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Improving Management of Obstetrical Emergencies: Using Simulation-Based Training

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Comprehensive Project Report

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Abstract

The aim of this Executive Leadership Doctorate in Nursing Practice project was to assess the effectiveness of simulation-based training as a strategy to ensure patient safety and quality care by improving the knowledge and confidence of obstetric nursing staff in a mid-eastern country. Collateral goals included the development of a simulation-based interactive training program to improve staff response to obstetric emergencies and the establishment of an Interprofessional Simulation Training Center.In addition, this DNP project was associated with a larger research project designed to assess the effectiveness of SBT methodology as an tool for interprofessional education(IPE).

The use of simulation-based training is widely accepted and used in healthcare education. Several benefits of simulation-based training include a learner-centered approach, safe acquisition of technical skills training, and the development of effective communication skills. Simulation-based training provides healthcare professionals the opportunity to be involved in simulated patient care scenarios without causing harm to actual patients.

The labor and delivery unitis one of the vital areas in the hospital where the management of obstetric emergencies of laboring women, neonates, and postpartum mothers is critical and requires expert skills sets. The increasing number of harm events occurring in obstetrics warranted action. With this need identified, the decision was made to implement a simulation-based training program to improve participants' knowledge and confidence in their ability to intervene and manage obstetric emergencies. Project feedback from all participants in the simulation-based training revealed a favorable climate for division-wide implementation.

***Key words*:**obstetric emergencies, simulation-based training, patient safety, and quality care

Section II

Introduction

Obstetrical emergencies are pregnancy related conditions that can threaten the lives of both mother and newborn. Obstetrical emergencies can occur during pregnancy, labor, or post-delivery. Obstetrical emergencies tend to be unpredictable, stressful, and can cause ethical dilemmas because two lives are at stake. Additionally, obstetrical emergencies challenge the skills and expertise of the staff (Fransen, Banga, van de Ven, Mol, &Oei, 2015).

Problem Description

Global mismanagement of obstetric emergencies. The issue of mismanagement of obstetric emergencies is a worldwide problem. A review of studies on the subject spanned the globe, including the United Kingdom, the Americas, Australia, Scandinavia, Africa, and the Middle East (Ameh& van den Broek, 2015; Fransen et al., 2015; Merién, van de Ven, Mol, Houterman, &Oei, 2010).

In 2010, the United Nations launched the Global Strategy for Women's and Children's Health. The initiative focused on global safety in maternity care and resulted in a dramatic decrease in maternal deaths worldwide. Globally, there were an estimated 289,000 maternal deaths in 2013, a decline of 45% from 1990 (World Health Organization, 2013).

Unfortunately, while health care providers intend to provide safe, quality care, when faced with emergency situations patients may receive less than optimal care, which can result in adverse outcomes. Poor maternal/neonatal outcomes in high-income countries have been linked primarily to inappropriate management of OB emergencies (Crofts et al., 2014; Fransen et al., 2015). Furthermore, inadequate staff training has been the most commonly identified cause of adverse events in OB emergencies globally (Ameh& van den Broek, 2015; Fransen et al., 2015; Merién et al., 2010).

Less than optimal emergency care is frequently identified as a factor in adverse outcomes (CMACE, 2011; Nolan et al., 2010; IOM, 2000). In order to provide safe, quality care, practitioners must be proficient in communication, leadership, problem solving, and conflict management (AONE, 2005). Furthermore, interprofessional collaborative relationships must be promoted, nurtured, and sustained. The ability to utilize emotional intelligence and to function within a team culture are also essential (AONE, 2005).

Nursing in the Middle East. The majority of nursing and medical staff within Middle East health systems are recruited from around the world (Philippines, India, South Africa, Malaysia, Europe, and other Arab countries). They bring variable qualifications, training backgrounds, and skill sets (Altaweli, McCourt, & Baron, 2014; Amatullah, 2007). Of note, the employment requirements for midwives and obstetric nurses in the Middle East facility includes specialty certification and at least 2 years of recent clinical experience in obstetrics/perinatal nursing care.

This unique context of nursing in the Middle East encompasses many cultures, both within nursing teams and across the wider population. Nursing care is provided primarily by expatriate nurses who are recruited from many parts of the world and present with diverse cultural, linguist, and educational backgrounds. Although, highly skilled technically, expatriate nurses tend to lack knowledge about the language, culture, and traditional practices of the patient population (Amatullah, 2007; 2008). The healthcare system is shaped by Islamic principles and values that inform health care practices (Al-Shahri, 2002; Al-Yateem, Al-Yateem, &Rossiter, 2015; Amatullah, 2007, 2008). Al-Fozan (2013) summarized the concerns of nursing care in the Middle East:

Primary domains of concerns have emerged from reliance on expatriate nurses, language

> barriers and effectiveness of communication, the majority of nurses speak English while the language of the patients is Arabic; inability of expatriates to deliver culturally sensitive care, and sustainability of the nursing workforce (p.1).

Language barriers. Coffman (2004) conducted a meta-synthesis of qualitative studies to examine the experiences of nurses caring for patients from other cultures. The meta-synthesis summarized the experiences of clinicians caring for patients from a variety of cultural backgrounds. The findings identified language barriers as the major cause of ineffective communication with patients. Many expatriate nurses working in hospitals in the Middle East have expressed their concerns about communication with patients andother members of the multinational staff (Amatullah, 2008, 2016).

Moral distress. For many of the expatriate nurses in the Middle East, the manifestation of moral distress is also of concern. The issue of moral distress often appears as a numbing or psychological distancing exhibited when nurses are frequently faced with situations in which they feel powerless to do the right thing (Grace, 2016). For example, many expatriate nurses have an inherent fear of the authority and power of physicians to cause nurses to lose their jobs. This fear of termination may play a major role in a nurse's decision not to take action or speak up when faced with problematic practices (Grace, 2016).

Leadership styles. There is evidence that nurse leaders can both facilitate patient safety and help to create a supportive workplace (Darrah, Traynor, & Joyce-McCoach, 2016). In view of the health care context in the Middle East, it is essential to identify leadership styles best suited for such multicultural diversity and challenges (Darrah, et al., 2016; El Amouri& O'Neill, 2014).

Rodgers (2012) suggested that it is critical for leaders to incorporate a blend of

leadership styles in accordance with the situation. For example, it was my observation that the most successful leaders in our practice environment in the ME utilized different leadership styles as indicated by the situation and/or presenting issue. As such, this Nurse Executive and DNP student was further incentivized in her role to the responsibility inherent in the conception, development, and implementation of a quality improvement project housed in a simulation-based interactive program for obstetrical staff.

Obstetrics emergencies in the Kingdom of Saudi Arabia (KSA). In 2015, the World Health Organization (WHO) reported twelve maternal deaths during the intrapartum (labor/delivery) period in the Kingdom of Saudi Arabia (KSA) compared to ten deaths in 2013 (WHO, 2015). In 2016, the obstetrics (OB) services of our hospitals across five geographical regions were impacted by an even more dramatic increase in maternal and neonatal morbidity and mortality as a direct result of the mismanagement of OB emergencies.

In the Middle East, in general, the childbirth process is affected by culture as well as by religion, race, economic status, level of education, and environmental factors (Al-Shahri, 2002; Al-Yateem et al., 2015; Amatullah, 2008). Within the cultural context of the ME, most women prefer to be treated by female healthcare practitioners, especially during pregnancy and delivery (Al-Shahri, 2002; Al-Yateem et al., 2015; Amatullah, 2008). As such, the midwifery/obstetrical nurse role is considered crucial and often expanded to fill the gap when female doctors are not readily available. To support this expanded role for midwives, the training and competencies related to management of OB emergency situations is essential.

Available Knowledge

Several database searches were conducted between May and July 2016. These searches included the following databases: Cochrane Library of Systematic Reviews, CINAHL, PubMed, Medline, Medscape, and Joanna Briggs. Keywords used in the search included: *healthcare simulation, obstetric emergencies, teamwork, patient safety*, quality improvement, *care teams, nurses, midwives,* and *physicians* (Amatullah, 2016). Later searches included key words: *high-fidelity simulation* (HFS), *competency*, and *evidence-based practice* (EBP).

Limitations were established for language (English), year of publication (between 2010 and 2016)and peer-reviewed, randomized controlled trials, case studies, implementation or protocols. The initial searches yielded more than 13,000 articles of which 233 were retrieved and reviewed for relevance. Once an overlap in the articles was observed, the search was concluded (Amatullah, 2016).

Eleven studies were most relevant and eight with the strongest evidence were selected for inclusion. Strength of evidence was measured with the Johns Hopkins *Research and Non-Research Evidence Appraisal Tools* described below.

PICO(T) question. In obstetric hospital staff (P) can the implementation of a simulation-based training program in the management of OB emergencies (I) compared to staff receiving traditional obstetric staff orientation (C) affect their knowledge, skills and confidence and improve patient safety and quality of care (O) within one year (T).

Critical appraisal tool. The Johns Hopkins *Research andNon-Research Evidence Appraisal Tools* were utilized to critically appraise the studies selected for this project (Dearholt& Dang, 2012). Strength of the evidence (i.e. level and quality ratings) can be found in the evaluation tables in Appendix A. Overall the strength of the ratings on the JHNEBP tools ranged between level I andlevel II and the quality ratings were primarily B or C.

Five of the eight articles evaluated using the JHNEBP tool were rated as good-quality (B) for clinical practice guidelines, consensus or position statements:

> Good quality: Material officially sponsored by a professional, public, private organization, or government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise is clearly evident; developed or revised within the last 5 years (Johns Hopkins, n.d.).

One article was rated as low quality (C). Limited size and inability to address confounding variables were frequently noted in these studies.

> Low quality or major flaws: Material not sponsored by an official organization or agency; undefined, poorly defined, or limited literature search strategy; no evaluation of strengths and limitations of included studies, insufficient evidence with inconsistent results, conclusions cannot be drawn; not revised within the last 5 years.

Five of the articles, reviewed below, focused on clinical outcomes for simulation-based training (SBT). The review by Fransen et al. was eliminated due to concerns about quality. Strength of the evidence ratings (i.e., level and quality) ratings can be found in the evaluation table (see Appendix A). A synthesis of the evidence can be found in Appendix B.

Critical appraisal of the evidence.Merién et al. (2010) conducted a systematic review of studies that used simulation-based training. These studies demonstrated that teamwork in simulation activities improved staff knowledge, communication skills, and performance in managing OB emergencies. In one study that included nearly 20,000 neonates, Apgar scores were shown to increase after simulation-based obstetric team training. The Apgar score is the

perinatal outcomes indicator that is helpful in predicting the vitality of newborns in the first few minutes of life. The results of Merién et al.'s root cause analysis was considered of good quality and appeared to support the advantage of simulation-based activities in teamwork training and improvement in patient outcomes. Using the JHNEBP*Research Evidence Appraisal Tool* (Dearholt& Dang, 2012) the rating of evidence was Level II and Quality B.

Yuan et al. (2012) conducted a systematic review of 18 English studies and six Chinese studies using high-fidelity simulation (HFS) in the learning environment. The aim was to evaluate the impact of HFS on competency in nursing education. HFS was proposed as a supplemental teaching-learning strategy to enhance the transfer of clinical competence and confidence into actual practice. The control group underwent traditional teaching without simulation, while the experimental group experienced life-like scenarios in an HFS environment. Using meta-analysis statistical techniques, all results demonstrated positive results in favor of the simulated-learning environment conducted with HFS (p. 28). Using the JHNEBP*Research Evidence AppraisalTool* (Dearholt& Dang, 2012)this systematic review was rated as Level IIwith Quality B.

Watson et al. (2012) conducted two single-blind, multicenter, random controlled trials (RCTs) simultaneously using physiotherapy student volunteers from six Australian universities. The experimental group underwent simulated-learning education for two to four weeks; the control group underwent four weeks of traditional, full-time clinical practice. Both groups spent equal time in the learning environment. The authors' findings support the efficacy of simulated-learning education utilization in at least a portion of clinical placements. This study was rated as Level I and Quality B using the JHNEBP *Research Evidence AppraisalTool* (Dearholt& Dang,2012).

Reeves et al. (2013) conducted a systematic review of fifteen articles to assess the effectiveness of interprofessional education (IPE) on improving OB outcomes. The review included 8 RCTs and 3 cluster RCTs .The authors included nine new studies and six from a 2008 review. The effectiveness of IPE interventions in contrast to no intervention was measured and the results highlighted the importance of IPE as a method for improving team collaboration and patient care. The authors of the review reported that standardized OB emergency response drills and safety training in the management of OB emergencies are useful in improving team response, skills and patient outcomes. Using the JHNEBP, *Research Evidence Appraisal tool*(Dearholt& Dang, 2012), this review received a rating of Level II and Quality C.

