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Improving Perinatal Team Communication to Decrease Patient Harm With Team Strategies and Tools to Enhance Performance and Patient Safety Training

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Raquel Walker

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2017

Abstract

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With Team Strategies and Tools to Enhance Performance and Patient Safety Training

by

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MS, Medical University of South Carolina, College of Nursing, 2008

BS, Medical University of South Carolina, College of Nursing, 1995

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

December 2016

Abstract

During childbirth, multiple providers deliver care at the bedside that requires optimal teamwork and communication to prevent patient harm. The complexity of caring for obstetrical patient demands a well-coordinated team to relay information and respond to conditions that can change quickly during childbirth. A patient safety strategy to prevent perinatal harm is Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) training. TeamSTEPPS is an evidence-based program based on crew resource management (CRM) principles developed in the aviation and military industries. This process improvement project used the Plan-Do-Study-Act framework and Kotter's change theory to implement TeamSTEPPS training after an increase in patient safety events from 2014 to 2016. A convenience sample of 200 physicians, nurses, respiratory therapists, scrub techs, and patient care techs from perinatal units completed the training in a community hospital setting. The Teamwork Perceptions Questionnaire administered pre- and posttraining show a statistical improvement in teamwork, communication, and situational awareness among nursing staff that correlated with a decrease in safety events. Project limitations include lack of a control group for comparison and lack of physician involvement with training. The positive social impact of TeamSTEPPS training is the decrease in maternal and newborn adverse events surrounding childbirth due to perinatal teams using CRM principles. Over the long term, TeamSTEPPS training may become the standard team training method to improve birth outcomes and support the establishment of a patient safety culture, which may be replicated in perinatal centers around the world.

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Dedication

I would like to dedicate this project to my family. My husband, Stephen, who has supported me throughout this journey as my cheerleader, proofreader, and best friend.

My children, Ashley and Zachary, whom I love with all my heart, and who give me purpose to be a better person, mother, and nurse. In addition, I would like to thank James and Mary Ann Walker for their love and always being there when I needed them.

For my parents, who are not here today. In their memory, I continue to believe that education and hard work can help you accomplish your goals. In addition, I would like to thank my brothers and sisters, Maureen, Jose, Dinah, and Vincent, for their love and support. My extended family—the Walkers, Templetons, Youngs, Douglasses, and Baxleys—for always accepting me as one of their own with loving hearts. Lastly, my friends, for cheering me on and helping me make it to the finish line.

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Section 1: Nature of the Project

Introduction

Childbirth is the leading reason for hospital admissions in the United States, with over 4 million births annually (Petker & Grobman, 2015). Patients and families expect the childbirth experience to be a happy event. When an adverse perinatal event occurs, inadequate care is not acceptable to patients or society, especially if the adverse event was preventable. The main reason for negative patient outcomes is failure in interprofessional communication and teamwork by healthcare providers (Budin, Gennarro, O'Connor, & Contratti, 2014; Riley, Davis, Miller, Hansen, Sainfort, & Sweet, 2011; Yalcin, 2014). Since the publication of the Institute of Medicine's (IOM) report *To Err Is Human*, a focus on medical errors and preventable deaths has become a national priority for health and quality organizations in the United States (Kohn, Corrigan, & Donaldson, 2000). The IOM report remains the leading document recommending patient safety initiatives to fix flawed system processes, especially in the perinatal area, where two lives are susceptible to risk. This project involved the use of Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) training to reduce adverse perinatal events that occur due to poor communication and teamwork between perinatal team members during routine and emergent patient care.

Teamwork and communication are nontechnical skills that enhance critical thinking and clinical decision-making in a patient safety environment (Riley et al., 2011). Without effective communication and teamwork, the risk of medical errors can increase as much as 55% in perinatal settings (Riley et al., 2011). *Teamwork* is defined as people

working together to accomplish the same goals in an environment with mutual trust, leadership, and open communication (Rosenman, Shandro, Ilgen, Harper, & Fernandez, 2014; Yalcin, 2014). Although the shared goal of the perinatal team is safe obstetrical care, clinical staff need training in teamwork skills, given that expertise does not necessarily produce an expert clinical team (Riley et al., 2008). Closed-loop communication occurs where the receiver of the communication confirms the sender's message and the sender verifies the message. Interprofessional teams exchanging dysfunctional closed-loop communication develop unclear patient goals that affect the delivery of safe and effective care. With multiple providers caring for the obstetrical patient, healthcare teams using TeamSTEPPS strategies may reduce the variability in knowledge, attitudes, and skills to improve closed-loop communication thus preventing medical errors from occurring in the perinatal setting (Riley et al., 2008; Weller, Boyd, & Cumin, 2014).

A team that uses patient-centered communication based on crew resource management (CRM) and human factors principles found in the TeamSTEPPS training program can prevent harm from reaching mothers and newborns (Clapper & Kong, 2012; Matze, Houston, Fischer, & Bradshaw, 2014). Key words and mnemonics used in TeamSTEPPS training provide a structured and standardized method of communication to help providers act as a cohesive team, especially where multiple providers need to respond quickly, or where team members must assume care from other team members in the changing environment of labor and delivery (Weller et al., 2014). One example is the use of the mnemonic, *SBAR*, which stands for Situation-Background-Assessment-

Recommendation. SBAR is a verbal framework for providers to exchange information about a patient's status to prevent miscommunication and errors and part of the TeamSTEPPS training curriculum (AHRQ, 2016). SBAR is a best practice to perform patient hand-off and recognized by the Joint Commission as a patient safety goal to standardize communication.

TeamSTEPPS training can break down the psychological, educational, and organizational barriers that prevent the development of a collaborative environment and thriving patient safety culture by fostering team members' trust, situational awareness, and communication (Gittell, Beswick, Goldmann, & Wallack, 2015). With patient safety events increasing from 2014 to 2016 in a community hospital's perinatal unit, TeamSTEPPS training is a relevant and practical method that fosters improvement in the knowledge, attitude, and performance of a team where few structured communication approaches exist (Gittell et al., 2015). TeamSTEPPS training also improves team behaviors, thereby leading to improved quality of care in hospitals and facilitating social change on a wider scale. The positive social impact of TeamSTEPPS training resides in the implementation of a team-centered communication guideline that may serve as the foundation for interprofessional teamwork and communication among providers. Standardized communication by providers who use the same language to make clinical care decisions can lead to better patient outcomes and thereby decrease patient harm.

Problem Statement

Despite advances in technology to improve patient outcomes, changes in healthcare systems have not supported teammates' communication and teamwork and

may lead to medical errors (Sonesh et al., 2015). In the hospital project setting, failure to communicate was the reason for the doubling of safety events in 2015 and 2016, which indicated a rising trend that prompted administration and the patient safety officer to support TeamSTEPPS training. The Joint Commission (2004) cited communication failure as the root cause of 72% of sentinel events in perinatal care, noting that 3%-16% percent of these events were preventable (Pettker & Grobman, 2015; Riley et al., 2011).

An environment where perinatal healthcare teams are reluctant to voice safety concerns is vulnerable to horizontal violence among teammates, nursing burnout, and turnover (Maxfield, Lyndon, Kennedy, O’Keeffe, & Zlatnik, 2013). Fear of speaking up and advocating for the patient may lead to nurses leaving their employer and may indirectly affect patient care (American College of Obstetricians and Gynecologists, 2011; Lyndon et al., 2015). According to Lyndon et al. (2015), 34% of physicians, 40% of midwives, and 56% of registered nurses stated that lack of organizational support to prioritize safety places patients at risk. Other studies confirmed the Joint Commission’s findings that human error, poor communication, and leadership gaps have been the top root causes of reported maternal and perinatal sentinel events since 2004 (Lyndon et al., 2015). An environment with collaboration and open communication among teammates fosters higher job satisfaction and a perception of improved quality of care for patients (Castner, Foltz-Ramos, Schwartz, & Ceravolo, 2012).

Examination of the practice setting revealed that the increased number of patient safety events in 2015 and 2016 are due to communication failures within the healthcare team according to the patient safety officer. Patient safety events that occur within 3

hours after childbirth place the mother and newborn at risk for potential harm. Common causes include a nonstandardized communication process during patient hand-offs or huddles regarding nonreassuring fetal monitor tracings, compromised infant transition after birth, and changes in maternal status after childbirth. In one such event, communication failure occurred between the obstetric registered nurse (RN) and the transition RN during the transition phase. Both nurses assumed that the other was caring for the newborn, and vital signs and labs were not performed. The newborn needed immediate intervention for neonatal hypoglycemia that required a transfer to a higher level of care, which could have been prevented with proper hand-off procedures.

Although no serious harm occurred, the failure to perform proper patient hand-off prompted the development of poor situational awareness or monitoring of the practice environment. A breakdown in trust, closed-loop communication, and teamwork necessitated the implementation of TeamSTEPPS training as a patient safety priority for the perinatal units. The significance of this project rests in the development of situational awareness and interprofessional teamwork and collaboration using TeamSTEPPS strategies that are essential to safe nursing practice, leadership, and teamwork. An effective team with situational awareness decreases the chances of unintentional blindness that can hinder effective communication and teamwork and lead to harm of the mother and a newborn at birth and postpartum period (Endozien, 2015).

Purpose

The goal of this project was to implement a TeamSTEPPS curriculum to improve perinatal communication and teamwork to decrease near misses and adverse events and

prevent sentinel events that may cause death or severe harm in the perinatal setting. A *near miss* is a deviation from a standard of care or protocol that does not reach the patient and cause harm (Mahlmeister, 2006). An *adverse event* results in harm to the patient due to an error or system process that requires investigation by hospital leaders and the patient safety department (The Joint Commission, 2016a).

The two categories of safety events are reportable to the Joint Commission, the organization that accredits hospitals to provide care. *Safety events* are occurrences in a patient's hospitalization that are not attributed to the patient's medical diagnosis or underlying conditions and that require investigation to determine the cause and prevent further harm (The Joint Commission, 2016a). Patient safety and quality organizations such as the Agency for Healthcare Research and Quality (AHRQ) and the Institute of Healthcare Improvement recommend that safety interventions be in place to decrease medical errors that can lead to patient harm.

TeamSTEPPS is an evidence-based program created by the Department of Defense (DOD) and the AHRQ that is based on communication, leadership, teamwork, situational monitoring, and mutual support, which are essential to team performance and patient safety (AHRQ, 2015). Highly functioning teams make fewer errors, indicating that teamwork and communication are critical components of a patient safety culture (AHRQ, 2015; Cranford & Bates, 2015; Fransen, Banga, van de Ven, Mol, & Oei, 2015). The sharing of information among team members striving for the same goal of safe and effective care is characteristic of an effective team and involves leadership, mutual

support, and situational awareness, all of which are addressed in TeamSTEPPS training (Weller et al., 2014).

TeamSTEPPS training exemplifies communication techniques from CRM principles using SBAR, huddles, hand-offs, and debriefs that have a structured format to communicate safety concerns or patient information concisely and assertively to prevent harm reaching a mother, fetus, or newborn. The practice question for this project addressed whether TeamSTEPPS training can prevent patient harm and improve interprofessional communication and teamwork using TeamSTEPPS communication strategies during patient handover or emergent situations (Arora et al., 2015; Maxfield et al., 2013). This doctoral project addressed a practice gap in communication and teamwork using a communication algorithm based on TeamSTEPPS competencies during the transition period after a newborn's birth, when multiple patient handovers can occur between providers.

Nature of the Doctoral Project

This doctoral project focused on the translation of evidence that supports the implementation of TeamSTEPPS training to decrease medical errors and improve patient outcomes with the use of structured communication strategies. TeamSTEPPS training fosters a culture of safety that reduces adverse events and maternal morbidity and mortality by helping providers develop skills to be effective team members. Teams that train together can practice nontechnical skills of communication, collaboration, and clarification to prevent conflict or dysfunctional team performance (Pettker & Grobman, 2015). Sources of evidence pertaining to TeamSTEPPS training in perinatal care were

collected from perinatal nursing and health care journals using the Walden Library databases and quality organizations' publications and websites published within the past 5 years. Other sources included peer-reviewed journals and websites that publish scientific studies, clinical practice guidelines, or information on policy issues and practice issues that affect nursing practice and patient outcomes, such as *The Journal of Obstetric, Gynecologic, and Neonatal Nurses*; *Nursing for Women's Health (AWHONN)*; American Nurses Association (ANA) online periodicals; and the *Green Journal* of the American College of Obstetricians and Gynecologists (ACOG). Systematic reviews, articles with high levels of evidence, and quality improvement studies were used for this doctoral project. Articles regarding TeamSTEPPS and simulation training were evaluated for the project, but simulation training was not integrated into the didactic training sessions due to the lack of access to a simulation center in the project setting.

In the practice setting, a communication algorithm using TeamSTEPPS competencies for the transition period after a newborn's birth was not being used. The doctoral project addressed the communication and teamwork gap by implementing TeamSTEPPS training to cultivate aspects of a highly reliable teamwork. The doctoral project assisted in addressing the barriers in the perinatal environment and used an effective team-centered communication guideline. The guideline improved patient handover, especially after a newborn's birth, when multiple providers exchange patient information that can affect the delivery of safe and effective care (Figure 1).

The implementation of TeamSTEPPS training was a process improvement project that used the Shewart cycle or Plan-Do-Study-Act (PDSA) cycle to guide the project

team in implementing the training, using the communication guideline, and addressing barriers to interprofessional communication in the practice setting (Kelly, 2011). The PDSA cycle is a continuous quality improvement method that integrates best practices as small tests of change when applied to the system (Clarke & Persaud, 2011).

TeamSTEPPS is an evidence-based program designed for healthcare providers and applied in various practice settings across the United States. Project success was measured by the decrease in near misses or adverse safety events in the perinatal setting for the organization when TeamSTEPPS strategies were implemented (Phipps et al., 2012; Riley et al., 2011; Weaver, Dy, & Rosen, 2014). Because national quality measurements on perinatal safety events are not standardized, adverse events are assigned weighted scores that are based on a patient's clinical acuity (Appendix B). A high adverse outcome weighted score for an organization indicates poor quality of care and a need to prioritize patient safety.

For perinatal centers in a rural or community setting, the number of adverse events may have a larger impact on quality outcomes due to a smaller delivery volume. The lack of team training and the low frequency of high-risk obstetrical events in perinatal centers make it difficult for researchers to correlate the impact of TeamSTEPPS training and improved patient outcomes (Sweeney, Maietta, & Olson, 2015). A few studies demonstrate that TeamSTEPPS training without simulation can positively affect patient outcomes in multiple practice settings (Deering et al., 2011; Fransen et al., 2015; Wagner et al., 2011). One can assume that improvement in teamwork and

communication behaviors indirectly leads to improved patient outcomes, as team members feel comfortable in voicing concerns for patient safety.

