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Implementation & Evaluation of an Interprofessional TeamSTEPPS Simulation Program

Abstract

Joint Commission 2015 sentinel event data identified communication as the third leading cause of all medical errors in the United States. The complex delivery of health care requires teamwork; however, members of the health care team are rarely trained together and often come from different educational and cultural backgrounds. To improve communication, an interprofessional high fidelity simulation-based program that uses the Agency for Healthcare Research and Quality TeamSTEPPS® 2.0 Framework and associated communication tools was implemented and evaluated in a medium sized acute care community hospital. This quantitative descriptive correlational study addresses two research questions: (1) how does the implementation of a TeamSTEPPS® Simulation Program impact the communication between members of the interprofessional team? (2) How does the implementation of a TeamSTEPPS® Simulation Program impact individual's attitudes, knowledge, and skills towards teamwork?

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Abstract

Joint Commission 2015 sentinel event data identified communication as the third leading cause of all medical errors in the United States. The complex delivery of health care requires teamwork; however, members of the health care team are rarely trained together and often come from different educational and cultural backgrounds. To improve communication, an interprofessional high fidelity simulation-based program that uses the Agency for Healthcare Research and Quality TeamSTEPPS® 2.0 Framework and associated communication tools was implemented and evaluated in a medium sized acute care community hospital. This quantitative descriptive correlational study addresses two research questions: (1) how does the implementation of a TeamSTEPPS® Simulation Program impact the communication between members of the interprofessional team? (2) How does the implementation of a TeamSTEPPS® Simulation Program impact individual's attitudes, knowledge, and skills towards teamwork?

Keywords: Interprofessional, TeamSTEPPS®, Simulation, Team Effectiveness, Communication.

Introduction

Between 210,000 and 440,000 patient deaths per year are related to medical errors in the United States (Joint Commission, 2015). Recent 2015 sentinel event data, released by the Joint Commission, identified communication as the third leading cause of all medical errors. The inpatient population served by healthcare professionals expect effective, high quality, and above all else, safe healthcare. Health care teams perform interdependent tasks while functioning in specific roles with the shared mental model of providing safe quality care. However, even though the delivery of care requires teamwork, members of the health care team are rarely trained together and often come from different educational and cultural backgrounds.

Background

The patient safety movement that began in the 1990's with the Institute of Medicine's, *To Err is Human: Building a Safer Health System* report, brought national attention to the 98,000 patient deaths per year due to medical errors (Kohn, Corrigan, & Donaldson, 1999). Multiple landmark reports have called for increased patient safety initiatives that include inter-professional training and education opportunities. Such reports include: *Crossing the Quality Chasm: A New Health System for the 21st Century* (IOM, 2001), *The Future of Nursing: Leading Change, Advancing Health* (IOM, 2010), *Framework for Action on Inter-Professional Education and Collaborative Practice* (WHO, 2010) and *Transforming Education to Strengthen Health Systems in an Interdependent World* (Frenk et al., 2010).

In direct response to the IOM report, the evidence-based Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) curriculum was developed by the Department of Defense (DoD) and the Agency for Healthcare Research and Quality (AHRQ). This framework is based upon 25 years of research in the fields of military, aviation, nuclear power, and business (TeamSTEPPS® Instructor Manual, 2014). The TeamSTEPPS® framework is comprised of three main constructs surrounding the healthcare team: knowledge, attitudes, and performance. Knowledge is specific to the cognition of how individuals think and the way they perceive situations. Attitudes are the feel and effect of an individual and the overall performance of these individuals working together as a team. To improve the overall team performance, the TeamSTEPPS® curriculum focuses on four teachable skills: communication, leadership, mutual support, and situation monitoring. Team structure refers to the composition of an individual team or a multi-team system (TeamSTEPPS® Instructor Manual, 2014). Team structure is an integral part of the teamwork process. A properly structured healthcare team is an enabler for and the

result of effective communication, leadership, situation monitoring, and mutual support. This framework was released to the public in 2006 as the national standard for team training in health care.

There is an extensive body of research surrounding teamwork and the effectiveness of team training on improving outcomes. A synthesis of the literature focusing on the impact of teamwork and inter-professional education on clinical outcomes yielded the conclusion that a lack of team coordination and training results in increased medical errors (AHRQ, 2006). Formal team training is effective for improving team behaviors, reducing errors, and improving staff attitudes towards teamwork (Morey et al., 2002; Theilen et al., 2013; Lisbon et al., 2016). Use of the TeamSTEPPS® tools in simulation-based training improves patient outcomes and teamwork (Capella et al., 2010; Riley et al., 2011; Harvey, Echols, Clark, & Lee, 2014). Overall, high performing teams that perform well hold shared mental models, have clear roles and responsibilities, strong leadership, engage in regular feedback, have a strong sense of collective trust and confidence, and manage and optimize performance outcomes (Baker, Day, & Salas, 2006).

