate that team training followed by debriefing sessions improved the management of unwanted events. The cardiac team was aware that an adverse event would happen, but not what event. The procedure was observed and recorded by trained educators. This study's application was hampered by its small sample size (four members performing four different scenarios) and lack of a control group. Due to the small sample size and the use of only one team, the authors were unable to assess differences between teams who participated and teams who did not. As the main purpose of this study was to analyze teamwork, trends were determined using linear regression analysis. A linear trend line was fitted for each dataset and the slope and r^2-value of the trend line was determined. Descending or ascending trend lines were considered significant when analyzing timing and scoring, respectively. The authors reported that team performance and communication had positive effects on personal behavior. Simulation was found to be a low cost tool for the improvement of the management of adverse events.

Satisfaction with team training as an educational modality. Many investigators (Colacchio, Johnson, Zigmont, Kappus, & Sudikoff , 2012; Edwards, Seggie, & Murphy, 2012; Frengley et al., 2011; Laird-Fick et al., 2010; Maxson et al., 2011; Morey et al. 2002, Wallin, Meurling, Hedman, Hedegard, & Fellander-Tsai, 2007,) have documented participants' satisfaction with team training. Participants' satisfaction with SBTT has also been studied.

Morey et al (2002) provided formal team training and evaluated team behavior and performance in an ED. Data were collected from 684 clinical staff members in nine hospitals. Using paired t tests, the authors reported significant improvement in the experimental group as compared with the control group (p=0.012). The authors reported that staff attitudes toward teamwork increased (p=. 047) and staff's view of institutional support increased (p=. 040) after formal team training. These findings point to the effectiveness of formal teamwork training for

improving staff attitudes among trained individuals.

Wallin et al. (2007), evaluated the effects of SBTT on behavior and attitudes of 15 student medical emergency staff. Investigators created a trauma team course for novice medical students, allowing the students to practice team skills in five scenarios. Using a pre/post test design, the authors utilized video recordings and a tool developed previously for crisis management, the Operating Team Resource Management Survey (OTRMS). Wilcoxon signed-ranks test of difference was used to compare pre- and post- training data. Simulation was perceived as very realistic, participants recommended the course to peers, behavioral components were rated significantly higher after the course.

Laird-Fick, et al. (2010) used a pre/post-test format to evaluate training of residents and nurses to work together in a patient-centered team. The study was conducted on a 32-bed ward in a university setting (n=28 nurses, n=20 residents). Nurses showed significant improvement in knowledge ($p = 0.02$) and self-efficacy ($p = 0.001$) from baseline to 6 months post-training. There was no significant change for residents ($p = 0.15$) or nurses ($p = 0.28$) on the Team Performance Survey. A limitation to this study was lack of observation of the residents and nurses. The possibility exists that the participants did not effectively deploy the intervention.

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Maxson et al. (2011) utilized a pre/post test design to evaluate whether nurse and physician (n=28, 19 nurses, 9 physicians) collaboration was enhanced through SBT based on the TeamSTEPPS™ teamwork system. The tool for evaluation was the Collaboration and Satisfaction About Care Decisions Instrument (CSASD). Responses to the CSACD survey items at three time points were collated and CSACD analysis was performed using paired t tests. Two weeks after the intervention, the CSACD median scores for each item improved significantly, as did the overall summary score (pretest vs. posttest; $p<.002$). Perhaps more importantly, improvement was sustained at two months (pretest vs. posttest; $p<.002$). The authors reported significant improvement in satisfaction scores for both physicians and nurses demonstrating that team training promoted a collaborative work environment. After simulation training, participants perceived that improvements to decision making were sustained over a two-month time period.

Colacchio et al. (2012) implemented and evaluated teamwork training using simulation in situ in a 54-bed level IIIc neonatal intensive care unit. The participants were 176 employees from various disciplines (e.g., attending physicians, fellows, nursing leadership and staff, nurse practitioners, respiratory therapists and physician assistants) who received the TeamSTEPPS™ Teamwork system training. The outcomes included teamwork attitudes measured by the Teamwork Attitudes Questionnaire (TAQ). Results of the TAQ were averaged within the teamwork component for each discipline and each component was rated on a scale of 1 (strongly disagree) to 5 (strongly agree). Team structure average rating (sd) for physicians (MD) was reported as 4.46 (0.70), for nurse practitioners and physician's assistants (NP/PA) 4.44 (0.66), and for nurses(RN) 4.39 (0.73). The average leadership rating for MD was 4.68 (0.47), for NP/PA 4.69 (0.49), and for RN 4.73 (0.47). The average rating for situation monitoring for MD was 4.40 (0.63), for NP/PA 4.35 (0.58), and for RN 4.45 (0.59). The average rating for mutual

support for MD was 4.43 (0.50), for NP/PA 4.42 (0.67), and for RN 4.25 (0.97). The average rating for communication for MD was 4.42 (0.62), for NP/PA 4.28 (0.61), and for RN (0.73). The participants reported that training was helpful and informative and would allow them to apply skills in daily practice.

Westmead Hospital, a tertiary care Level I Trauma Center, in Australia redesigned the composition of the hospital's trauma team. Edwards et al. (2012) conducted a posttest observational study of the process for redesign. After noting that roles and responsibilities were vague among the team members, the authors developed a posttest survey to evaluate the process of team redesign. Participants were asked, via follow-up Likert survey (with 1 representing strongly agree, 2 disagree, 3 cannot decide, 4 agree and 5 representing strongly agree), how assessments of their clinical practice had improved. All 28 participants agreed or strongly agreed that team training was useful.

Simulation Training

Many investigators have evaluated the benefits of simulation training for educating health care teams. The simulated learning environment allows educators and researchers to test new clinical programs safely. Team and individual skills can be enhanced prior to encountering patients. Simulation training in a dedicated environment offers a realistic experience in which learners can practice responses to clinical scenarios, debrief, and evaluate the team performance in a safe environment, absent of patient risk. The Agency for Healthcare Research and Quality (AHRQ) (2010) sets standards for health care safety and develops training programs that create a culture of safety across disciplines. The AHRQ (2010) recognizes the simulation in health care creates a safe learning environment. Simulation-based training (SBT), using high-fidelity human simulators (HFHS) is gaining popularity within the healthcare setting. HFSHS are computerized

mannequins that mimic real-life patients with a variety of physiologic functions, such as respiratory effort and vital signs.

Most SBT research evaluated the efficacy, confidence gain, satisfaction and perception of the training modality. Bambini, Washburn, and Perkins, 2009; Brown and Chronister, 2009; Dyer, Gregory, and Higbee, 2012; Gordon and Buckley, 2009; Reznek et al., 2003; Roh, Lee, Chung, and Park, 2011; Smith and Roehrs, 2009; Stamper, Jones, and Thompson, 2008; Vyas, McCulloh, Dyer, 2012; and Wehbe-Janek et al., 2011, all report participant's satisfaction with SBT and positive perceptions of SBT. The authors also report improved confidence and SBT was efficacious.

Efficacy. Two groups of investigators (Bambini, Washburn, & Perkins, 2009 and Roh, Lee, Chung, & Park 2011) have documented participants' reported efficacy with simulation training. Bambini et al. (2009) evaluated simulated clinical experiences as teaching/learning methods to increase the self-efficacy of nursing students. An integrated quasi-experimental repeated measures design was used on a sample size of 112 nursing students. The authors utilized a qualitative and quantitative tool, developed specifically for the study, which indicated participant's confidence in various skills. The students completed surveys that evaluated confidence in a variety of postpartum and newborn nursing skills. A t-test analysis was used to compare the means of the pretest and posttest scores. Results indicated that students experienced an increase in overall self-efficacy ($p<.001$). Three themes that were identified as important in the qualitative results were communication, confidence, and clinical judgment.

Roh et al. (2011) evaluated the effects of simulation-based resuscitation training on nurses' self-efficacy and satisfaction using a pre/post test comparison study. Outcomes measured included baseline advanced cardiac life support knowledge, self-efficacy, and satisfaction. A

total of 38 nurses participated: 18 nurses in computer simulations, and 20 nurses with mannequin-based simulation. The outcomes were measured using the multiple choice questionnaires based on the American Heart Association Advanced Cardiac Life Support Course Questionnaire. It is a 10-item questionnaire with each item scored either 0 (false response) or 1 (true response). Self-efficacy was measured with a 10 point Likert Scale ranging from "not at all confident" (scored as 0) to "very confident" (scored as 10). Learner satisfaction was measured with a 10 point Likert type scale with higher scores indicating higher satisfaction. The participants overall self-efficacy rating was 6.5 (SD=1.66), and satisfaction rating was 7.53 (SD=1.20). Most nurses reported that the simulation experience was useful for future performance, for education on setting priorities and for aid in implementing protocols. Simulation was an effective tool in resuscitation education to identify deficiencies in skills or to use as an instructional strategy. The authors further reported that nurses highly valued simulations usefulness for performance tasks and the hands-on atmosphere was engaging and aided in alleviating the distress associated with patient care.

Confidence Gain. Three studies (Brown & Chronister, 2009; Gordon & Buckley, 2009; and Smith &Roehrs, 2009) have documented participants' reported confidence gain with simulation training. Brown and Chronister (2009) evaluated the effect of simulation learning on critical thinking and self-confidence as it pertains to and electrocardiogram nursing course. The authors utilized a comparative pre/post test with control group design. The treatment group (n=70) received weekly simulation and lecture educations, and the control group (n=70) received only didactic instruction. Elsevier's computerized Evolve Electrocardiogram custom exam tool was used to evaluate knowledge. Self-confidence was evaluated with a tool developed by the authors which demonstrated content but not construct validity with a Cronbach's alpha of .899.

A two-sample t-test was used to evaluate differences between the two groups ($p<.05$). A correlation analysis was performed to evaluate the link between post-test self-confidence and ECG test scores ($p<.05$) A pre-posttest analysis of self-confidence for the control group, using paired t test, demonstrated statistically significant increases ($p<.05$) on all items following simulation activities. Results demonstrated that critical thinking and self-confidence improved after SBT. Higher critical thinking scores were significantly related to higher self-confidence ratings.

Gordon and Buckley (2009) evaluated the effect of high-fidelity simulation training on 50 medical-surgical nurses' perceived ability to respond to clinical emergencies. The investigators measured confidence in ability and technical and non-technical skills with a pre-post-test design. Respondents rated their ability and confidences with tasks on a Likert scale ranging from "not at all" (scored as 1) to "a great deal" (scored as 4). A posttest questionnaire included a Likert scale ranging from "a great deal" (scored as 4) to "not at all" (scored as 1). The Cronbach's alpha correlation was .94 and .91 for the pre- and post-questionnaire, respectively. Pre and posttest scores were analyzed with paired t tests. The authors reported that after simulation, participants reported increased confidence in their ability to perform technical ($p<.001$) and non-technical activities ($p<.001$). There was an increased ability to recognize unstable patients ($p<.001$), to identify priorities ($p<.001$), to serve as a team leader and to voice and share concerns ($p<.001$). Participants reported an increased confidence in ability to initiate interventions, to be team leader, to share information, to voice concerns and to utilize resources appropriately ($p<.001$). The most valued aspects of simulation were identified as debriefing (94% scored this aspect 4), practicing roles in simulation (90%), managing patients with a simulator (82%), practicing

assertiveness (755), practicing role as leader (58%), and practicing patient handover (54%). Enhanced perceived performance was demonstrated following simulation training.

Smith and Roehrs (2009) examined the effects of a simulation experience on student satisfaction and self-confidence, along with factors that correlate with those outcomes. The sample population consisted of junior nursing students (n=68) enrolled in a medical/surgical course at a public university. Spearman's rho and multiple linear regression was used to correlate the outcomes. Students completed a HFS experience related to a patient respiratory decline scenario. Two instruments developed by the National League of Nursing were used: the Student Satisfaction and Self-confidence in Learning Scale and the Simulation Design Scale (SDS). Both are self-report instruments using a 5-point Likert scale. Nursing students reported satisfaction with an HFS experience, overall mean score was 4.5 (SD=0.5) with 1 representing strongly disagree to 5 representing strongly agree. Reported self confidence scores ranged from 1 (strongly disagree) to 5 (strongly agree). A mean score of 4.2 (SD=0.5) indicated students felt confident in their ability. Responses from the SDS indicated students had positive feelings about the design characteristics. Scores ranged from 1 (strongly disagree) to 5 (strongly agree). The highest mean score was guided reflection (M=4.4, SD=0.5); the lowest was objectives (M=4.4, SD=0.5). Support, problem solving and fidelity were the same (M-4.6, SD=0.5, 0.4, 0.6, respectively). The design subscale with the highest correlation to both student satisfaction (rs=0.614) and self-confidence (rs=0.573) was objectives of the simulation were clearly delineated, indicating a moderate correlation. Using Spearman's' rho (rs=0.05) elicited no significant correlation between any demographic characteristics and reports of student satisfaction or self-confidence. Results indicated that certain design characteristics, clear learning

objectives and a challenging problem to solve, were significantly correlated with student satisfaction and self-confidence. The authors reported positive feelings associated with the SBT.

Satisfaction. One study (Stamper, Jones, & Thompson, 2008) documented participants' satisfaction with simulation training. Stamper et al. (2008) collected data at the Trauma Simulation Training Center (TSTC) on utilization of the facility and the level of overall satisfaction among the users. Anonymous surveys were administered to 1,900 participants with completion and return of 196 surveys. Participants included Department of Defense medical personnel, e.g., physicians, nurses, emergency medical technicians, medics, respiratory therapist, student nurses and physicians, and other medical technicians. Survey responses were rated as excellent/good, neutral, fair, or disappointed. The authors for the study developed the survey utilized. Sixty-three percdent of users report excellent satisfaction with simulation, 30% report good satisfaction. Narrative comments demonstrated that users appreciated SBT as helpful and useful because of the realism of the scenarios and the ability to safely practice procedures. The majority of respondents thought simulation enhanced overall learning. This study validates the use of simulation's effectiveness.