Merrielet al. (2016) conducted a systematic review of various types of emergency training available for staff in hospital-settings. Only studies that looked at level 3 (behavioral change) and level 4 (practice and patient outcomes) training were included in their review. Their review identified essential interactive training interventions as components for effective training. The focus of the review was on change in practice and patient outcomes as evidenced by actual staff behavior change and patient outcomes in emergency situations. Their goal was to identify components of effective training in specific hospital environments that could be incorporated into training courses to facilitate improvement in patient outcomes. Using the JHNEBP, *Research Evidence Appraisal Tool* this review was rated at Level II and Quality B.

Simulation-based training (SBT). There is increasing recognition that collaborative practice among healthcare professionals is associated with improved patient outcomes, decreased medical errors, and enhanced team work (Reeves et al., 2013). The professional development of collaborative healthcare practitioners requires training and education. Furthermore, there must be opportunities for attaining knowledge, skills, and attitudes to function as a collaborative

healthcare professional (Stockert&Ohtake, 2017).

According to scholars, simulation is an educational and evaluative tool that provides a framework for the theoretical and conceptual foundations that form the elements of nursing care (Campbell & Daley, 2013). In addition, quality faculty development in simulation activities has been touted as the key to sustainability for simulation centers worldwide. It has been recognized and acknowledged by professional organizations that if simulation is to be used as an effective teaching tool, there must be quality and structure in developing faculty to utilize the methodology (Jefferies, Drefuerst, Kardong-Edgren, & Hayden, 2015; Lemoine, Chauvin, Broussard, &Oberleitner, 2015).

The evidence supported the premise of this DNP project's aim to use SBT as a valid teaching methodology in healthcare, emergency management, safety, and improved patient outcomes. Simulation is widely used in many industries and has gained popularity in the area of healthcare education. In hospital settings, simulated experiences provide healthcare professionals with the opportunity to be involved in simulated patient care situations without causing actual harm to patients (Kiat, Mei, Nagammal, & Jonnie, 2007; Leighton, & Scholl, 2009).

A recent literature review (Amatullah, 2016) identified ample evidence supporting the use of SBT in the management of staff education, especially related to medical emergencies. The most prominent benefits of SBT, according to the review, were the improvement of knowledge, skill performance, team coordination, and retention of competency skills (Chen, Chen, Lee, Chang, &Yeh, 2017; Elliott, Murrell, Harper, Stephens, &Pellowe, 2011).

Scholars have concluded that use of interprofessional SBT in the management of acute OB emergencies could help prevent errors and improve patient safety (Gjeraa et al., 2014; Merien et al., 2010). A number of studies and quality improvement projects have shown the benefit of

interprofessional education and training in the management of obstetric emergencies (Burke et al., 2013; Einerson, Miller, &Grobman, 2015; The Joint Commission, 2004). For instance, The Joint Commission recommended simulation as a risk reduction strategy to ameliorate root causes of both maternal death and infant death and injury during birth (The Joint Commission, 2004). Data suggest that simulation education is associated with a decrease in errors, better communication, enhanced team work, increased confidence, improved patient health outcomes, increased learner satisfaction, increased critical thinking, retention of knowledge and skills, decrease in malpractice claims, and more accurate self-assessments by staff (Merien et al., 2010).

There is an abundance of evidence supporting the efficacy of SBT specifically in the management of OB emergencies (Crofts et al., 2014; Reeves, Goldman, Freeth, Perrier, &Zwarenstein, 2013). The use of simulation-based training is well supported in the literature and has been recommended as a method for improving perinatal outcomes (Reeves et al., 2013; Watson et al., 2012; Yuan et al., 2011).For example, well-trained coordinated teams work quickly to assess and manage critically ill patients, reducing the incidence of maternal/neonatal morbidity and mortalities (Gjerra, Moller, &Ostergaard, 2014).

The use of SBT is widely accepted and used in healthcare education (Campbell & Daley, 2013; Cant & Cooper, 2017). The benefits of SBT include a learner-centered approach, safe acquisition of psychomotor skills, and the development of effective communication skills (Burke, Grohman, & Miller, 2013; O'Rourke et al., 2018).

The LDU is one of the major areas in the hospital where the management of OB emergencies of women in labor, neonates and postpartum mothers is critical and requires special expertise. As such, given the wealth of evidence supporting the benefits of simulated-based training (SBT) in OB emergency situations, the LDU was identified as a priority area for the

utilization of simulation-based interactive in the management of obstetric emergencies (Ameh& van den Brock, 2015; Fransen et al., 2015; Gjeraa et al., 2014). For example, SBT with delivery room teams in the management of OB emergencies such as pregnancy induced hypertension or postpartum hemorrhage has been shown to improve clinical performance and reduce the incidence of medical negligence (Gjeraa et al., 2014; Lentz et al., 2001; Rath, 2011). Additionally, SBT has been associated with improved neonatal outcomes during shoulder dystocia incidents (Macedonia, Gherman, & Satin, 2003; Rath, 2011).

SBT in OB education. Comprehensive protocols and safety bundles have been developed and shown to improve OB emergency outcomes. Healthcare providers caring for women during the intrapartum and postpartum periods need the knowledge and skills to respond to clinical emergencies. Further, all providers in the obstetric setting should be prepared to identify and respond appropriately to potentially life-threatening emergencies (Troiano, Harvey, & Chez, 2013). Although, life-threatening obstetric emergencies are uncommon, they do however require knowledge of specific skilled obstetric maneuvers and prompt action.

All OB emergencies require management by confident and competent staff. As a teaching methodology, the SBT experience is an active event in which participants are immersed into a realistic clinical environment. The objective is to create situations that are as similar to real life as possible. OB emergencies can be life-threatening and require prompt action from highly skilled clinicians. It has been shown that SBT of delivery room teams in the management of OB emergencies can improve clinical performance and reduce the incidence of medical negligence (Highfield, Scharf-Swaller& Chu, 2016; Lentz et al., 2001; Macedonia et al., 2003; Su &Juestel, 2010).

There is an abundance of evidence supporting the use of SBT specifically in the

management of OB emergencies (Crofts et al., 2014; Reeves et al., 2013; Watson et al., 2012; Yuan et al., 2012). Database searches and a critical review of the evidence evaluating the effectiveness of SBT in the management of OB emergencies indicated that SBT was associated with improved outcomes (Einerson et al., 2015). Specially, SBT helped with team coordination, assessment skills, and a measurable decease in adverse outcomes for the maternal/neonatal couplet (Fransen et al., 2015).

Depending on closeness to reality, simulations can be either low or high fidelity, or a combination of both; this can be crucial in linking didactic content to a simulated clinical environment (Shields &Veille, 2009). For example, postpartum hemorrhage (PPH) is a significant obstetric emergency and a leading cause of maternal morbidity and mortality worldwide (Goffman, Nathan, &Chazette, 2016; Rath, 2011). Early identification of PPH is the key factor in patient outcomes, and SBT has been shown to improve clinical skills in the management of PPH (Rath, 2011).

Research has shown the effectiveness of SBT in improving obstetric/perinatal nurse competency in managing OB emergencies. Additionally, increased knowledge and confidence, improved communication/teamwork, and timeliness were found in SBT interventions in OB emergencies. For instance, shoulder dystocia is an unpredictable OB emergency that requires prompt recognition and swift, skillful performance of specialized maneuvers required to prevent either maternal and/or neonatal injury (Gurewitsch Allen, 2018).

Preventable errors remain a great concern in healthcare; nurses and other healthcare professionals have been given responsibilities for patients in the realms of safety and quality of care. Use of simulated patient scenarios may focus on low frequency emergencies like uterine inversion or high frequency emergencies like shoulder dystocia, cord prolapse, or postpartum

hemorrhage. SBT may focus on or other competencies to give the health care professionals the opportunity to be involved in realistic patient care experiences they might not otherwise experience in actual clinical settings (Ameh& van den Brock, 2015; Highfield et al., 2016).

Mismanagement of OB emergencies is often tied to the competency of the OB staff. For example, simulation training in obstetrics has been tied to improved neonatal outcomes and improved performance in management of postpartum hemorrhage (Shields &Veille, 2009).

Risk Management

The issue of mismanagement of OB emergencies is a worldwide concern and inadequate staff training has been identified as the most common cause of preventable adverse events affecting the management of obstetric emergencies (Amatullah, 2008; Flanagan, Nestel, & Joseph, 2004). The significant risks associated with mismanagement of OB emergencies include: (a) adverse patient outcomes, (b) malpractice litigation, and (c) loss of reputation for the organization (Gaamangwe, Krivoy, &Kresta, 2008). The actions of OB teams to reduce the impact of risk associated with mismanagement of OB emergencies concentrated on limiting or eliminating damage at the time of the occurrence and cost containment should an event occur (Hopkin, 2014).

The objective of this DNP project was to evaluate the effectiveness of an SBT program on the level of OB nurses' knowledge and confidence in the management of OB emergencies as well as their retention of the acquired competencies. The impetus for this project was precipitated by a sentinel event in the Labor/Delivery Unit. The reports from the investigatory activities of the hospital mortality and morbidity committee and root cause analyses from the QPS department indicated that the increased numbers of adverse patient outcomes were preventable incidents of substandard care.

As such, the goal of the current project was to assess the effects of an SBT program on staff management of OB emergencies using acute obstetric interventions integrated in a simulation-based setting. This training was intended to help improve patient outcomes and quality of care while decreasing errors in management of OB emergencies. The idea was that the SBT, combined with acute obstetric interventions and the communication strategies outlined in TeamSTEPPS® (AHRQ, 2008), would increase the knowledge, skills, and confidence of the OB staff. This would, in turn, facilitate better management of OB emergencies with better outcomes. Moreover, simulation training would potentially mitigate the medical and legal risks associated with adverse patient outcomes (Gherman et al., 2006).

"Project risk management is mainly concerned with the management of uncertainty and is closely aligned to control management" (Hopkin, 2014, p. 233). For example, when a risk is of high likelihood and high potential impact, such as with OB emergencies, it is best for the organization to eliminate the risk (Hopkin, 2014). Actions must be put in place to reduce the potential for, incidence of, and/or severity of harm events. For instance, studies have shown that SBT with delivery room teams in the management of OB emergencies can improve clinical performance and reduce the incidence of medical negligence (Gurewitsch Allen, 2018; Macedoniaet al., 2003).

Risk identification tools. There are a number of risk identification tools that have been adopted by healthcare organizations to improve the quality of risk management and patient safety (Card, Ward, & Clarkson, 2013). For example, significant time and effort is used in risk assessment using root cause analyses or failure mode effect analysis. Although useful, these tools do not help with the task of risk control, which is needed in order to reduce or eliminate risks (Card et al., 2013).

A SWOT analysis was completed (Appendix J) to identify and help the research team understand the risks in terms of strengths, weaknesses, opportunities, and threats. The analysis revealed the following:

- Strengths: organizational support, financial stability, strong human resources, solid electronic medical record (EMR) system, good safety reporting system
- Weaknesses: lack of an SBT facility, language barriers, poor leadership
- Opportunities: increase patient safety, reduce incidence of poor patient outcomes, reduce legal risks
- Threats: potential loss of reputation, malpractice litigation, competitiveness with other hospitals.

Rationale

The motivation for this Doctorate in Nursing Practice (DNP) research was triggered by increase in neonatal mortality and maternal morbidity. Hospital administration supported the recommendation of the principle investigator of the current study to focus an improvement plan on enhancing the culture of teamwork within the targeted high-risk OB clinical areas. In addressing this safety issue, every effort was made to balance the needs of the patients, the priorities of the organization, and the rights and responsibilities of employees (Pozgar&Santucci, 2016).

In light of the growing body of evidence that simulation is a satisfactory instructional mode for procedural and communication skills, the current project combined teamwork communication training with acute obstetric interventions using a simulation-based methodology. The objective of the project was to increase the knowledge, skills, and confidence of the OB staff, thereby directly improving patient outcome measures in the management of

obstetric emergencies (Amatullah, 2018; Hellier, Ramponi, Wrynn, &Garofalo, 2017). The evolution of this DNP project required a second search for evidence focused on information about the role of SBT in the specific diverse multicultural environment.

The conceptual framework for this evidence-based change of practice project consisted of several components: (a) Jeffries' simulation theory and (b) TeamSTEPPS®. Each of these components are discussed in detail.