The quality improvement project helped to identify whether TeamSTEPPS training can address barriers to communication and teamwork and develop a communication guideline designed for perinatal care providers for the transition period of the mother-baby pair (Figure 1).

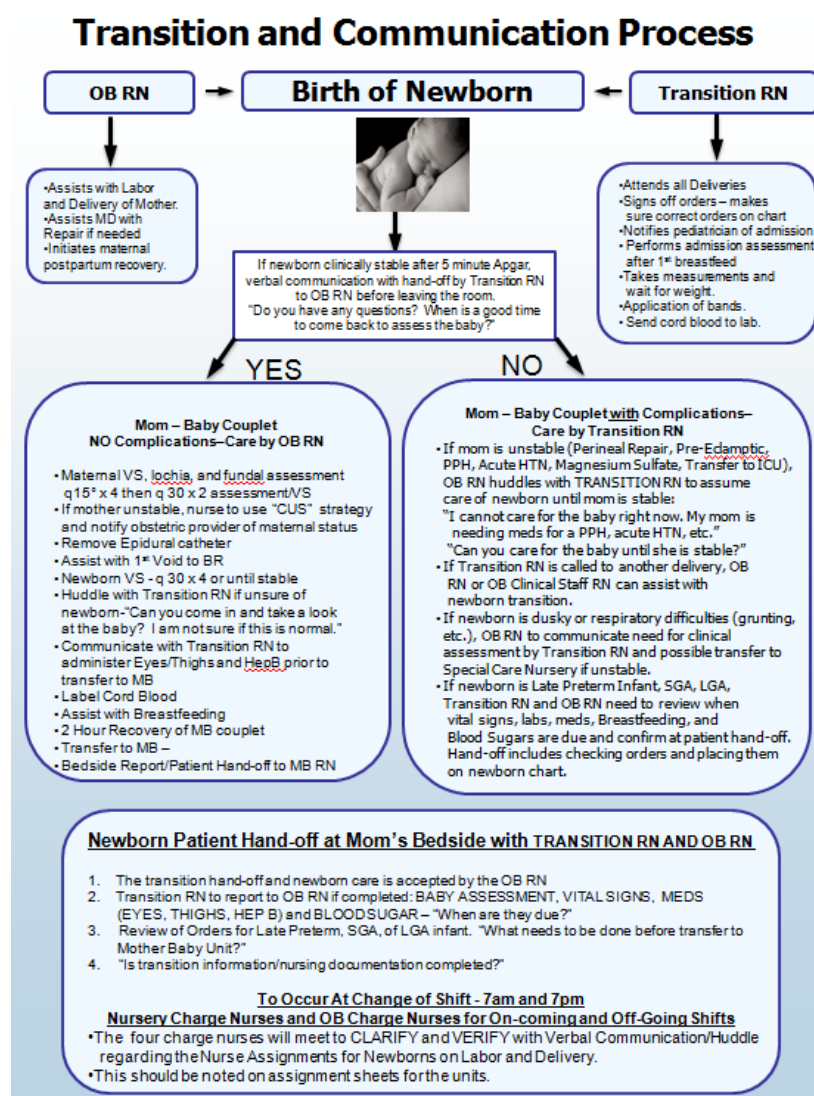


Figure 1. Transition and communication process using TeamSTEPPS.

Significance

Stakeholder involvement is key to the integration of evidence-based practice changes at the bedside in the perinatal environment (Grove, Burns, & Gray, 2013). Stakeholders are the core team members who provide direct care to the patient along with ancillary staff who provide indirect care yet affect the safety environment. Core team members are nurses, physicians, scrub techs, and respiratory therapists. Ancillary staff include pharmacy, dietary, environmental services, information services, and admitting department staff. All providers affect the outcome for the mother and newborn from the time of admission to the time of discharge. The period of time when the mother and newborn are the most vulnerable is at delivery and immediately after birth. Communication and teamwork between team members are vital for the mother-baby dyad, in that things can go wrong quickly if an abnormal physiological transition occurs. The team's action or inaction can influence patient outcomes with adverse events potentially resulting from lack of situational awareness and poor communication among team members.

The TeamSTEPPS project provides a structured communication guideline using bedside shift reporting, SBAR, patient hand-off, and huddles between team members. Currently, nursing and medical curricula generally do not address interprofessional collaboration and tend to focus on individual performance rather than team performance. The lack of collaborative team training leads to gaps in care and increased medical errors, which are often due to team members' hesitance to speak up about a noticeable error or a lack of situational awareness (Cranford & Bates, 2015; Fransen, Banga, van de Ven, Mol,

& Oei, 2015). The practice of coordinated communication in TeamSTEPPS training provides an environment for open communication and trust development that prompts effective and efficient teams to function with less chance of error (Keebler et al., 2014; Leonard & Frankel, 2011). The perinatal setting served as the pilot area for TeamSTEPPS training, which will be implemented later in other acute-care patient areas.

The complex world of health care requires professionals to work collaboratively and focus on a common goal rather than individual skills or tasks. In perinatal care, a breakdown in communication between multidisciplinary team members places two patients at risk and can result in harm and an increased risk of liability (Riley et al., 2011). Errors during obstetrical emergencies or patient hand-offs can have devastating effects on patients, families, and therefore society. Without structured systems of care and communication in place, conflict and disagreements over interventions can arise. There have been few studies regarding TeamSTEPPS in the perinatal setting, and this project has the potential to promote social change that has large impact in light of the 4 million births that occur annually in the United States (Pettker & Grobman, 2015). The positive social impact of the TeamSTEPPS project rests in the use of an interdisciplinary communication guideline during the mother-newborn transition period in the effort to foster a culture of safety in perinatal centers in the United States and around the world.

Summary

TeamSTEPPS is a proven program created by the Department of Defense and the AHRQ that is based on teammates having the knowledge, attitudes, and skills to be an efficient team (AHRQ, 2015). TeamSTEPPS is an initiative to establish a culture of

safety where effective communication is the foundation for team performance (Chen, 2016). Due to the increase in adverse events from 2014 to 2016 at the study site, the implementation of TeamSTEPPS team training focused on team-centered communication and decision-making in perinatal areas. The project implementation of TeamSTEPPS team training is a practical and multidisciplinary strategy for effective teams to see a broader picture of the situation with open communication and teamwork by perinatal teammates.

This doctoral project focused on the translation of evidence produced by TeamSTEPPS training that improved team decision making and patient outcomes. In the next section, the background and context of the DNP project related to TeamSTEPPS are be discussed. The project involved the process improvement framework of PDSA and engaged the multidisciplinary team in implementing and evaluating the effects of TeamSTEPPS training. The PDSA framework allowed the testing of small interventions to improve team-centered communication and practice changes to sustain a culture of safety. Kotter's change theory supported the urgency of a project regarding near misses that would result in the formation of a guiding coalition to implement a formalized patient hand-off, huddle, and bedside report process. The eight steps prescribed within this theory are grouped into three phases: changing the status quo, implementing the new practice changes, and embedding the change into the culture (Ponti, 2011). Kotter's change theory delineates how TeamSTEPPS training can improve provider communication and teamwork and be sustainable in an organization (Kelly, 2011; Ponti, 2011).

If TeamSTEPPS strategies are used in the practice environment, the social implications of TeamSTEPPS training in the local context may extend to a greater number of patients outside the perinatal area (Ponti, 2011). The dynamic nature of healthcare needs a culture of teamwork that produces quality outcomes that are transparent to the public, insurers, and policymakers. As the Affordable Care Act and quality organizations mandate patient safety as a priority issue, TeamSTEPPS training is a validated, key strategy for perinatal centers and other clinical areas to employ team-based care and closed-loop communication (Gittell, Beswick, Goldmann, & Wallack, 2015).

Section 2: Background and Context

Introduction

A culture of patient safety fosters teamwork, open communication, and reporting of errors for transparency and improvement (Budin et al., 2014). Effective communication and teamwork are essential to mother and newborn outcomes during and after childbirth and are priorities for patient safety. The application of CRM principles in TeamSTEPPS training is aimed to reduce the variability in human practice and focuses on the team behaviors that empower staff to voice safety issues (Leonard & Frankel, 2011; Lyndon et al., 2015; Pettker & Grobman, 2015; Sutton et al., 2011). Perinatal teams must share information rapidly when responding to expected and unexpected events in a labor and delivery unit. Lack of communication is the principal reason for perinatal death and injury in 72% of perinatal events, and poor hand-off represents 35% of reported sentinel events (The Joint Commission, 2004; Lee et al., 2016; Plonien & Williams, 2015). TeamSTEPPS training reduces barriers to communication and the variability in care that can influence team performance and clinical outcomes (Clapper & Kong, 2012; Weaver et al., 2014).

The aim of the project was to determine whether TeamSTEPPS training improved perinatal communication and teamwork and reduced the number of adverse events in the practice setting by the end of 2016. The practice setting is the women's services department in a Magnet-recognized community hospital comprised of a 12-bed labor and delivery unit, a special care nursery, a 23-bed mother-baby unit, and a gynecological and pediatric unit with an average of 2,600 births a year. The following sections address the

relevance of team training and its impact on nursing practice and patient outcomes in the perinatal setting.

Concepts, Models, and Theories

The IOM report *To Err Is Human* identified six aims for improvement in healthcare: family-centered, safe, equitable, timely, efficient, and environmentally and socially responsible (Howard & Jolles, 2015). The report was the first of its kind to address quality and preventable medical errors, which are responsible for 44,000 to 98,000 Americans dying each year—the equivalent of the number of deaths caused by one jumbo jet crashing each day (Kohn et al., 2000). In addition, preventable medical errors cost almost 29 billion dollars annually (Wagner et al., 2013). The report suggests that organizations should mandate a patient safety environment and suffer penalties for not meeting quality benchmarks (Kohn et al., 2000). Since the publication of the IOM report, organizations and government agencies such as the AHRQ have worked toward improving delivery systems to improve patient safety and outcomes. There is a national consensus that systems and human error are responsible for the majority of errors and injuries (Kohn et al., 2000).

The TeamSTEPPS training program was developed in 2006 by the AHRQ and the DOD as part of a government response to the 1999 IOM report, which revealed how systemic failures in health care delivery cause more errors than individuals alone (AHRQ, 2015). The AHRQ, in cooperation with the DOD, commissioned research to explore ways to reduce medical errors and improve patient safety practices in high-risk clinical settings (Gittell et al., 2015). The report supports team training of providers with

diverse expertise to develop effective communication and teamwork, especially in high-risk environments. Since its inception, several studies in various clinical settings have revealed positive outcomes from TeamSTEPPS training.

The Joint Commission's Sentinel Alert 30 recommends team training and identifies communication failures as the main cause of perinatal death and injury (The Joint Commission, 2004; Deering, Johnston, & Colacchio, 2011). According to the IOM, poor communication is the sixth leading cause of death and is the reason for 80% of adverse events that occur in the Veterans Health Administration (Vertino, 2014). TeamSTEPPS training uses the principles of CRM to improve hand-offs, where there is a chance of error if structured communication tools and increased situational awareness are not in place. A narrative synthesis by Weaver et al. (2014) demonstrated that team training decreased variance in care and increased team compliance with protocols found in two studies set in the obstetric area. The standardized approach to care increases adherence to evidence-based practices by providers and decreases the risk of harm (ACOG, 2015). Studies indicate that TeamSTEPPS and CRM training improve team performance and correlate with improvement in patient outcomes and a decrease in adverse outcomes according to the Adverse Outcomes Index (AOI), which uses a weighted score to rank clinical outcomes (Weaver et al., 2014). However, there is not a standardized method for teaching collaborative communication and efficient teamwork in medical or nursing curricula. Once physicians and nurses enter the clinical environment, the opportunity to improve collaborative teamwork and communication is difficult to realize if organizations do not have the resources to conduct team training.

Quality improvement initiatives can help organizations identify gaps in care, particularly when variability in practice makes it difficult to detect the presence of errors. The implementation of TeamSTEPPS training is a process improvement project that uses the Shewart cycle or Plan-Do-Study-Act (PDSA) cycle to focus on improvements or the quality of project outcomes (Kelly, 2011). The PDSA cycle is a quality improvement method that integrates best practices as small tests of change to ensure safe handovers using TeamSTEPPS strategies (Clarke & Persaud, 2011). The PDSA approach allows staff to participate in the design of the project, identify barriers during training, and feel empowered to make changes in keeping with the goals of the project. The implementation of changes by the team leader and stakeholders can successfully transform the practice environment with effective planning and evaluation using the PDSA framework (Clarke & Persaud, 2011).

The PDSA framework and Kotter's change theory are adaptable to implement TeamSTEPPS training in small steps and thus create a positive culture change (Thomas & Galla, 2013). The transformational change theory used for TeamSTEPPS training is Kotter's change theory, which includes eight steps toward leading change in an organization (Kotter, 2012). Kotter's change theory is noted mostly for its application in business and industry, but its use is increasing in healthcare (Thomas & Galla, 2013). Kotter's change theory outlines how TeamSTEPPS training can improve provider communication and teamwork as a collaborative process:

1. Establish a sense of urgency
2. Create a guiding coalition

3. Develop a vision and strategy
4. Communicate the change vision
5. Introduce the change and empower a broad base of people to take action
6. Generate short-term wins
7. Consolidate gains and even more change, and
8. Institutionalize new approaches in the corporate culture to ground the changes in the culture and make them stick, despite challenges from internal and external factors (Kotter, 2012).

Kotter's change theory is a sequential framework that requires a team to work in three phases of change by challenging the status quo, implementing changes, and creating a sustainable safety culture (Ponti, 2011). The urgency of the need for change was evidenced by the increase in perinatal patient events in 2015, which triggered the urgent implementation of TeamSTEPPS training (Step 1) by the patient safety officer, administration, and clinical managers. Safety events are reviewed by the sentinel event review team, an interdisciplinary team of clinical experts who analyze the causes of events, the level of harm to the patient, and recommendations to improve processes or address human errors. The sentinel event review team reported that the events occurred due to communication failures between teammates. One of the recommendations of the team was to implement TeamSTEPPS training in women's services, which would serve as the pilot area for this approach, which could then be replicated in other specialty areas.

The Joint Commission, the national organization that accredits hospital organizations that meet quality and performance standards, requires hospitals to review

and report patient safety events to identify gaps in care due to system processes or human error, as well as to indicate whether harm occurred. A true culture of safety is transparent and uses a non-punitive approach to investigate safety events in order to improve safety and disseminate the results in the organization. The transparency of data helps providers make better decisions, change behaviors, and use best practices to affect patient outcomes. In the project setting, the number of safety events demonstrated the need for TeamSTEPPS training, as indicated by an incremental increase with one maternal death in 2014, five events in 2015, and 10 in 2016. After a thorough investigation, the patient safety officer stated that the events occurred due to the health care team failing to communicate urgency, recognize clinical changes in a patient by the health care team, and perform patient hand-off.