Perceptions. Three investigators (Dyer, Gregory & Higbee, 2012; Reznek et al., 2003; Vyas, et al., 2012; and Wehbe-Janek et al., 2011) have documented participants' perceptions with simulation training. Reznek et al. (2003) evaluated a simulation-based crisis management course of emergency medicine for 13 medical residents. The authors sought to determine perceptions of SBT. The investigators developed the tool used to evaluate satisfaction, self-efficacy and benefits. Residents completed a horizontal numerical scale survey (1-worst rating to 5= best rating) of their perception of the training. Results demonstrated that participants reported that simulation was realistic (4.6 ± 0.6) (mean + SD), the course was enjoyable (4.9 ± 0.3) and

they believed the knowledge learned would be helpful (4.5 ± 0.6). Participants also reported that simulation prompted realistic responses and the scenarios were believable (4.8 ± 0.4). The positive response to simulation training in this study adds to the growing body of knowledge.

Wehbe-Janek et al. (2011) evaluated nurses' perspectives of simulation training for rapid response and code blue events using a post-test mixed-methods design. In a 600-bed tertiary academic Level 1-Trauma Center, 203 nurses completed surveys. The survey used included demographic items and 12 Likert-response items scored from 1 (strongly disagree) to 5 (strongly agree). Data was analyzed with frequency and percent. Results generated certain themes: opportunity for hands-on practice and experience (39, 18.4%) (number of exemplars, percent), increased awareness and preparedness (32, 15.1%), role clarity (27, 12.7%), teamwork and interprofessional team training (27, 12.7%), increased knowledge and skills (21, 9.9%), communication (16, 7.8%), increased confidence and comfort (15, 7.1%), simulation experience (14, 6.6%), debriefing and reflective learning (13, 6.1%), and patient outcomes (5, 2.4%). The top three statements (98%) to which nurses strongly agree and agree were: increased familiarity with equipment (n=199), debriefing beneficial (n=197), increased familiarity with roles and responsibilities (n=197). More than 97% of the nurses strongly agreed or agreed that simulation increased communication skills and allowed them the opportunity to practice skills. The authors reported that simulation was a useful adjunct to clinical teaching and noted there was predicted potential for improved clinical learning with use of organized simulated scenarios. Nurses who participated in SBT reported that it helped clarify team members' roles and the nurses value the hands of practice as it increased preparedness and the ability to make critical decisions.

Vyas et al. (2012) evaluated the effectiveness of simulation to teach patient safety, team building skills and the value of interprofessional collaboration. Five scenarios simulating urgent

situations that required interprofessional collaboration were developed at a university setting. 208 students from various disciplines (11% pharmacy students, 46% medical students, and 26% nursing students) participated in the simulation exercise. The investigators measured identification of team members' roles, communication, skills, and knowledge. The pre/post-test design questionnaire used was the Knowledge, Skills, Attitudes (KSA) survey. The KSA is a 30-item Likert scale (1=strongly disagree, 5+ strongly agree). The average score was 4.2 for the question "Should simulation be included in future courses?" The results indicated an improvement in responses on questions about interprofessional communication and teamwork. Students felt strongly that simulation should be included in future courses. Nearly all (90%) agreed or strongly agreed that simulation increased understanding of communication, roles and response to safety.

Multiple benefits of simulation training have been demonstrated by a variety of patient care settings. These findings support the inclusion of simulation training in the Trauma Boot Camp. Simulation training provided trauma nurses with the skills necessary to deliver urgent care to a critically ill and injured trauma patient.

Improved Clinical Outcomes

DeVita, Schaefer, Lutz, Wang, and Dongilli, 2005; Riley et al., 2011; Siassakos et al., 2009; Strasser et al., 2008; and Wheelan, Burchill, and Tilin, 2003) all evaluated the effects of team training on patient outcomes. While evaluating patient outcomes was beyond the scope of this capstone, favorable results lend further support to the benefits of team training. There was relatively little data on patient outcomes related to simulation-based team training in trauma settings. Evaluating outcomes for this capstone project was premature. Evaluating current

research to determine safety issues and long-term functional outcomes lends credence to utilizing SBTT.

Trauma Settings. Wheelan et al. (2003) evaluated the link between teamwork and patient outcomes in the ICU. A total of 394 staff members in 17 intensive care units completed the Group Development Questionnaire (GDQ), an assessment tool used to clarify issues obstructing group effectiveness. The tool uses a scale ratings as follows: I (members go along with whatever leader suggests, little conflict noted), II (members challenge the leader, there is quite a bit of tension), III (the group works as a team and is able to form subgroups), and IV (the group acts on its own decisions and is able to get, give, and use feedback constructively). Post hoc analyses revealed that the 18 nurses who held masters' degrees perceived significantly more conflict in their units than did other staff members. A significant correlation was noted between a unit's stage of group development and that unit's standardized mortality rations (SMR) (r=-0.662, p=. 004). As stage of group development increased fewer deaths occurred. Staff members of units with mortality rates that were lower than predicted perceived their teams as functioning at a higher group development. They also perceived their teams as more structured and organized than did staff members of lower-performing units.

DeVita et al. (2005) used SBTT to develop multidisciplinary team skills and to improve medical emergency team performance. Clinically experienced individuals were trained (n=138 of which 69 were critical care nurses, 48 were physicians, and 21 were respiratory therapists). Each course included a presentation prior to the course, a didactic session on the day of the course, three simulated scenarios and debriefing. The authors evaluated teams, which responded to emergencies using specified roles and goals in emergency medicine. Simulated survival increased form 0% to 90% across the three sessions (Cochran's Q=1.26, p=0.002). The initial

team task completion rate (TCR) was 10-45% and rose to 80-95% during the third scenario. The improvement in overall TCR was statistically significant (Kendall's W-0.91, $p<0.001$). Results indicated that multidisciplinary team training using simulation results in improvement in process elements and simulated outcome. The investigators concluded that SBTT improved medical emergency team performance.

Non-trauma settings. Strasser et al. (2008) evaluated the effect of team training on patient outcomes in stroke victims. Outcome measures were identified as a change from admission to discharge in the motor skills, length of stay and discharge disposition. A cluster-randomized trial of 31 rehabilitation units at Veterans Affairs medical centers consisted of a multiphase staff-training program. Results supported practitioners who work in teams are encouraged to examine how team functioning affects patient outcomes and to develop interventions to optimize treatment effectiveness.

Siassakos et al. (2009) evaluated whether a one-day SBTT was associated with improvements in management of cord prolapse in 62 females. . The authors reviewed hospital notes and software system entries to determine diagnosis to delivery interval (DDI), proportion of caesarean sections, type of anesthesia, rate of low apgar scores, and rate of admission to the neonatal intensive care unit. The authors reported a reduction in median DDI from 25 to 14.5 minutes ($p<0.001$). Team training was associated with a significant decrease in the percentage of cases with DDI of fetal bradycardia of more than 30 minutes, from six pre-training to none post-training ($p=0.007$). The introduction of annual training was associated with improved management of a complication. The findings of this study provided evidence that team simulation training for obstetrical emergencies was associated with improved compliance with national standards.

Riley et al. (2011) evaluated the effectiveness of TeamSTEPPS^{TM} teamwork system training on perinatal morbidity and mortality as well as culture of safety. The small cluster randomized clinical trial involved three, small hospitals, representing approximately 1,800 births per year. The authors reported a 37% reduction in perinatal morbidity and mortality. No improvement on team training or culture of safety was found. This study supports the use of simulation for training and provides evidence the simulation training was effective in decreasing perinatal emergencies.

Multiple benefits of team training have been demonstrated for a variety of patient care situations. These findings support the inclusion of team training in the Trauma Boot Camp to provide trauma nurses with skills necessary to deliver urgent care to patients admitted with multiple or severe traumatic injuries.

Agency Description

Setting

The UK Hospital is a Level I Trauma Center located in central Kentucky. It currently has approximately 700 beds, but an expansion of an additional 200 beds is expected to be completed by 2016. UK Hospital opened in 1962 and is currently the only Level I Trauma Center in central and eastern Kentucky. The trauma service includes two 12-bed trauma surgical intensive care units, each staffed with 30 nurses, four nursing care technicians, four clerks, one patient care manager and one assistant manager. There is a synergistic relationship between the two units and between the ED and the units. Communication between the charge nurse of both units, the House Officer Administrator (HOA), and with capacity command personnel (responsible for bed assignment and staff allocation) is a fluid, ongoing entity. The implementation of the Trauma

Boot Camp will be instrumental in educating the TSICU nurses to be on the frontline for care providers for trauma alert patients.

Target Population

The TSICU nursing staff comprises approximately 60, primarily female, nurses with bachelor degrees. Most of the nurses have less than 10 years of experience. Registered nurse experience of the employees is as follows: 11% have less than 1 year experience, 43% have less than 5 years, 35% have more than 5 years experience, 14% more than 10 years, 9% more than 15 years, and 5% have more than 20 years of nursing experience.

Approximately 20 trauma/surgical nurses are hired each year. Newly hired nurses to the TSICU, regardless of previous experience, must be educated to admit a critically injured and ill trauma patient. Nurses undergo a rigorous three-month orientation and other educational offerings within the first year of employment. The completion of the year culminates with the Trauma Boot Camp. The Trauma Boot Camp synthesized the nurses' past year of experience and knowledge to produce an engaged, well-rounded, proficient TSICU nurse.

Congruence of Capstone Project to Selected Organizations' Mission, Goals and Strategic Plan

UK Hospital Mission and Vision. UK Hospital is a member of UK HealthCare, a system that provides services for children and adults, including acute and primary patient care services and six academic health sciences colleges. The UK healthcare Mission and Vision are as follows:

> The mission of UK HealthCare is dedicated to the health of the people of Kentucky, to provide the most advanced patient care, to serve as an information resource, to strengthen local health care, to improve the delivery system by partnering with

> community Hospitals and physicians, and to support the organization's education and research needs by offering cutting edge services on par with the nation's best providers. (UK Healthcare, 2014)

The vision of UK HealthCare is to achieve national recognition as a Top 20 public academic health center, providing optimal multidisciplinary health care and developing advanced medical therapeutics for the people of Kentucky and surrounding regions. The proposed project falls in line with the Enterprise's mission and vision. (http://UK Hospitalhealthcare.UK Hospitaly.edu/about/leadership/mission-vision/).

The mission of the TSICU was to be prepared to admit and care for the most injured and critically sick patients. Patients' first point of contact with the trauma team was in the ED, which based on severity of injury, often quickly necessitates a transfer to the TSICU. The patient flow, or throughput, must be accomplished in a timely manner, for ultimate patient survival. The proposed project supports the mission and values of UK HealthCare and the UK Hospital TSICU. Preparing TSICU nurses to function, as a highly skilled health care delivery team for Trauma Alert patients expedites their admission to the TSIU, thus expediting the implementation of trauma care. This strategy for patient care delivery was expected to improve patient outcomes and reduce overall corset, adverse events, and length of stay.

Stakeholders

The primary stakeholders for this project include patients and families, TSICU nurses and patient care managers, interprofessional providers of care for trauma patients, and those responsible for patient care outcomes, cost, and quality of the UK Hospital and UK HealthCare services. Implementation of an evidence-based team-training program enhances trauma care for

Trauma Alert patients, thus improving trauma services at UK Hospital. The appropriate people approved the setting. (Appendix D).

Project Design

Implementation and evaluation of the Team Training component of the Trauma Boot Camp was accomplished with a pre-test/post-test program evaluation design.

Project Methods

After obtaining Institutional Review Board (IRB) approval, a convenience sample (N=7) of registered nurses was obtained. Participants of the Trauma Boot Camp (November, 2014) were provided with a brief informational description of the project prior to consent being obtained. The Trauma Boot Camp originally consisted of three components: (a) a one-hour didactic in trauma care, (b) a high fidelity simulation exercise (Appendix E), and (c) a debriefing session to evaluate performance in the simulation exercise. The didactic trauma care component was based on the Advanced Trauma Life Support standards (ATLS, 2008) and taught by Dr. Cynthia Talley, a specialist in trauma and surgical critical care. The high-fidelity simulation demonstration and exercise was led by Cynthia Talley and conducted using SimMan (iStan #526, CAE/ METI, Sarasota, FL, 2011). Participants were observed initially during the simulation exercise for teamwork dynamics using the Trauma Team Performance Observation Tool (TTPOT) (Baker, Capella, Hawkes, & Gallo, 2011). Debriefing lasted for approximately 30 minutes and was conducted by Dr. Cynthia Talley. Participants received feedback on their performance and had an opportunity for clarification and a question/answer session.

Team Training was a new component for the Trauma Boot Camp and consisted of a didactic component based on the AHRQ TeamSTEPPS^{TM} teamwork system (ARQH, 2012). The capstone project leader, taught the Team Training in the ICU Smart Room on Tower 100, 7th

floor, UK Medical Center. Team Training was taught after the debriefing session. During the post-training simulation exercise, the capstone project leader observed teamwork dynamics of participants using the TTPOT.

Description of the Team Training

A modified TeamSTEPPS™ teamwork system requiring a minimal time commitment was presented. The didactic portion took approximately one hour and emphasized the evidence for team performance improving outcomes, a delineation of the roles of each team member (Appendix F), and the vital components of strong team performance. The TeamSTEPPS™ program was an evidenced-based teamwork system aimed at optimizing patient outcomes by improving communication and other teamwork skills among healthcare professionals. The content was based on four key team performance skills: leadership, communication, situation monitoring, and mutual support (AHRQ, 2012). The team training focused on identifying the roles of each team member prior to the admission, assigning tasks to each member, and effective communication techniques (Appendix G).