Jeffries' simulation theory. Jeffries' theory served as part of the conceptual framework upon which the current DNP research project was based (Jeffries & Rodgers, 2012; Jeffries, Rodgers, & Adamson, 2015). The general concepts of the theory are defined in a manner that provides clarity and demonstrates appropriateness for this improvement project. Jefferies' simulation theory has undergone several changes since its inception and has evolved into the current theory espoused by Jeffries and Rodgers (2012). Their work can be used as a framework for simulation incorporating a holistic, flexible, and multi-dimensional methodology to integrate simulation and nursing education. The advancement of Jeffries from a theoretical framework into theory enhances and clarifies the contextual elements for today's complex environment (see Appendix C).

Jeffries theory addresses the environment, settings, and their impact on the starting points for designing or evaluating simulation activities. For instance, goals and specific expectations or benchmarks must be addressed within the context to inform the design of the simulation and implementation, including the mechanisms for allocating resources such as time and equipment (Jeffries et al., 2015).

Jeffries's theoryprovided a template that helped to identify the factors to be considered and utilized in the current SBT research. These factors include: (a) context, (b) background, (c)

design, (d) simulation experience, (e) facilitator and education strategies, (f) participants, and (g) outcomes (Jeffries & Rogers, 2012). Each of these factors are defined below as they relate to this DNP project.

This DNP project used TeamSTEPPS® (AHRQ, 2008), an evidence-based system to improve teamwork, collaboration, and communication skills. These combined models helped to optimize patient outcomes by improving critical skills among healthcare providers. Staff were trained to use TeamSTEPPS® strategies by standardizing and reducing variation in management of OB emergencies. TeamSTEPPS®was customized to enhance team performance by enabling staff to respond quickly and effectively to whatever OB emergency they faced. OB rapid response teams used: (a) the daily 15-minute huddle, (b) debriefing after any situation/action, (c) the SBAR model. SBAR facilitates prompt and effective team communication using a four-step technique addressing the situation, background, assessment, and recommendations.

Specific Aim

The deliverable for this DNP project was to improve staff management of OB emergencies using simulation-based training (SBT). The introduction of SBT using high-fidelity simulation (HFS) models integrated with acute obstetric interventions in a labor/delivery setting in order to decrease errors in management of OB emergencies. The expected outcomes were improved staff knowledge, skills, and confidence that would be translated into improved patient outcomes and higher quality of care.Of note, this DNP project was associated with a larger research project. The larger research project aimedto assess the effectiveness of SBT in interprofessional education programs (IPE) and the value of the IPSTC as an organizational investment.While, the overarching aim of this DNP project was to improve OB nursing skills and abilities in the management of OB clinical emergencies using SBT. The project was designed to

provide skills training opportunities for all categories of nursing professionals who would encounter OB emergencies.

Section III. Methods

The introduction of high-fidelity simulation (HFS) training, integrated with acute obstetric clinical practice interventions in a simulated setting was implemented to: (a) decrease medical errors, (b) improve communication (c) enhance collaboration/teamwork and (d) reduce the number of adverse outcomes related to substandard care. Researchers measured perceived knowledge and confidence of nurses before and after the SBT. The PDSA cycle (plan, do study, act) was used as an iterative test for changes in practice. A series of small SBT sessions were conducted and repeated until there was a measurable improvement in outcomes. Improved patient outcome metrics were evidenced by the decrease in number of reportable harm events in the management of OB emergencies.

Context

Contextual factors for this DNP project,included the circumstances, the setting, and the key stakeholders. Each of these factors had a tremendous impact on every aspect of the simulation program. They were an important starting point in the design and, later, were important to consider in each phase of this improvement project.

Circumstances. In the Labor/Delivery Units (LDU), there were numerous harm events related to substandard care practices. The results of a 2016 organizational patient safety culture survey conducted by the Quality Patient Safety (QPS) departments signaled that the obstetrics departments in all of the facilities were within the high-risk zone. The number of reported harm events for maternal/child and LDU from all five regional facilities indicated almost daily harm event occurrences in OB. The initial motivation for this DNP project was triggered by the

outcomes of a neonatal mortality and maternal morbidity. This sentinel event was identified as a preventable incidence of substandard care. Specific concerns were: (a) poor communication (b) lack of teamwork (c) increased number of adverse patient outcomes and (d) substandard care practices (Amatullah, 2016, 2017). The QPS identified major contributing factors to the daily harm events, including (a) lack of teamwork and collaboration, (b) poor or ineffective communication, (c) lack of leadership and direction; and (d) inadequate staff training in management of OB emergencies (Amatullah, 2016; 2017). According to the QPS reports, the evidence of inadequate staff training was a key factor in the increased incidence of mismanagement of OB emergencies (Executive Director of the QPS, personal communication, February 7, 2017).

Although training and refreshment programs were previously a mandatory practice in the OB departments, these educational programs relied on traditional teaching strategies rather than simulation. Simulation in health care education has been found to educate and build the confidence of providers to make the right decisions in life and death situations.

Setting. The context included place (practice and the in-situlab) and participant instruction as the overarching purpose of the simulation. For instance, the SBT was designed to improve knowledge, skills, and confidence of OB staff. Further, the simulation activities initially took place within the laboratory settings of The Interprofessional Simulation Training Center (IPSTC).

Key stakeholders.The three key stakeholder groups ofthis DNP project included: (a) the organization, (b) nursing professionals, and, most importantly, the (c) patients.For example, the project business case was presented to the executive leadership, (b) the nursing staff suggestions were included in the development of scenarios and helped with their buy-in, (c) improved patient

outcome metrics

Intervention

Background. Elements of background, including timeframe, resources and their utilization, informed the simulation design and implementation process. Because some elements of the design were subject to change during implementation, specific learning objectives were identified to guide the development/selection of appropriate activities and scenarios. The aim was selection of activities and scenarios with appropriate content and problem-solving complexity. In addition, pre-selected facilitator responses to participants' interventions were established as part of the simulation design. The roles of the participants and facilitators were choreographed (with and without videography), activity progression and briefing/debriefing were all considered and included in the DNP project design (Highfield et al., 2016; Jeffries et al., 2012).

Design. In designing simulation scenarios, the specific learning objectives were critical, as were the activities, content, and the complexity of the problems to be solved. Briefing and debriefing strategies were included in this stage of the process. For example, the simulation briefing included (a) introductions, (b) review of learning objectives, (c) orientation to HFS and related equipment, (d) orientation to the scenario content and dynamics, and (d) team roles.

The intergenerational differences of the target customers required communication in alanguage and manner consistent with their values and understanding. In addition, the employees of our facility were from various parts of the globe where English is often learned as a second or third language. The language of the workplace was primarily Arabic and English. As such, all the written materials for this DNP improvement project were printed in both Arabic andEnglish. We also provided information in the various languages spoken by the majority of the Philippine

and Malaysian employees.

Simulation experience. Once established and the experience of participating in a simulation had begun, attention was paid to the environment to ensure it was: (a) learner centered, (b) experiential, (c) interactive, and (d) collaborative (Jeffries et al., 2015). The partnership between the facilitator and participant was paramount to the success of the experience, suspending reality and being able to create buy-in to the simulated situation.

Project permissions. The setting for this DNP project was an acute care facility located in the ME at one of five hospitals in a large healthcare conglomerate organization. The facilities were distributed across the country in each of the country's five geographical regions. The patient populations served in all five facilities were primarily national security forces and their dependents, although, many expatriates and other clients receive health care services at each of the hospitals.

The DNP project was a collaboration between several organizations and institutions. The University of San Francisco, on behalf of the DNP student established a collaborative agreement with the Hospital in the ME (see Appendix D). This allowed the DNP student to implement the project. The DNP student received permissions from The University of San Francisco to conduct the project under the supervision of Dr. Robin Buccheri (see Appendix E). Widerorganizational permissions were sought. The IRB approval supported publication of the findings, sharing outcomes with other regions, and the ability to assess the transferability of knowledge to other facilities.It was important to the project team to have a positive working relationship with the hospital administrators. However, implementing improvement projects that have positive outcomes and not sharing the results makes it harder for practitioners to improve care and can hurt patients. This was the driving force behind the project team's efforts to obtain permission

from the IRB of the research center.

Root cause analysis. The impetus for this project was precipitated by a sentinel event in the LDU. The harm event that precipitated this improvement project was a maternal uterine rupture and subsequent neonatal death; the standard of care expected for obstetric staff was not met. Review of the nursing notes during the most critical period of pending uterine rupture revealed that the primary nurse decided to “take my break." The nurse endorsed the care of a critical patient to a junior member of the staff, who had not completed the required skills competency in obstetric life support. The failure of the health care providers to recognize the seriousness of the conditions of both mother and neonate, and the subsequent failure to seek appropriate assistance, represented deviation from the expected standard of care (Pozgar&Santucci, 2016).

Numerous OB harm events with serious consequences levied severe damage to the reputation of the hospital in the community (Amatullah, 2017). Several cases received unusually widespread publicity, including the mother with a uterine rupture who lost her infant. That case was followed in rapid succession by two incidents of shoulder dystocia with clavicle fractures. Thus, the need to control and prevent harm and loss to patients through mismanagement of obstetric emergencies was warranted and apparent in the hospital. Loss control activities were designed to reduce the likelihood of an adverse event occurring and/or decreasing the magnitude or harm events when they occurred (Hopkin, 2014). Furthermore, the hospital’s executive leadership wanted assurances that such occurrences associated with mismanagement of OB emergencies would be controlled and reduced.

The reports from the investigatory activities of the hospital mortality and morbidity committee and root cause analyses (RCAs) from the QPS department indicated that the increased

numbers of adverse patient outcomes were preventable incidences of substandard care (See Appendix F and Appendix G). Hospital administration supported the recommendation of the DNP student to focus an improvement plan on enhancing the culture of teamwork within the targeted high-risk OB clinical areas. In addressing this safety issue, every effort was made to balance the needs of the patients, the priorities of the organization, and the rights and responsibilities of employees (Pozgar&Santucci, 2016).

Interprofessional Simulation Training Center (IPSTC). Establishment of the Interprofessional Simulation Training Center (IPSTC) was central to the project, and vital to the hospital and the community. The mandate for the establishment of the IPSTC was to utilize simulation activities to improve health care training and professional development. Simulation training was introduced via the establishment of the IPSTC. In addition, the DNP student proposed to contribute to the body of research assessing the effectiveness of simulation training strategy on measurable patient outcomes (see Appendix H).

The IPSTC provided opportunities for interprofessional healthcare providers to enhance their skills, sharpen critical thinking, and prepare for unexpected events. Overall, the use of obstetric skills training and simulation drills increased the confidence and competency of the staff, improved response times, assessment skills, and interventions in OB emergencies.

In order to adequately provide simulation-based experiences for the staff, researchers first had to secure approval and support from the organization, executives, and other stakeholders. The alignment of the business strategy, mission, and vision of the research improvement project with those of the organization helped to garner the support needed for the project. Further, the metrics demonstrated that the project added value and would definitely contribute to the long-term viability and goals of the organization (Martinelli& Milosevic, 2016).

Market analysis. The industry analysis resulted in the establishment of a healthcare simulation program that provided successful scores for each dimension of the venture concept. According to the authors, gathering sources of information regarding the target industry are indicators of profitability. Then scoring the attractiveness of each of the dimensions of the industry will help to determine if the segment/niche is a good place to start a venture.For example, the ten categories measured the simulation center scored 90/100 (see Appendix I). These scores indicated the venture was well worth the investment to secure improvement in quality of care and patient outcomes (Meyer & Crane, 2014).

Market positioning. The IPSTC established a niche within the simulation segment of the regional education industry. For example, there was only one other simulation lab in the area that was operated by and exclusively for the medical university. The establishment of the IPSTC, that was open to the entire region, caused it to grow exponentially and allowed for rapid expansion. Each of the five organizational facilities had affiliated medical, nursing, and allied health professions colleges that could make use of the IPSTC. The availability of a well-equipped, organized, and coordinated simulation training center that could meet the needs of interprofessional nursing staff, medical residents, and allied health students was met with much enthusiasm Moreover, sister facilities expressed the need for services of the IPSTC.

SWOT analysis. A SWOT analysis was completed to identify and help the project team understand the risks faced by the project in terms of strengths, weaknesses, opportunities, and threats (see Appendix J). A list of the risks and opportunities identified through the SWOT analysis was compiled. Threats and weaknesses included loss of reputation, malpractice litigation, competitors, lack of an SBT facility, language barriers, and poor leadership. Opportunities and strengths included organizational support, financial stability, human resources,

electronic medical record, safety reporting system, and the IPSTC with expensive HFS equipment.