TeamSTEPPS is an evidence-based program that improves communication and teamwork skills among health care professionals by eliminating barriers to quality and safety through increased awareness. TeamSTEPPS is based on the core principles of team structure, leadership, situation monitoring, mutual support, and communication, with positive outcomes noted in teamwork perception and clinical outcomes in various clinical settings (AHRQ, 2015; Gaston et al., 2016). TeamSTEPPS integrates the principles of CRM into a set of training procedures originally developed by the National Aeronautics and Space Administration in 1973 to improve air safety and reduce fatal accidents attributed to human error (Plonien & Williams, 2015). Developed in response to an increase in fatal aviation disasters, with 70% due to team communication and human errors, CRM is a framework for team training in communication, leadership, and

decision making. The high-risk environment of health care is similar to the aviation industry, where human errors can lead to fatal outcomes. The 1999 IOM report *To Err Is Human: Building a Safer Health System* was the pivotal publication that increased public awareness regarding the 98,000 preventable deaths that occur annually (Plonien & Williams, 2015). After the publication, many government and accredited organizations recognized that teamwork and communication are key to improving patient safety (Plonien & Williams, 2015).

TeamSTEPPS training was used to educate perinatal employees for 6 to 8 weeks and was offered at various times to accommodate all shifts. The standardized communication methods (Appendix A) based on CRM principles in the TeamSTEPPS curriculum include situation monitoring, SBAR, concerned/uncomfortable/safety issue (CUS), huddles, and debriefing (AHRQ, 2015). The verbal communication tools provide a standardized framework to improve team communication and teamwork, addressing the five essential components of leadership, situation monitoring, teamwork, communication, and mutual support in a safe learning environment (Plonien & Williams, 2015). Checklists and clinical scenarios allow team members to practice the concepts and team behaviors during the training. Because the organization was transitioning to a new electronic medical record at the same time, competition for staff resources, attention, and scheduling were limitations to the training.

A survey tool was administered by the facility to assess the effectiveness of the TeamSTEPPS training. The survey tool developed by the AHRQ, the Teamwork Perceptions Questionnaire (TPQ), measured the perception of teamwork, communication,

and knowledge before and after the TeamSTEPPS didactic training. The Teamwork Perceptions Questionnaire (TPQ) is a 35-item survey that addresses issues of team structure, team leadership, mutual support, situation monitoring, and communication that support effective teamwork and communication. The survey uses Likert-type responses that are coded as 5 = *strongly agree*, 4 = *agree*, 3 = *neutral*, 2 = *disagree*, and 1 = *strongly disagree*. The survey is a subjective measurement tool that demonstrates the relationship between teamwork and patient safety through team training (Havyer et al., 2013).

The opportunity to participate in a unit-based patient and quality safety team empowers staff to provide feedback, make improvements, and promote sustainment of teamwork and communication behaviors (Steps 5, 6, 7, and 8). Communications via face-to-face conversations, flyers, and emails were delivered regarding project training and progress (Steps 4, 5, and 6). The nurses and staff who were part of the project team demonstrated strong team behaviors (Steps 5 and 6). As staff at a Magnet-recognized facility, nurses felt confident in participating in shared decision making that affected patient outcomes. According to Buffington et al. (2012), Magnet hospitals demonstrate improved patient outcomes, greater nursing satisfaction, and less nurse burnout and nursing turnover. A Magnet culture engages nurses to analyze evidence and embrace evidence-based practice to improve patient outcomes (Grant et al., 2010).

Relevance to Nursing Practice

Interprofessional collaboration is necessary in today's healthcare environment. The critical features of an efficient team include leadership, teamwork, and

communication, yet these skills are not included in clinical training for nurses or physicians (Pettker & Grobman, 2015; Weaver et al., 2015). TeamSTEPPS training offers the opportunity for healthcare teams to practice TeamSTEPPS communication methods in a nonpunitive environment. The use of structured communication promotes standards of behavior and predictability among team members that provide the opportunity to discuss concerns and develop a shared plan (Leonard & Frankel, 2011). The Joint Commission (2004, 2010) identified that poor communication is one of the major causes of perinatal sentinel events and advised the following in Sentinel Event Alert 30 (*Preventing Infant Death and Injury During Delivery*) and Sentinel Event Alert 44 (*Preventing Maternal Death*):

1. Conduct team training in perinatal areas to teach staff to work together and communicate more effectively
2. For high-risk events, such as shoulder dystocia, emergency Cesarean delivery, maternal hemorrhage and neonatal resuscitation, conduct clinical drills to help staff prepare for when such events actually occur, and conduct debriefings to evaluate team performance and identify areas for improvement
3. Based on the hospital's early warning criteria, have staff seek additional assistance when they have concerns about a patient's condition
4. Inform the patient and family how to seek assistance when they have concerns about a patient's condition. (The Joint Commission, 2004, p. 2; The Joint Commission, 2010, p. 2.)

In the perinatal setting, it is crucial for communication and teamwork to be reliable and effective due to the unpredictable setting and patient acuity. Matze et al. (2014) stated that an environment with strong communication and teamwork produces better clinical outcomes. However, perinatal staff are reluctant to voice concerns to avoid conflict in a traditional hierarchical environment when there is lack of managerial support (Lyndon et al., 2015; Matze et al., 2014). Team-centered communication fosters shared responsibility for making clinical decisions, where every team member contributes to the plan of care (Matze et al., 2014; Shannon, 2011). An example of team-centered communication is the implementation of team training at Beth Israel Deaconess Medical Center (BIDMC) in Boston, which decreased adverse events 1 year after team training (Shannon, 2011). Team training allows staff members the opportunity to voice clinical disagreements, thus fostering two-way communication and the ability to work collaboratively (Shannon, 2011).

Currently, there are no quality frameworks to implement team training from professional nursing or medical organizations such as AWHONN or ACOG, although both organizations recognize the importance of collaborative training to decrease adverse events (ACOG, 2013). AHRQ (2015) is the one organization that has addressed the gap in practice with an implementation plan for team training to improve patient outcomes. The use of real-life scenarios to practice team-centered hand-offs and debriefing provides participants with the opportunity to review information in a collaborative and nonthreatening classroom environment. The list of communication strategies for interdisciplinary staff (Appendix A) is based on CRM principles for becoming an error-

proof team. Studies demonstrate improved maternal-newborn outcomes with the integration of simulation and TeamSTEPPS training, as noted in the Cochrane Review by Fransen et al. (2015), but many rural or small community hospitals cannot afford the cost of high-fidelity simulation centers to practice team training. A few studies have reported improved teamwork and communication after 1 year or more of implementation of TeamSTEPPS training without simulation, with four studies in the obstetrical setting (Beitlich, 2015; Budin et al., 2014; Clapper & Kong, 2012; Haller et al., 2008; Sweeney et al., 2014; Thomas & Galla, 2013).

Improving team-centered communication and teamwork in the perinatal setting can reduce the gap in practice that is affected by the sometimes unpredictable, changing status of the patient during childbirth and postpartum. Research evidence suggests that all clinicians in perinatal care minimize communication breakdowns if a culture supports the ability to voice safety concerns or work in an environment of mutual trust and open communication (Lyndon et al., 2015). Barriers to effective communication and teamwork result from the lack of leadership support, hierarchical relationships between physicians and nurses, and the fear of repercussions from colleagues to voice safety concerns (Lyndon et al., 2015). There are no standardized approaches to address the variation in communication due to hospital size, model of care, and staffing resources. However, the structured communication tools in TeamSTEPPS and CRM principles can enhance and improve decision making at the bedside or in an emergency (Budin et al., 2014). One team training study set in a perinatal unit shows a 50% reduction in infant adverse outcomes when labor and delivery staff had participated in a safety initiative

(Deering et al., 2011). Overall, TeamSTEPPS training affects patient safety outcomes as well as the psychological impact where providers can communicate without fear (Salas et al., 2011).

Local Background and Context

The project focuses on improving communication and teamwork to reduce adverse events in a women's services department. The practice setting is the women's services department in a Magnet-recognized, community hospital comprised of a 12-bed labor and delivery unit, a special care nursery, a 23-bed mother-baby unit, and a gynecological and pediatric unit with an average of 2,600 births a year. The women's services area is a leading provider of maternal-newborn care in the community for the past 20 years. The project will include staff from the labor and delivery unit, the special care nursery, the mother-baby unit, respiratory therapists, and physicians. The results from the 2015 Hospital Survey on Patient Safety Culture for the special care nursery and mother-baby unit demonstrate teamwork at 83%, communication at 78%, and teamwork with their fellow units at 50% in the project setting.

The patient safety events in 2015 and 2016 are due to failure to communicate and work as a team after they were reviewed by subject matter experts and the patient safety officer. The TeamSTEPPS training project will standardize communication in the perinatal area especially with the use of safety huddles, CUS, SBAR, and debriefing which staff perform 50% of the time according to the clinical manager of the perinatal units. The analysis of patient safety events indicate poor communication between the labor and delivery staff and special care nursery staff during patient hand-off or transfer

of care during shift change. Poor hand-off that occurs during shift change are a result from the lack of awareness of the perinatal environment especially one that is busy or high patient turnover (Poot et al., 2014). As the volume of births increase every year at the project setting, the realignment of staffing and resources require that the labor and delivery nurse assume care of the mother-newborn dyad during a 2 hour transition period and transfer care to the mother-baby nurse. The practice question related to TeamSTEPPS training is if teamwork and communication will improve after training and influence a decrease in safety events.

In perinatal care, nurses at the bedside work with other interdisciplinary teammates at the time of birth necessitating the need for team training and communication found in TeamSTEPPS training. Collaborative communication and quick decision-making is necessary in an emergency and transition in care where poor actions can affect the mother, newborn, and the team. In the hospital setting, the 2014 Hospital Survey on Patient Safety Culture (HSOPSC) survey lists teamwork and poor communication within units and between other health care providers with ratings in the 30th percentile. In addition, the perception of teamwork and communication rank as poor on the annual employee engagement survey in 2014 and 2015. With the increase in patient safety events that has doubled since 2015, TeamSTEPPS is a practical and effective solution to teach providers how to work as a team.

At the federal level, the AHRQ and The Joint Commission recommend the application of TeamSTEPPS to decrease medical errors. Currently, there are no federal rules or regulations to mandate TeamSTEPPS training in perinatal centers. The increase

in preventable medical errors can affect an organization's reimbursement if they do not meet quality targets, and the information is accessible to the public. Organizations accepting the challenge to offer TeamSTEPPS training for providers can access free and downloadable information from the AHRQ's website. Trainers attend a master-class at a designated AHRQ training site, and the curriculum uses a train-the-trainer approach. In the clinical setting, the DNP student's preceptor is a master-trainer and assists with training sessions.

At the state level, the quality organization for perinatal centers in the DNP student's state does not mandate TeamSTEPPS training either. However, the state quality organization is providing mobile simulation training to all the perinatal centers in the state to improve teamwork and communication during obstetrical and neonatal emergencies. The application of TeamSTEPPS in combination with simulation drills are discussed in several studies as being an effective method to improve communication and teamwork without endangering patients in a real clinical setting (Sonesh et al., 2015; Weaver et al., 2015). Gaston et al.'s (2016) study reports 81% of staff citing improved teamwork and 85% citing improved communication, and 89% citing their use of huddles, debriefs, and clarifications in their daily practice.

Role of the DNP Student

The DNP student worked in the women's services department in a community hospital with twenty-two years of nursing experience in various clinical roles. I did not possess any bias in implementing this project although I work in the women's services area. I worked with the patient safety officer to address maternal-newborn safety events

in perinatal inpatient units. As the change agent, I: 1) facilitated and implemented TeamSTEPPS team training, 2) developed a communication process for the first two hours of life using the CRM principles of CUS, SBAR, debrief, hand-off, and huddle and 3) analyzed the perception of teamwork and communication by administering the AHRQ's Teamwork Perceptions Questionnaire (TPQ). Participants completed the presurvey and postsurvey using the TPQ survey to determine if the perception of teamwork, communication, and knowledge improved in the perinatal area. The project team and I observed the performance of hand-off, huddles, and debriefings to verify if teamwork and communication behaviors were being integrated into nursing practice. The goal of TeamSTEPPS training was the prevention of maternal and newborn harm after birth that has the highest potential for medical error in the practice setting. The outcomes of the project will need follow-up from nursing leadership 6 months later and one year following implementation of the TeamSTEPPS project by the DNP student.

Role of the Project Team

In the team environment, providers with unique skills and expertise focus on a common goal to improve patient safety and care as a team as opposed to accomplishing it as individual care providers. Project champions identified by the patient safety officer and author included clinical staff and physicians to develop the implementation plan and vision. The project team members are the DNP student, the patient safety officer, the physician leader of the perinatal quality and patient safety collaborative, the service line director, the nurse educator for women's services, the labor and delivery clinical manager, and 2 labor and delivery registered nurses. The DNP student and patient safety

officer engaged the project team by keeping them up-to-date via monthly meetings, email communication, and one-on-one conversations. The team identified possible challenges to training and made improvements to integrate TeamSTEPPS strategies into daily practice.

The results of the presurvey were disclosed to the team in September and October 2016 to gather feedback regarding the TeamSTEPPS training and the use of SBAR, CUS, huddles, and debriefing concepts into daily practice. The team assisted with the facilitation of teamwork behaviors to support the core concepts of TeamSTEPPS training. However, staffing resources and training time were affected by the implementation of the new electronic medical record system occurring simultaneously as the TeamSTEPPS training. The implementation of the electronic medical record system was determined as a higher training priority and made it difficult for staff and physicians to attend team training. The challenge to engage staff in two practice changes occurring simultaneously required the team and DNP student to collaborate with leaders and staff since both initiatives affect patient care and safety.

Summary

Creating a culture of safety based on effective communication and teamwork in a complex perinatal environment requires changes in behavior, knowledge, and skills. Effective communication and teamwork are essential to safe outcomes for mother and newborn during and after childbirth. The critical features of an efficient, collaborative team include leadership, teamwork, and communication; these features are not part of the clinical training for nurses or physicians (Pettker & Grobman, 2015; Weaver et al., 2014).

In the next section, the analysis of the collected evidence demonstrate how TeamSTEPPS training improves communication and teamwork skills among health care professionals and optimize patient outcomes (Gittell et al., 2015). The sources of evidence also address practice gaps and the identification of best practices using TeamSTEPPS training to eliminate barriers to providing safe and quality care and decrease the occurrence of adverse events.