The simulation performed prior to team training included resuscitation of a Trauma Alert patient with the eight-person trauma team. Participants demonstrated current ability to perform functions as a team based on the TTPOT. The participants then received the team-training lecture. The Trauma Boot Camp participants then performed another simulated resuscitation after the team training educational component (Figure 4). Participants were observed at each simulation event.

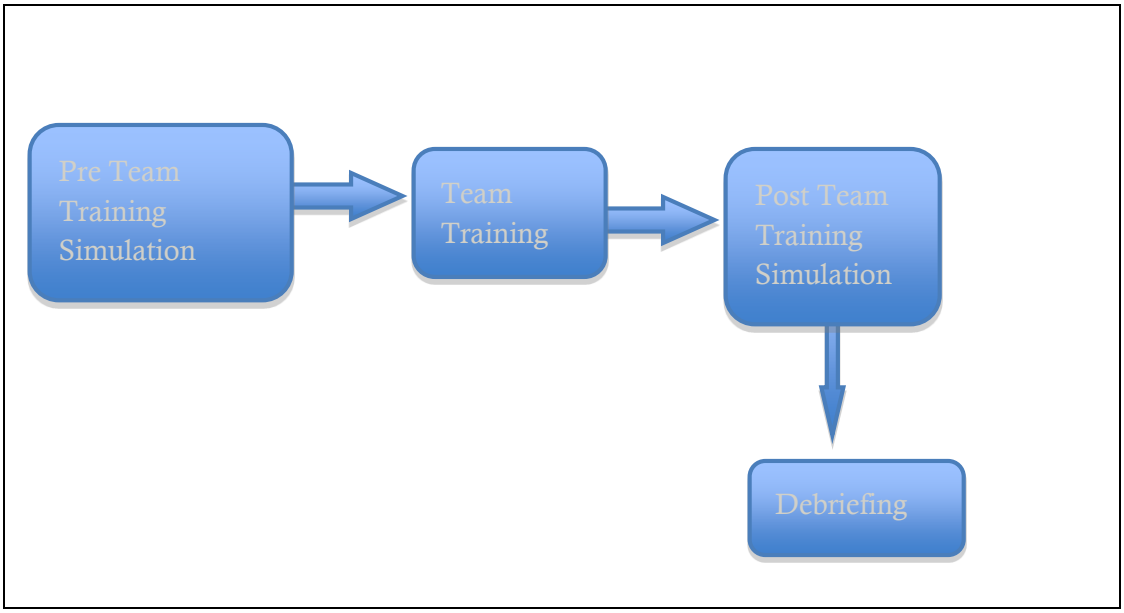


Figure 4. Agenda for the Trauma Boot Camp

Procedures

IRB submission process. The proposal was submitted to the University of Kentucky (UK) Institution review Board (IRB) for approval. The UK IRB served as the primary IRB of record; an IRB Authorization Agreement was obtained from Eastern Kentucky University. The capstone project leader obtained written consent from all participants.

Measures and Instruments.

Demographic data. Participants were asked to complete a short demographic questionnaire related to age, education, and type and length of nursing experience. The demographic questionnaire was not matched with other outcome instruments (Appendix H).

Teamwork attitude. The TeamSTEPPS™ Teamwork Attitudes Questionnaire (T-TAQ) (Appendix I) was designed and developed to measure individual attitudes towards team structure, leadership, mutual support, situation monitoring, and communication (Baker, Krokos, & Amodeo, 2008). The T-TAQ can be used to assess whether the TeamSTEPPS™ intervention

produced the desired results. The T-TAQ is a 30-item instrument measuring teamwork attitudes in five subscales: (a) team structure, (b) leadership, (c) situation monitoring, (d) mutual support, and (e) communication. Respondents rate each item on a Likert Scale with the following response options: 1 = Strongly Disagree; 2 = Disagree; 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. With this rating, lower scores represent negative attitudes related to teamwork, whereas higher scores represent positive attitudes.

Investigators administered a pilot T-TAQ to training participants (n=449) upon initial development. Of the respondents, n=175 (44.3%) reported that they deliver direct inpatient care (Baker, Amodeo, Krokos, Slonim, & Herrera, 2010). The 85 respondents were registered nurses working predominantly in ICU settings. Survey developers recommend users not customize the T-TAQ, but scales can be used separately. Scale reliabilities exceeded 0.7, and scales were moderately correlated.

Najafi, Mi., Keshmiri, Najafi, M., and Shirazi, in their 2012 cross-sectional survey to specifically assess the validity and reliability of T-TAQ, submitted the questionnaire to 11 healthcare experts. To estimate the reliability of the instrument, test-retest method was used. Cronbach's alpha was 0.80 and the ICC was 0.8.

The T-TAQ was administered to the Trauma Boot Camp participants prior to the team training and after the training was completed. This provided information on how well team training produced desirable attitude changes. The pre-test Cronbach's alpha for the sample in this project was .88 and the post-test Cronbach's alpha was .92.

Teamwork perception. The TeamSTEPPS™ Teamwork Perceptions Questionnaire (T-TPQ) (Appendix J) was developed by James Battles (2010) in response to the T-TAQ's failure to capture how an individual perceives the current state of teamwork within an organization.

Measuring perceptions of teamwork offers a larger picture of an organizations team climate. The T-TAQ is not adequate for measuring the success of Team Training by itself. The T-TPQ is a 35-item instrument measuring teamwork perception in five subscales: (a) team structure, (b) leadership, (c) situation monitoring, (d) mutual support, and (e) communication. Respondents rate each item on a Likert Scale with the following response options: 1 = Strongly Agree; 2 = Agree; 3 = Neutral, 4 = Disagree, and 5 = Strongly Disagree. With this rating, lower scores represent positive perceptions related to teamwork, whereas higher scores represent negative perceptions.

The final version of the T-TPQ was administered to 169 health care workers. Seventy-three point four percent were direct patient care providers, with the largest subgroup consisting of nurses (32.6%). Coefficients ranged from .57 (team structure and communication to) to .79 (situation monitoring and mutual support). The T-TPQ should be administered before and after Team Training, and item modification was not recommended (Battles & King, 2010).

Keebler, et al. (2014) reported that the T-TPQ measure was more reliable than previously thought (Cronbach's alpha=0.978). The authors surveyed 1,700 multidisciplinary healthcare professionals and support staff on their perceptions of teamwork.

The T-TPQ was administered in conjunction with the T-TAQ prior to and after completion of the team training. The pre-test Cronbach's alpha for the sample in this project was .92 and the post-test Cronbach's alpha was .90.

Both the T-TPQ and T-TAQ's scoring was accomplished two ways. A total score was calculated for each team construct. An average score was calculated for each construct, as well, for graphical representation. A paired samples t test was calculated for each variable.

Nurse satisfaction and nurse self-confidence. Both nurse satisfaction and nurse self-confidence were measured with the same instrument, the Student Satisfaction and Self-Confidence in Learning survey. Nurse satisfaction was defined, by the project leader, as satisfaction with the team-training component of the Trauma Boot Camp and with simulation as a form of learning. Self-confidence was defined as confidence with mastery of the material presented in the Trauma Boot Camp and confidence in translating the simulation experience to real life. Jeffries and Rizzolo (2006), sponsored by the National League of Nursing (NLN), conducted a national, multi-site, multi-method study to develop and test models that nursing faculty can use with simulation training. The NLN's Student Satisfaction and Self-confidence in Learning survey (Appendix K) is a 13-item instrument. It was designed to measure student satisfaction (5 items) with simulation and self-confidence (8 items) in learning. A five-point scale was used. Jeffries and Rizzolo (2006) reported that reliability of the scale was tested using Cronbach's alpha (satisfaction=0.94; self-confidence=0.87). Student Satisfaction and Self-Confidence in Learning scale were administered post-intervention.

Fountain and Alfred (2009) utilized the Student Satisfaction and Self-Confidence in Learning scale while investigating the student satisfaction and HFS. Cronbach's alpha was 0.91 for satisfaction and 0.84 for self-confidence.

The Student Satisfaction and Self-Confidence in Learning scale data was analyzed with descriptive statistics. The Cronbach's alpha for the sample in this project was .95.

Simulated trauma team performance. The Trauma Team Performance Observation Tool (TTPOT) (Baker, Capella, Hawkes, & Gallo, 2011) (Appendix L) was developed to evaluate, observe, and measure team performance during trauma resuscitation. Interviews were conducted with 31 trauma team members (physicians, nurses, and residents) from multiple

organizations. Steps in trauma resuscitation were identified, as well as critical variables that could affect team performance. As the items were written they were linked with the four-team core components (leadership, situation monitoring, mutual support, and communication). The TTPOT includes 21 items using a 5-point scale to assess each of the 21 items, where 1=very poor and a 5=excellent. A "not applicable" item was included as well. With this rating, higher scores represent better teamwork performance, whereas lower scores represent poor teamwork performance. Intraclass correlations (ICC's) and inter-rater agreement were used to determine interrater reliability. The average ICC was .54 and the average level of agreement was 75%. Internal consistency was acceptable with Alpha across all items of .83.

The capstone project leader observed participants within each core component (leadership, situation monitoring, mutual support and communication) during the simulation section of the Trauma Boot Camp. Participants were observed prior to team training and after team training. The pre-test Cronbach's alpha for the sample in this project was .80 and the post-test Cronbach's alpha was .66. Comparing pre-training and post-training simulations, means, standard deviations, and p values for teamwork ratings were calculated. Significance was determined using paired samples t-tests.

Implementation

Implementation and evaluation for the Team Training took place in November, 2014 (Appendix M). The team-training component was added to the existing UK Hospital Trauma Boot Camp, and taught by the capstone project leader. The Team Training didactic component, taught by Dr. Talley, was delivered using PowerPoint slides and a traditional lecture method. Participants enacted team roles and dynamics in the Trauma Boot Camp Simulation pre-team

training and post-team training. Dr. Talley provided the scenario in the simulation and then the team participants enacted the scenario.

The capstone project leader was blinded to the ID for each of the participants. During the Simulation Exercise, the capstone project leader silently observed the participants' team performance and completed the TTPOT for each individual.

Results

Data were entered into the Statistical Package for Social Science (SPSS) Version 21.0. Statistical significance was set at 0.05 (Polit, 2010). Descriptive statistics were summarized for the Student Satisfaction and Self-Confidence and Learning questionnaire, demographics, TTPOT, T-TAQ, and T-TPQ. Paired t-tests were computed on mean pre- and post-intervention scores for the T-TAQ, T-TPQ, and TTPOT. Overall scores and mean summed scores were calculated on the T-TAQ, T-TPQ, and TTPOT. Significance was established with $p \leq 0.05$.

Sample Description

Seven nurses attended the Trauma Boot Camp, completing all five surveys. One nurse did not complete the Student Satisfaction and Self-confidence in Learning questionnaire. Participants included six females and one male. All participants were younger than 29. All (100%) were educated at the Baccalaureate level. Six participants had less than two years of experience; the remaining participant had exactly two years of experience. All held a nursing license for two years or less, with the same reported nursing experience as an ICU, and specifically, TSICU registered nurse.

Team Training Outcomes

Teamwork attitude. Paired t-tests (Table 1) were conducted to evaluate the impact of the TBC on participants' T-TAQ scores. Mean scores, where higher scores represent positive attitudes and lower scores represent negative attitudes, worsened significantly for T-TAQ Total, T-TAQ Mutual Support, and T-TAQ Communication. Participants' mean overall T-TAQ score worsened significantly from the pre-test (131.1±8.9) to the post-test (121.4±7.7), $t(6)=2.59$, $p=.041$. The mean change in T-TAQ scores was 9.71 with a 95% CI ranging from .53-18.89. The magnitude of difference in the means was large (eta squared=.527). Participants' mean T-TAQ Mutual Support subscale score worsened significantly from the pre-test (25.85±4.14) to the post-test (19.71±2.36), $t(6)=2.62$, $p=.04$. The mean change in T-TAQ Mutual Support subscale score was 6.14 with a 95% CI ranging from .40-11.87. The magnitude of difference in the means was large (eta squared=.53). Participants' mean T-TAQ Communication subscale score worsened significantly from the pre-test (26.14±1.95) to the post-test (23.00±1.29), $t(6)=5.68$, $p=.001$. The mean change in T-TAQ Communication subscale score was 3.14 with a 95% CI ranging from 1.78-4.49. The magnitude of difference in the means was large (eta squared=.84). No significant differences were noted in T-TAQ Team Structure, Situation Monitoring, or Leadership subscale scores.

Table 1

T-TAQ Scores pre- and post-implementation of TBC

Variable	Mean±SD	*t*	*df*	*p*
T-TAQ Total Pre-Simulation	131.1±8.8	2.59	6	.041*
T-TAQ Total Post-Simulation	121.4±7.6			
Mutual Support Pre-Simulation	25.85±4.14	2.62	6	.040*
Mutual Support Post-Simulation	19.71±2.36			
Communication Pre-Simulation	26.14 ±1.95	5.68	6	.001*
Communication Post Simulation	23.00 ±1.29			

Note. N=7

Teamwork perception. Paired t-tests (Table 2) were conducted to evaluate the impact of the TBC on participants' T-TPQ scores. Mean scores, where lower scores represent positive perceptions and higher scores represent negative perceptions, improved significantly for T-TAQ Total, T-TAQ Team Structure, and T-TAQ Communication. Participants' mean T-TPQ Total score improved significantly from the pre-test (72.85±11.30) to the post-test (69.00±10.13), t(6)=3.10, p=.021. The mean increase in T-TPQ scores was 3.85 with a 95% CI ranging from .816-6.89. The magnitude of difference in the means was large (eta squared=.616).. Participants'

mean T-TPQ Team Structure subscale score improved significantly from the pre-test (13.71±0.95) to the post-test (12.57±2.82), t(6)=-15.48, $p<.0001$. The mean improvement in T-TPQ Team Structure subscale score was -55.28 with a 95% CI ranging from ¨64- ¯46.54. The magnitude of difference in the means was large (eta squared=.97). Participants' mean T-TPQ Communication subscale score improved significantly from the pre-test (14.85±2.26) to the post-test (12.14±0.37), $t(6)=3.8$, $p=.009$. The mean improvement in T-TPQ Communication subscale score was 2.71 with a 95% CI ranging from .96-4.46. The magnitude of difference in the means was large (eta squared=.70). No significant differences were noted in T-TPQ Leadership, Situation Monitoring, or Mutual Support subscale scores.