The SWOT analysis was then used to develop positioning and utilization of strengths and opportunities while minimizing the risks and threats (Milosevic &Martinelli, 2016). The project was well aligned with the mission, vision, core values, and strategic plans of the organization, so it was well positioned for successful execution.

A PowerPoint presentation of the business case for the development of the project was presented to the C-suite executive committee members to garner support for investment and funding of the project (Milosevic &Martinelli, 2016). The SWOT analysis related to the gap in market share and revenue the IPSTC could provide. The IPSTC would fill the market potential and garner market share the organization was missing in educational simulation (Milosevic &Martinelli, 2016).

Gantt chart. The utilization of project management tools in the development of the research proposal was helpful in: (a) outlining the business management strategy, (b) developing a Gantt chart of the project timeline, and (c) outlining the work breakdown structures (Appendix K and Appendix L).

Work breakdownstructure(WBS). The WBS was developed after the approvals were received. The small scale of the DNPproject could adequately be organized and managed with three levels in the WBS. The WBS tool served to divide the work into manageable pieces, thus helping with the planning, managing, and tracking of project achievements. Using the WBS made it easy to (a) assign tasks to the team, (b) plan the project to completion, (c) estimate time and cost, (d) increase number of check points, and (e) collect the information about work that needed to be done for the project. Equally important, the WBS allowed for changes and re-

arrangement of priorities within different parts of the project as needed. The WBS for this Safety and Quality Project (SQP) had three levels of hierarchy:

1. Project level-one (1.0)
2. Summary level two(1.1, 1.2, 1.3, 1.4, etc.) was the reporting level
3. Work package level three(1.1.1,1.1.2, 1.1.3, 1.1.4, etc.) was where the costs and schedules were estimated

Project level one tasks were the responsibility of the DNP student and included identification of the safety and quality project and development of the business case. Summary level two tasks of the WBS included those high-level tasks that summarized the project; they were assigned to clinical director level staff. Work Package level three were assigned to the entry level management positions like managers and shift supervisors. Additionally, further breakdowns of work package tasks were assigned to team leaders based on their skills set and experience with SBT improvement projects (Appendix M and Appendix N).

Project budget. Because the component pieces of quality management initiatives are often difficult to identify in financial terms, a structured evaluation was included as part of the business proposal value proposition, to allow the appreciation of value by those evaluating the project (Fetterolf& Shah, 2010). Parametric estimates of the costs were useful in the early stages of project definition because there was insufficient information to develop a bottom-up estimate. Once identification of the scope and parameters (cost drivers) were identified, they were used for comparison to similar projects. Burn down charts also helped provide visual representation of the amount of work to be completed over a specific timeframe (Milosevic &Martinelli, 2016).

The IPSTC budget was time-based, included the costs of materials and equipment as well as ancillary expenditures such as facilitator training, travel, and meals. The costs associated with

the establishment of the IPSTC were minimal because the project utilized existing building structures, equipment, supplies, and human resources. The costs associated with labor, employee salaries, and benefits for the project were not considered because they were figured into the existing budget (see Appendix O). For example, using the budgeted manpower status reports submitted by each department at the start of the fiscal year, the research project did not require additional funding for salaries. Salaries of staff identified for the IPSTC included Director, Clinical Nursing, Manager of Nursing Education, Project Manager, IPSTC, Clinical Resource Nurses, Nurse Educators, and technical support personnel.

The IPSTC was a partnership venture between Nursing Services and university departments of Post-Graduate and Academic Affairs. Therefore, the costs associated with overtime were absorbed by the owners of the project and shared between the cost centers of the two departments .The costs for overtime were computed by the payroll/finance departments and varied based on individual staff position and base salary earnings, although the rate remained constant at 1.5 times the employee's base hourly salary rate (Appendix P).

The size of the improvement project dictated that administrative and operational tasks be shared among executive nursing leadership (ENL) staff. The project assignments reflected their area of expertise, position levels, span of control, and other duties and responsibilities. Finally, the pro-forma income statements contained forecasts with revenues, expenses, and projected profits that would be realized in future operation of the simulation center (see Appendix Q).

The equipment (OB) mannequins began to show wear-and-tear because of repeated use; they required extra time for replacement and preparation between sessions. As such, the business case budget requirements were adjusted to include new equipment for the center.

There was no other funding for this quality improvement project. All costs associated

with this improvement project were absorbed by this DNP student. These costs included printing, snacks, editing, graphics for poster displays, and travel.

Return on investment (ROI). The establishment of a simulation-based education and training center at the hospital facility provided a designated venue for knowledge and skills training. Benefits and outcomes of the SBT education included improved patient outcomes, higher quality of care and well-trained interprofessional staff. Moreover, the establishment of the IPSTC provided a return on investment (ROI) of more than 50%.The ROI occurred withinan eight-month period of the DNP project (October 2016 to May 2017), capturing between 5% and 6% of the 10,000 plus healthcare professionals and students in the area (Meyer & Crane, 2014

The profitability of the IPSTC was important to the future of SBT and the professional development of staff at the facility, as a direct spin-off of the DNP improvement project

Balancing the financial demands of facility operations with the delivery of high-quality safe patient care can be problematic for health care executives. Nurse executives must redesign care processes and payment systems around the value concept not the volume concept. The goal must be to reduce costs while improving the quality and reliability of care. Healthcare is hard pressed to stay on target with the cultural changes required to achieve quality care at an affordable cost (Shinkus-Clark, 2017).

Study of the Intervention

According to Jeffrieset al.(2015), the stated outcomes of SBT fall into categories of participant, patient, and systems. Participant outcomes include greater self-confidence as well as increase in knowledge, skills, and behaviors that can transfer to other environments. Jeffries' simulation theoryfocused on clinical simulation, but the elements of the theory and the earlier framework easily translated to the soft skill simulations modality for enhancing leadership

development. As such, the DNP project scenarios included leadership skills required to survive and thrive in the current healthcare environment: (a) communication, (b) problem solving, and (c) conflict management (AONE, 2005). The theoretical perspective for the current DNP specific simulation experiences were also important elements of the background, informing the design and implementation of the SBT. Incorporation of the TeamSTEPPS® strategies of team building helped to improve the key principles of situation monitoring and mutual support.

Stakeholder analysis and participation. The viability of this DNP project depended on the voluntary participation of staff in the OB department as well as staff from other clinical areas that were involved in OB emergencies. Upon approval by both the organization the DNP pilot project was implemented under the auspices of the IPSTC on a limited basis within the Obstetric/Gynecology (OB/GYN) Department.

Participants were recruited from among nursing staff in the OB department and clinical areas impacting obstetrical services including emergency room, operating theaters, neonatal and adult intensive care, and OB/GYN ambulatory care services. This target population was selected because the objective was to evaluate the impact of SBT designed to improve staff knowledge, skills, and confidence in management of OB emergencies. Participant's knowledge and confidence in the management of obstetric emergencies was measured before and after the simulation intervention using an established measurement tool (described in the Outcomes Measures section).

For purposes of this improvement pilot project, only members of the nursing staff from OB/GYNunits(mother/baby, postpartum and gynecology) were included in the pilots. In collaboration with the nurse managers of the selected units, nursing staff were identified to participate based solely on their availability/work schedules on the proposed dates for the

simulation exercises.

Special emphasis was placed on those individuals that were involved in reportable harm events during 2016. In terms of the standards of acceptable care a “reasonably prudent” personis expected to provide, any deviation from the standard is equivalent to negligence (Pozgar&Santucci, 2016). By definition, harm events are violations of acceptable standards of care; negligence may be willful, but it may also stem from insufficient training, fatigue, staffing shortages, etc. As such, the mismanaged OB emergencies that resulted from incidences of substandard care fit the category of tort laws of negligence (Amatullah, 2017).

There were a total number of thirty participants working specifically in the LDU at the time of project implementation. Four were directly involved in the sentinel event and at least ten had been directly involved in a reportable harm event. The remaining sixteen had been indirectly involved in at least one OB emergency during the study period of 2016.

Inclusion criteria were based on (a) clinical practice area, (b) length of employment (at least 6 months), and (c) position category (staff nurse or midwife). Exclusion criteria included any staff nurses or midwives who were planning to leave the hospital (due to end of contract or transfer to another facility) at any time during the six-month duration of the training program (n = 0). Participants were incentivized with paid education days, including breakfast, snacks, and lunch provided on the training days.

It is noteworthy that participants were eager to participate in the project as part of the competency validation process required for renewal of employment contracts; positions included nurse leaders, midwives, staff nurses, patient care technicians, nurse managers, assistant nurse managers, clinical resources nurses, and perinatal nurse educators. In contrast, unit-based administrative staff (unit assistants, administrative support and patient escorts) participation was

strictly voluntary. The decision to allow inclusion of ancillary personnel as learners was made early because it was recognized that to be most effective theprofessional and support staffcould benefit fromthetraining.However, because of hierarchy of physician authority, medical services staff retained the ability to elect to participate or not (Polit& Beck, 2014) (See Appendix R).

The intergenerational differences of the target participants required communication in a language and manner consistent with their values and understanding. The language of the workplace was primarily Arabic and English. However, the employees of the facility were from many countries where English is often learned as a second or third language. As such, all the written materials for this DNP project were printed in both Arabic and English. As many of the employees were from the Philippines and Malaysia, the project team also provided information in the various languages spoken by the majority of the employees from those countries.

Simulation-based training (SBT) intervention. The low frequency of obstetric/perinatal complications lead to situations in which clinicians have difficulty maintaining related skills; however, LDU staff are expected to perform well in all situations. Training outside of real-world situations is critical. In a study to determine the optimal frequency for a psychomotor skill refresher program the authors found knowledge and psychomotor skill proficiency to be transient (Amatullah, 2017). Following traditional training, skills proficiency was highly variable, and retention of skills was poor at three to six-months after training. However, re-training using SBT at one to three-month intervals has been shown to improve skills retention (Niles et al., 2017). The use of SBT increased the knowledge, skills, and confidence of the OB staff, and lead to improved patient safety and quality of care. SBT appeared to be particularly suited to teach technical skills. Convergent evidence showed that SBT improved healthcare based on improved learner competency (Amatullah, 2017; Noll et al., 2017).

The journey towards increased staff knowledge and confidence with improved technical skills was undertaken using SBT. The acquisition and retention by staff of better technical skills, increased knowledge, and greater confidence was predicted to lead to improved patient outcomes and higher quality of care (Amatullah, 2017).

For example, shoulder dystocia is an unpredictable and unpreventable obstetric emergency. It requires swift response and use of specific obstetric maneuvers to achieve a safe birth while minimizing adverse maternal and neonatal outcomes (ACOG, 2017). Complications of shoulder dystocia can include (a) postpartum hemorrhage, (b) severe perineal lacerations for women, (c) brachial plexus nerve injuries, and (d) fractures of the clavicle and humerus for neonates (ACOG, 2017; Hansen &Chauhan, 2014).

The primary management goal in shoulder dystocia is a timely birth before hypoxic injury to the fetus occurs (Fahey & Mighty, 2008). In births complicated by shoulder dystocia, quick and well-coordinated interventions by the heath care team are critical for the prevention and reduction of harmful outcomes (ACOG, 2017; Fahey & Mighty, 2008; Grobman, 2014). The ability to transfer skills learned in SBT to clinical practice has a significant clinical impact in the management of shoulder dystocia and other OB emergencies. Quality metrics such as reduced rates of birth injury is a validation of simulation-based education (Gurewitsch Allen, 2018).

High-fidelity simulation (HFS). Simulation been around for nearly fifty years and is an important part of the process improvement strategies for better patient outcomes (Maxworthy&Kutzin, 2015). The DNP project was designed to provide hands-on training opportunities for nursingstaff. SBT allowed health care providers to practice in a safe environment using computerized manikins to create patient care scenarios for obstetrics (OB) emergencies.

The introduction of high-fidelity simulation (HFS) training integrated with acute clinical practice interventions in a simulation setting supported our goals to (a) decrease medical errors, (b) improve communication, (c) enhance collaboration and teamwork, (d) reduce the number of adverse outcomes related to substandard care, and (e) improve patient outcomes and quality of care (Amatullah, 2017).

The use of manikin based high-fidelity simulation (HFS) has gained popularity because it offers training opportunities in life-like scenarios. In addition to innovative learning experiences and training, HFS offers an avenue to assess clinical judgment and skills without bringing harm to patients (Amatullah, 2017).