Section 3: Collection and Analysis of Evidence

Introduction

Structured systems of communication and care optimize a team's response to a rapid clinical change in an obstetrical patient's status. The application of CRM principles in TeamSTEPPS training provides team-centered communication strategies to ensure safe patient care through increased situational awareness (Endozien, 2015; Klipfel et al., 2014). Effective teams are characterized as having situational monitoring, structured communication, leadership, mutual support, and psychological safety where teammates can speak up if necessary (Castner et al., 2014; Leonard & Frankel, 2011; Lyndon et al., 2015). Currently, nursing and medical curricula do not teach collaborative team training and focus on individual skills rather than how to work as a team. Nursing programs focus on a narrative approach to patient care, in contrast to physicians using brief facts to communicate care (Beckett & Kipnis, 2009). The differences in communication can lead to poor teamwork and medical errors. In addition, the use of technology with paging systems, smartphones, and computer notifications decreases reliance on verbal communication and teamwork (Matzke, Houston, Fischer, & Bradshaw, 2015). The use of communication devices can lead to ineffective handoffs and misinterpretation of messages, which may delay or impede care (Matzke et al., 2015).

TeamSTEPPS training is a safety-focused curriculum using CRM principles and developed by the U.S. Department of Defense in collaboration with the AHRQ. TeamSTEPPS is based on the core principles of team structure, leadership, situation monitoring, mutual support, and communication. This approach has been found to result

in positive outcomes in teamwork perception among participants. Additionally, among TeamSTEPPS participants, a 20% increase in decision-making accuracy has been noted, as well as a decrease in infant length of stay and maternal transfer to the intensive care unit (Sonesh et al., 2015). In the following section, I discuss sources of evidence for positive clinical outcomes related to TeamSTEPPS training, present analysis and synthesis of information that supports TeamSTEPPS training for perinatal staff, and address TeamSTEPPS's potential social change impact affecting mothers and newborns nationally and around the world.

Practice-Focused Question

When perinatal patient safety events occur, the principal reasons are human error due to poor communication, lack of teamwork, and system failure (Deering et al., 2011; Plonien & Williams, 2015). The Joint Commission reported that the top three root causes of maternal sentinel events from 2004 to 2015 arose from human factors and communication (The Joint Commission, 2016). In the project setting, the increase in safety events was due to communication failures during patient hand-off, huddle, and shift change. The human factor and systems approach in TeamSTEPPS identifies gaps in care that result in medical errors and near misses. The goal of the perinatal team was to ensure the well-being of mother and newborn before, during, and after childbirth using effective hand-off, bedside report, and SBAR. The project was designed to determine whether TeamSTEPPS training improved perinatal communication and teamwork and reduced the number of adverse events in the project setting by the end of 2016. Another positive social impact of the training was the application of a standardized

communication guideline based on TeamSTEPPS strategies and the replication of the training in other high-risk clinical areas in the organization.

Sources of Evidence

Published Outcomes and Research

I examined literature sources for best practices and protocols regarding TeamSTEPPS training and the reduction of preventable harm in perinatal practice settings. Evidence-based databases used to locate literature included the Cochrane Pregnancy and Childbirth Group Database, CINAHL, MEDLINE, PubMed, Joanna Briggs Institute, and OVID. I used these databases to locate integrative reviews, meta-analyses, and systematic reviews from professional perinatal peer-reviewed journals published within the past 5 years. Relevant studies included key search items such as *TeamSTEPPS*, *team training*, *crew resource management*, *communication*, *teamwork*, *obstetrics*, *adverse events*, *patient safety*, *situation awareness*, *hand-off*, *perinatal*, and *labor and delivery*, with non-English studies excluded. Internal sources of data included safety reports from the patient safety department regarding incidents that were due to failure to communicate or breaches in standards of perinatal care with the risk of harm. A manual review of abstracts eliminated articles that did not focus on team training, TeamSTEPPS, or CRM and yielded 32 articles. The evaluation of literature assisted in the creation of a communication guideline used by staff members during patient handover to aid in the reduction of perinatal safety events. The evidence showed that team training promotes better work environments and safer, higher quality clinical outcomes when implemented.

An exhaustive and comprehensive analysis of the literature yielded 18 articles that were screened for inclusion of TeamSTEPPS, team training, or CRM in evidence-based, medical, and nursing databases. A search for literature on team training in relation to leadership, simulation training, or communication produced 14 studies with a focus on teamwork and safety outcomes, which included two randomized controlled studies on team training, four systematic reviews, one narrative synthesis, one meta-analysis, one integrative review, and several quality improvement studies. The search also produced studies of TeamSTEPPS or CRM training without simulation as a component in patient safety initiatives.

Based on moderate to high-quality evidence, it is possible to conclude that TeamSTEPPS training is more effective at reducing patient harm when combined with other strategies. Systematic reviews by Fransen et al. (2015) and Meri  n et al. (2010) suggested that neonatal and maternal outcomes improve with the use of TeamSTEPPS training and simulation. The Cochrane intervention protocol by Fransen et al. addresses how adverse outcomes are due to human errors and system failures. The protocol suggests a patient safety strategy of multiprofessional team training and simulation to reduce adverse events. Fransen et al. are currently investigating three modes of team training and comparing individual simulation-based training, team-based simulation training, and CRM training in low, middle, and high-income countries. The results emphasize the need for obstetrics team training with the goal of improving maternal neonatal outcomes globally (Fransen et al., 2015).

In another systematic review, Merién et al. (2010) analyzed randomized controlled studies associated with team training and the reduction of adverse outcomes. Merién et al. identified three studies with a pretraining and posttraining comparison using team training and simulation for acute obstetric emergencies. The systematic review showed that only one study reported an improvement where team training decreased the occurrence of Apgar scores of 6 or lower from 86.6 to 44.6 per 10,000 births and hypoxic-ischemic encephalopathy from 27.3 to 13.6 per 10,000 births (Merién et al., 2010). In conclusion, interprofessional team training and simulation can constitute a powerful patient safety approach to improve outcomes even for the most vulnerable patients.

Yalcin's (2014) systematic review on team training in healthcare listed 20 articles, with only one study set in a neonatal intensive care unit (NICU). The study in the NICU demonstrated that TeamSTEPPS training improves staff perception of teamwork and communication between multidisciplinary team members. A systematic review by the National Patient Safety Program for Hospitals in the Netherlands explored team training using CRM principles, finding that 22 studies reported an improved safety culture in the organizations and participants (van Noord, de Bruijne, Zwijnenberg, Jansma, van Dyck, & Wagner, 2014). However, van Noord et al. (2014) stated that most of the studies may have been biased, poorly designed, and uncontrolled, noting that controlled studies with organizational and leader support produce better safety practices and patient outcomes.

A narrative synthesis of team training by Weaver et al. (2012) supported TeamSTEPPS as an effective method that can affect patient outcomes when embedded

into daily practice. Weaver et al. identified 26 studies that addressed the concept of team training in acute care settings such as the emergency department, intensive care unit, and labor and delivery unit. The narrative synthesis concluded that seven of the 26 studies used CRM and TeamSTEPPS training and revealed a significant reduction in surgical morbidity, increased adherence to obstetric protocols, a decrease in neonatal infections, and a significant reduction in obstetric adverse outcomes (Phipps, 2012; Riley, 2011). The Weaver et al. synthesis reviewed four studies in a perinatal setting, but only three studies used TeamSTEPPS and CRM principles as a team training method integrating simulation that affected patient outcomes (Fransen et al., 2012; Phipps et al., 2012; Riley et al., 2012).

A study by Fransen et al. (2012) indicated that in a patient safety culture with staff trained in TeamSTEPPS, staff will use protocols 83% of the time, compared to nontrained teams that are 46% compliant. The standardization of practice decreases the risk of medical errors and patient harm when teams huddle, debrief, and use SBAR. The narrative synthesis also stated that the Riley et al. (2011) study was one of the stronger studies, demonstrating a 37% reduction in adverse outcomes in the perinatal setting with the full intervention of TeamSTEPPS and simulation training. The 4 year prospective study examined outcomes in a hospital without TeamSTEPPS training (the control), another hospital with only didactic TeamSTEPPS training, and a third hospital with TeamSTEPPS training and simulation training combined. To this day, Riley et al. are the only researchers to conduct a study assessing the impact of different learning methods associated with TeamSTEPPS and show statistical significance in patient outcomes.

Other studies indicate that simulation-based training and TeamSTEPPS training have a greater impact on nurse performance and knowledge than TeamSTEPPS training administered alone (Harvey et al., 2014; Phipps et al., 2012). In a quasi-experimental, two-group comparison, Harvey et al. (2014) used a pre- and postintervention design to compare simulation with TeamSTEPPS training and case study review with TeamSTEPPS training in an acute care setting. The study supported simulation training and TeamSTEPPS as an effective method that can improve teamwork ($p < .05$), attitudes, and performance ($p > .05$). In a prospective evaluation, Phipps et al. (2012) showed a decrease in adverse events on a labor and delivery unit with 9,200 births a year after TeamSTEPPS and simulation training. This improvement in the safety culture was validated by the HSOPSC survey even 8 months after completion of the training (Phipps et al., 2012). Phipps et al. reported a decrease in adverse outcomes from a 0.052 baseline measurement (95% confidence interval, 0.048–0.055) to 0.043 (95% confidence interval, 0.040–0.047) in the postimplementation period. Because medical and nursing curricula do not integrate team training with simulation training, team training has the potential to reduce errors related to human factors and improve situational awareness and communication (Clapper & Kong, 2012). Simulation offers teams opportunities to practice leadership skills and coordinated communication in a safe environment, rather than in an emergency context where poor decisions can alter maternal-newborn outcomes.

A few studies have demonstrated the effectiveness of TeamSTEPPS training based on CRM principles as a patient safety strategy without simulation to improve team

performance and patient outcomes, and have addressed its sustainability. TeamSTEPPS training implemented in the Veterans Health Administration and other organizations led to significant improvement in team performance and culture (Thomas & Galla, 2013; Vertino, 2014). One comparative design study in a large academic medical center used CRM training over a 6 month period for nurses and physicians, using incremental safety interventions during the time frame (Budin et al., 2014). The purpose of the study was to focus on the perception of teamwork and the patient safety climate. The study demonstrated a 22% improved perception of patient safety and teamwork by physicians and nurses after implementation, although the improvement in perception for nurses was slightly lower than the physicians' response (Budin et al., 2014). This finding supports the view that hierarchical communication exists in a labor and delivery unit, although the study defined a patient safety climate as one based on open communication, trust, and no fear of punitive action for reporting an error (Budin et al., 2014).

It is difficult to determine whether TeamSTEPPS training and simulation improve patient outcomes. Team training and the evaluation of its sustainability vary in studies conducted from 3 months to 1 year after implementation (Nielsen et al., 2007; Riley et al., 2011). The narrative synthesis by Weaver et al. (2014) did not include Nielsen's study because it did not show a significant improvement in patient outcomes. The study by Nielsen et al. (2007) was a randomized controlled study that used seven intervention hospitals and eight control hospitals, comparing team training and patient outcomes on 15 labor and delivery units. The study found that after team training implementation, there was not a significant change in perinatal outcomes. However, Riley et al. (2011), in a

small cluster randomized clinical study, evaluated one hospital using TeamSTEPPS training only and another hospital using TeamSTEPPS training and simulation. The Riley et al. study showed no statistical significance in the two interventions, but the prospective cohort study did show a 37% improvement in perinatal morbidity in the hospital that received simulation and TeamSTEPPS training.

Evidence suggests that systems that include proper hand-off, situational awareness, and communication experience fewer errors and better teamwork (Poot, de Bruijne, Wouters, de Groot, & Wagner, 2014; Leonard & Frankel, 2011). Open communication is essential in the exchange of information between teammates with a shared mental model or common goal (Castner et al., 2013; Clapper & Kong, 2012). Failure to communicate the bigger picture or promote situational awareness by the team leader can lead to adverse events if clinical decisions are based on poor information or complacency (Endozien, 2015). Hospital teams must prepare with team training to coordinate clinical skills and practice structured communication to prevent error or harm to the patient (Klipfel et al., 2014). Structured communication creates a shared mindset among team members regarding roles and tasks (Matzke, 2014). Nursing and medical curricula rarely involve the use of team-centered communication to make decisions and resort to status-based communication (Clapper & Kong, 2012; Matzke et al., 2014).

A cross-sectional study by Haller et al. (2008) demonstrated the use of CRM interventions on an obstetrical unit in Switzerland. This large academic study reported that poor teamwork and communication were responsible for 67% of maternal deaths and 30% of neonatal complications. In this study, participants reported a 63%-90%

satisfaction rate with the training and an increased perception of teamwork (Haller et al., 2008). The results from the cross-sectional study demonstrated an improvement in interdisciplinary teamwork 1 year after CRM training was implemented in the obstetrical unit.

Other studies indicate that training staff in TeamSTEPPS principles produces health care teams that make fewer errors due to efficient communication and teamwork (AHRQ, 2015; Beitlich, 2015; Sonesh et al., 2015). A qualitative review of TeamSTEPPS training set in an oncology service was similar in methodology to this DNP project. The study reported 89% of staff making a change in practice using TeamSTEPPS communication techniques after training was completed (Gaston et al., 2016). In addition, the qualitative review indicated an increase in teamwork perception with a 92% mean and Hospital Survey on Patient Safety Culture results, above the 75th percentile benchmark from the previous year.

Patient safety initiatives that implement safety bundles ensure that a culture of safety is viable. A patient safety bundle is a tool to improve outcomes by grouping a set of evidence-based interventions and facilitating reliable care by providers (Arora et al., 2015). Given that perinatal patient safety bundles do not include TeamSTEPPS training, quality organizations need to recommend the inclusion of TeamSTEPPS to foster a patient-safety-focused organization. The clinical practice bundle would include TeamSTEPPS, simulation training, standardized protocols, a 24-hour laborist (obstetrical hospitalist), a patient safety nurse, and mandatory electronic fetal monitoring courses for nurses and physicians to promote a patient safety culture (Appendix C). All of the bundle

components, especially TeamSTEPPS, are interventions that have been found to decrease adverse events related to poor communication and teamwork in the safety literature (Wagner et al., 2011). The elements of the bundle in addition to TeamSTEPPS training can reduce perinatal harm by laying the foundation for a collaborative culture of safety (Arora et al., 2015). Adding TeamSTEPPS principles to the point of care protects mothers and newborns from harm. In addition, a communication and teamwork pathway based on these principles can be integrated into the safety culture of perinatal centers in the United States and around the world.

Archival and Operational Data

The fluctuation of patient volume affects the assignment of staff and patient ratios and increases the risk of missed care or safety events. The analysis of patient safety events indicate they are due to poor communication between the labor and delivery staff and special care nursery staff. Labor and delivery staff assume care of the mother and newborn as a pair after birth for a 2 hour physiological and emotional transition. The labor and delivery nurse works with other interdisciplinary teammates during this transition phase necessitating the need for optimal communication and teamwork found in TeamSTEPPS training.