Table 2

TTPQ Scores pre and post-implementation of TBC

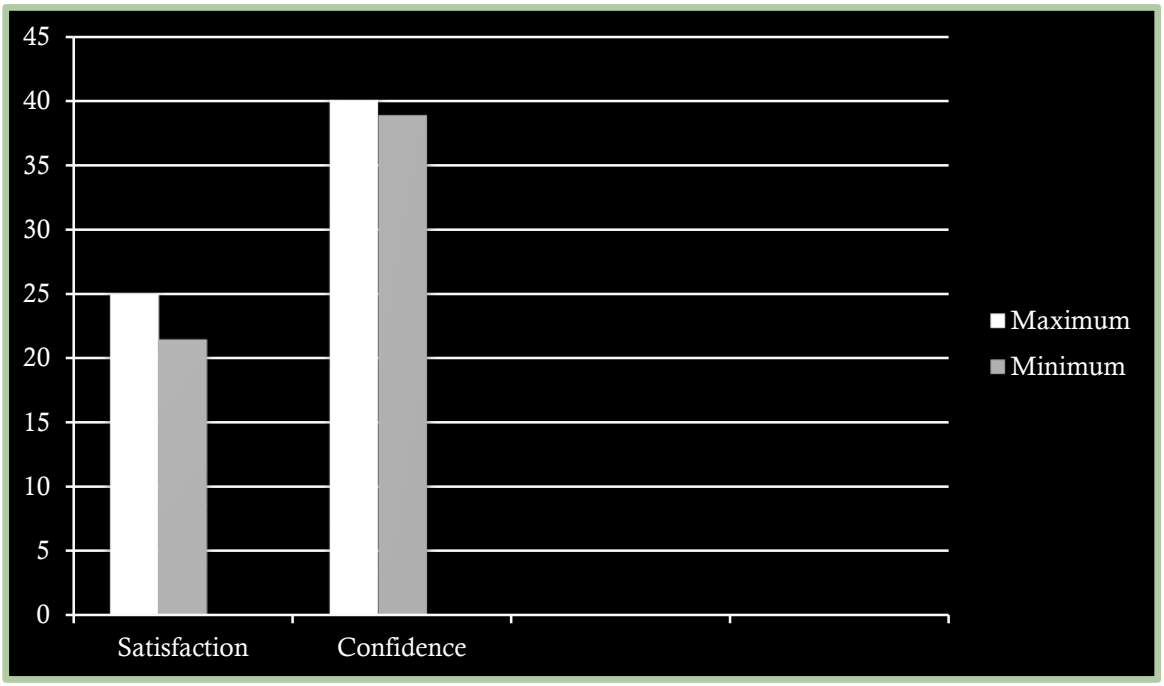
Variable	Mean±SD	*t*	*df*	*p*
T-TPQ Total Pre-Simulation	72.85±11.30	3.10	6	.021*
T-TPQ Total Post-Simulation	69.00±10.13			
Team Structure Pre-Simulation	13.71±.95	-15.48	6	.000*
Team Structure Post-Simulation	12.57±2.82			
Communication Pre-Simulation	14.85 ±2.26	3.80	6	.009*
Communication Post Simulation	12.14 ±.37			

Note. N=7

Nurse satisfaction and nurse self-confidence. Post-test means were calculated on the Student satisfaction and self-confidence in learning questionnaire (Graph 1). Mean satisfaction scores were 21.5 of a possible 25 points total. Mean self-confidence scores were 38.83 out of a possible 40 points total. The results support that participants' are satisfied with SBTT learning and self-confidence improved with SBTT.

Graph 1

Nurse Satisfaction and Self-Confidence Post TBC



Simulated trauma team performance. Paired t-tests (Table 4) were conducted to evaluate the impact of the TBC on participants' TTPOT scores. High scores on the TTPOT represent positive team performance. Participants' mean TTPOT Total score improved significantly from the pre-test (64.85±11.23) to the post-test (93.28±5.87), t(6)= ⁻10.75, p=.000. The mean increase in TTPOT scores was ⁻28.42 with a 95% CI ranging from ⁻34.89-⁻21.95. The magnitude of difference in the means was large (eta squared=.950). Participants' mean TTPOT Situation Monitoring scores improved significantly from the pre-test (17.42 ±3.50) to the post-test (25.28 ±2.62), t(6)= ⁻8.38, p=.000. The mean improvement in TTPOT Situation Monitoring subscale score was -7.85 with a 95% CI ranging from ⁻10.14- ⁻5.56. The magnitude of difference in the means was large (eta squared= .92). Participants' mean TTPOT Mutual Support scores improved significantly from the pre-test (12.57± 1.51) to the post-test (8.57 ±97), t(6)= ⁻7.09, p=.000. The mean improvement in TTPOT Mutual Support subscale score was -6.00 with a 95% CI ranging from ⁻8.06- ⁻3.93. The magnitude of difference in the means was large (eta squared=.89). Participants' mean TTPOT Communication subscale score improved significantly

from the pre-test (15.42 ±.97) to the post-test (25±3.87), t (6)= -5.97, p=.001. The mean improvement in TTPOT Communication subscale score was -9.57 with 95% CI ranging from -13.49- -5.65. The magnitude of difference in the means was large (eta squared=.70). No significant differences were noted in TTPOT Leadership subscale.

Table 4

TTPOT Scores pre and post-implementation of TBC

Variable	Mean±SD	*t*	*df*	*p*
TTPOT Total Pre-Simulation	64.851±1.23			
		-10.75	6	.000*
TTPOT Total Post-Simulation	93.28±5.87			
Situation Monitoring Pre-Simulation	17.42±3.50			
		-8.38	6	.000*
Situation Monitoring Post-Simulation	25.28±2.62			
Mutual Support Pre-Simulation	12.57 ±1.51			
		-7.09	6	.000*
Mutual Support Post Simulation	18.57 ±.97			
Communication Pre-Simulation	15.42±.97			
		-5.97	6	.001*
Communication Post-Simulation	25.0±3.87			

Note. N=7

Discussion

The purpose of this capstone project was to implement a simulation-based team-training (SBTT) component as part of a comprehensive trauma nurse-training program. Evaluation of the team training included knowledge, nurse satisfaction, nurse self-confidence, and simulated team performance.

The results from this project support the implementation of a team simulation-training program for newly hired nurses in the TSICU. The mean overall scores for the T-TPQ demonstrated improved teamwork attitudes and perceptions. The decline in mean overall T-TAQ scores was attributed to the T-TPQ's authors finding that the T-TAQ captures how an individual approaches team related issues but not necessarily how individuals' perceive the current state of teamwork in their organizations. The T-TAQ is not adequate for measuring the success of Team Training by itself.

The overall scores for the TTPOT demonstrated that team training improved team performance. Team communication demonstrated significant improvement in two of the three instruments (T-TPQ and TTPOT) (Tables 2, and 3). ARQH (2010) identified that poor communication as one of the leading causes of medical errors in the United States. Unexpectedly, leadership subscale mean scores did not significantly improve following the implementation.

Results from the Student Satisfaction and Self-Confidence in Learning survey showed that most participants agreed or strongly agreed that they were satisfied with simulation as a learning modality and gained self-confidence. The IOM (2000) recommended teamwork training to enhance patient safety. The TBC Team Training evaluation findings of this project are

consistent the current literature's standing that simulation teamwork training improves participants' self-confidence.

The TeamSTEPPS™ teamwork system was a good fit for this program implementation. The modified information was meaningful to the participants and feasible for implementation. More time to develop the team training aspect could more strongly augment the participating nurses' knowledge. Working within an institutional staff development structure provided time constraints, and could, in future implementations, have any number of problems (no ICU room available, sickness, and lack of availability of equipment). The simulation experience was well planned and implemented without problems. The simulation room was available, the SimMan worked appropriately. Participants voiced concerns that there were too many observers in the room, making it crowded and "nerve-racking." Though not planned, not all of resuscitation equipment was available, which lent an air of authenticity to the simulation.

Limitations

One limitation to this project evaluation was a small sample size. A single observer limited the analysis of observational data. The simulation experience, while in-situ, was a replica of a critical event, not the event itself. No post-simulation assessment was conducted to determine the perceived authenticity of the simulation. It was possible the didactic TeamSTEPPS™ curriculum, which was modified from the original training program, did not adequately test the TeamSTEPPS™ curriculum.

Implications for Practice

Results of project support continuation of a team-training component of the established TBC. Based on the data obtained from this project, along with open response feedback obtained from staff development, participants appreciated the TBC as a valuable educational experience.

Further teamwork training classes have been planned that will include the TeamSTEPPS™ curriculum. Verbal feedback from nursing staff, nurse managers, physicians, and nursing staff development specialists reported favorable impressions with agreement to continue the team training. Long-term planning includes additional assessment of team training outcomes and elimination of bystander observers during simulation. The goal of the project agency is to present two TBCs each year.

Conclusion

The primary purpose of this project was to evaluate a simulation-based training program, including didactic instruction, emphasizing team training and trauma resuscitation. The program was, and will continue to be geared toward new nurse employees in the TSICU. The literature review supports team training and the use of simulation training. The project evaluated perceptions of the program and recorded observations of the team training. Utilizing a variety of outcome measures enhanced the evaluation of this project. The impact on the TSICU was an enriched learning experience that assisted new employees in caring for trauma victims who bypass the ED and are directly admitted to the TSICU.

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Appendix A

University of Kentucky Hospital
Adult Trauma Alert Activation Criteria

Trauma Alert Criteria

One or more of the following:
Confirmed SBP<90 at any time
Gunshot wounds to the neck, chest or abdomen
GCS <8 with mechanism attributed to trauma
Intubated patients transferred directly from scene
Patients with respiratory compromise or obstruction
- Includes intubated patients who are transferred from another facility with ongoing respiratory compromise
Does not include intubated patients from referring facility who are stable from a respiratory standpoint
Transfer trauma patients receiving blood to maintain vital signs
Emergency Medicine Attending discretion

Response/Resources activated:
Trauma Surgery Attending
Trauma Surgery Chief Resident
Anesthesiology Attending
Emergency Medicine Resident
ED Nurses
ED Technician
ED Paramedics
Ultrasound Technologist
Radiology Technologist
CT Scan Technologist
Respiratory Therapist
Blood bank cooler of uncross-matched blood
Operating Room Charge Nurse notified
Operating Room made available
Chaplain

Trauma Alert Red Criteria

One or more of the following:
Any intubated trauma patient
Respiratory Rate <10 or > 30
GCS < 12
Penetrating head trauma
Stab wounds to neck, chest, back, abdomen or pelvis
> 15% BSA with 2nd or 3rd degree burns and multiple trauma
Spinal Cord Injury – Suspected or known
Pregnant trauma patient > 24 weeks
Age > 65 with significant chest, abdomen, pelvic or extremity injuries
2 or more proximal extremity fractures, open fractures and/or pelvic fractures
Amputation above ankle or wrist
Emergency Medicine Attending discretion

Potential Criteria:
Age > 55 with significant mechanism of injury
Falls > 20 feet
Rollover MVC
Ejection of patient
Extrication > 20 minutes
Motorcycle crash speed > 20 mph & separation of rider
Motor vehicle crash speed > 40 mph
Same vehicle occupant fatality
Pedestrian struck by motor vehicle
Intrusion into vehicle > 12 inches
Blast injury
Multiple system trauma involving
more than 1 surgical specialty

Response/Resources activated:
Emergency Medicine Attending
Trauma Surgery Chief Resident
Emergency Medicine Resident
OB Chief Resident *if applicable
ED Nurses
ED Technicians
ED Paramedics
Radiology Technologist
Ultrasound Technologist
Respiratory Therapist
CT Scan Technologist
Blood Bank cooler of uncross-matched blood
Chaplain