Simulation is experiential learning that immerses providers through critically important healthcare events in a controlled environment. The goal with simulation is to educate and build the confidence of providers to make the right decisions in life and death situations. The use of HFS to theatrically simulate emergent events can cause anxiety and stress in some practitioners; however, this helps to desensitize them to such events without negative outcomes. Furthermore, the quality of the simulation experience can enhance the "buy-in" to the authenticity of the experiences and, therefore, help promote engagement and psychological fidelity within the simulation experience (Kiat et al., 2007; Leighton &Sholl, 2009; von Soeren et al., 2011). HFS is an opportunity to take healthcare providers out of their practice environment, to test and refine their skills in a safe and effective way, and to ensure they are competent providers (Dunn, 2018).

The improvement project utilized high-fidelity simulation (HFS) in a laboratory-like setting. The manikins were programmed to replicate OB emergencies, such as changes in blood pressure (BP), postpartum hemorrhage (PPH), fetal heart sounds, and shoulder dystocia. Additionally, abnormal conditions such as heart attack, allergic reactions, respiratory conditions,

and trauma were created to allow staff to practice other technical skills. Further, SBT provided participants with the opportunity to repeat the training sessions multiple times in order to improve their reaction time, knowledge, skills, and confidence when faced with real-life emergencies.

The most prevalent OB emergencies of shoulder dystocia, post-partum hemorrhage (PPH), and uterine rupture were selected for the simulation scenarios. Participant's knowledge and confidence in management of obstetric (OB) emergencies were to be measured before and after the simulation intervention using the NursOB Scale (Highfield et al., 2016).

Simulation design. Prior to the simulation experience, the specific elements of the design were defined including (a) specific learning objectives, (b) equipment, (c) facilitators responses to participants interventions (conceptual), (d) participant and observer roles (whether to video or not), and (e) briefing and debriefing processes. The simulation exercises drew upon Jeffries' simulation theory (2015, 2016). The recommended evidence-based simulation elements from TeamSTEPPS® and QSEN competencies were also included in the simulations.

Jeffries' framework was applied to this improvement project. Instructors were drawn from the executive nurse leader group, none of whom had any prior experience with simulation-based education. They worked collaboratively with the IPSTC staff to plan scenarios in the context of the hospital’s policies, procedures, and resources. For instance, SBT utilized HFS in a laboratory-like setting. The project was designed to provide hands-on training opportunities for healthcare staff. SBT allowed health care providers to practice in a safe environment on computerized manikins used to create patient care scenarios about OB emergencies. The manikins were programmed to replicate OB emergencies such as changes in blood pressure (BP), post-partum hemorrhage (PPH), fetal heart sounds, and shoulder dystocia. Additionally,

abnormal conditions such as heart attack, allergic reactions, respiratory conditions, and traumas were created to allow staff to practice other technical skills.

SBT was an important part of the process improvement strategies to impact patient outcomes in the management of OB emergencies. The goals of this DNP project were actively pursued following development of (a) the idea for change, (b) testing the change on a small scale, (c) learning from each pilot test, and (d) refining the change using several cycles under various conditions. For example, the project team conducted pilot sessions in three clinical settings: (a) the simulation center, (b) labor/delivery unit, and (c) the pediatric intensive care unit. The outcomes and impact from each area were included in the overall evaluation process and in the further development of the SBT program. In effect, the change in practice project was piloted in a series of small tests that were repeated until there was a measurable improvement in quality metrics. These metrics included reduced incidences of patient harm events.

Responsibility and communication matrix. Miscommunication is a major contributing factor with preventable medical errors. These preventable errors, in turn, are a leading cause of death and can occur at the individual or system level. Inaccurate communication about patient history and/or current status can be catastrophic (Makary& Daniel, 2016). Ineffective communication was identified during the investigative processes as one of the contributing factors in the instances of preventable substandard care in OB emergency mismanagement. The issue was compounded by language barriers. Thus, the need for a standardized tool to help health care providers' communication was indicated (O'Rourke et al., 2018). In this DNP project we used theTeamSTEPPs® communication tools :SBAR, CUS and check-Back.One of the benefits of SBT is the development of effective communication skills in a safe environment.

Interprofessional collaborative relationships must be promoted, nurtured, and sustained.

As such, practitioners must be proficient in skills of communication, leadership, and functioning within a team culture (AONE, 2005). Good communication became more complex as the scope of this improvement project increased and teams were geographically separated. Fortunately, the conceptual approach and plans for communication was outlined in advance. Thus, the team was able to get the right information to the right people at the right time in the right format with the right emphasis (Biafore 2016).

The communication plan was designed to meet the needs of our primary audiences: (a) executive leadership and key stakeholders, (b) team members, and (c) staff working on the project. The message to each specific group described the conceptual approach for communication for the project, the information to be shared, and the method, to help facilitate effective communication.

There were several categories of communication utilized to ensure simple and effective information was shared. For instance, all information for approvals was documented, including any actual changes and/or requests for changes in project deliverables. The stakeholder status updates included high-level summaries of the milestones, major accomplishments, current schedules, budget performance, and issues or risks that may have occurred or were likely to occur. For example, a PowerPoint presentation was prepared for the executive leadership committee; the budget was presented to the finance department as an Excel sheet. In addition, for the Project Management Office (PMO), the development of a Microsoft SharePoint site was deemed appropriate (Biafore, 2013).

It was also essential to maintain an accurate tracking mechanism for all information types along with a distribution method and timetable based on the type of communication. For example, project status reports were submitted to executive leadership on a weekly basis,

whereas reports for finance were completed on a monthly basis. The schedule was a summary table with planning and actual dates listed by major tasks or phases. An explanation for any delays of deliverables was included and actual dates listed by major tasks or phases.

Because communication tasks were established as milestones in the project, use of reminders were helpful. For instance, a dialog box setup in the Outlook tasks tool provided electronic reminders throughout the life of the project. Additionally, the project team used standardized templates for status reports. For example, the executive summary outlined accomplishments during a specified period, to include any major issues, risks, and high-level activities and deliverables for the next period. The budget section included a summary table with budget and actual values as well as explanations for significant variances in cost.

The communication methods changed with the stages of the project. For instance, the planning stage included a problem statement and timetable/schedule of execution, with the management of each step clearly delineating how the project would be run. At the execution stage, team members were provided with clear rules and guidelines, procedures, reporting structures, processes for escalating issues, and future plans. At project closure, communication included a wrap up and summarized the performance of the improvement project (Biafore, 2013) (See Appendix S, Appendix T and Appendix U).

TeamSTEPPS®. This improvement project incorporated the TeamSTEPPS® communication techniques, including SBAR, CUS, and check-back (AHRQ, 2008). These effective team-building strategies helped to improve team performance in the key principles of leadership, situation monitoring, mutual support and communication (see Appendix V).

Quality and safety education for nurses (QSEN). The Quality and Safety Education for Nurses (QSEN) core competencies (Cronenwett et al., 2007) were utilized in this Project. The

QSEN core competencies are: (a) patient-centered care, (b) teamwork and collaboration, (c) evidence-based practice, (e) quality improvement, (f) safety, and (g) informatics. These QSEN competencies were threaded through the revised nursing competency-based job descriptions, new employee orientation packages, and the nursing employee performance evaluations. Together, these provided a completely integrated employee performance management system across all nursing divisions.

Description of the project intervention phases. The need for simulation-based education was identified based on medical error rates, root cause analyses, and adverse patient outcomes, all of which indicated that poor communication and lack of team practice training were major contributors to breaches in healthcare quality (Palaganas& Rock, 2015). Simulation was an important aspect in the process improvement strategies for better patient outcomes (Maxworthy&Kutzin, 2015). The IPSTC project combined health education with acute clinical interventions in simulation-based training (SBT) methodology. The objective was to increase the knowledge, skills and confidence of the staff thereby improving patient safety outcomes and quality of care (Amatullah, 2016, 2017).

Because healthcare practitioners continuously use their experiences to improve their skills, simulation as a learning experience can be utilized to highlight the process of decision-making and, when supported with the tools of reflective practice, can lead to change in behavior (Morrison &Deckers, 2015). The DNP project implementation was conducted in three phases across a six-month period, beginning March 2017 and ending August 2017(Appendix K).

Phaseone. Training of staff selected to conduct the simulations. The staff were selected from the Department of Nursing Education and Professional Development (NE/PD):

- Director, Clinical Nursing, PhD, with university nursing teaching experience

- Manager, NE/PD, with 15 years education experience and critical care background
- Manager, IPSTC, with MSN and Certified Healthcare Simulation Educator
- Advanced Life Support Instructors working with adults, pediatrics, and neonates
- Clinical Resource Nurses who were specialists in obstetrics
- Nurse Educators, MSN prepared with critical care backgrounds

Additionally, all IPSTC project staff received HFS training at the corporate simulation training center, received certificates of completion, and earned continuing medical education credits prior to commencement of the DNP project (Appendix W).

Phasetwo. Interprofessional hospital staff attended at least one three-hour training session that included:

- Overview of project objectives
- Pre-assessment test of knowledge, skills and confidence in skills management of OB emergencies
- Participating in scenarios derived from the Simulation Society for Healthcare (SSH) and from facility situations
- Enacting two interprofessional simulations in the management of OB emergencies
- Completing a post-test assessment of their knowledge, skills, and confidence in the management of OB emergencies
- Providing feedback about the SBT program

Feedback was also solicited from the IPSTC staff responsible for facilitating the HFS training sessions (Appendix X).

Phasethree. Data collection, management, and analysis of the DNP project included the following measures:

- Analysis of feedback from the facilitators who conducted the SBT programs
- Interprofessional staff who participated in the SBT programs
- Participant scores on the pre/post assessment of knowledge, skills, and confidence in management of OB emergencies
- Program evaluation feedback. Sources of data included but were not limited to information from
    - Safety Reporting System
    - Root Cause Analyses
    - Electronic Medical Records
    - Pre/post assessment tests
    - Feedback/Evaluations
    - Debriefing/ focus group

Simulation-based training (SBT). The SBT programs were constructed utilizing the International Nursing Association for Clinical Simulation and Learning Standards of Best Practice in Simulation (INACSL, 2016). The SBT pre-assessment was conducted prior to commencement of the course to measure participant's knowledge and confidence regarding the identified obstetric emergencies. The SBT program began with (a) simulation preparatory phase, (b) the distribution of preparatory reading packages prior to the SBT course, and (c) request for demonstrations/remediation as necessary. The preparatory packages contained program outlines, reading material covering knowledge and content, and the skills check lists (Appendices:Y, Z, AA and BB).

The SBT sessions were opened with a brief demonstration by the facilitator on how to manage the specific scenario utilizing simulation equipment. The SBT sessions on team

management of obstetric emergencies were conducted using a Noel high fidelity birthing simulator (HFS) in a simulated labor/delivery room with all necessary equipment and supplies. The scenarios were developed primarily by use of an event-based approach to training (EBAT). EBAT utilizes targeted acceptable responses to specific simulated events.

The scheduled program activities included: (a) welcoming and briefing on the program learning objectives, (b) practice/review on the use of the simulator and related equipment, and (c) individual skills testing stations and remediation. The training sessions covered three priority obstetric emergencies separately over two days of training for groups of five to six participants. Post-intervention knowledge and confidence assessment was obtained from each participant immediately following each scenario (see Appendix CC).

Measures

Self-assessment measures. In this DNP project, the participantscompleted a self-assessment measurement about their knowledge and confidence in the management of OB emergencies before and after the simulation intervention using the NursOB tool, a self-assessment measure. The NursOB tool was previously used by Highfield et al. (2016) to measure obstetric/perinatal staff nurses' knowledge and confidence in managing five identified high-risk, low-frequency situations. Participants were asked to rate themselves on a scale from 0 to 10, rating their knowledge and confidence in dealing with each of the five priority obstetric emergencies: (a) shoulder dystocia, (b) obstetrical hemorrhage, (c) operative delivery, (d) oxytocin management, and (e) pregnancy induced hypertension. Each item on the scale was scored and, then, the five knowledge items and five confidence items were totaled for two subscale scores ranging from 0 to 50. Higher scores suggested higher perceived knowledge and confidence. Cultural adaptation of the tool was affirmed by review of the content of the scale by

the clinical experts in the hospital labor/delivery unit. Content validity of the NursOB tool was confirmed and piloted by the tool authors (Appendix DD). For the purposes of this DNP improvement project, no changes were required on the NursOB tool.

Analysis

Data analysis was designed to measure the effect of the SBT program on nurse's knowledge and confidence in managing OB emergencies. Descriptive statistics were used to summarize the demographic data and to identify the levels of knowledge and confidence of participants in the management of different obstetrical emergencies before and after the simulated training (Al Yateem, Amatullah, & Al Yateem, 2018).

In this DNP project, comparison of the same group of individuals over time was useful because the analysis question was evaluative, and the aim was to determine whether the outcomes had been successfully met by comparing the group means at two distinct points in time (pre- and post-intervention). The comparison group methodology is commonly used when testing improvements in knowledge of staff and provider education interventions (Sylvia &Terhaar, 2014).