Patient safety data was obtained through an online reporting system where users can anonymously enter or self-report near misses or safety events. The limitation of the data is the perception of care from one witness that requires an investigation of all participants involved with the event. The patient safety officer reviews the reports to identify if events were due to human error or system failures that contributed to patient

harm in the perinatal area. Near misses identify system errors that may have contributed to the error, but the error was noticed before it reached the patient. A *serious safety event* is defined as an adverse event or a sentinel event that required a root cause analysis to determine if a standard of care was breached. In 2015, the number of events were a combination of near misses and adverse events that increased since 2014. For 2016, the safety events are near misses of care that occurred after birth of the newborn and after transfer to the mother-baby unit. Documentation from the patient's electronic medical record was reviewed to determine if a standard of care was breached or if the near miss occurred due to a system failure.

Evidence Generated for the Doctoral Project

Researchers suggest that at least 50% of maternal morbidity and mortality is preventable if perinatal teams practice communication, teamwork, and use standardized protocols (Lyndon et al., 2015). The TeamSTEPPS training was recommended for staff to attend since the care of the mother and newborn affects the areas of labor and delivery, special care nursery, and mother-baby staff. Participants were a convenience sample of 200 physicians, nurses, respiratory therapist, scrub techs, and patient care techs who are involved in the care of intrapartum and postpartum patients and work in the women's services department in a community hospital setting. Staff and physicians were asked to attend a didactic session combined with role-play scenarios to practice communication and teamwork as outlined by the curriculum. The urgency and reason for TeamSTEPPS training was explained in staff meetings, email, flyers, and face-to-face communication.

To measure the improvement in team-centered communication, the survey tool, the Teamwork Perception Questionnaire (TPQ), was administered by the facility to evaluate the effects of TeamSTEPPS training. The survey by the AHRQ consists of 35 questions that examine the perception of communication, mutual support, situation monitoring, and leadership based on a Likert scale of strongly disagree to strongly agree. Keebler et al.'s (2014) analysis confirms that the TPQ tool is a reliable instrument that validates the construct of teamwork and its connection to healthcare quality. Keebler et al.'s study had an overall reliability of a Cronbach's $\alpha=0.978$ using confirmatory factor analysis and strong construct validity. Another study by Gaston et al. (2016) describes one hospital's use of an abbreviated TPQ survey and HSOPSC survey focusing on the two sub-scales of teamwork and communication. Gaston et al.'s study proves that the tools are psychometrically sound with the TPQ tool demonstrating strong construct validity.

Participants of the TeamSTEPPS training anonymously filled out the TPQ survey and was administered by the organization. The postsurvey was administered 8 weeks after the implementation of TeamSTEPPS training and evaluated the perceptions of teamwork by participants that were nursing or respiratory staff. The TPQ survey was reviewed by the project setting's IRB to ensure ethical protection of participants and the safeguarding of privacy. The data was analyzed by the DNP student, the patient safety officer, and statistician consulted by the organization. Results of the survey were shared with the project team and perinatal staff via meetings, presentations, and email to disseminate project outcomes.

Analysis and Synthesis

The TeamSTEPPS training was available to multiple health providers who attend the birth of a mother and newborn before, during, and after childbirth. Team training decreases the fear of voicing concerns and flattens the hierarchy since medical errors, or near misses can occur with poor communication during emergencies, poor handover, or routine care. However, physicians did not attend the 2 hour didactic training to review and practice TeamSTEPPS strategies with other teammates although sessions were offered at various times to accommodate shifts and office hours. Physicians opted to attend a course provided by the physician champion, or they obtained TeamSTEPPS education in 2 monthly physician meetings. The lack of interprofessional team training by physicians supported the communication barriers between nurses and physicians although this circumstance is not evidenced in the 2016 safety reports. The training improved the communication between nursing staff and reduced the perceived fragmentation of care that may be caused by the physical layout of the patient units.

The TeamSTEPPS curriculum encompasses PowerPoint modules, video vignettes of the structured communication strategies, and practice scenarios that were revised to fit the perinatal environment. The seven modules reflect the components of effective teamwork and communication regarding leadership, teamwork, mutual support, situation monitoring, and communication (AHRQ, 2015). The curriculum covers nontechnical aspects of team work that are replaced by technical competencies, but they are vital to the delivery of care to patients and the prevention of medical errors. The ability to practice voicing a safety concern is a strength of the training since most perinatal sentinel events

are due to failure to communicate by a team member (Lyndon et al., 2015; Maxfield et al., 2013).

An Excel spreadsheet assisted in the data collection of the TPQ survey results. Survey data was entered by the DNP student and analyzed by the statistician. To generate statistical evidence, the Excel program for descriptive statistics was used to validate the perceptions and correlations of teamwork based on the five components of TeamSTEPPS leadership, mutual support, teamwork, communication, and situational awareness. The statistical test to determine pre- and poststatistical significance was a two-tailed, two-sample unequal variance for the five different components of teamwork as indicated by the TPQ survey. Any survey not completely filled out was not counted in the data collection. Due to the anonymity of the surveys, it was difficult to ascertain the unit, shift, or professional role of the participants. Another comparison survey offered by the AHRQ is the HSOPSC survey that will not be administered by the organization until 2017. Data from the HSOPSC survey cannot be utilized as a data comparison for the project due to the timing of its administration. After results were reviewed, the DNP student presented the survey results via face-to-face communication, staff meetings, physician monthly meetings, and quality and patient safety collaborative meetings.

Literature indicates that TeamSTEPPS improvements are not sustainable if not practiced daily and supported in a patient safety culture (Budin, et al., 2014; Weaver et al., 2012). The evaluation of the literature assisted in the application of a communication guideline using TeamSTEPPS principles to reduce the number of perinatal adverse events and near misses. Currently, team training and communication protocols developed by

professional perinatal medical or nursing organizations are not utilized by the organization to help close the gap in perinatal safety events.

Summary

The Joint Commission's Sentinel Event Number Thirty states that interdisciplinary communication is vital to patient safety since poor communication failures are the root cause of 72% of sentinel events on obstetric units (Lukens & Fragneto, 2013). TeamSTEPPS is a systematic approach to integrate teamwork and communication into practice based on 25 years of research from the aviation and military industries to become reliable and error-free (Beitlich, 2015). High-reliability organizations have a high potential for error, but all providers who engage in safety performance practices generate less adverse outcomes (Castner et al., 2012). The techniques used in TeamSTEPPS facilitate teamwork and communication based on leadership, situational awareness, team structure, mutual support, and effective communication to become a safety-oriented culture (Gaston et al., 2016).

In the next section, the purpose of TeamSTEPPS training and the gap in practice were addressed based on the results from the pre- and postsurveys and the rate of perinatal adverse events in the hospital setting. Strengths and limitations of the project reveal the impact of TeamSTEPPS training and building a safety-focused environment. Overall, the next section discusses the positive social impact of increased teamwork and communication from TeamSTEPPS training, and the prevention of harm to mothers and newborns when staff utilize the communication techniques of SBAR, CUS, huddles, and debriefing (AHRQ, 2015). The implication of the TeamSTEPPS training project can

extend to other specialty areas of the hospital setting and build a safety-oriented culture in the organization.

Section 4: Findings and Recommendations

Introduction

There have been improvements in medical science and technology intended to improve patient outcomes and decrease preventable errors; however, healthcare systems do not have the infrastructure to support providers from making errors (Pettker & Grobman, 2015). The healthcare system combined with poor teamwork can lead to patient harm. This project entailed the implementation of TeamSTEPPS training to reduce adverse perinatal events that occur due to poor communication and teamwork during routine or emergent patient care. In the hospital project setting, the main reasons for the increase in safety events from 2015 to 2016 were failures in communication and teamwork (Figure 2). The significance of the project resides in the development of situational awareness, interprofessional teamwork, and collaboration in the perinatal setting using TeamSTEPPS strategies with focused attention on exchanges between nursing staff, who are the main facilitators of care between providers and the patient.

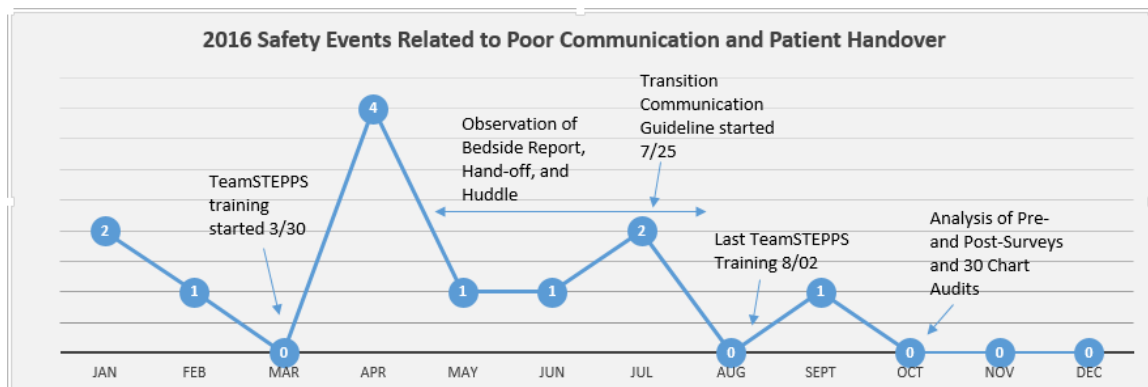


Figure 2. 2016 safety events related to poor communication and patient handover.

The goal of this project was to improve perinatal communication and teamwork to decrease safety events that may cause death or severe harm in the perinatal setting. The doctoral project addressed the practice gap using a communication algorithm that is based on TeamSTEPPS competencies and is used during the transition period after a newborn's birth, when multiple patient handovers can occur between providers. The safety events that occurred in 2016 were due to nursing communication failures during this phase of care. TeamSTEPPS training addresses the gap in practice affected by the changing status of the patient and newborn during childbirth and the postpartum period.

Relevant literature was obtained from the Cochrane Pregnancy and Childbirth Group Database, CINAHL, MEDLINE, PubMed, Joanna Briggs Institute, and OVID databases and included integrative reviews, meta-analyses, and systematic reviews from professional perinatal peer-reviewed journals published within the past 5 years. The literature search included terms related to TeamSTEPPS, team training, CRM, communication, teamwork, obstetrics, adverse events, patient safety, situation awareness, hand-off, handover, perinatal, and labor and delivery, with non-English studies excluded. Articles addressing TeamSTEPPS and improvement in patient outcomes were used for the project, with a focus on clinical handovers because the main cause of safety events was appearing during that time in the practice setting. Additional information was gathered from the AHRQ's TeamSTEPPS 2.0 Training Modules (2016) and Implementation Guide (2015), which are accessible to any organization interested in using the curriculum. The TeamSTEPPS curriculum uses structured communication tools and teamwork skills that require providers to perform as a team using scenarios.

The training allows participants to practice these skills as a team, adapt to changes that occur in the scenarios, and identify errors in order to correct them.

A manual review of qualitative and quantitative studies that focused on TeamSTEPPS pre- and postimplementation was analyzed for levels of evidence and application to the practice setting. Internal sources of data included safety reports from the patient safety department, which identified communication failures involving poor patient handover, bedside shift report, or huddles. Additional verification of bedside shift report and patient handover included a review of 30 patient medical records randomly pulled during the months of September and October 2016 to validate the use of TeamSTEPPS training and CRM principles between care providers. Data from all sources were entered into a 2016 Excel spreadsheet to calculate descriptive statistics and *t* tests for the pre- and postTeamSTEPPS training outcomes.

Findings and Implications

TeamSTEPPS training occurred in the project setting from the end of March 2016 to August 2016, with 16 sessions scheduled at various times to accommodate staff. Project data were collected before the training session and 8 weeks after the last training session using the AHRQ's Teamwork Perception Questionnaire (TPQ). The TPQ is an accessible tool from the AHRQ's website that is used to measure the effectiveness of TeamSTEPPS training within a unit or department. The data collected included the survey responses and the number of safety events reported after the implementation of the structured communication tool in July 2016.

A convenience sample of nursing staff and respiratory therapists was used ($n = 86$ pretraining and $n = 49$ posttraining), and a control group was not used for comparison. Survey data did not separate out professional roles because the survey did not require that information to encourage staff to fill out the survey anonymously. Any surveys missing data were excluded from the analysis. If a respondent checked two answers to a question, the two answers were averaged to equal one answer for data entry by the statistician.

All perinatal staff, including physicians and respiratory therapists, were encouraged to attend TeamSTEPPS training. TeamSTEPPS training was offered at the sister hospital with a perinatal unit, but survey data from that setting were not included for the project analysis because all of the safety events reported occurred in the project setting. Additionally, survey data were not obtained from physicians because the survey was not administered to them, although they were offered the option to attend the training with nursing staff. Physicians attended a training session led by the physician champion that was mostly informational. The lack of interprofessional participation by the physicians was a limitation of the project study.

To examine the performance improvement results of the project, the subscales of the five subcategories of teamwork, communication, leadership, mutual support, and situation monitoring were analyzed for statistical significance. Descriptive statistics using a two-tailed, two-sample, unequal variance for the five different components of teamwork were utilized for preTeamSTEPPS training and posttraining analysis. All components of the TPQ survey showed an improvement in teamwork from pre- to

posttraining, with team structure ($p=0.003$), situational monitoring ($p=0.03$), and communication ($p=0.03$) being the most statistically significant (Figure 3).

The results demonstrate that TeamSTEPPS training improves teamwork, situational awareness, and communication, which are key to highly reliable and functioning teams that prevent adverse events in perinatal care. Other studies have demonstrated improvement in teamwork and communication in other high-risk settings such as the emergency department, intensive care unit, and operating room, showing the curriculum's adaptability (Arora et al., 2015; Gaston et al., 2016). Other studies have validated improvements in teamwork perception and attitude using the TPQ survey with TeamSTEPPS training and have presented statistical significance in all five categories in an inpatient setting and operative setting (Tibbs & Moss, 2014; Vertino, 2014).