Problem Identification

The 337-bed acute care community hospital where this study was conducted is part of a larger five hospital healthcare system in Western New York. The largest hospital (528 bed) within this healthcare system currently provides an inter-professional TeamSTEPPS® simulation program and has received positive feedback from participants over the last two years. The success from this program offered an opportunity to bring inter-professional education to other hospitals within the system. The hospital where this study took place did not offer any inter-professional

training opportunities. The current new hire orientation process at this facility consists of a corporate orientation that reviews institution-wide policies and a discipline specific orientation that utilizes the preceptorship model. While many ongoing educational opportunities are provided, none focus on team building or are intentionally interdisciplinary.

Theoretical Framework

Three main evidenced-based components were utilized during the development of this program: interprofessional education, simulation based education, and the AHRQ *TeamSTEPPS*® 2.0 curriculum. Interprofessional education is a practice development initiative, which aims to promote collaboration and enhance the quality of care by bringing different professions together (Palganas, Maxworthy, Epps & Mancini, 2015). Simulation is an educational strategy, in which, a set of conditions are created or replicated to resemble authentic situations that are possible in real life. Replication of real life scenarios is called fidelity. The higher the fidelity, the greater the increase in realism (INACSL Standards of Best Practice: SimulationSM Simulation Glossary, 2016). This program was designed to be high fidelity. Key components used to maintain high fidelity were the use of manikins that reacted appropriately based on the teams' interventions, standardized patients (real people) when appropriate, and scenario development confirmed by content experts. Simulation offers a safe learning environment that can incorporate one or more modalities to promote, improve, or validate a participant's performance, in this case the utilization of the *TeamSTEPPS*® communication tools.

In addition to the above frameworks, Jody Gittel's Relational Coordination Theory (2009) was utilized. This theory is widely recognized within the field of business, specifically with the Southwest Airline Company, and it is easily applicable and translated to the realm of healthcare.

The Relational Coordination Theory is based on two constructs: coordination and relational coordination (Gittell, 2009). Coordination is the management of interdependent tasks that are performed by members of the healthcare team. For example, during the cardiac arrest simulation scenario, the communication of roles and responsibilities of each team member are identified (medications, CPR, recorder, time keeper). Relational coordination is the management of the people performing those tasks and the coordination of work through relationships of shared goals, shared knowledge, and mutual respect. For example, the organizational culture and team focus on quality, safe care provided to patients. Per this framework, when individuals with common goals use frequent, timely, accurate and problem solving communication, the individuals will be a high functioning team. Patients and families depend on and expect their healthcare team to work together to meet their needs. Gittell's framework is relevant to this study because it focuses directly on relationships and communication and the impact those two constructs have on building high functioning teams in healthcare.

Purpose

The purpose of this quantitative descriptive correlational study was to improve communication between members of the health care team by providing an inter-professional, high fidelity simulation-based program. This training program was developed using the TeamSTEPPS® 2.0 Framework and provided participants with standardized communication tools to bridge their varying educational and cultural backgrounds. The TeamSTEPPS® curriculum focuses on four teachable, learnable skills: communication, leadership, situational monitoring, and mutual support. There were two main purposes to this study. The first was to provide communication tools to members of the health care team and secondly, to provide a simulation-based training

opportunity for members of the healthcare team to interact, collaborate, and learn from one another.

Methodology

Methodology/Research Design

This quantitative descriptive correlational study explores the impact of an interprofessional high-fidelity TeamSTEPPS® simulation program on the communication between members of the healthcare team and the impact on individual's attitudes, knowledge, and skills towards teamwork.

Setting of Study

The setting for this study involved two locations. The first, a 337-bed medium sized community hospital located in Western New York, and the second, a large private academic institution also located in Western New York with a state of the art Simulation Center.

Ethical Considerations

Before participants were recruited, approvals were obtained from the participating hospital and university's institutional review boards. The hospital also supplied letters of administrative support. This study did not involve collecting personal, identifiable information about participants. There was no potential for breach in confidentiality. The primary investigator did not request any directly identifiable information about the participants on their survey responses. All the information collected was stored in a secure manner and only study team members had access to it. No participant compensation was provided for this study. Participation in the program was voluntary as was participation in all data collection. Refusal to participate was not

shared with any senior leadership or those who had line authority over participants at either facility.