Unit of analysis: Target population. The analysis plan began with a description and selection of the "unit of analysis". For this project, population was selected as the unit of analysis because the objective was to evaluate the impact of the intervention on staff knowledge, skills, and confidence. The aim was to try to understand the experiences of the population (OB staff) during OB emergencies (Sylvia &Terhaar, 2014). The comparison group methodology is commonly used when testing improvements in knowledge of staff and provider education interventions (Sylvia &Terhaar, 2014). Population descriptive information included (a) person-

specific information: age, gender, ethnicity, education level; (b) population information: physicians, midwives, staff nurses, PCT, and unit assistants in OB department; and (c) subgroup receiving intervention: ED, OR, OB/GYN (Appendix EE).

Utilizing the sample size calculator to determine the difference in means of the same group at two separate measurement points required comparing differences using paired t-tests, showing differences between pre- and post-individual values; showing expected standard deviations of the mean of the differences between individual pre- and post-values; appropriate levels of significance, and sufficient power (Sylvia &Terhaar, 2014). These conditions were met (see Appendix FF).

Scope of data collected for analysis. Event-specific contextual information collected included content-specific data:unit of assignment, number of procedures, time of day, day of the week, and exposure to OB emergencies. Data analysis included analyzing of feedback from (a) the staff who conducted the simulation-based training programs, (b) obstetric staff who participated in the SBT programs, and (c) pre- and post-assessment of knowledge, skills in management of OB emergencies, and program feedback. Data sources included but were not limited to (a) the safety reporting system, (b) the root cause analyses, (c) electronic medical records, (d) pre- and post-assessment tests, (e) feedback and evaluations, and (f) debriefing.

Primary data was collected at the time of and specifically for the purpose of measuring the descriptive and/or outcome information for the intervention. For example, pre- and post-tests of staff knowledge, debriefings, intervention checklists, and measures of satisfaction and confidence (Sylvia &Terhaar, 2014). (Appendix DD for the pre- and post-assessment tool.)

Secondary sources of information needed were obtained from employee files and the electronic medical records. All secondary data was collected by the unit-based administrative

staff and entered into the electronic data system all data was kept strictly confidential.

Excel was used for qualitative data and SPSS was used for quantitative data. Every effort was made to select instruments and collection tools that had established reliability and validity in the assessment of confidence, satisfaction, or readiness to change (Sylvia &Terhaar, 2014).

Ethical Considerations

Ethical considerations for this DNP improvement project was centered on maintaining patient privacy (cultural and traditional practices inform the approaches to healthcare). For instance, it was essential to ensure that there were competent female-care providers for the women in KSA. This factor was even more important for women accessing care in any of the OB/GYN areas.In addition, when required prayer rugs and space to offer prayer was available along with religious reading materials. The in-hospital closed circuit televisionsystem was a source of teachingabout labor, breastfeeding as well as providing access to the religious stations in their rooms, as preferredby many of the patients. The sections of the facility that focused on women and children was secured with specialized systems and monitored by female security personnel. These were very importantin the Saudi culture the protection of women and children.Nurses were also encouraged to learn the language of the dominant patient population in an effort to address the recurringissues of language barriers. Culturally competent care is viewed as a critical factor and essential component in providing relevant, effective and culturally responsive care.

For many of the expatriate nurses in the Middle East, the manifestation of moral distress is also of concern. The issue of moral distress often appears as a numbing or psychological distancing exhibited when nurses are frequently faced with situations in which they they feel powerless to do the right thing (Grace, 2016).

Ethical Principles

The impact of the cultural and traditional practices of a male-dominated society that views physicians as "all knowing", causes many of the nurses to lack confidence in their knowledge and skills and thus remain afraid and unsure of the importance of their point of view in ethically difficult situations (Grace, 2016). Throughout the myriad of investigative processes surrounding the neonatal death and severe maternal harm event in our LDU, nursing leadership remained steadfast in our resolve to protect staff that spoke out about unethical practice(s). For instance, the findings of the Nurse Practice Review Council (NPRC) were shared with all the relevant stakeholders: (a) Medical Practice Review Committee (b) Quality & Risk Management Review Committee and (c) Executive Management Committee, Operations, for inclusion in their respective reviews and recommendations. The actions taken by the executive nurse leadership, helped establish precedent, showed courage and provided staff with evidence of unwavering support for them.

Storage and security. The collected data was safely maintained throughout the project and stored in a secure place accessible only to the project leadership team. Participants were instructed not to write any personal identifying information on the evaluation forms or questionnaires to ensure anonymity. Confidentially was maintained at all times.

Section IV

Results

SBT methods have been reported in the literature to have a direct effect on the outcome of the training process because it utilizes technology and innovative strategies with blended learning methodologies to produce better experiences and outcomes (Chen et al., 2017; Fernandez-Aleman, Carrillo de Gea, & Rodriguez, 2011; Sherriff, Burston, & Wallis, 2012). The

best validation of any simulation-based activity is to have a demonstrable clinical impact on quality metrics (Gurewitsch Allen, 2018).

The intent of this project was to identify practical strategies for conducting and evaluating simulation activities that would be of benefit to both nursing and the wider healthcare provider community. These potential benefits included identification of areas for future education, overcoming barriers to learner engagement, and resolution of cost and space issues. A simulation-based training (SBT) intervention was introduced to the OB staff and its effect on OB staff competency was measured after the training and again two-months post-training. The change in knowledge and confidence of the participants was statistically significant ($p<0.001$) and the proportion of participants in the high-knowledge and high-confidence categories increased after the SBT. The follow-up assessments showed that the retention of knowledge and confidence was more significant compared to traditional non-SBT methods of healthcare education (i.e. classroom instruction).

Project Evaluation

Utilization of the Institute of Healthcare Improvement model for improvement aided in the evaluation of outcome measurements for this DNP project, including: (a) setting the goals (b)selecting the measures, (c) developing ideas for change, and (d) testing the change. Additionally, there were a range of quality improvement tools, techniques, and data (electronic health records, published data from the Middle East, comparative and benchmarking data) to demonstrate current practice, identify opportunities for improvement, and strive toward improved outcomes (NAHQ, 2015). Quarterly, reports were provided to stakeholders to communicate project milestone achievements, schedule of deliverables, actual or potential delays, and other concerns (Amatullah, 2016).

The simulation exercises drew upon the Jeffries simulation framework, therefore the project team measured perceived knowledge and confidence of all the participants before and after the SBT. The evaluations included the recommended evidence-based simulation elements: (a) aligned outcome measures with organizational and OB departmental goals, (b) obstetric/perinatal simulation was supported by hospital policy, (c) nurse managers and clinical directors were active participants in the SBT exercises, and (d) adequate human and equipment resources were available in advance (Jeffries, 2005; Jeffries & Rodgers, 2012).

As suggested by previous research, the two primary outcomes of simulation are increased knowledge and greater confidence for participants. Therefore, care was taken to ensure that the scenarios fit the roles of the both the staff in labor/delivery unit and the postpartum units. This helped to increase participant buy-in and understanding of each other's work while decreasing rivalries and improving self-confidence.

Outcome Measures

The complexity of health care systems makes it necessary to use a number of measures to determine if improvement has occurred in the system. This DNP project aimed to determine if there had been an increase in the knowledge and skills of OB staff with respect to integration of TeamSTEPPS® strategies and the QSEN concepts as well as to determine if the SBT had been transformed into practice. It was, therefore, essential to (a) conduct surveys and assessments for at least one-year post-training to ascertain knowledge retention and the ability to apply the combination of competencies in clinical practice, (b) include outcomes in the yearly performance review as an incentive, and (c) quantify the frequency of adverse occurrences involving OB staff who completed the SBT.

Outcomes measures for simulation activities typically fall into three areas: the

participants, the patients, and the hospital system. Historically, most healthcare literature has focused on participant outcomes, including reactions, satisfaction, and confidence. A secondary focus often includes participant learning (changes in knowledge, skills, and attitudes) and behaviors (was the learning transferred to the clinical environment). More recent literature increasingly focuses on the outcomes of simulation with regard to (a) health of the recipients (patient) whose care providers participated in SBT, (b) organizational and system outcomes, (c) cost effectiveness, and (d) changes in practice.

Outcome measures of the simulation experiences in the DNP project included participant's ability to demonstrate: (a) application of the appropriate skills to the simulated clinical situations, (b) improvement in their knowledge of the environment and the equipment, (c) ability to assess risk in relation to the clinical practice environment, (d) effective communication, (e) teamwork and collaboration, (f) leadership skills, and (g) evidence of increased confidence after the simulation experiences (Elliot et al., 2011).

Practitioner outcomes pre and post SBT. The results of this DNP project indicated that the majority of the participants categorized themselves in the low to medium categories for both knowledge and confidence before the SBT. This self-categorization changed after the training, with the majority of participants identifying themselves in the high category for both knowledge and confidence. For example, the mean scores on a ten-point scale of participants' knowledge and confidence in the management of shoulder dystocia were 6 before the SBT and 9 after the SBT. The participant's knowledge and confidence scores in the management of postpartum hemorrhage increased from 7 to 10 points following SBT. The participant's knowledge in the management of uterine inversion increased from increased from 5 to 9; their confidence increased doubled from 5 to 10 (Appendix II).

The change in knowledge and confidence levels of participants after the simulation training was statistically significantly ($p < 0.001$). Additionally, the proportion of participants in the high knowledge and confidence categories increased.

Practitioner retention of knowledge and confidence. In the follow up assessment two months later, the participants' knowledge and confidence remained comparable to the immediate post-training levels (see Appendix II). For shoulder dystocia, knowledge and confidence scores post-SDT were both 9; after two months, they were 9.3 and 9.1, respectively. For postpartum hemorrhage, knowledge and confidence scores post-SDT were both 10; after two months, they were 9.3 and 9.4, respectively. For uterine inversion, knowledge and confidence scores post-SDT were 9 and 10, respectively; after two months, they were 9.2 and 9.1, respectively. This is likely due to the immediate confidence boost, post-SBT; when the reality of real-life situations occurs, confidence may waiver slightly.

Test of difference. The Chi square test was used to detect differences in knowledge and confidence in managing obstetric emergencies among different staff categories. The Chi square test revealed that there was no significant difference ($P = 0.47, 0.543$) between the participant subgroups in terms of their knowledge and confidence of managing obstetric emergencies pre- and/or post SBT experiences. For example, the responses of participant in the different subgroups were distributed similarly among the knowledge categories (see Appendix II- Table 2).

Practitioner satisfaction. Practitioners reported being extremely satisfied with the course goals, implementation, and outcomes.This satisfaction was consistent across SBT for shoulder dystocia, uterine inversion, and postpartum hemorrhage.

Patient outcomes. During the SBT project period and for at least two months following

the SBT, there were no reported incidents of: (a) clavicle fractures from shoulder dystocia, (b) blood transfusions required for treatment of postpartum hemorrhage, or (c) return to operating room for post cesarean deliveries. The ability to monitor outcomes following the conclusion of the improvement project were limited. In addition, the pre- and post-assessment scores of obstetric (OB) staff demonstrated a significant decrease in mean scores and frequency of adverse occurrences for those who completed the SBT.

Section V

Discussion

Training and monitoring of students and healthcare professionals for competency in clinical skills and practice is an important goal in health care organizations. The provision of professional development programs and other teaching and learning activities are constantly requiring updating in order to be in compliance with healthcare regulations.

The aim of this DNP project was to evaluate the effectiveness of SBT programs in increasing knowledge and confidence among nurses managing OB emergencies as well as to examine retention of those acquired competencies. The results of this DNP improvement project illustrated the positive effect of SBT programs in developing and maintaining obstetrical nurse competencies. Simulated activities have demonstrated a positive effect as a new and alternative educational methodology for nursing education and competency development (Duane &Satre, 2014).

The results of this project led to the recommendation for adoption of simulation-based activities for healthcare professionals, thatwas recently operationalized at the ME Hospital. The organizational willingness to utilize SBT in this project was in part due to the efforts of this DNP student who raised awareness that the existing traditional training methods were not sufficient to

support best clinical practices.

Summary

Key Findings for Risk Assessment

The control of the risk associated with mismanagement of OB emergencies was crucial to the survival and continued growth and success of the obstetrics programs at the ME hospital facility. Harm had come to patients and the hospital had suffered significant negative press coverage. Managing risk entailed recognizing three elements of risk (threat, uncertainty, and opportunity) managing them in an integrated manner (Hopkin, 2014).