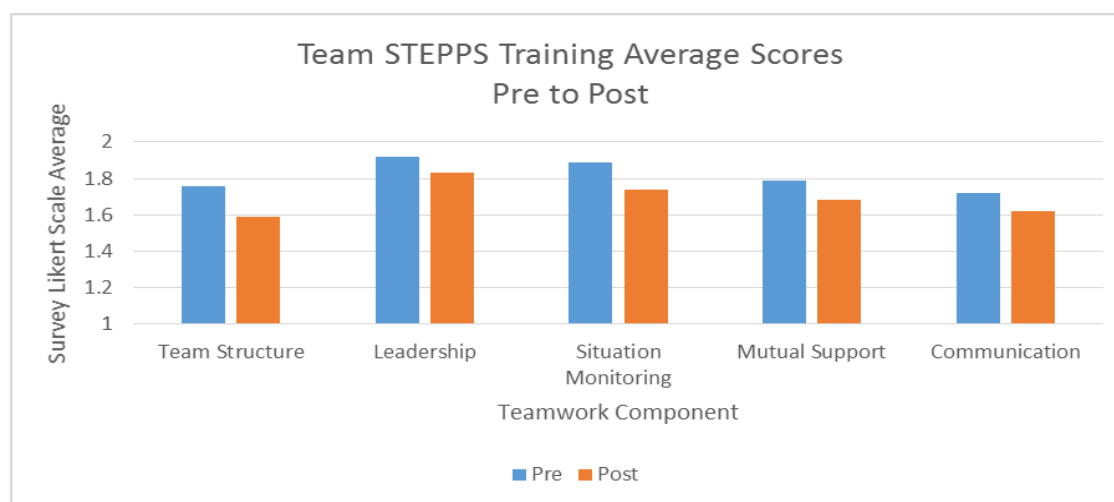


Figure 3. Averages of teamwork perception components pre- to postTeamSTEPPS training. Lower average score = superior situational conditions. 1 = *strongly agree*, 2 = *agree*, 3 = *neutral*, 4 = *disagree*, and 5 = *strongly disagree*.

Breakdowns in teamwork and communication are cited as the cause for safety events occurring in the practicum setting. Before the communication tool was

implemented, 12 safety events were reported to the patient safety department's incident database. However, a reduction in safety events was noted after the implementation of the communication tool in July 2016 and TeamSTEPPS training in August 2016. Since that time, only one safety event has occurred following the 10 weeks after the communication tool was implemented. The review of the safety event indicated that it was due to poor clinical handover that occurred after the 2 hour transition phase, during which the mother had to remain on labor and delivery while waiting for an available bed on the mother-baby unit. Patient care was not compromised for mother and newborn, but there was a lack of documentation regarding patient handover and newborn care. As a result, the assignment of maternal and newborn care was not performed at the change of shift.

Another finding demonstrating positive results is 100% performance and documentation of bedside shift report and SBAR in 30 patient medical records that were randomly abstracted and reviewed. The chart review confirmed that TeamSTEPPS training was an effective patient safety tool and improved staff behaviors and attitudes after it concluded in August 2016. However, there is an opportunity for improvement in the areas of mutual support and situational awareness, although there was improvement in all five categories. Staff commented on the TPQ survey that an increased patient census affects their ability to help teammates and adjust assignments to reflect patient acuity. Survey feedback indicate that staff feel stressed when they are asked to care for more than one patient during labor or to assume care of a higher couplet ratio when there

is increased patient volume and minimal staffing. The project did not evaluate these issues, but they were shared with nursing leadership and clinical management.

Limitations of the project included the short time frame of the intervention and the lower sample size of postintervention responses, which may have limited statistical significance in some of the categories. Another limitation was the system-wide implementation of a new electronic medical record, which had been delayed twice for 2016 and was set for the end of October 2016. The training for the new electronic medical record system pulled resources from administration, staff, and physicians, drawing attention away from the importance of communication and patient safety related to TeamSTEPPS principles. The addition of another change may have led to change fatigue among staff, especially with the increase in patient volume and short staffing.

TeamSTEPPS strategies are verbal and nonverbal strategies that allow teammates to practice communication and teamwork in a nonthreatening environment to develop situational awareness, mutual support, and leadership. The analysis revealed that the two subcategories of mutual support and leadership were not significant. However, studies have indicated that teamwork and leadership are integral features of an organizational culture that support TeamSTEPPS behaviors to promote patient safety (Castner et al., 2012). For example, Castner et al. stated that leadership is the reason why a team can effectively coordinate its actions to address a shared goal, especially in routine or emergent care. Other studies have supported the same conclusion, indicating that leadership is an important characteristic of a team leader, especially for charge nurses,

although the practicum survey results did not demonstrate the same perception found in those studies (Castner et al., 2012; Clapper & Kong, 2012).

The positive social impact of this study relates to the use of a structured communication process by perinatal teammates during the transition phase, when the mother and newborn are experiencing physiological transition. During this phase, multiple care providers exchange patient information, which can lead to errors if the team does not perform bedside report or huddles. The transfer of patient care to another teammate supports open communication to voice safety concerns about a patient's condition or an unsafe environment without fear of lateral violence (Lee et al., 2016; Lyndon et al., 2015). Clinical handovers in perinatal care can improve with bedside shift report, situational awareness, and lack of distraction (Poot et al., 2013). Team training can support teams in developing situational awareness, identifying and correcting poor communication exchanges with role-playing (Poot et al., 2013). Increased awareness for patient safety can improve outcomes in various clinical settings that are at high risk for medical errors, such as the emergency department, peri-operative departments, and intensive care units (Gaston et al., 2016).

Team members need to react quickly and coordinate efforts to provide care that is timely and effective. Improvement in teamwork and communication is the anticipated benefit of the project, in that all members of the team may openly communicate concerns or errors (Lyndon et al., 2015). Poor clinical handovers represent high-risk events that contribute to 35% of sentinel events and 80% of serious events. The practice of CRM principles in TeamSTEPPS can positively affect patient outcomes and nursing leadership

if staff feel empowered to voice concerns (Lee et al., 2016). With the removal of fear and an increase in situational awareness to identify errors, one potential implication for positive social change is the development of nursing professionalism in a flattened hierarchical environment that focuses on care that is patient-safety oriented.

The human factor and systems approach in TeamSTEPPS can identify the gaps in care that result in medical errors and near misses due to distraction, poor infrastructure support, or lack of awareness. The team training intervention can continue to improve teamwork and communication with current or new teammates with the incorporation of training with annual competency training and new employee orientation. The team training can also standardize practices and foster the development of a shared mental model among the perinatal team to ensure the well-being of mother and newborn before, during, and after childbirth. The project will determine if TeamSTEPPS training will improve perinatal communication and teamwork and reduce the number of safety events in the project setting by the end of 2016. The positive social impact of the training involves the application of a standardized communication guideline using TeamSTEPPS principles to deliver effective and efficient care, and the replication of the team training in other high-risk clinical areas in the organization.

Recommendations

Patient safety initiatives are intended to reduce medical errors and preventable harm by creating a patient-safety-focused culture. During an obstetric emergency or routine patient care on a busy labor and delivery unit, the risk of medical error or miscommunication occurring is high. TeamSTEPPS provides a framework for team-

centered communication based on CRM principles that equalize hierarchies and allows for open communication. Structured communication strategies can help every member of the team feel empowered to voice concerns and create a positive work environment (Lyndon et al., 2015; Weller et al., 2014). The use of a communication algorithm based on TeamSTEPPS can improve interprofessional communication and teamwork based on the results of the project (Arora et al., 2015; Maxfield et al., 2013).

Quality organizations recommend patient safety bundles to decrease adverse perinatal events and create a standardized care approach to obstetric complications such as obstetric hemorrhage or hypertension in pregnancy. The increasing maternal morbidity and mortality demands interprofessional collaboration to address the variables that affect pregnancy and recommends checklists and protocols to standardize care (Arora et al., 2015). The use of protocols or checklists in a practice bundle decreases the chance of using memory to guide practice in emergencies and increases structured communication tools to decrease the chance of error (Arora et al., 2015). The clinical practice bundle would promote collaborative practice with the inclusion of TeamSTEPPS, simulation training, and standardized protocols.

Additional components of the bundle include a 24-hour laborist (obstetrical hospitalist), a patient safety nurse, and mandatory electronic fetal monitoring courses for nurses and physicians to ensure that all members are communicating with the same terminology. The elements in the bundle are evidence-based and can reduce perinatal harm, with the potential to promote a collaborative culture of safety (Arora et al., 2015).

Further, the bundle creates a shared mental model between providers and facilitates standardized management of care that improves patient outcomes.

One recommendation for project improvement is the addition of TeamSTEPPS training during new employee orientation and annual competencies for nursing staff and physicians. Training gives staff preceptors the opportunity to orient and reinforces best practice on the use of SBAR, patient handover, CUS and huddles with the new employee. Team training for new and current staff maintains competency and refreshes knowledge and skills to practice patient scenarios as a team since team players can change with each shift (Harvey et al., 2014). Physician training is recommended especially for obstetricians who work as laborists and to promote interprofessional teamwork. This requirement may reduce the communication barriers and lack of interprofessional teamwork already noted in medical and nursing curriculums.

Future team training should include low-fidelity in-situ simulation training on the perinatal units. Simulation was not part of the project's team training since this was not available in the practice setting. Simulation is an additional resource for staff to practice teamwork and communication behaviors in TeamSTEPPS training and will be a recommendation for nursing leadership. Many studies identify simulation as a benefit to team training and improving patient outcomes in various high-risk settings (Harvey et al., 2014; Merien et al., 2010; Phipps et al., 2012; Riley et al., 2011; Sonesh et al., 2015). Team training paired with simulation enhances team performance and nurse confidence and may potentially decrease the failure-to-rescue events in a clinical setting (Harvey et

al., 2014). A recommendation by the student includes simulation as a part of future training and orientation sessions if staffing and resources are available.

Another recommendation is the development of a computer-based learning module on the TeamSTEPPS curriculum that is part of the annual training for physician and nursing staff. The computer-based learning module uses scenarios from the TeamSTEPPS curriculum and contains a quiz at the end to verify knowledge transfer. The participation in simulation drills on the unit can further enhance knowledge and application of communication strategies. The validation of skills and behaviors of TeamSTEPPS training demonstrates the development and sustainment of a patient safety culture. One validation method is the monitoring of communication exchanges during shift-to-shift patient handovers or emergent situations that should continue by staff champions and nursing leadership for another year after implementation of TeamSTEPPS training.

Quality improvement is a continuous process to gather data, address barriers, make improvements, and analyze results to make additional changes. The reduction in safety events and improved teamwork perception by nursing is attributed to the implementation of the TeamSTEPPS curriculum and the use of the communication guideline based on the strategies. The communication guideline developed for this project can be adapted to any clinical setting where a patient handover may occur. Organizations can also use the AHRQ's TeamSTEPPS 2.0 core curriculum as a template to get started. The curriculum is accessible on the AHRQ website (<http://www.ahrq.gov/teamstepps/instructor/index.html>) for any organization to utilize if

they want to improve their patient safety outcomes. The AHRQ website also contains an implementation guide that serves as a secondary resource for project planning for TeamSTEPPS training. The implementation guide provides a framework for evaluation and assists a program planner to develop measurable outcomes. The evaluation component of the program falls under phase two and three. The AHRQ (2015) shares the guide on their website and in the instructor manual to ensure success and sustainment in three phases to shift to a culture of safety: 1) assessment, 2) planning, training, and implementation, and 3) sustainment-monitor, coach, and integrate. Nursing leaders and administrators can employ the accessible resources to implement a culture change by surveying for environmental readiness, providing education by peer champions, discovering any barriers with feedback, and using data to improve and implement the change (Bingham & Main, 2009).

Nursing leaders recognize that patient safety is dependent on teams that can communicate and work effectively to prevent patient harm and medical errors from occurring (AHRQ, 2016). In their role, nursing leaders need several tools to help them accomplish the change. Nursing leaders can use the Centers for Disease Control and Prevention's acronym *SMART* to help design the project and ensure that it is specific, measurable, achievable, realistic, and timely (CDC, 2015). The SMART acronym is based on who, what, how much, and when for planning objectives related to being specific, measurable, achievable, realistic, and a time frame for the project (CDC, 2015). This methodology enhances the quality improvement PDSA framework that was employed for the project. The PDSA framework helps organizations eliminate waste to

be more efficient and save on costs. Phase two of the TeamSTEPPS evaluation is planning, training, and implementation that aligns itself with the plan and do phases of the PDSA framework. Phase three is the sustainment of the project that corresponds with the study and act pieces of the PDSA framework by examining the results, making improvements, and measuring the success of the project (AHRQ, 2015). The evaluation framework gives project leaders and the team a guide to evaluate clinical processes and outcomes and if they are measurable and sustainable.

The evaluation of a project determines if the project is making an impact, is sustainable, and measurable. The purpose of an evaluation is to integrate new knowledge to improve outcomes and determine if goals were achieved (CDC, 2012). There are many types of evaluations to determine if a program is successful and sustainable: formative, summative, process, impact, and outcome (Hodges & Videto, 2011). They are key to helping the team translate the data and its application to bedside practice. However, formative evaluation allows the project to be improved during its implementation and throughout implementation that is similar to the PDSA methodology. The AHRQ's TeamSTEPPS implementation guide contains an organizational readiness assessment that was completed by the patient safety department to help identify the opportunity for change, assess for barriers, and determine if resources were in place. The readiness assessment recognized the rising trend in safety events that was the catalyst for the TeamSTEPPS training and was implemented by the DNP student.

A recommendation for implementing TeamSTEPPS training is the involvement of stakeholders (physicians, nurses, and administration) in the planning and implementation

of the project is key to the project. Using Kotter's change theory, leaders need to communicate the urgency of the change with the support of a guiding coalition and use actions to demonstrate their commitment to the change (Ponti, 2011). Engaging stakeholders at the unit level and system level increases the sustainability of project if the team is part of the design, redesign, implementation, monitoring results, modifying actions, and further monitoring (Parsons & Cornett, 2011). Leaders at the system level are accountable for facilitating the project, creating short-term wins, and ensure that the new process becomes part of the organization's culture (Parsons & Cornett, 2011). Stakeholders can determine costs and resources needed for implementation, but leadership needs to collaborate with stakeholders to access the needed resources. Leaders need to emphasize the urgency and priority of the project and allocate for staffing if the project team determines the need for more staffing or project resources. The execution and evaluation of the training also involves the stakeholders in developing the protocols or guidelines that will affect their practice. The team would evaluate outcomes by observing for changes in trends of adverse events and the sustainment of a culture of safety.

Nursing leadership should know the project's purpose, the target population, and if the project will require any financial costs or additional support before giving their support (Hodges & Videto, 2011). In an ideal situation, top-down and bottom-up support would assist a project to become a best practice in its practice setting and part of the culture. Due to the short evaluation period of the project, the continued monitoring of TeamSTEPPS training at the 6 month and 1 year period will reveal if the improved

behaviors of teamwork and communication are sustainable. The future monitoring of the TeamSTEPPS training will require the commitment of the leadership team and staff champions to evaluate the project's impact and whether additional training is needed after the DNP project is completed.

Contributions of the Doctoral Team

The DNP student and patient safety officer engaged the project team by keeping them up-to-date via monthly meetings, email communication, and one-on-one conversations to keep them informed. The team also identified the lack of staffing, high census, and minimal education time as possible challenges to attend or utilize the principles in TeamSTEPPS training. Based on their feedback, the project team helped role model the concepts of bedside report, SBAR, CUS, and huddles into daily practice as observed by the DNP student and the patient safety officer.