Sample Selection

Convenience sampling was used for this quantitative descriptive correlational study from both participating facilities. Participants from the academic setting included 4th semester pharmacy students, and advanced practice registered nurse (APRN) students, both nurse practitioners (NP) and clinical nurse specialists (CNS). Inclusion criteria for APRN students included matriculation in one of four identified graduate nursing classes. Recruitment for this group included emails to the professors teaching the included courses, and a voluntary sign-up sheet for students with the dates and times of the simulations. The purpose of the program was outlined in the emails to the professors and was passed on to the students. Participation in the program was strictly voluntary and was not reflected as part of their class grade.

Participants from the acute practice setting included first year medical residents in the international residency program offered at the hospital and both novice and experienced bedside registered nurses (RN). Inclusion criteria for this group: ongoing employment at the participating hospital (full-time, part-time or per-diem), participating RNs who provide direct patient care greater than 50% of the time, and medical residents in their first year beginning in the summer of 2016. Recruitment for the acute practice group consisted of formal presentations/meetings with senior nursing and medical leadership. Participation was deemed mandatory for all incoming first year medical residents by the Director of the Medical Residency Program but voluntary participation in completion of study questionnaires, and voluntary participation for any bedside RNs interested in the opportunity.

Data Collection

The program implemented and evaluated in this study was divided into two main sections: pre-simulation education and simulation. Pre-simulation education was entitled “TeamSTEPPS® Foundation Training” day. This foundational training was mandatory for all participants to continue in the study. At this training day participants signed in and received a welcome packet that included content for the day (agenda, PowerPoints etc.) and the prospective participant information sheet (student or employee). The primary investigator (PI) read the information sheet at the start of the training day prior to any activities and time was allotted for questions. Participants were divided into five interdisciplinary teams with each participant group represented, and were asked to sit with their assigned team for the day. Throughout the TeamSTEPPS® Foundation Training Day participants were educated using the TeamSTEPPS® 2.0 curriculum and completed multiple team building activities. This training day was four hours in length and all education was provided by two TeamSTEPPS® Master Trainers (the PI and second instructor). At the completion of the training day, each team was provided with the date, time, and location of their scheduled simulation.

The second section of the study was Simulation. All simulated scenarios were completed at the partnering academic institutions simulation center. The simulated scenarios were broken into three main categories with two scenarios in each category: acute care (pronouncing a patient death & sepsis recognition), critical care (cardiac arrest & respiratory failure) and ambulatory clinic (teach back & agenda setting). Participants were assigned a category based on the clinical setting they currently worked in or would work in upon graduation. For example, the NP students were assigned to the ambulatory clinic simulation because the NP program was a primary care NP program. Team participants were assigned based on category: acute care and

critical care (medical residents, CNS APRN students, bedside RNs, pharmacy students), ambulatory clinic (medical residents, nurse practitioner APRN students, pharmacy students).

At the start of each simulation day participants were given a short tour of the simulation lab, introduced to the team assisting with running the lab, and completed a reading of the simulation basic assumptions. Each simulated scenario ran for approximately 20-25 minutes with a 30-minute debriefing session. Participants were given a short break in between each scenario and an hour for lunch. During the simulated scenarios, participants were videotaped for the sole purpose of the debriefing session held at the end of each scenario. The video files were not used for any data collection and were deleted at the end of each scheduled day. All debriefing sessions were facilitated by trained simulation educators also experts in TeamSTEPPS® curriculum.

Instruments

The two measurement tools used for data collection were the TeamSTEPPS® Teamwork Attitudes Questionnaire (T-TAQ) and the TeamSTEPPS® Observation Tool (AHRQ, 2010). These tools are provided free of charge on the AHRQ website. Both instruments have been psychometrically tested for reliability and validity and are used extensively in research specific to teamwork.

The T-TAQ is a 30-item self-report tool where respondents rate their agreement with items on a 5-point Likert scale, which measures attitudes about teamwork skills and behaviors taught in TeamSTEPPS® training: team structure, leadership, mutual support, situation monitoring, and communication. The T-TAQ was given as a retrospective pre-and posttest survey at the completion of day one.

The TeamSTEPPS® Observation Tool is used for observing team performance and measuring training effectiveness. Day one of simulation required participants to complete four simulated scenarios total. The TeamSTEPPS® Observation Tool was utilized during the first simulation scenario of day one, and the last simulation scenario of day one. The TeamSTEPPS® Observation Tool was used to evaluate whether the participants were utilizing the communication tools during their simulations. This instrument was completed by the same two TeamSTEPPS® Master Trainers that led the education during the TeamSTEPPS® Foundation Training day.