Appendix B
Team Training

Author	Type of study	Purpose	Outcomes measured	Tool Used	Findings
Capella et al. (2010)	Pre/post test	Does formal team training improve team behaviors in trauma resuscitation and doe improved teamwork lead to more efficiency and /or improved clinical outcomes	Leadership, situation monitoring, mutual support, communication, time to: ct scan, endotracheal intubation, OR	TTPOT	Time from arrival to CT scan, oett, and OR were decreased. No change in LOS-ICU or hospital, complication rate or mortality rate
Edwards, Seggie, and Murphy (2012)	Post test/observation	To redesign the composition and practice of the hospitals trauma team.-to identify roles/responsibilities	Satisfaction with training course	N/A	Agree to strongly agree responses to questionnaire concerning satisfaction with team training
Laird-Fick et al. (2010)	Pre/post test	To train medical residents and nurses to work together as a patient centered team and test its feasibility, nurses learning and patient outcomes	Patient satisfaction, learning by nurses of patient centered interview, team performance	N/A	Significant improvement for RN in knowledge for PCC and self-efficacy. No change for residents or RN on team performance. No significant change for patients
Mayer et al. (2011)	Implementation	Evaluate effectiveness/team performance improvement after implementation of TeamSTEPPS system	Evidence-based teamwork system	TeamSTEPPS program	Improved experience of team work, improvement in staff perceptions of team work and communication openness, rate of nosocomial infections was below upper control limit
Deering et al. (2011)	Implementation	Implementation and evaluation of team training (TeamSTEPPS) in Iraq	Evidence-based teamwork system	TeamSTEPPS	Improved patient safety, improved communication
Riley et al. (2011)	RCT	Evaluate effectiveness of TeamSTEPPS training on perinatal outcomes	Perinatal morbidity and mortality	One hospital was control group, TeamSTEPPS for one hospital One hospital used TeamSTEPPS and simulation training exercises	37% improvement with full intervention (SBT and didactic) in reduction of perinatal harm. No improvement on team training on culture of safety
Figueroa, Sepanski, Goldberg and Shah (2013)	Pre/post test	determine whether participation in SBteamT aids in improving teamwork,	Evaluation of skill, knowledge, and confidence, team training	N/A-perceptions of confidence and skill and communicatio	Course was useful, better prepared ($p<0.05$) to participate and to lead, significant change in confidence ($p<0.05$) and

		confidence, and communication during these events.		n and collaboration as team	skill, significant increase ($p<0.05$) in communication, use of debriefing, perception of mutual respect and sense of empowerment
Frengley et al. (2011)	Randomized crossover study. Pre/post	The effects of SBTT on performance of critical care unit team.	Evaluate effectiveness of simulation-based intervention on improving teamwork	Teamwork Behavioral Rater (TBR) tool-"good reliability"	Significant improvement in overall teamwork, leadership and team coordination ($p<.002$) and in verbalizing situational information ($p<.02$), clinical management ($p<.003$)
Maxson et al. (2011)	Pre/post test	To enhance nurse/md collaboration via SBteam training	Collaboration and satisfaction about care decisions	CSACD	Significant improvement in satisfaction scores for both physician and RN
Morey et al. (2002)	Pre/post test Quasi-experimental untreated control group design	Does formal team training reduce errors and improve performance in the ED	Team behavior, ED performance and attitudes and opinions	NASA Task Load Index, Staff attitude and opinion survey and patient satisfaction survey developed for this study	Significant improvement in quality of team behaviors ($p=.012$), error rate decreased 30.9 to 4.4 %, staff attitudes increase ($p=.047$) and staffs view of institutional support increased ($p=.040$)
Nielson et al. (2007)	Randomized controlled trial	Does teamwork training have an effect of adverse outcomes and process of care in labor and delivery	Effect of teamwork training on occurrence of adverse outcomes and process of care in Labor and delivery	N/A	No statistical difference between control and experimental group
Shapiro et al. (2004)	Single crossover prospective blinded and controlled observational study Pre/post	Does SB teamwork training for ED improve clinical team performance	Can SBT can improve clinical team performance	Team Dimensions Rating Form (validated in aviation studies and the MedTeams project	Lack of statistical significance, but face validity based on other industries. Positive impact on teamwork behavior
Siassako et al. (2010)	Randomized controlled trial	To determine whether team performance in a simulated emergency is related to generic teamwork skills and behaviors.	Whether team performance in a simulated emergency is related to teamwork skills and behaviors	Obstetrical emergencies	Significant Positive correlation between clinical efficiency and teamwork scores

Strasser et al. (2008)	RCT	To test whether a team training intervention in stroke rehabilitation is associated with improved patient outcomes.	Can team training improve patient outcomes (functional improvement in stroke victims, discharge and LOS)	Stroke victims	Statistically significant improvement in motor function (increase of 4.4% in intervention group, decrease of 9/2% in control group). No measurable effect on LOS or discharge destination
Undre et al. (2007)	Pre/post test	To develop a team training module for OR crisis management and to evaluate feasibility and value of such training, and to explore potential differences in non-technical skills in different professions.	Develop a team-training module for crisis mgt in surgical teams, to evaluate feasibility and value of such training, to explore potential differences in non-technical skills of operating room teams.	OSATS (objective structured assessment of surgical skills) ICATS-N (imperial college assessment of technical skills for nurses NOTECHS (non technical skills) PETQ (participant evaluation of training questionnaire)	Simulated operating room setting represents a useful training environment. Using crisis simulations is feasible and participants across professions found the simulations helpful. Moderate levels of performance in teamwork skills overall
Wallin, Meurling, Hedman, Hedegard, and Fellander-Tsai (2007)	Pre/post test	Effects of team training on behavior and attitude of medical emergency team training	Effects of SBT on behavior and attitude	Video recordings Instrument developed by Gaba and colleagues at Stanford for crisis management behaviors. OTRMS (operating team resource management survey	Simulation perceived as very realistic, recommended the course to peers, behavioral components were rated significantly higher , inter-rater reliability for communication 0.7 and recognition of limitations 0.78
Wheelan, Burchill, and Tilin (2003)	Post test	Link between teamwork and patients outcomes in ICU's	Examine relationship between level of self identified teamwork in ICU and patients outcomes	Group development questionnaire Apache	A link was found between teamwork and patients outcomes in ICU
Colacchio, Johnson, Zigmont, Kappus, and Sudikoff (2012)	Pre/Post test	Implement and evaluate teamwork training using simulation in situ (not in training center) in neonatal ICU	Teamwork attitudes regarding team structure, leadership, situation monitoring, mutual support, communication	Teamwork Attitudes Questionnaire (TAQ) TeamSTEPPS	Caregivers views group-level team skills and effective communication as being very important. Training was helpful and informative and would apply skills into daily practice

DeVita, Schaefer, Lutz, Wang, and Dongilli (2005)	Post test/observation	Use SBT to develop multidisciplinary team skills and improve medical emergency team performance. Evaluate teams responding to emergencies using specified roles and goals in emergency medicine	Successful crisis management resulting in mannequin "survival", secondary outcomes were completion of organizational and patient care tasks. Crisis mgt goals: manage airway, targeting the definitive therapy of each scenarios, working within time constraints	Authors grouped in 3 categories developed 29 tasks: assessment and treatment, organizing response, communication. Task completion reviewed on video by authors	Use SBT to develop multidisciplinary team skills and improve medical emergency team performance. Evaluate teams responding to emergencies using specified roles and goals in emergency medicine
Fouilloux, Bsell, Lebel, Keritmann, and Berdah (2013)	Pre/Post test/observation	To assess training tools based on team performance in the extracorporeal circulation training institute- and experimental operating room using live animal models (pigs).	teamwork , time of resolution of events, (minor and major)	Satisfaction survey developed for study	Time was halved in minor events (venous air lock)-66-75 seconds, pre, 33-31 post. Assessment scores improved (4, 6 to 10, 10). For major events (air embolism, (3,5 to 9,8) Satisfaction noted with program, relevant and should be available to all cardiac teams
Siassakos et al. (2009)	Retrospective cohort observational study	Determine whether multi professional simulation training was associated with improvements in management of cord prolapse	Diagnosis-delivery interval, (DDI) proportion of c-sections, type of anesthesia, rate of low apgar scores, rate of admission to NICU	Review of hospital notes and software system entries	Reduction in median DDI from 25 to 14.5 minutes Increase in proportion of C sections with action ($p=0.003$.

Appendix C
Simulation Training

Author	Type of Study	Purpose	Outcomes measured	Tool Used	Findings
Roh, Lee, Chung, and Park, (2011)	Pre/post test comparison study	Evaluate efficacy of simulation-based resuscitation training	Baseline ACLS knowledge, self-efficacy, satisfaction	N/A	Significant increase in satisfaction for usefulness, setting priorities and implementing protocols.
Wehbe-Janek et al. (2011)	Post test	Evaluate nurses perspectives of simulation training for rapid response and code blue events	Perception of what is most valuable experience of training, satisfaction with training,	N/A	Increased knowledge, skills, awareness and preparedness following SBT
Gordon and Buckley (2009)	Pre/post test	Evaluation of effect of Simulation training on medical-surgical nurses perceived ability to respond to clinical emergencies	Confidence in ability to respond to emergencies, and in technical and non technical skills	Developed for study, never replicated or use prior	Increased confidence in ability to recognize unstable patient and identify priorities. Increased confidence in ability to initiate interventions. Increased confidence in being team leader, sharing information, voicing concerns and using resources
Smith and Roehrs (2009)	Pre/post test	To determine what factors correlate with nursing satisfaction and self confidence with simulation training	Factors correlated with student satisfaction and self confidence with HFS	Student satisfaction and self-confidence in learning scale and the simulation design scale	Satisfaction with SBT as training method, confidence in ability, positive feelings about the SBT. Variation in outcomes explained by design characteristics, notably objectives and problem solving.
Bambini, Washburn, and Perkins (2009)	pre/post test	Evaluate simulated clinical experiences as a learning method to increase self efficacy	Confidence self-efficacy of obstetrics students. Critical thinking	Developed by authors, quantitative and qualitative questionnaire on confidence, self efficacy and skill acquisition	Increase in overall self-efficacy, increase in confidence in assessment skills and in providing patient education

Brown and Chronister (2009)	Pre/post test Use of control group	Effect of simulation learning on critical thinking and self-confidence	Effects of simulation activities on critical thinking and self confidence in ECG course	Elsevier's computerized Evolve Electrocardiogram custom exam. Self-confidence evaluated with tool developed by the authors-has content but not construct validity. Cronbach's alpha of .899	Critical thinking and self confidence improved post SBT
Reznek et al. (2003)	Post test	To determine perceptions of simulation based crisis management course for emergency medicine	Perceptions of simulation-based crisis management course for emergency medicine	Developed by authors-satisfaction, self-efficacy, benefits	Simulation is enjoyable, helpful knowledge gain, simulation prompted realistic responses and scenarios believable.
Stamper, Jones, and Thompson (2008)	Post test	Level of satisfaction with simulation based training	Satisfaction with simulation and most and least helpful components of simulation	Developed by authors-satisfaction with simulation	Satisfaction with simulation, excellent (63%) and good (30%) experience. Realism and ability to practice procedures helpful. Majority of respondents thought simulation enhanced overall learning
Vyas, McCulloh, Dyer, Gregory, and Higbee (2011)	Pre/post test	Assess effectiveness of human patient simulation to teach patient safety, team-building skills and the value of inter-professional collaboration to pharmacy students	Identification of team members roles, communication, skills and knowledge	KSA (knowledge, skills attitudes) survey instrument developed by Madigosky and colleagues. Survey tool developed for this study on communication	Improvement in responses on questions about inter-professional communication and teamwork. Students felt strongly that simulation should be included in course. 90% agreed or strongly agreed that simulation had increased understanding of communication, roles and response to safety

Appendix D

Statement of Mutual Agreement for Capstone Project

The purpose of a Statement of Mutual Agreement is to describe the agreement between a designated clinical agency and the DNP student regarding the student's Capstone Project.

I. General Information

Student Name: Yvonne Rice_____

Project Title: Evaluation of a Team Simulation Training Program

Agency: University of Kentucky_____

Agency Contact: Lisa Fryman_____

II. Brief description of the project

- Evidence-based intervention
- Expected project outcomes (products, documents, etc.)
- On-site Activities (DNP student role, required meetings, access to agency records, non-disclosure expectations)
- Products resulting from DNP Capstone Project with potential market value.
  Any products produced from collaboration with the agency must be discussed with the student, Capstone Advisor, and appropriate agency representative. The ownership of intellectual property rights must be determined prior to the implementation of the project.

The purpose of the capstone project is to implement a simulation-based team-training (SBTT) component as part of a comprehensive trauma nurse-training program. The intervention, team training, is based on the TeamSTEPPS^{TM} core components of leadership, communication, situation monitoring, and mutual support. Expected outcomes are improved nursing satisfaction with roles during a trauma admission, increased confidence in ability to manage a newly admitted critically ill and injured trauma victim and improved team performance when managing

a newly admitted trauma victim. On site activities will include participation in the Trauma Boot Camp on November 5, 2014.

Student Name: Yvonne Rice_____

Project Title: Evaluation of a Team Simulation Training Program____

III. Agreement of written and oral communication

- Reference to clinical agency in student's academic work, publications, and presentations
- Restrictions on discussion of any project or agency details
- Formal agency approval needed for any publicly shared findings

- **IV. Required Signatures:**

_____ _____

Student Date

_____ _____

Capstone Advisor Date

_____ _____

Agency Representative Date

Appendix E

Trauma Boot Camp Simulation #2

Objectives:

1. Recognize importance of Team Management
2. Recognize pitfalls of Team Management
3. Troubleshoot etiologies of patient decline

Time: 15-20 minutes

Location: TSICU patient room vs. Smart Room

Observers: Cynthia Talley, MD, Lisa Fryman, RN, Yvonne Rice, APRN

Case:

ED Nurse Calls Report: 19yo M fall from 15 feet, intubated for head trauma in the field, open L ankle fx waiting on CT reads. Normotensive

Arrival ICU Vitals: HR 80, BP 100/70, sat 90%, ventilated, temp 96.8 (Display vitals only after requested by staff.)

Recommended Tasks (any order):

1. Check IV sites for patency, adequacy:
    a. Find: L SC CVL from ER
    b. Action: Ask MDs for Aline
2. RT connects to the ventilator & checks ETT for position
    a. Find: 7.5 ETT 29 cm at the lip
    b. Action: place on vent
3. Physical exam
    a. Find: R pupil fixed/dilated, L 4mm, sluggish, posturing (GCS 5T)
    b. Find: Head abrasions/lac, open L ankle fx with nl pulse
    c. Action: Doppler ankle, find DP signal.
4. Connect to ICU monitors
    a. Find: VS above
    b. Action: Recognize head trauma and hypoxia.

Confederate: Trauma Intensivist: asks for Aline equipment, places, then leaves

Vitals (slow change over 3 minutes from arrival): HR 80, BP 100/70, sat 80%

Recommended Tasks:

1. Call RT to eval ventilator mode
2. Consider Ambu Bagging
3. Listen to Breath Sounds:
    a. Find: Decreased BS on the Left
    b. Action: withdraw ETT until Bilateral BS (24cm at lip)

Vitals (after bagging & adjusting ETT): HR 80, BP 100/70, Sat 98%

Confederate: Ortho: "Where's the splint cart? We need to reduce this ankle fx."