The team also assisted with communicating the reason for TeamSTEPPS implementation and its impact on teamwork and patient safety. The project team identified the transition period as a high-risk period for breakdowns in communication and teamwork. The project team also provided feedback on the communication algorithm and hand-off process that was initiated in July 2016. The team gathered feedback from their peers to determine the system gaps in care and possible solutions to prevent miscommunication. The Centers for Disease Control and Prevention's (2011) framework is a framework picked by the DNP student to aid in the translation of TeamSTEPPS' best practices in the perinatal setting. The framework engages stakeholders by keeping them informed, identifying possible conflicts, and addressing

them as they occur. Sustaining the change will require leaders on all levels of the microsystem and macro system of the organization to engage staff and encourage the change in practices and attitudes (Parsons, 2011).

Strengths and Limitations of the Project

A barrier that could influence participation and patient outcomes are staff experiencing change fatigue. Change fatigue is defined as rapid and continuous change in the workplace causing high levels of stress, exhaustion, and burnout associated with staff under constant pressure to implement new practice changes (McMillan & Perron, 2013). Change projects have a high failure rate at 62% citing poor leadership and organizational culture as the main reasons for their failure (Ponti, 2011). However, staff experiencing a constant state of change may not participate or verbally oppose the change due to the stress of their mental and physical abilities. As a result, staff are labeled as saboteurs, but they may be dealing with the condition of change fatigue.

Change is inevitable in healthcare, and there are no solutions for change fatigue except to help staff adjust for a practice change and let it embed itself into the organizational culture. The long-term goal is the establishment of a patient safety culture where stakeholders integrate the use of huddles, bedside shift report, and hand-offs in their daily practice. Staff may reach a saturation point in knowledge where they are unable to adopt another skill if they do not have enough time to absorb the previous one (Eads, 2015). The effect of change fatigue may result in staff deciding not to use the structured communication techniques that they learned in TeamSTEPPS training and revert to old practice behaviors.

One limitation of the project's sustainment is the implementation of a new electronic medical record system occurring simultaneously as the TeamSTEPPS training. The implementation of the electronic medical record system has a higher priority for staff training and resources by hospital administration and nursing leadership, making it difficult for staff and physicians to attend focus on the patient safety reasons for TeamSTEPPS training. To engage the staff in two practice changes simultaneously is a challenge since both initiatives impact patient care and patient safety outcomes.

Another limitation of the project is its generalizability to other settings and professions. Since the majority of participants were registered nurses, scrub techs, and patient care techs, the impact of teamwork and communication to other professional roles and their perception of teamwork is limited. Future research needs to include the participation of physicians since they are part of the interprofessional team that cares for mothers and newborns. Furthermore, increased interprofessional participation may strengthen the recommendation that inter-professional team training is needed in medical and nursing curriculums for future providers to practice collaborative communication and teamwork before becoming licensed professionals.

The short evaluation period is another limitation to observe for outcomes and sustainability due to the timing and length of training. The length of the training was adapted to fit the schedules of staff with a focus on improving communication and teamwork behaviors with role-playing. Due to the electronic medical record implementation scheduled to start in October 2016, the competition for staff attendance and resources affected the lower response rate for postsurvey data collection. Nursing

leadership will need to continue the evaluation after the DNP project completion at the 6 month or 1 year benchmark to assess the impact of TeamSTEPPS training on teamwork, communication attitudes, and behaviors.

Strengths of the project include the project setting in a Magnet-recognized hospital where strong leadership, professional autonomy, and nursing empowerment are valued and part of the organization's culture. Nurses feel empowered to make decisions for patients and improve their practice based on the best clinical evidence. According to Grant et al. (2010), the Magnet culture creates an environment where nurses feel supported by their nursing leaders and peers to make decisions to change practices. Transformational leadership is role-modeled by the chief nursing officer and her commitment to nursing empowerment. In a Magnet culture with transformational leaders, there is a strong correlation between a nurse's job satisfaction and their commitment to the organization (Schwartz et al, 2011). A strong nurse leader guides the team and allows them to make decisions for the project and help it succeed. The nurse leaders involved in the TeamSTEPPS project demonstrates transformational leadership qualities. The clinical manager and service line director for the perinatal area are supportive of TeamSTEPPS training and are dedicated to making sure that all mothers and newborns have safe and quality care.

Another strength of the project is the low cost of implementing AHRQ's core curriculum and materials. All of the documents are free and accessible from AHRQ's website for organizations to use with possible costs accruing from the printing of materials and staff time to implement the program. A master trainer course is offered for

in-person training without cost for attendance except for travel expenses or staff can complete an online course. Both training courses require the participant to complete a teach-back session with a certified master trainer to meet the criteria of obtaining a certified master trainer certificate. The patient safety officer is a certified master trainer for TeamSTEPPS and was an integral player in the implementation of the project.

Based on the results of the TeamSTEPPS survey and the decrease in safety events, TeamSTEPPS training made an impact and improved communication and teamwork within the perinatal setting. The use of standardized communication and language during routine and emergent care builds an effective and prepared healthcare team. The positive results of training demonstrate that TeamSTEPPS is an essential patient safety tool that can assist organizations in building a culture of safety and improve staff satisfaction and patient outcomes.

Section 5: Dissemination Plan

Dissemination conveys research findings and translates the evidence to the bedside, where nurses can affect patient care and outcomes (White & Dudley-Brown, 2012). Dissemination is an integral step in project planning where information is shared so that others can learn from the experience to replicate or improve their practice. The TeamSTEPPS training results will be shared with hospital leaders and clinical staff via staff meetings, email communication, nursing grand rounds, and poster or podium presentations at the state and national level. Outcomes will be measured by decrease in patient safety events for the perinatal setting and improved teamwork and communication as evidenced in the TPQ results 1 month post TeamSTEPPS training.

I will use the expertise and knowledge of my preceptor, the patient safety officer, concerning the micro and macro levels of the system to help me evaluate and translate the information via the three Ps: poster, publication, and presentation (White & Dudley-Brown, 2012). Her mentorship and the assistance of my nursing colleagues have inspired me to be an effective and passionate leader for perinatal patient safety. The Association of Women's Health, Obstetrics, and Neonatal Nurses (AWHONN), a professional nursing association, publishes a peer-reviewed journal called *Nursing for Women's Health* every month for nurses who work in perinatal care. I plan to submit an abstract to this journal since it appeals to perinatal nurses and raises awareness regarding practice issues that affect patient care. Another option is entering a submission for the 2017 AWHONN National Conference as either a poster or podium presentation. If the project is accepted, the project implementation and results would be disseminated to over 3,000

nurses who attend every year. Staff of perinatal centers seeking to improve their patient safety outcomes may attend a poster or podium presentation that outlines a TeamSTEPPS training program that is low cost and feasible.

At the state level, another event for the potential dissemination of results is the Nursing Excellence Conference sponsored by the South Carolina Hospital Association. This conference accepts poster and podium submissions for evidence-based practice, process improvement, or research and gives an opportunity to share outcomes with hospital organizations from across the state. Staff at any clinical setting experiencing communication and teamwork failures may want to replicate the project, given that TeamSTEPPS can be applied in any clinical setting. Another state-level opportunity for dissemination is the 2017 AWHONN South Carolina Section Conference, an annual event attended by perinatal nurses from across the state. The project may affect the delivery of nursing care and patient outcomes if adopted at the local level and throughout perinatal centers in the state. TeamSTEPPS training can improve perinatal communication and teamwork and has the potential to decrease the 27.1% maternal mortality rate and the 4.4% newborn mortality rates in the state, which are among the highest in the United States (United Health Foundation, 2016).

Analysis of Self

As a nurse leader, I am charged with ensuring that CRM principles from TeamSTEPPS training are embedded into daily practice. Engagement of staff is a key step in a successful project (Parsons & Cornett, 2011). With the knowledge that 70% of change projects fail due to lack of staff participation, I had to engage staff in positive

teamwork behaviors, be present on the units, and communicate the vision and progress of the project (Parsons & Cornett, 2011). I observed and validated patient handovers and witnessed positive communication exchanges between staff members during project implementation. My presence on the unit helped me connect the project's objectives regarding patient safety to the unit level. I managed issues related to patient hand-off and teamwork and diminished resistance to practice changes, with positive results (Shirey, 2011). The use of Kotter's change theory as a framework assisted me in keeping the staff engaged with constant communication regarding safety events, implementing the change, and recognizing quick wins when proper hand-off and teamwork were achieved (Shirey, 2011).

The TeamSTEPPS training project provided me with an opportunity to develop my leadership skills and attain professional growth. The National Center for Healthcare Leadership (NCHL) competency model is a framework that focuses on the areas of transformation, execution, and people with a subset of competencies. The subset competencies—innovative thinking, self-confidence, team leadership, and process and project management—are areas in which I want to improve as a growing nurse leader (NCHL, 2015). The subset of competencies aligns with the DNP Essentials regarding Organizational and Systems Leadership for Quality Improvement and Systems Thinking, Clinical Scholarship and Analytical Methods for Evidence-Based Practice, Interprofessional Collaboration for Improving Patient and Population Health Outcomes, Health Care Policy for Advocacy in Health Care, and Clinical Prevention and Population Health for Improving the Nation's Health (AACN, 2006). The DNP scholarly project on

TeamSTEPPS training integrated concepts from the DNP Essentials and strengthened my ability to lead stakeholders, direct the project's goals and objectives, and produce measurable outcomes.

The IOM envisions DNP-prepared leaders linking best practices and research to bedside practice that supports improvement in patient outcomes and quality of care. From this experience of implementing a patient safety initiative, I have gained understanding of the significance of an advanced practice nurse's role in the translation and dissemination of evidence in today's healthcare environment. As a change agent and leader of the TeamSTEPPS training project, I had to collaborate with multidisciplinary providers, educate and implement TeamSTEPPS principles, design the training for staff, and evaluate the project's outcomes. I learned that being an effective leader requires timely and constant communication, efforts to address communication and teamwork barriers between staff, and advocacy for practice changes. Despite its challenges, the project reaffirmed my belief that nursing is an honorable profession and combines the attributes of caring, compassion, accountability, and responsibility. I will continue to work tirelessly in my organization and will seek local and national opportunities to promote quality outcomes for mothers and newborns. All mothers and newborns deserve a safe birth experience regardless of location or country.

Summary

This DNP scholarly project involving TeamSTEPPS training provided an opportunity to influence patient safety outcomes in the perinatal setting by reducing safety events and improving team-centered communication between nurses and their

teammates. The implementation of TeamSTEPPS training supports the growth of a patient safety environment and improvement in communication and teamwork in perinatal care and other high risk areas. TeamSTEPPS training fosters a learning environment in which staff can practice skills and behaviors required for healthcare teams to be effective, safe, and reliable during routine and emergent care. TeamSTEPPS training is a practical patient safety tool that organizations can use to decrease patient harm and build a culture focused on quality and better patient outcomes.

References

- Agency for Healthcare Research and Quality. (2015). *TeamSTEPPS implementation guide*. Retrieved September 29, 2016, from <http://www.ahrq.gov/sites/default/files/wysiwyg/professionals/education/curriculum-tools/teamstepps/instructor/essentials/implguide.pdf>
- Agency for Healthcare Research and Quality. (2016). TeamSTEPPS 2.0. Retrieved September 4, 2016, from <http://www.ahrq.gov/teamstepps/instructor/index.html>
- American College of Obstetricians and Gynecologists. (2015, April). *Clinical guidelines and standardization of practice to improve outcomes* (Committee Opinion No. 629). Retrieved October 23, 2016, from <http://www.acog.org/Resources-And-Publications/Committee-Opinions/Committee-on-Patient-Safety-and-Quality-Improvement/Clinical-Guidelines-and-Standardization-of-Practice-to-Improve-Outcomes>
- Arora, K., Shields, L., Grobman, W., D'Alton, M., Lappen, J., & Mercer, B. (2015). Triggers, bundles, protocols, and checklists—What every maternal care provider needs to know. *American Journal of Obstetrics & Gynecology*, 214(4), 444-451. doi:10.1016/j.ajog.2015.10.011
- Beckett, C., & Kipnis, G. (2009). Collaborative communication: Integrating SBAR to improve quality/patient safety outcomes. *Journal for Healthcare Quality*, 31(5), 19-28. doi:10.1111/j.1945-1474.2009.00043.x
- Beitlich, P. (2015). TeamSTEPPS implementation in the LD/NICU settings. *Nursing Management*, 46(6), 15-18. doi:10.1097/01.NUMA.0000465404.30709.a5

- Bingham, D., & Elliott, M. (2009). Effective implementation strategies and tactics for leading change on maternity units. *Journal of Perinatal and Neonatal Nurses*, 24(1), 32-42. doi:10.1097/JPN.0b013e3181c94a24
- Budin, W., Gennaro, S., O'Connor, C., & Contratti, F. (2014). Sustainability of improvements in perinatal teamwork and safety climate. *Journal of Nursing Care Quality*, 29(4), 363–370. doi:10.1097/NCQ.000000000000067
- Buffington, A., Zwink, J., Fink, R., DeVine, D., & Sanders, C. (2012). Factors affecting nurse retention at an academic magnet hospital. *Journal of Nursing Administration*, 42(5), 273-281. doi:10.1097/NNA.0b013e3182433812
- Burgess, A. (2014). An evolutionary concept analysis of labor support. *International Journal of Childbirth Education*, 29(2), 62-72.
- Castner, J., Foltz-Ramos, K., Schwartz, D., & Ceravolo, D. (2012). A leadership challenge: Staff nurse perceptions after an organizational TeamSTEPPS initiative. *Journal of Nursing Administration*, 42(10), 467-472. doi:10.1097/NNA.0b013e31826a1fc1
- Clapper, T., & Kong, M. (2012). TeamSTEPPS: The patient safety tool that needs to be implemented. *Clinical Simulation in Nursing*, 8, e367-e373. doi:10.1016/j.ecns.2011.03.002
- Clarke, C., & Persaud, D. (2011). Leading clinical handover improvement: A change strategy to implement best practices in the acute care setting. *Journal of Patient Safety*, 7(1), 11-18. doi:10.1097/PTS.0b013e31820c98a8
- Creanga, A., Berg, C., Syverson, C., Seed, K., Bruce, C., & Callaghan, W. (2015).