The significant risks associated with mismanagement of OB emergencies included: (a) adverse patient outcomes, (b) malpractice litigation, and (c) loss of reputation for the organization (Gaamangwe et al., 2008). There were a number of risk identification tools that had been adopted by the hospital to improve the quality of risk management and patient safety (Card et al., 2013). For example, significant time and effort were taken up with investigative reviews, cause and effect diagrams, and root cause analyses. While useful in assessing the scope of risk, these tools did not help with the task of risk control, which was needed in order to reduce or eliminate negative risks (Card et al., 2013).

Healthcare organizations are responsible for ensuring competency of their employees and providing adequate numbers of competent staff. In the hospital facility in the ME the verification of credentials, qualifications, and privileging was the responsibility of Recruitment Services and Human Resources. However, the assessment of staff competency, especially the OB nurses, was under the authority of the nursing department. In the case of mismanagement of OB emergencies, wherein the events were identified as preventable incidences of substandard care,

the organization was liable for harm to the patients, but the Nursing Department was accountable for alleged failure to use reasonable care to ensure provider competency. Integrating and streamlining channels of authority may provide a solution to ensuring more consistent OB nurse credentialing and privileging.

Key Findings for Preventing Patient Harm

Although OB emergencies occur infrequently, they can be life threatening; therefore, they require skill and prompt action (Lentz et al., 2001; Macedonia et al., 2003). SBT has been recognized as a potential mitigating tool to decrease the incidence of patient harm, improve patient outcomes, and decrease medical and legal risks associated with OB emergencies (AHRQ, 2011). For purposes of this DNP improvement project, SBT proved to be effective in decreasing substandard care. SBT holds promise for hospital systems as they work to contain financial liability from medical malpractice and improve organizational reputation by minimizing or eliminating catastrophic patient outcomes, including death and permanent damage (Hopkin, 2014).

Implications for Evidence-Based Practice and Research

According to scholars, evidenced-based projects are generated in response to clinical or administrative problems (Mei, Johnson, Newhouse, & Warren, 2013; Melnyk&Fineout-Overholt, 2015; Polit& Beck, 2014). The existing practices of the ME hospital acute care facilities were not entirely evidence-based. The capabilities of the organization included but were not limited to: (a) electronic medical records, (b) computerized safety reporting system, and (c) an organizational structure that included colleges of medicine, nursing, allied health and research centers. Throughout the organization there were identified needs for implementation of evidenced-based best practices (EBP). For example, the constraints within the organization

identified from document review, the SWOT analysis, and the root cause analyses included: (a) hierarchal structure that did not empower end users to implement EBP changes; (b) lack of EBP practitioners and facilitators to provide knowledge transfer; (c) language barriers among staff, patients, and employees; (d) poor communication and collaboration among health professionals; and (e) lack of teamwork.

In evidence-based processes and practices, a variety of actions and interactions are necessary to assure both relevance and viability in clinical practice. For instance, a practitioner' readiness and approach to practice must be fluid and flexible enough to be modified immediately to ensure delivery of appropriate patient care (Porter-O'Grady &Malloch, 2017). Evidence-based practice implies availability and readiness of practitioners who can incorporate significant adjustments into clinical practice, making just-in-time decisions and modifying clinical practice as necessary. With the establishment of the IPSTC facility, EBP was incorporated into the systemic processes, facilitating and supporting the development of critical thinking and technical skills among staff. The design of the DNP project laid a foundation for provision of skills training opportunities for all categories of health care professionals in a safe environment.

The research implications identified by this DNP project include: (a) increasing the number of random controlled trials to sort out the relative value of lecture only, simulation only, and lecture plus simulation methodologies and (b) comparing short- and long-term outcomes of low- and high-fidelity simulation to ascertain which is better and more cost effective. In addition, future research should address measures of the ranges of simulation outcomes including learner knowledge, critical thinking, confidence, performance, and satisfaction.

Interpretation

Simulation-based training (SBT) and nursing practice.Chen et al. (2017) conducted a study to determine the impact of an interactive, situated and simulated (ISST) learning workshop. They focused on the clinical competence of novice nurse practitioners. One group received ISST training and the other did not. At the end of the study period, the ISST group demonstrated superior nursing competency, reported lower stress levels, and showed increased confidence in clinical skills.

In a comprehensive meta-analysis, Cant and Cooper (2017) reviewed the results of approximately 700 primary research studies conducted between 2010 and 2015 that focused on SBT in undergraduate nurse education. Their review found that simulation-based activities supported psychomotor skills development, improved self-efficacy, and strong satisfaction among trainees (Cant & Cooper, 2017).

The results of this DNP project showed similar outcomes. Participants primarily nurse practitioners, reported greater knowledge and confidence following SBT intervention. Participants were extremely satisfied with the program and results were retained in the two-month period following the SBT intervention. While this DNP project did not measure stress, professionals from all walks of life are less stressed when they feel competent and confident; there is no reason to believe that nurses would be any different.

SBT andretention of skills. The measurement of clinical skills retention comprised an important component of the learning and was a factor for utilizing SBT in this DNP improvement project. The results of the follow-up assessment at two months post-SBT revealed that the participants retained the competencies that they gained during the initial SBT. The self-reported levels of knowledge and confidence gained immediately following training and at

follow up did not change significantly in the two-month gap between training and follow-up. This is in line with the results of another study in which competitive e-learning methods produced significant cognitive gains for the students in the experimental group immediately after training was completed and was retained after four months and six months (Fernandez-Aleman et al., 2011).

SBT and communication. Additionally, the simulation drills of postpartum hemorrhage cases assessed system weaknesses and strengths, tested policies and procedures for coping with hemorrhage, and improved teamwork and communication skills of staff members. Whenever possible, the drills included all disciplines (obstetrics, anesthesia, pediatrics and nursing) and were especially effective in improving communication and coordination among team members. Furthermore, the implementation of the OB Rapid Response team helped in addressing systems issues for management of obstetrical hemorrhage, decreased maternal mortality, and improved outcomes (Appendix JJ and Appendix KK).

Moreover, communication and teamwork were improved by human factors training. The human factors included briefings, handoffs, time-outs, and increased situational awareness. These factors helped all participants to share an understanding of what was happening and what the next steps would entail. Furthermore, participants were taught explicit communication skills that included: (a) addressing team members by name, (b) making eye contact, (c) repeating back orders, (d) confirming the response to an order, and (e) directing speech to an individual rather than speaking to the room and assuming that you were heard.

Limitations

There were numerous fundamental challenges in implementation of this DNP improvement project. Challenges included but were not limited to: (a) adequate time and

resources, (b) lack of recognition of staff efforts in improvement activities, (c) failure to disseminate initiatives beyond the unit, and (d) failure to share individual improvements.

Time and Financial Resources

Once administrative approval was received, the second hurdle was to secure financial approval and backing from the executive leadership and other stakeholders in a timely manner. Alignment of the business strategy, mission, and vision for this DNP improvement project with those of the hospital helped to garner project support. Furthermore, the project team were able to demonstrate that the project would contribute to the long-term viability and goals of the organization, thereby providing great value (Milosevic &Martinelli, 2016). This is an important consideration for future clinical practice improvement projects. If the improvement teams are unable to conduct a business analysis themselves, they should seek out partners who can. Part of creating buy-in and the early successes of this project were directly attributable to the fact the DNP student and the project team "spoke the language of "the administrators.

Lack of recognition of staff efforts in improvement activities. The efforts and work of staff that participated in the operational aspect of the improvement activities often was not recognized by hospital management. As such, it became incumbent upon the nursing leadership to recognize and acknowledge staff for their exceptional efforts in the support of activities geared toward improving the quality of patient care.

Failure to disseminate initiatives beyond the unit. In addition, this improvement project was hindered by the inability to include actual medical staff outcomes metrics due to organizational expectations of perfection that may have affected clinicians' decisions not to report errors. For instance, there was a prevailing sense of shame, guilt, and weakness associated with error reporting; thus, many clinicians were ambivalent about accountability, fearing

punitive actions. Although department leaders felt responsible for ensuring compliance with standards, they found it difficult to hold the responsible clinicians accountable (Zabari& Southern, 2018).

The first major hurdle was to obtain approval for the DNP improvement project. Following intense negotiations, approval was granted for the quality improvement project within the hospital but without permission to publish. It is understandable that hospitals do not want issues of patient harm, staff training and institutional failure shared with the public, it is critical to the overall improvement of healthcare for organizations to share this kind of data within the healthcare community. Sharing challenges that have been successfully addressed should be a point of pride rather than shame. In addition, findings from this project can inform practitioners who want the best practices for patient care and ultimately the patients themselves.

In order to circumvent the limitations of the hospital approval, wider organizational permissions were sought for the larger study.The manager of the IPSTC applied for Institutional Review Board (IRB) approval, which was subsequently granted in February 2017. The IRB approval supported publication of the findings, sharing outcomes with other regions, and the ability to assess the transferability of knowledge to sister facilities. It was important to the project team to have a positive working relationship with the hospital administrators. However, implementing improvement projects that have positive outcomes and not sharing the results makes it harder for practitioners to improve care and can hurt patients. This was the driving force behind the project team's efforts to obtain permission from the IRB of the research center.

Failure to share individual improvements. Theclinical practice change/improvements of different facilities within the organization were not readily shared with other regions, despite the success and impact on patient care outcomes. The nursing leadership was hampered and

prevented by organizational cultural form sharing individual improvements across regions.

Other Limitations

The quality tools used for analysis and determining outcomes of the project included but were not limited to: (a) quality improvements testing and measuring change, (b) dashboard display of process and outcome measures, and (c) run and control charts. Sources of internal evidence were also utilized, including (a) staff satisfaction, (b) turnover rates, and (c) employee health clinic records.

The complexity of healthcare systems makes it necessary to use different measures to ascertain whether or not improvement has actually occurred. For example, it would take one or two years to adequately measure if the knowledge and skills of the obstetric staff with respect to the concepts in the QSEN competencies had been integrated and transferred into practice. Unfortunately, the DNP project leader separated from the organization before such follow-up could be fulfilled. Again, future research should strive to use multiple sources of information, as this DNP project did, but over a longer time frame allowing for more longitudinal data collection.

The follow up assessment of participants' knowledge and confidence levels took place two months after the initial SBT. However, the timeframe of reassessment was short and, thus, the outcome measures may not be considered reliable enough to assess long-term retention. A longer time lapse between the initial SBT and re-assessment periods or a second assessment would have provided a better indication of knowledge retention. Unfortunately, a longer time lapse between the SBT and re-assessment was not logistically possible within the DNP project timeframe. This is an important consideration for future improvement projects.

Conclusions

This DNP project was of local and cultural importance to the hospital and the wider hospital system. The project demonstrated that SBT contributes to the creation of the desired clinical competence levels required to ensure the provision of safe, quality care. Extrapolation of the outcome data indicated the applicability and utility of SBT in a wide range of applications and scenarios to improve healthcare. Although primarily designed to improve management of OB emergencies using SBT, the DNP project design laid the foundation for skills training opportunities across many categories of healthcare professionals. The collective wisdom and teamwork, combined with clinical practice activities, served and supported the evolution of a very creative SBT environment (Weberg, 2017).The use of simulation-based training (SBT) is widely accepted and used in healthcare education (Crofts et al., 2014; Reeves et al., 2013; Watson et al., 2012; Yuan et al., 2011). In particular, the use of interprofessional simulation training in the management of obstetric emergencies is well supported in the literature (Crofts et al., 2014; Gjerra et al., 2014; Reeves et al., 2013; Watson et al., 2012; & Yuan et al., 2011). The benefits of SBT include (a) learner-centered approach, (b) safe acquisition of skills, and (c) supports the development of communication skills. In this DNP improvement project utilized SBT combined with TeamSTEPPS® communication strategies and other tools to enhance staff communication and patient safety.

Simulated training was found to be effective in the training of nursing staff in the management of OB emergencies they encountered in their clinical practice. SBT contributed to the increased knowledge and confidence as well as the retention of the knowledge and technical skills among the participants. Furthermore, SBT was the best choice because many of the nurses presented with variable educational backgrounds, experiences, and qualifications. As such, SBT

provided a method of teaching that supported acquisition of knowledge, confidence, and competency required for the job. The introduction of high-fidelity simulation (HFS) training, integrated with acute clinical practice interventions in a simulated setting helped to (a) decrease medical errors, (b) improve communication, (c) enhance collaboration and teamwork, and (d) improve patient outcomes and quality of care (Amatullah, 2017).

Simulation-based training (SBT). The objective of simulation is to create situations that are as similar to "real life" as possible, whether utilizing complex, high-fidelity computerized simulators or low-fidelity simulation. Further, simulation in situ improved our ability to address systems issues because it allowed for practice in one's own hospital setting with familiar resources.