ENT: "We need to suture his scalp lac."

Vitals (after 3 min): HR 110, BP 80/50, sat 88%, PIP on vent: 45

Recommended Tasks:

1. Perform Physical Exam:
    a. Find: Abdomen distended & Firm and Foley clamped
    b. Action: concern for Abdominal Compartment Syndrome
    c. Action: unclamp Foley catheter
    d. Action: consider obtaining a bladder pressure (30mmHg)
2. Check Labs
    a. Find: INR 1.6, plt 74, Hct 26
    b. Action: Consider transfusion of FFP

Vitals (after : HR 45, BP 115/60, sats 95%

Recommended Tasks:

1. Reassess Physical Exam:
    a. Find: Abdomen less distended and Both pupils fixed/dilated
    b. Action: Recognize concern for brain herniation and notify neurosurgery immediately.

Confederate: Neuro: "I need to do a physical exam. You guys haven't given him anything have you? We need mannitol and I need to place a ventriculostomy."

Debrief Thoughts:

1. Troubleshooting
2. Anticipating
3. Chaos Management
4. Formal Roles

Patient Moulage:

- Intubated with 7.5 ETT 29cm at the lips
- L Subclavian CVL
- R pupil fixed/dilated, L pupil 4mm sluggish
- Scalp Laceration
- L ankle fx: in splint, wrapped with kerlix/ACE
- Decreased Breath Sounds on Left until ETT adjusted
- Foley catheter clamped under the splint

Equipment: (to be obtained by the nursing staff during the simulation)

- IV tubing
- Flushes
- Ambu Bag w/ Oxygen
- Bare Hugger
- SCDs
- Aline Equipment with PPE
- IVF (NS)
- Doppler
- Bladder Pressure monitor

Confederates:

- Ortho Resident
- ENT Resident
- Trauma Intensivist
- Neuro Resident

Appendix F
Inter-professional Trauma Resuscitation Team

RN #1: Primary RN
- Ensures trauma room is set-up prior to patient arrival
- Hook patient up to monitor
- Initial and pre assessment/monitoring vital signs
- Takes report from physicians
- Places orders in computer
- Reports lab values to team
- Delegates tasks to others

RN #2: Resuscitation RN
- Assessing access and obtaining new IV if needed
- Hooking up/running level 1 utilizing MTP
- Chart on resuscitation document
- Draws labs
- Assists with procedures if not running level 1

Nursing Care Technician
- Set-up of trauma resuscitation room prior to patient arrival
- Retrieves Splint and Trauma Carts
- Obtains blood from blood bank as needed
- Sends lab specimens
- Assist with CPR as needed

Trauma Attending/Fellow
- Provides guidance to trauma team
- Performs and/or assists with procedures

Unit PCA
- Registers patient
- Locates family
- Provide unit information/visitation

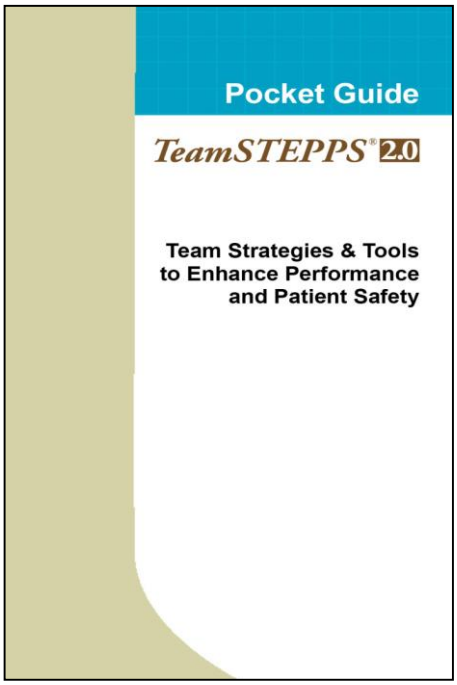
Respiratory Therapists
- Sets up ventilator prior to patient arrival
- Assists with airway control
- Obtains ECG/ABG as ordered

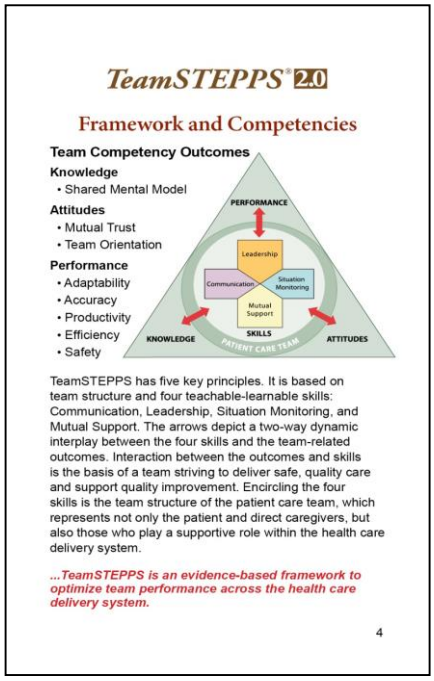
RN #3: Circulating RN
- Placing orders in computer
- Drawing labs
- Reporting lab values
- Charting
- Assisting with Procedures
- Delegating tasks/need for supplies to NCT

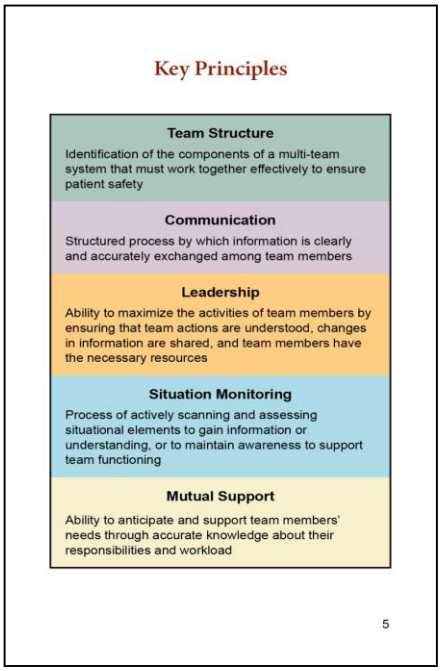
Charge RN
- Ensures unit readiness prior to patient arrival
- Ensures all CT scans/Extremity films are complete or ordered
- Ensures Consult orders are complete
- Assists as needed
- Covers for RN #2 patients until resuscitation is complete

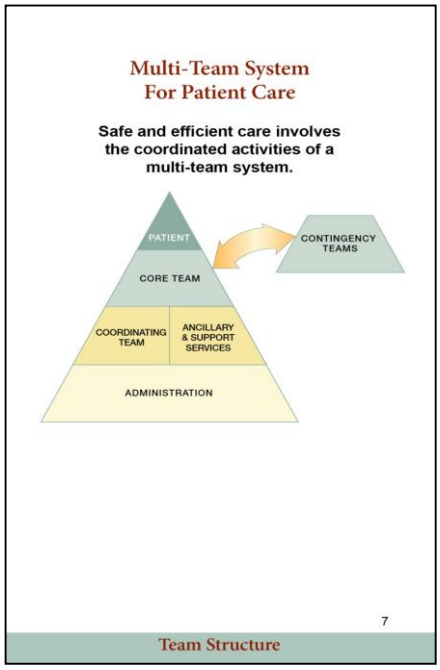
Appendix G

TeamSTEPPS™ Training PowerPoint









SBAR

A technique for communicating critical information that requires immediate attention and action concerning a patient's condition

Situation – What is going on with the patient?

"I am calling about Mrs. Joseph in room 251. Chief complaint is shortness of breath of new onset."

Background – What is the clinical background or context?

"Patient is a 62-year-old female post-op day one from abdominal surgery. No prior history of cardiac or lung disease."

Assessment – What do I think the problem is?

"Breath sounds are decreased on the right side with acknowledgment of pain. Would like to rule out pneumothorax."

Recommendation and Request – What would I do to correct it?

"I feel strongly the patient should be assessed now. Can you come to room 251 now?"

9

Communication

Communication

Call-Out

Strategy used to communicate important or critical information

- Informs all team members simultaneously during emergent situations
- Helps team members anticipate next steps
- Important to direct responsibility to a specific individual responsible for carrying out the task

Example during an incoming trauma:

Leader: "Airway status?"

Resident: "Airway clear"

Leader: "Breath sounds?"

Resident: "Breath sounds decreased on right"

Leader: "Blood pressure?"

Nurse: "BP is 96/62"

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Handoff

Strategy designed to enhance information exchange during transitions in care

"I PASS THE BATON"

I	Introduction	Introduce yourself and your role/job (include patient)
P	Patient	Name, identifiers, age, sex, location
A	Assessment	Present chief complaint, vital signs, symptoms, and diagnoses
S	Situation	Current status/circumstances, including code status, level of (un)certainty, recent changes, and response to treatment
S	Safety Concerns	Critical lab values/reports, socioeconomic factors, allergies, and alerts (falls, isolation, etc.)
THE		
B	Background	Comorbidities, previous episodes, current medications, and family history
A	Actions	Explain what actions were taken or are required. Provide rationale.
T	Timing	Level of urgency and explicit timing and prioritization of actions
O	Ownership	Identify who is responsible (person/team), including patient/family members
N	Next	What will happen next? Anticipated changes? What is the plan? Are there contingency plans?

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Communication

Check-Back

Using closed-loop communication to ensure that information conveyed by the sender is understood by the receiver as intended

The steps include the following:

1. Sender initiates the message
2. Receiver accepts the message and provides feedback
3. Sender double-checks to ensure that the message was received

Example:

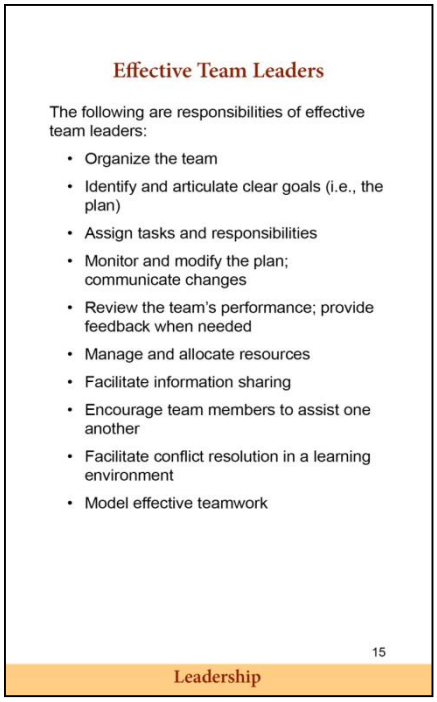
Doctor: *"Give 25 mg Benadryl IV push"*

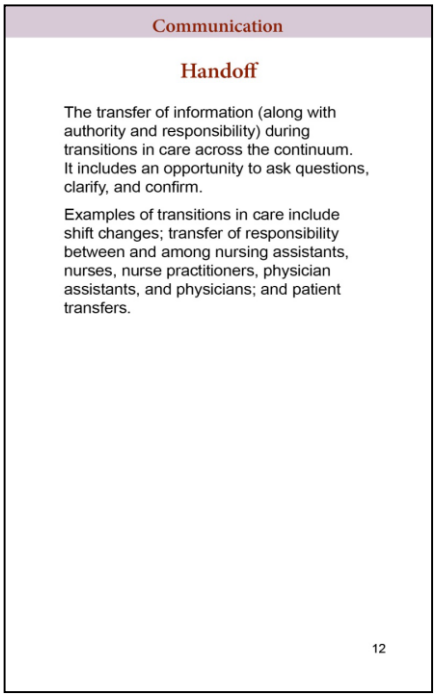
Nurse: *"25 mg Benadryl IV push"*

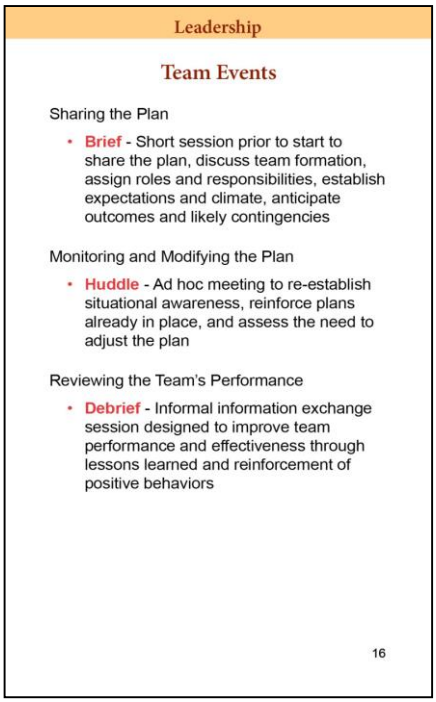
Doctor: *"That's correct"*

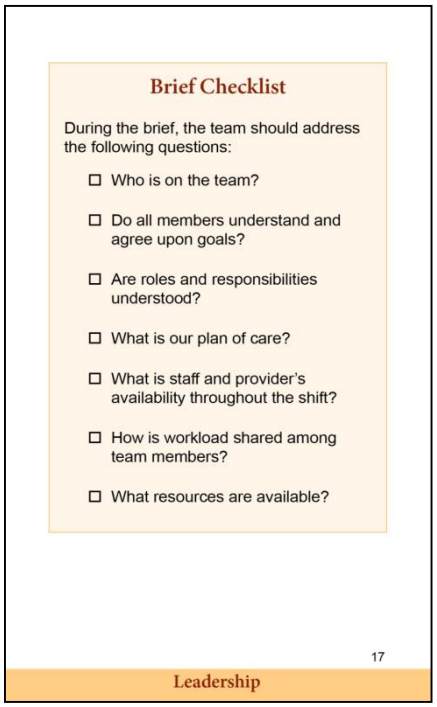
11

Communication


Effective Team Leaders
The following are responsibilities of effective team leaders:
• Organize the team
• Identify and articulate clear goals (i.e., the plan)
• Assign tasks and responsibilities
• Monitor and modify the plan; communicate changes
• Review the team's performance; provide feedback when needed
• Manage and allocate resources
• Facilitate information sharing
• Encourage team members to assist one another
• Facilitate conflict resolution in a learning environment
• Model effective teamwork
15
Leadership