- Pregnancy-related mortality in the United States, 2006–2010. *Obstetrics and Gynecology*, 125(1), 5-12. doi:10.1097/AOG.0000000000000564
- Deering, S., Johnston, L., & Colacchio, K. (2011). Multidisciplinary teamwork and communication training. *Seminars in Perinatology*, 35, 89-96.
doi:10.1053/j.semperi.2011.01.009
- Endozien, L. (2015). Situational awareness and its application in the delivery suite. *Obstetrics and Gynecology*, 125(1), 65-69. doi:10.1097/AOG.0000000000000597
- Fransen, A., Banga, F., van de Ven, J., Mol, B., & Oei, S. (2015). Multi-professional simulation-based team training in obstetric emergencies for improving patient outcomes and trainees' performance. *Cochrane Database of Systematic Reviews*, 2, 1-9. (Art. No. CD011545). doi:10.1002/14651858.CD011545
- Gaston, T., Short, N., Ralyea, C., & Casterline, G. (2016). Promoting patient safety: Results of a TeamSTEPPS initiative. *Journal of Nursing Administration*, 46, 2012-2017. doi:10.1097/NNA.0000000000000333
- Gittell, J., Beswick, J., Goldmann, D., & Wallack, S. (2015). Teamwork method for accountable care: Relational coordination and TeamSTEPPS. *Health Care Management Review*, 40(2), 116-125. doi:10.1097/HMR.0000000000000021
- Grant, B., Colello, S., Riehle, M., & Dende, D. (2010). An evaluation of the nursing practice environment and successful change management using the new generation Magnet Model. *Journal of Nursing Management*, 18(3), 326–331.
doi:10.1111/j.1365-2834.2010.01076.x
- Grunebaum, A., Chervenak, F., & Skupski, M. (2011). Effect of a comprehensive

obstetric patient safety program on compensation and sentinel events. *American Journal of Obstetrics and Gynecology*, 204(2), 97-105.

doi:10.1016/j.ajog.2010.11.009

Haller, G., Garnerin, P., Morales, M., Pfister, R., Berner, M., Irion, O., Clergue, F.,& Kern, C. (2008). Effect of crew resource management training in a multidisciplinary obstetrical setting. *International Journal for Quality in Health Care*, 20(4), 254-263. doi:10.1093/intqhc/mzn018

Harvey, E. M., Echols, S. R., Clark, R., & Lee, E. (2014). Comparison of two TeamSTEPPS training methods on nurse failure-to-rescue performance. *Clinical Simulation in Nursing*, 10(2), e57-e64.
<http://dx.doi.org/10.1016/j.ecns.2013.08.006>

Havyer, R., Wingo, M., Confrere, N., Nelson, D., Halvorsen, A., McDonald, F., & Reed, D. (2013). Teamwork assessment in internal medicine: A systematic review of validity evidence and outcomes. *Journal of General Internal Medicine*, 29(4), 894-910. doi:10.1007/s11606-013-2686-8

Hodges, B. & Videto, D. (2011). *Assessment and planning in health programs*. Sudbury, MA: Jones & Bartlett Learning.

Howard, E., & Jolles, D. (2015). Navigating the perinatal quality landscape. *The Journal of Perinatal & Neonatal Nursing*, 29(2), 116-129.
doi:10.1097/JPN.0000000000000092

The Joint Commission. (2004). Sentinel Event Alert Number 30: Preventing infant death and injury during delivery. Retrieved May 2, 2016, from

https://www.jointcommission.org/assets/1/18/SEA_30.PDF.

The Joint Commission. (2010). Sentinel Event Alert Number 44: Preventing Maternal Death. Retrieved May 2, 2016 from

https://www.jointcommission.org/assets/1/6/SEA_44_Maternal_Death_4_26_16.pdf.

The Joint Commission. (2016). Sentinel event data - root causes by event type. Retrieved from

http://www.jointcommission.org/assets/1/18/Root_Causes_by_Event_Type_2004-2015.pdf.

The Joint Commission. (2016a). Sentinel events. Retrieved from

https://www.jointcommission.org/assets/1/6/CAMH_24_SE_all_CURRENT.pdf

Keebler, J., Dietz, A., Lazzara, E., Benishek, L., Almeida, S., Toor, P., King, H., & Salas, E. (2014). Validation of a teamwork perceptions measure to increase patient safety. *BMJ Quality and Safety*, 23, 718-726. doi:10.1136/bmjqs-2013-001942

Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (Eds). (2000). *To err is human: Building a safer health system*. Washington, D.C.: National Academy Press.

Kotter, J. (2012). *Leading change*. Boston, MA: Harvard Business Review Press.

Lee, S., Phan, P., Dorman, T., Weavers, S., & Provonost, P. (2016). Handoffs, safety culture, and practices: evidence from the hospital survey on patient safety culture.

BMC Health Services Research, 16(254), 1-8. doi:10.1186/s12913-016-1502-7

Leonard, M., & Frankel, A. (2011). Role of effective teamwork and communication in delivering safe, high-quality care. *Mount Sinai Journal of Medicine*, 78, 820-826.

doi:10.1002/msj.20295

Lukens, M., & Fragneto, R. (2013). Improving communication in the labor suite.

Anesthesiology Clinics, 31(3), 545-558.

doi: <http://dx.doi.org/10.1016/j.anclin.2013.03.00>

Lyndon, A., Johnson, C., Bingham, D., Napolitano, P., Joseph, G., Maxfield, B., &

O'Keeffe, D. (2015). Transforming communication and safety culture in

intrapartum care: A multi-organization blueprint. *Obstetrics and Gynecology*,

125, 1049-1055. doi:0.1097/AOG.0000000000000793

Mahlmeister, L. (2006). Best practices in perinatal care: Reporting “near misses” and

“good catches” as a risk reduction strategy. *Journal of Perinatal & Neonatal*

Nursing, 20(3), 197-199.

Matze, B., Houston, S., Fischer, U., & Bradshaw, M. (2014). Using a team-centered

approach to evaluate effectiveness of nurse–physician communications. *JOGNN*,

43, 684-694. doi:10.1111/1552-6909.12486

McMillan, K., & Perron, A. (2013). Nurses amidst change: The concept of change fatigue

offers an alternative perspective on organizational change. *Policy, Politics and*

Nursing Practice, 20, 1–7. doi:10.1177/1527154413481811

Merién, A., van de Ven, J., Mol, B., Houterman, S. & Oei, S. (2010). Multidisciplinary

Team training in a simulation setting for acute obstetric emergencies: A

systematic review. *Obstetrics & Gynecology*, 115(5), 1021-1031.

doi:10.1097/AOG.0b013e3181d9f4cd

Nielsen, P. E., Goldman, M. B., Mann, S., Shapiro, D. E., Marcus, R. G., Pratt, S. D., ...

- & Gluck, P. A. (2007). Effects of teamwork training on adverse outcomes and process of care in labor and delivery: a randomized controlled trial. *Obstetrics & Gynecology*, 109(1), 48-55. doi:10.1097/01.AOG.0000250900.53126.c2
- O'Daniel, M., & Rosenstein, A. (2008). Professional Communication and Team Collaboration. In: Hughes RG, editor. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses*. AHRQ Publication No. 08-0043. Rockville, MD.
- Parsons, M., & Cornett, P. (2011). Leading change for sustainability. *Nurse Leader*, 9(4), 36-40. doi:http://dx.doi.org/10.1016/j.mnl.2011.05.005
- Pettker, C., & Grobman, W. (2015). Obstetric safety and quality. *Obstetrics and Gynecology*, 126(1), 196-200. doi:10.1097/AOG.0000000000000918
- Phipps, M., Lindquist, D., McConaughy, E., O'Brien, J., Raker, C., & Paglia, M. (2012). Outcomes from a labor and delivery team training program with simulation component. *American Journal of Obstetrics & Gynecology*, 206(1), 3-9. doi:http://dx.doi.org/10.1016/j.ajog.2011.06.046
- Ponti, M. (2011). Why change fails. *Nurse Leader*, 9(4), 41-43. doi:http://dx.doi.org/10.1016/j.mnl.2011.05.004
- Poot, E., de Bruijne, M., Wouters, M., de Groot, C., & Wagner, C. (2014). Exploring perinatal shift-to-shift handover communication and process: An observational study. *Journal of Evaluation in Clinical Practice*, 20(2), 166-175. doi:10.1111/jep.12103
- Pronovost, P., Murphy, D., & Needham D. (2010). The science of translating research into practice in intensive care. *American Journal of Respiratory and Critical*

Care Medicine, 182(12), 1463–1464. doi:10.1164/rccm.201008-1255ED

- Riley, W., Hansen, H., Gürses, A., Davis, S., Miller, K., & Priester, R. (2008). The nature, characteristics and patterns of perinatal critical events teams. *Advances in Patient Safety: New Directions and Alternative Approaches*, (Vol. 3: Performance and Tools). Rockville (MD): Agency for Healthcare Research and Quality. Retrieved August 16, 2016, from <http://www.ncbi.nlm.nih.gov/books/NBK43664>.
- Riley, W., Davis, S., Miller, K., Hansen, H., Sainfort, F., & Sweet, R. (2011). Didactic and simulation nontechnical skills team training to improve perinatal patient outcomes in a community hospital. *The Joint Commission Journal on Quality and Patient Safety*, 37(8), 357-364. doi:10.1016/S1553-7250(11)37046-8
- Rosenman, E., Shandro, J., Ilgen, J., Harper, A., & Fernandez, R. (2014). MD leadership training in health care action teams: A systematic review academic medicine. *Academic Medicine*, 89(9), 1295–1306. doi:10.1097/ACM.0000000000000413
- Salas, E., Gregory, M., & King, H. (2011). Team training can enhance patient safety-the data, the challenge ahead. *The Joint Commission Journal on Quality and Patient Safety*, 37(8), 339-349. doi:10.1016/S1553-7250(11)37043-2
- Schwartz, D. (2011). Transformational leadership: Implications for nursing leaders in facilities seeking magnet designation. *AORN Journal*, 93(6), 737–748. doi:<http://dx.doi.org/10.1016/j.aorn.2010.09.032>
- Shannon, D. (2011). Obstetrical team training: How the response to a tragic event revolutionized care across the country. *Physician Executive*, 37(2), 4-11.
- Shirey, M. (2011). Establishing a sense of urgency for leading transformational change.

Journal of Nursing Administration, 41(4), 145-148.

doi:10.1097/NNA.0b013e3182118550

Sonesh, S., Gregory, M., Hughes, A., Feitosa, J., Benishek, L., Verhoeven, D., Patzer, B.,

Salazar, M., Gonzalez, L., & Salas, E. (2015). Team training in obstetrics: A multi-level evaluation. *Families, Systems, & Health*, 33(3), 250–261. doi:

10.1037/fsh0000148

Sorra, J., & Dyer, N. (2010). Multilevel psychometric properties of the AHRQ hospital survey on patient safety culture. *BMC Health Services Research*, 10(199), 1-13.

doi:10.1186/1472-6963-10-199

Sweeney, J., , K. (2015). An analysis comparing “sim huddles” to

traditional simulation for obstetric emergency preparedness. *Nursing for Women's Health*, 19(1), 16-25. doi:10.1111/1751-486X.12172

Thomas, L., & Galla, C. (2013). Building a culture of safety through team training and

engagement. *BMJ Quality & Safety*, 89, 394-401. doi:10.1136/bmjqs-2012-001011

United Health Foundation. (2016). America's health rankings: Health of women and children report. Retrieved October 20, 2016 from

<http://www.americashealthrankings.org/learn/news/2016-americas-health-rankings-health-of-women-and-children-report>

van Noord, I., de Bruijne, M., Zwijnenberg, N., Jansma, E., van Dyck, C.,

& Wagner, C. (2014). Does classroom-based crew resource management

training improve patient safety culture? A systematic review. *Open Medicine*, 2,

1-15. doi:10.1177/2050312114529561

- Wagner, B., Meirowitz, N. Shah, J., Nanda, D., Reggio, L., Cohen, P., Kritt, K., Kaufman, L., Walia, R., Bacote, C., Lesser, M. Pekmezaris, R., Fleischer, A.,... & Abrams, K. (2011). Comprehensive perinatal safety initiative to reduce adverse obstetric events. *Journal for Healthcare Quality*, 34(1), 6-15. doi:10.1111/j.1945-1474.2011.00134.
- Weaver, S., Dy, S., & Rosen, M. (2015). Team-training healthcare: a narrative synthesis of the literature. *British Medical Journal Quality and Safety*, 23, 359-372. <http://dx.doi.org/10.1136/bmjqs-2013-001848>
- Weller, J., Boyd, M., & Cumin, D. (2014). Teams, tribes, and patient safety: Overcoming barriers to effective teamwork in healthcare. *Postgraduate Medicine Journal*, 90, p. 149-150. doi:10.1136/postgradmedj-2012-131168
- Yalcin, B. (2014). Team training enhances collaboration and patient safety: A systematic approach and implementation suggestions. *The Journal of MacroTrends in Health and Medicine*, 2(1), 205-211.

Appendix A: TeamSTEPPS Communication and Teamwork Strategies

TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety)	An evidence-based framework to optimize team performance in healthcare settings based on Leadership, Situation Monitoring, Mutual Support, and Communication. Team Competency Outcomes also integrate with Knowledge, Attitudes, and Performance.
Brief:	A planning session for the team to discuss team formation, roles and expectations, and contingencies
Huddle:	To adjust the plan when changes occurs and problem solve to reestablish situation awareness
Debrief:	Designed to improve team performance and effectiveness based on team feedback
Shared mental models	Team members sharing information to make sure that everyone on the team is “on the same page.”
SBAR	Communication strategy using regarding a patient’s condition that requires immediate attention and action
CUS	Teammates stopping the line and voicing concerns: <ul style="list-style-type: none"> • I am Concerned • I am Uncomfortable • This is a Safety issue or I don’t feel like this is Safe!
Two Challenge Rule	When an initial assertion is ignored at least two times, the teammates may voice concern at least two times before taking a stronger course of action and utilizing the chain of command especially regarding a safety breach

Reference: (Agency for Healthcare Research and Quality, 2015)

Appendix B: Perinatal Patient Safety Adverse Events

Maternal Indicators	Fetal/Neonatal Indicators
Maternal Death	Stillbirth
Admitted to a higher level of care	Neonatal Death
Uterine Rupture	5 minute APGAR < 7
Peripartum Hysterectomy	Birth Trauma
Return to the OR	HIE-hypoxic-ischemic encephalopathy
Blood Transfusions > 4 units	

Reference: (Wagner et al., 2011).

Appendix C: Safety Initiatives Designed to Target the Potential Contributing Factors to
Adverse Outcomes

Safety Initiatives	Communication	Escalation	Lack of Standardized Protocol	Lack of Standardized EFM
Team STEPPS	✓	✓		
EFM course and exam	✓		✓	
Multi-disciplinary teaching rounds	✓	✓	✓	✓
Obstetrical emergency simulation	✓	✓	✓	

Reference: (Wagner et al., 2011).