In addition to the above instruments, this research generated data on participants' demographics including role, level of education, and number of years practicing as a licensed healthcare provider.

Data Analysis

Data were managed and analyzed by using SPSS software version 21 (IBM SPSS Inc). When appropriate, incomplete or missing data were discarded. To examine the pre-and post-data for both the T-TAQ survey and TeamSTEPPS® Observation Tool, Wilcoxon Signed Ranks Test was performed secondary to the sample size and distribution. Inter-rater reliability was determined for the TeamSTEPPS® Observation Tool utilizing a 2-tailed Pearson Correlation. Statistical significance level (α) of .05 or less was established a priori for each statistical test.

Results

Sample Characteristics

A total of 24 individuals participated in the simulation portion of the program: 15 medical residents, 6 bedside RNs, and 3 APRN students. More than half of the sample was comprised of first year medical residents (52%) who had varying cultural backgrounds. Sixty-five percent of participants had less than five years' experience as a licensed healthcare provider. Education levels ranged from associate prepared RN to doctor of medicine graduate. Twenty participants completed the retrospective T-TAQ survey for an 84% response rate.

TeamSTEPPS® Team Attitudes Questionnaire (T-TAQ)

The results of the Wilcoxon signed ranks test indicated that the 20 participants who took part in the program significantly increased their median attitude levels on all five subscales from pre-to posttest with a statistical significance level of .05.

TeamSTEPPS® Observation Tool

One of the primary goals of this program was to provide participants with tangible, standardized strategies to improve communication within the healthcare team. The TeamSTEPPS® Observation Tool provided a quantitative way to evaluate whether participants were using these tools during simulation. A moderate correlation ($r = .601$) was identified between observers for day 1, simulation 1 with an average score of 51.6%. A strong correlation ($r = .866$) was identified between observers for day 1, simulation 4, with an average score of 71.7%, an overall improvement of 20.1%. While only a moderate correlation was found between raters on day 1, scenario 1, the overall Pearson's R was positive. This positive trend, while moderate, indicated that as rater number one scores increased, rater number two scores increased, resulting in an overall improvement for all five teams.

Summative Evaluation

Each participant completed a summative program evaluation with both a 5 point Likert scale of strongly disagree to strongly agree and two open ended questions. The percentage reporting is those who answered either agree or strongly agree to the four questions. Likert scaled questions were specific to the participants' level of agreement that the learning environment was conducive to applying previously attained knowledge (97%), acquiring new knowledge (97%), training as a team (100%), and reinforcing communication (100%). Thematic analysis was utilized with the two open ended questions completed by the PI and another content expert in simulation-based education. Table 1 outlines the identified themes.

Discussion

The statistically significant results of this study support similar results outlined in the literature. The positive TeamSTEPPS® Observation Tool results specifically support the findings of Baker et al. (2006) that teams which have a shared mental model, clear roles and responsibilities, strong leadership, engage in regular feedback, a strong sense of collective trust and confidence will function as highly effective teams. This study also supports the national patient safety initiatives encouraging interprofessional education, through utilization of the national standard for team training TeamSTEPPS® 2.0 Framework.

Limitations

This study has many limitations. First, this study was a convenience sample that yielded a small sample size of 29 total participants. The scenarios developed for this simulation program require a certain number of participants to provide an adequate learning environment. The average number of participants per team was 4. While all participating disciplines were represented on

each team, the small team number does not lend itself to having all roles played during the simulation scenarios. For example, one team could be missing a role played by a supporting RN or provider. A second limitation was the lack of representation from the pharmacy group. Pharmacy students were targeted for recruitment, yet none volunteered to participate in the program. Future research should explore a more comprehensive array of disciplines to be fully inclusive of all those present on current dynamic healthcare teams. Despite these limitations, this study recognizes the impact team dynamics and communication have on the development of highly functioning healthcare teams.

Conclusions

This evidenced-based interprofessional TeamSTEPPS® Simulation Program provides an opportunity for members of the healthcare team to collaborate and learn from and with each other. The TeamSTEPPS® standardize communication tools are tangible skills participants can take back to their practice and use to provide safe, effective, quality care to patients and their families. A commitment to the patient safety movement and extensive initiatives that surround it will require more research into the importance of interprofessional educational opportunities and the direct impact a lack of teamwork has on patient specific outcomes. The clinically significant results and summative evaluation of this study provide a framework for those interested in innovative solutions for providing evidenced-based, interprofessional educational opportunities, and breaking down the silos that the healthcare system perpetuates.

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