Communication
Handoff
The transfer of information (along with authority and responsibility) during transitions in care across the continuum. It includes an opportunity to ask questions, clarify, and confirm.
Examples of transitions in care include shift changes; transfer of responsibility between and among nursing assistants, nurses, nurse practitioners, physician assistants, and physicians; and patient transfers.
12


Leadership
Team Events
Sharing the Plan
Brief - Short session prior to start to share the plan, discuss team formation, assign roles and responsibilities, establish expectations and climate, anticipate outcomes and likely contingencies
Monitoring and Modifying the Plan
Huddle - Ad hoc meeting to re-establish situational awareness, reinforce plans already in place, and assess the need to adjust the plan
Reviewing the Team's Performance
Debrief - Informal information exchange session designed to improve team performance and effectiveness through lessons learned and reinforcement of positive behaviors
16


Brief Checklist
During the brief, the team should address the following questions:
Who is on the team?
Do all members understand and agree upon goals?
Are roles and responsibilities understood?
What is our plan of care?
What is staff and provider's availability throughout the shift?
How is workload shared among team members?
What resources are available?
17
Leadership

Leadership

Debrief Checklist

The team should address the following questions during a debrief:

- ☐ Was communication clear?
- ☐ Were roles and responsibilities understood?
- ☐ Was situation awareness maintained?
- ☐ Was workload distribution equitable?
- ☐ Was task assistance requested or offered?
- ☐ Were errors made or avoided?
- ☐ Were resources available?
- ☐ What went well?
- ☐ What should improve?

18

Situation Monitoring

Situation Monitoring Process

Situation monitoring is the process of continually scanning and assessing a situation to gain and maintain an understanding of what's going on around you.

Situation awareness is the state of "knowing what's going on around you."

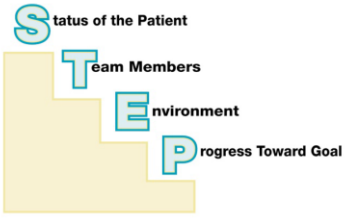
A **shared mental model** results from each team member maintaining situation awareness and ensures that all team members are "on the same page."

20

STEP

A tool for monitoring situations in the delivery of health care

Components of Situation Monitoring:



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Situation Monitoring

Situation Monitoring

STEP

Tool to help assess health care situations

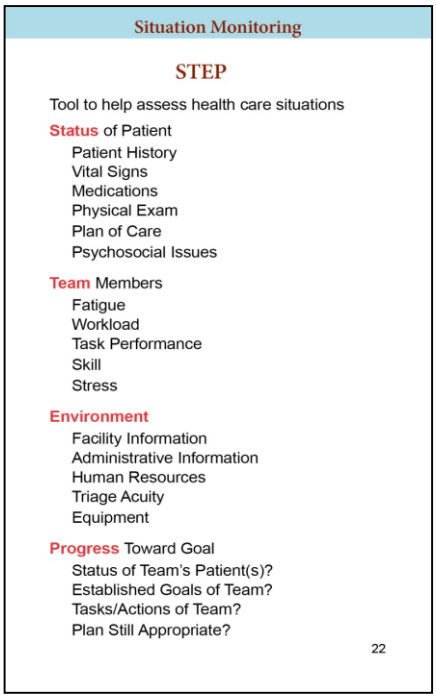
Status of Patient
- Patient History
- Vital Signs
- Medications
- Physical Exam
- Plan of Care
- Psychosocial Issues

Team Members
- Fatigue
- Workload
- Task Performance
- Skill
- Stress

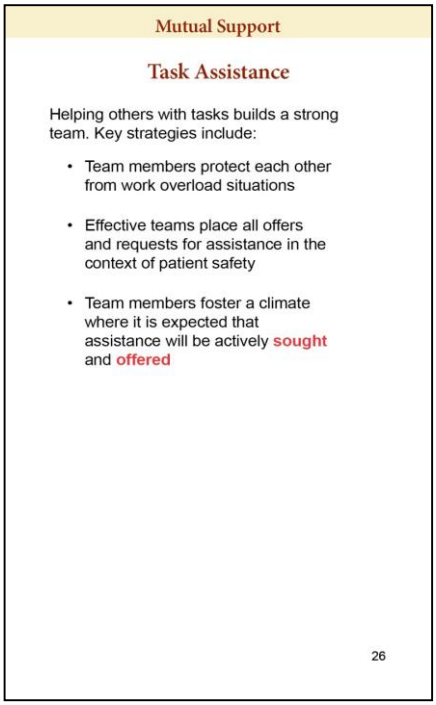
Environment
- Facility Information
- Administrative Information
- Human Resources
- Triage Acuity
- Equipment

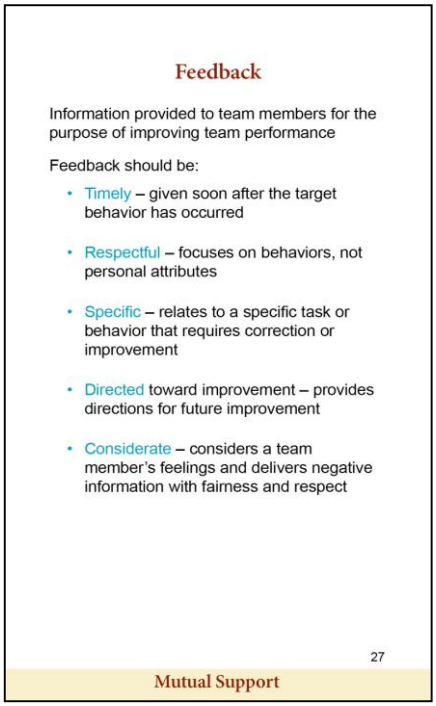
Progress Toward Goal
- Status of Team's Patient(s)?
- Established Goals of Team?
- Tasks/Actions of Team?
- Plan Still Appropriate?

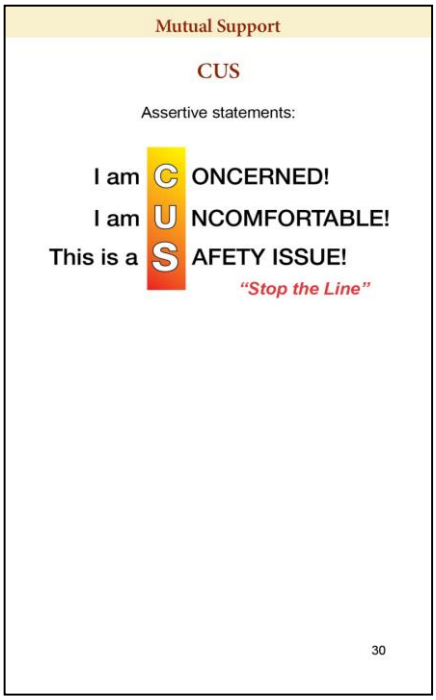
22

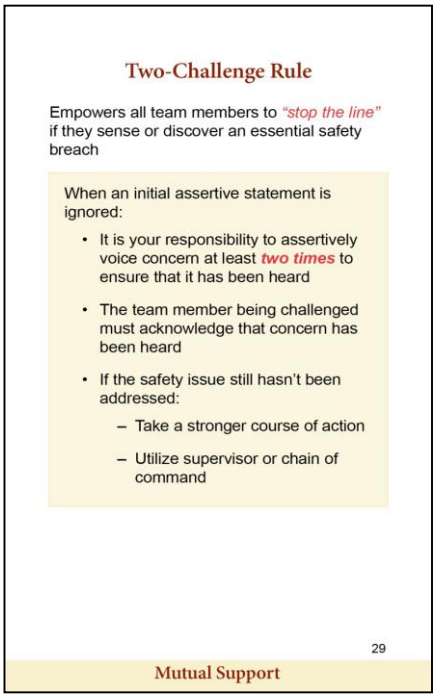

Situation Monitoring
STEP
Tool to help assess health care situations
Status of Patient
Patient History
Vital Signs
Medications
Physical Exam
Plan of Care
Psychosocial Issues
Team Members
Fatigue
Workload
Task Performance
Skill
Stress
Environment
Facility Information
Administrative Information
Human Resources
Triage Acuity
Equipment
Progress Toward Goal
Status of Team's Patient(s)?
Established Goals of Team?
Tasks/Actions of Team?
Plan Still Appropriate?
22

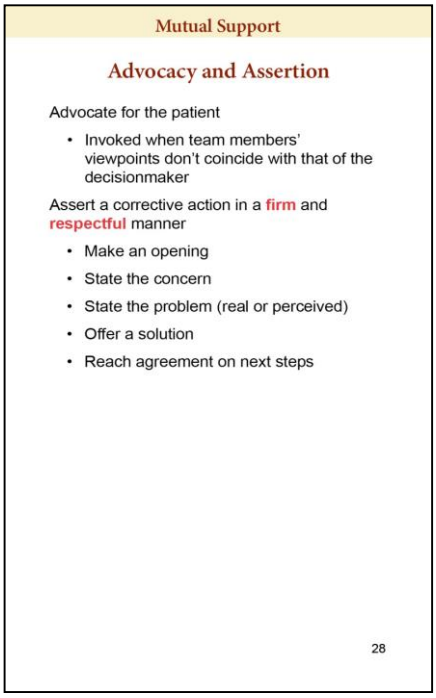

Situation Monitoring
Each team member is responsible for assessing his or her own safety status
I'M SAFE Checklist
I = Illness
M = Medication
S = Stress
A = Alcohol and Drugs
F = Fatigue
E = Eating and Elimination
24

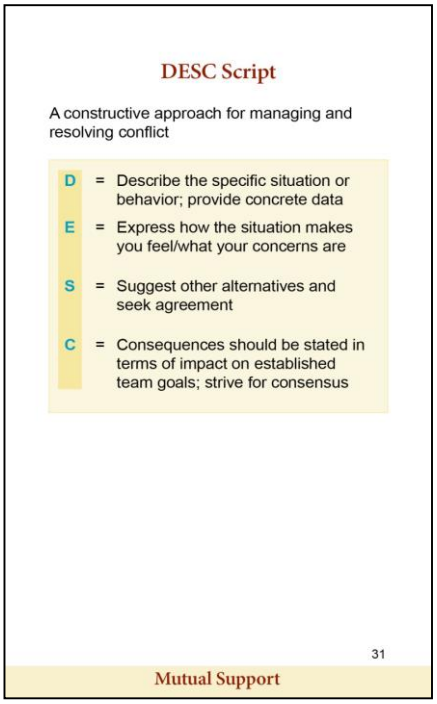

Mutual Support
Task Assistance
Helping others with tasks builds a strong team. Key strategies include:
Team members protect each other from work overload situations
Effective teams place all offers and requests for assistance in the context of patient safety
Team members foster a climate where it is expected that assistance will be actively sought and offered
26

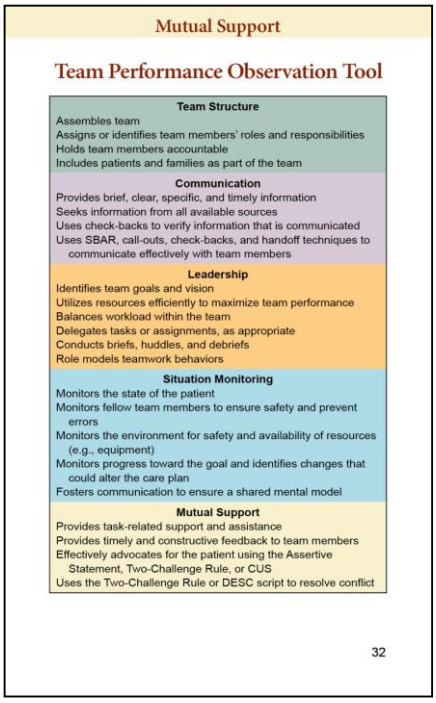

Feedback
Information provided to team members for the purpose of improving team performance
Feedback should be:
Timely – given soon after the target behavior has occurred
Respectful – focuses on behaviors, not personal attributes
Specific – relates to a specific task or behavior that requires correction or improvement
Directed toward improvement – provides directions for future improvement
Considerate – considers a team member's feelings and delivers negative information with fairness and respect
27
Mutual Support

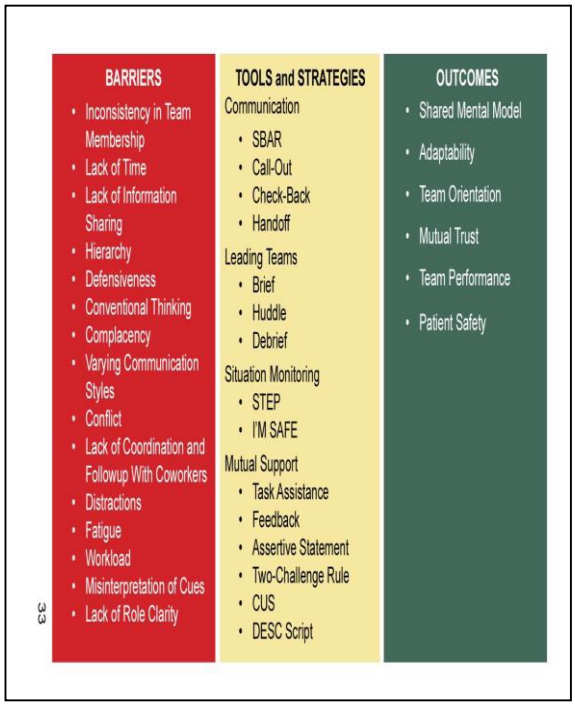

Mutual Support
CUS
Assertive statements:
I am C ONCERNED!
I am U NCOMFORTABLE!
This is a S AFETY ISSUE!
"Stop the Line"
30


Two-Challenge Rule
Empowers all team members to "stop the line" if they sense or discover an essential safety breach
When an initial assertive statement is ignored:
• It is your responsibility to assertively voice concern at least two times to ensure that it has been heard
• The team member being challenged must acknowledge that concern has been heard
• If the safety issue still hasn't been addressed:
– Take a stronger course of action
– Utilize supervisor or chain of command
29
Mutual Support


Mutual Support
Advocacy and Assertion
Advocate for the patient
• Invoked when team members' viewpoints don't coincide with that of the decisionmaker
Assert a corrective action in a firm and respectful manner
• Make an opening
• State the concern
• State the problem (real or perceived)
• Offer a solution
• Reach agreement on next steps
28


DESC Script
A constructive approach for managing and resolving conflict
D = Describe the specific situation or behavior; provide concrete data
E = Express how the situation makes you feel/what your concerns are
S = Suggest other alternatives and seek agreement
C = Consequences should be stated in terms of impact on established team goals; strive for consensus
31
Mutual Support


Mutual Support
Team Performance Observation Tool
Team Structure
Assembles team
Assigns or identifies team members' roles and responsibilities
Holds team members accountable
Includes patients and families as part of the team
Communication
Provides brief, clear, specific, and timely information
Seeks information from all available sources
Uses check-backs to verify information that is communicated
Uses SBAR, call-outs, check-backs, and handoff techniques to communicate effectively with team members
Leadership
Identifies team goals and vision
Utilizes resources efficiently to maximize team performance
Balances workload within the team
Delegates tasks or assignments, as appropriate
Conducts briefs, huddles, and debriefs
Role models teamwork behaviors
Situation Monitoring
Monitors the state of the patient
Monitors fellow team members to ensure safety and prevent errors
Monitors the environment for safety and availability of resources (e.g., equipment)
Monitors progress toward the goal and identifies changes that could alter the care plan
Fosters communication to ensure a shared mental model
Mutual Support
Provides task-related support and assistance
Provides timely and constructive feedback to team members
Effectively advocates for the patient using the Assertive Statement, Two-Challenge Rule, or CUS
Uses the Two-Challenge Rule or DESC script to resolve conflict
32


BARRIERS
Inconsistency in Team Membership
Lack of Time
Lack of Information Sharing
Hierarchy
Defensiveness
Conventional Thinking
Complacency
Varying Communication Styles
Conflict
Lack of Coordination and Followup With Coworkers
Distractions
Fatigue
Workload
Misinterpretation of Cues
Lack of Role Clarity
TOOLS and STRATEGIES
Communication
SBAR
Call-Out
Check-Back
Handoff
Leading Teams
Brief
Huddle
Debrief
Situation Monitoring
STEP
I'M SAFE
Mutual Support
Task Assistance
Feedback
Assertive Statement
Two-Challenge Rule
CUS
DESC Script
OUTCOMES
Shared Mental Model
Adaptability
Team Orientation
Mutual Trust
Team Performance
Patient Safety
33

Appendix H

Demographic Data

Study ID_____

Age:_____

Highest Level of Education:

_____ADN

_____BSN

_____MSN

_____Doctoral Degree

How long have you held a license as an RN?

_____Years

How long have you been an ICU nurse:

_____Years

How long have you been working in the Trauma Surgical ICU:

_____Years

Appendix I

T-TAQ

Study ID_____

TeamSTEPPS Teamwork Attitudes Questionnaire (T-TAQ)

Instructions: Please respond to the questions below by placing a check mark (√) in the box that corresponds to your level of agreement from *Strongly Disagree* to *Strongly Agree*. Please select only one response for each question.

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Team Structure						
1.	It is important to ask patients and their families for feedback regarding patient care.					
2.	Patients are a critical component of the care team.					
3.	This facility's administration influences the success of direct care teams.					
4.	A team's mission is of greater value than the goals of individual team members.					
5.	Effective team members can anticipate the needs of other team members.					
6.	High performing teams in health care share common characteristics with high performing teams in other industries.					
Leadership						
7.	It is important for leaders to share information with team members.					
8.	Leaders should create informal opportunities for team members to share information.					
9.	Effective leaders view honest mistakes as meaningful learning opportunities.					
10.	It is a leader's responsibility to model appropriate team behavior.					
11.	It is important for leaders to take time to discuss with their team member's plans for each patient.					
12.	Team leaders should ensure that team members help each other out when necessary.					

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Situation Monitoring						
13.	Individuals can be taught how to scan the environment for important situational cues.					
14.	Monitoring patients provides an important contribution to effective team performance.					
15.	Even individuals who are not part of the direct care team should be encouraged to scan for and report changes in patient status.					
16.	It is important to monitor the emotional and physical status of other team members.					
17.	It is appropriate for one team member to offer assistance to another who may be too tired or stressed to perform a task.					
18.	Team members who monitor their emotional and physical status on the job are more effective.					
Mutual Support						
19.	To be effective, team members should understand the work of their fellow team members.					
20.	Asking for assistance from a team member is a sign that an individual does not know how to do his/her job effectively.					
21.	Providing assistance to team members is a sign that an individual does not have enough work to do.					
22.	Offering to help a fellow team member with his/her individual work tasks is an effective tool for improving team performance.					
23.	It is appropriate to continue to assert a patient safety concern until you are certain that it has been heard.					
24.	Personal conflicts between team members do not affect patient safety.					

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Communication						
25.	Teams that do not communicate effectively significantly increase their risk of committing errors.					
26.	Poor communication is the most common cause of reported errors.					
27.	Adverse events may be reduced by maintaining an information exchange with patients and their					
28.	I prefer to work with team members who ask questions about information I provide.					
29.	It is important to have a standardized method for sharing information when handing off patients.					
30.	It is nearly impossible to train individuals how to be better communicators.					

Please provide any additional comments in the space below.

Appendix J

T-TPQ

Study ID_____

TeamSTEPPS Teamwork Perceptions Questionnaire (T-TPQ)

Instructions: Please respond to the questions below by placing a check mark (√) in the box that corresponds to your level of agreement from *Strongly Agree* to *Strongly Disagree*. Please select only one response for each question.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Team Structure						
1.	The skills of staff overlap sufficiently so that work can be shared when necessary.					
2.	Staff are held accountable for their actions.					
3.	Staff within my unit share information that enables timely decision making by the direct patient care team.					
4.	My unit makes efficient use of resources (e.g., staff supplies, equipment, information).					
5.	Staff understand their roles and responsibilities.					
6.	My unit has clearly articulated goals.					
7.	My unit operates at a high level of efficiency.					
Leadership						
8.	My supervisor/manager considers staff input when making decisions about patient care.					
9.	My supervisor/manager provides opportunities to discuss the unit's performance after an event.					
10.	My supervisor/manager takes time to meet with staff to develop a plan for patient care.					
11.	My supervisor/manager ensures that adequate resources (e.g., staff, supplies, equipment, information) are available.					
12.	My supervisor/manager resolves conflicts successfully.					

13.	My supervisor/manager models appropriate team behavior.					
14.	My supervisor/manager ensures that staff are aware of any situations or changes that may affect patient care.					

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Situation Monitoring						
15.	Staff effectively anticipate each other's needs.					
16.	Staff monitor each other's performance.					
17.	Staff exchange relevant information as it becomes available.					
18.	Staff continuously scan the environment for important information.					
19.	Staff share information regarding potential complications (e.g., patient changes, bed availability).					
20.	Staff meets to reevaluate patient care goals when aspects of the situation have changed.					
21.	Staff correct each other's mistakes to ensure that procedures are followed properly.					
Mutual Support						
22.	Staff assist fellow staff during high workload.					
23.	Staff request assistance from fellow staff when they feel overwhelmed.					
24.	Staff caution each other about potentially dangerous situations.					
25.	Feedback between staff is delivered in a way that promotes positive interactions and future change.					
26.	Staff advocate for patients even when their opinion conflicts with that of a senior member of the unit.					
27.	When staff have a concern about patient safety, they challenge others until they are sure the concern has been heard.					
28.	Staff resolve their conflicts, even when the conflicts have become personal.					

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Communication						
29.	Information regarding patient care is explained to patients and their families in lay terms.					
30.	Staff relay relevant information in a timely manner.					
31.	When communicating with patients, staff allow enough time for questions.					
32.	Staff use common terminology when communicating with each other.					
33.	Staff verbally verify information that they receive from one another.					
34.	Staff follow a standardized method of sharing information when handing off patients.					
35.	Staff seek information from all available sources.					

Appendix K

Study ID_____

Student Satisfaction and Self-Confidence in Learning

Instructions: This questionnaire is a series of statements about your personal attitudes about the instruction you receive during your simulation activity. Each item represents a statement about your attitude toward your satisfaction with learning and self-confidence in obtaining the instruction you need. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your attitude as it really is, not what you would like for it to be. This is anonymous with the results being compiled as a group, not individually.

Mark:
1 = STRONGLY DISAGREE with the statement
2 = DISAGREE with the statement
3 = UNDECIDED - you neither agree or disagree with the statement
4 = AGREE with the statement
5 = STRONGLY AGREE with the statement

Satisfaction with Current Learning	**SD**	**D**	**UN**	**A**	**SA**
1. The teaching methods used in this simulation were helpful and effective.	○1	○2	○3	○4	○5
2. The simulation provided me with a variety of learning materials and activities to promote my learning the medical surgical curriculum.	○1	○2	○3	○4	○5
3. I enjoyed how my instructor taught the simulation.	○1	○2	○3	○4	○5
4. The teaching materials used in this simulation were motivating and helped me to learn.	○1	○2	○3	○4	○5
5. The way my instructor(s) taught the simulation was suitable to the way I learn.	○1	○2	○3	○4	○5
Self-confidence in Learning	**SD**	**D**	**UN**	**A**	**SA**
6. I am confident that I am mastering the content of the simulation activity that my instructors presented to me.	○1	○2	○3	○4	○5
7. I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum.	○1	○2	○3	○4	○5
8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting	○1	○2	○3	○4	○5
9. My instructors used helpful resources to teach the simulation.	○1	○2	○3	○4	○5
10. It is my responsibility as the student to learn what I need to know from this simulation activity.	○1	○2	○3	○4	○5
11. I know how to get help when I do not understand the concepts covered in the simulation.	1	2	3	4	5
12. I know how to use simulation activities to learn critical aspects of these skills.	1	2	3	4	5
13. It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time..	1	2	3	4	5

Appendix L

Study ID_____

Trauma Team Performance Observation Tool

1=very poor, 2=poor, 3=average, 4=good, 5=excellent, N/A= not applicable

1	2	3	4	5	6
Very poor Very poorly done Should have been performed but was not	Poor Poorly done Should have been performed more often	Average Acceptable performance Could have been performed more often/consistently but is acceptable as is	Good Good performance Performed most of the time	Excellent Perfect performance Performed at all times appropriately	Not Applicable Did not need to be done Was not performed and did not need to be

	Leadership – The Team Leader ….	**Rating**
1	Conducts a brief prior to patient arrival (e.g., identifies self, assigns members roles and responsibilities, discusses initial plan based on current information, anticipates interventions [e.g., chest tube, OR, etc.])	
2	Continually renders plan of care to the team	
3	Feedback provided to team members is constructive	
4	Ensures task prioritization (e.g., important tasks performed first, ABC's and survey sequence are being completed)	
5	Asks non-response team members to leave when they are distracting	
	Overall Rating	
	Situation Monitoring – Team Members ….	**Rating**
6	Prepare equipment before patient arrival (e.g., set up IV, ultrasound machine, suction)	
7	Work quickly and efficiently	
8	Conduct tasks in right order	
9	Are not distracted by major injuries	
10	Ensure that NEW team members perform expected role and responsibilities	
11	Adapt quickly and efficiently to deterioration of patient's condition (e.g., decreased O2 sats, decreased blood pressure, decreased mental status)	
	Overall Rating	
	Mutual Support – Team Members ….	**Rating**
12	Feedback provided to other team members is constructive.	
13	Assist when moving patient to next unit (e.g., CT scanner, OR, ICU)	
14	Provide assistance when needed/Complete other team members' tasks	
15	Identify/Call out when patient safety issue is suspected	
	Overall Rating	
	Communication – Team Members ….	**Rating**
16	Remain quiet while EMS team gives report	
17	Request additional information from EMS (e.g., medications given, vital signs, mechanism of injury)	
18	Use call-outs to share important patient information (i.e., Team leader "Airway status?" Airway doc responds "Airway clear!")	

19	Use check-backs to verify important information is exchanged (i.e., Doctor "Give 25 mg Benadryl IV." Nurse "25 mg Benadryl IV" to confirm. Doctor "That's correct")	
20	Use clear and concise language	
21	Request information from others when it's not readily shared	
	Overall Rating	
	Team Performance Rating – Overall, this team's performance was	

Appendix M

Agenda
Trauma Boot Camp Agenda
November 5, 2014 9:00-1:00

Consent
Didactic 8:00-9:00

Skills station 9:00-10:00 Stephanie Devore and TSICU staff volunteers

Break 10:00-10:15

Pre team training simulation 10:15-10:45 Dr. Talley and Darrin Burchell

Team training 10:45-11:45 Yvonne Rice

Break 11:45-12:00

Post team training simulation 12:00-12:30 Dr. Talley and Darrin Burchell

Debriefing 12:30-1:00 (lunch served)