Simulation in the computerized simulation center offered high technology in an environment similar to real life, but without the distractions of the hospital. For example, practicing complex events requiring a maternal cardiorespiratory arrest, high-fidelity simulation was a better choice because chest compressions could not be performed on a live model. The simulations for postpartum hemorrhage were also used to teach other related skills, including (a) quantification of blood loss, (b) bimanual uterine compression techniques, and (c) inspection for lacerations (Homcha, Mets, Goldberg, Kong, &Vaida, 2017).

Interprofessionalcollaboration. Scholars have concluded that use of interprofessional SBT in the management of acute OB emergencies could help prevent errors and improve patient safety (Gjeraa et al., 2014; Merién et al., 2010). One goal of this DNP project was to use SBT to promote, nurture, and sustain interprofessional collaborative relationships. In fact, practice drills that included the interprofessional staff from all clinical areas were more effective in improving both the communication and the coordination of the teams. The lessons learned from this DNP

project supported the scholarly recommendations from literature that hospitals adopt regularly scheduled simulation drills for practicing response to obstetric emergencies (Casper &Arafeh, 2015).

Learner-focus. One of the benefits of SBT is that it is a learner-centered approach that promotes safe acquisition of technical skills training and the development of effective communication skills. The project team learned early on that scenarios for simulation must be designed for the needs of the learners (nurses, physicians, residents, respiratory therapy, etc.) and tailored to available resources.

Debriefing. Debriefing was necessary both for simulation drills and live events. The videos taken during simulations were used as a debriefing tool to explore what went well and what needed to be improved or changed. To facilitate debriefing, the research team provided a safe area for discussions, acknowledged the value of all input, stressed the importance of reflection, and reinforced the confidential nature of the debriefings. The utilization of evaluation tools, such as checklists, provided an objective approach for expectations of each participant in their role as well as for team and individual performances.

Safety. An important aspect of the lessons learned related to approaches to safety. These included (a) use of existing data to design safe systems and devices, (b) simulation-based testing of fitness of new obstetrics workflows, (c) identifying and mitigating existing hazards and vulnerabilities of the work environment, (d) detection of safety threats in high risk OB emergencies via SBT, and (e) performing systems-based event reviews after an adverse event (using simulation to improve root cause analysis of adverse outcomes). The use of these approaches to inform safety can lead to optimizing safety in the system (Paige, Fairbanks &Gaba, 2018).

Systemic change. Most importantly, the project team recognized that the practice change had been successfully implemented following a near complete staff turnover in the labor/delivery unit. During the implementation process, the goal was to create system change as a permanent part of the process. The project manager and IPSTC staff were, in fact, able to build the changes into the formal SBT formats and the expected learning outcomes during the program. Many of the staff who originally participated in the SBT left the organization; remarkably, however, the practice changes remained in place as part of the system of care.

Project dissemination plan and X-Point. In 2015, the Quality Patient Safety (QPS) department, in collaboration with a company in the United Kingdom, developed an online system called "X-Point," an electronic quality improvement tool. X-Point supports clinical teams by enabling improvement teams to enter their data directly into the system to produce statistical process control charts or run charts. This data will show how the process for improvement has changed during and after project implementation. The platform allows users to create personal pages, project pages, and display data (see Appendix LL).

In addition, all improvement projects were designed to be searchable by region, hospital, department, and topic with the goal of staff sharing lessons learned. Graphical display of projects enables staff and stakeholders to search and view projects completed or in progress (see Appendix MM). Update notifications could be pushed out quickly to those needing to view them

Project documents, reports, and other supporting information can be stored in the X-Point system. The project document space is an area where all information related to each project is stored and is accessible for others to view and learn from and follow the project to completion. The collaborative message board space of X-Point allows project members to communicate, provide updates, and comments on achievements .The discussion board and document space can

be set up to highlight best practice examples, thus supporting transfer of knowledge and active collaboration on quality improvements across staff groups, departments, hospitals and disciplines.

The X-Point program was configured to reflect the needs of the specific hospital system. Theoretically, future improvement projects will be able to build on improvements across the organization and be accessible to all (Deputy Executive Director, QPS, personal communication, November 21, 2016).

The X-Point program was scheduled to go live in late 2018, after the completion of this DNP project. Clearly, the X-point program would have addressed some of the limitations faced with establishing, implementing, and monitoring this DNP improvement project. Nevertheless, the simulation experiences were experiential, interactive, collaborative, and learner-centered. The shared responsibility and trust that developed between and among the facilitators and the participants helped maintain the cohesive learning environment (Weberg, 2017).

Obstetric emergencies. The LDU was chosen to implement the first simulation training programs because of the significant increase in the incidence of maternal and neonatal morbidity and mortality related directly to mismanagement of obstetric emergencies (Amatullah, 2017). As such, the SBT scenarios were designed to focus on the top three priority obstetric emergencies experienced at the facility: shoulder dystocia, postpartum hemorrhage, and uterine rupture. During the practice drills for this improvement project, the strength of SBT was especially evident in the LDU unit-based performance, where we were able to deconstruct the clinical performance and teamwork into various components. The focus was on both technical psychomotor skills and nontechnical team-based competencies (Paige et al., 2018).

The merging of human factors approaches with SBT activities helped to improve the

quality and safety aspects of the hospital system. For example, participants were taught explicit and effective communication skills that included (a) briefings, (b) handoffs, (c) use of time-outs, and (d) situational awareness. Team training included practicing (a) worst case scenarios, (b) assisting teammates in completion of tasks, and (c) monitoring teammate performance (Paige, Fairbanks, &Gaba, 2018). The simulation exercises helped participants (a) correct problems for future drills, (b) anticipate resource requirements, (c) identify learning needs, and (d) develop a team of facilitators from among the hospital staff.

Several members of the nursing leadership team served as facilitators in the simulation experiences. Although they had no prior experience with simulation, they did remarkably well and worked closely with the IPSTC team to plan scenarios in the context of the ME hospital setting, organizational policies, procedures and resources. Moreover, SBT activities promoted an interest in simulation education, with overwhelmingly positive responses from the participants.

Simulation-based activities and research can be used to help organizations improve structures and care processes to balance safety, clinical results, and efficiency. In addition, simulation-based strategies are well suited to assist with continuous professional development and training of individuals and teams across the organization and throughout their careers. It has been shown that coming together through SBT helps teams provide more effective patient care (von Wendt &Niemi-Murola, 2018). Well-designed simulation activities provide clarity for the participants and may serve as the trigger for transformative change.

Following traditional instruction methods, skills proficiency is highly variable and retention of those skills 3-6-month after training is poor. Niles et al. (2017) found that a single refresher training session resulted in 60% of the providers performing well. Further, when the providers were retrained at intervals of one to three months, skill retention was improved (Niles

et al., 2017). In this DNP project, assessment of the retention of technical skills was a component of the learning process and contributed to the decision to utilize SBT. The results indicated that the participants retained their competency skills for at least the period of two months post-training. Results with SBT over longer periods of time or using an SBT retraining process are likely to provide equally strong results.

The healthcare industry is a complex, dynamic work environment where the safe, quality care of patients depends on the smooth functioning of each component involved in the care of the patients as well as the team members responsible for that care. Unfortunately, such seamless treatment is often more the ideal than the reality. Full-scale clinical SBT has been shown to be an effective modality that provides safe and realistic learning environments that do not compromise patient safety. SBT activities can help improve healthcare through research and training. Most important SBT focused on education and training, assessment and metrics, process improvement, and culture change that can facilitate the move toward patient safety and quality of care.

Section VI

Other Information

Funding

There was no funding provided for this quality improvement project. All costs associated with this DNP project that were not part of the approved budget of the larger studywere absorbed bythis DNP student. This included printing materials, snacks, editing, graphics for poster displays and travel.

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Appendix A

Evaluation Table

Citation	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement Variables	Data Analysis	Findings	Worth to Practice
DarrahTraynor Joyce-McCoach 2016	*NHS (7) Domains of leadership	Systematic Review *Experimental Epidemiological RCTs Non-RCTs Quasi-Experimental Before & after studies Prospective & Retrospective Cohort Studies Case Control			Studies with validated tools Multifactor leadership questionnaire	JBI-MAStARI	Traditional Task-Force leadership not effective RN leadership requires management skills increase competencies Thus it is important for high quality outcomes.	Yes, will be worthy to practice JHNEBP Research Evidence Appraisal Level=II Quality B

*National Health Service (NHS) UK
**Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI)

Evaluation Table- continued

Citation: Author(s) Date & Title	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement of Major Variables	Data Analysis	Findings	Worthiness to Practice
El Amouri& O'Neill 2014		"Quantitative description design"	UAE Nursing Leader - Managers Gov't Hospital = (6) (n)=118 Private (Hospital (4) (n) = 35 Female = 143 Male = 10	Comparison of nurse leader Managers' rating of leadership style on-multifactor leadership Transformational or Transactional Leadership	Multifactor leadership questionnaire	Multifactor leadership questionnaire with 36 items 5 point Likert Scale responses were analysed for teams which emerged based on hospital type mean scores	Both groups (private & government hospitals) Nurse leadership use both transformative & translational leadership styles to some degree rated high reliability and validity interval consisting Cronbach's alpha, r= 0.85	Yes, worth to practice Theories of leadership in profession done if nurse leaders JHNEBP Research Evidence appraisal Level = II Quality B

Evaluation Table- continued

Citation	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement Variables	Data Analysis	Findings	Worth to Practice
Fransen, Banga, van de Ven, Mol&Oei 2015	Protocol	RCTs Cluster RCTs	Obstetric multi professional teams with at least (2) members	Intervention will be simulation-based team training in OB vs. no training or traditional training		Review manager software, fixed-effect meta-analysis to combine needed or random effects analysis for increasing clinical heterogeneity	no findings yet for this review	Yes, if hypothesis is supported JHNEBP research evidence appraisal tool Level = II Quality = C

Evaluation Table- continued

Citation	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement Variables	Data Analysis	Finding	Worth to Practice
Merién van de Ven, Mol, Houterman&Oei 2010	Systematic review with 8 articles	RCTs (x4) pilot Study (x1) Descriptive (x2) Retrospective cohort study (x1)	Delivery Suites, x16 hospitals Simulation Center (1) Teaching Hospital			*QUADAS	SLE of multidisciplinary teams is potentially effective Significant increase in magnesium sulphate loading dose from 61% to 92% (p=.04) Non significant increase in finished tasks (87%) before to 100% after significant decrease from 55 to 27 seconds (p=.01)	Yes, worthiness to practice JHNEBP research evidence appraisal Level = II Quality = B

*Quality Using the Assessment of Diagnostic Accuracy

Evaluation Table- continued

Citation	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement Variables	Data Analysis	Finding	Worth to Practice
Merriel van de Nelson Lenguerr and Chung, Soar, Ficquet, Grey, Winter, Draycott and Siassakos 2016	Protocol Kirkpatrick Model	Systematic review RCT (cluster and step-wedge randomization) Non-RCT observational studies: controlled before and after with x2 interventions x2 control groups intercepted time series	In-hospital emergency settings: Emergency Ob/GYN ICU, Pediatrics, neonatology, all surgical & medical specialities	Interactive education sessions		PRISMA to identify # of hits Cochrane EPOC 2013a- data extraction- risk bias Kappa Statistic Review manager 5.3 t-tests Forest plots for statistical heterogeneity I2 statistic Funnel plot (5-10 studies) if needed *SMD with 95% CI	Summary of finding will present evidence for (3) primary and (4) secondary outcomes	Yes, JHNEBP research tool Level = II Quality = B

Evaluation Table- continued

Citation	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement Variables	Data Analysis	Finding	Worth to Practice
Reeves, Perrier, Goldman, Freeth& Zwarenstein 2013	Unable to determine	Systematic Review x15 studies (9 from this update and 6 form 2008 update) Original study review in 1999	RCTs x8 CBA Controlled before &after = x(5) Intercepted Time Series (ITS = x2) USA & UK	IPE intervention No IPE Intervention	all x15 compared outcomes after IPE	Narrative form because of heterogeneity of study designs; thus did not do meta-analysis	small improvements with IPE overall, unable to decide on efficiency of IPE	Yes, JHNEBP research Level = II Quality = B

Evaluation Table- continued

Citation	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement Variables	Data Analysis	Finding	Worth to Practice
Watson, Wright, Morris, McMeeken, Rivett, Blackstock… Jull (201S2)		Parallel group Single blind Multicenter RCTs Simultaneously independent using a non-inferiority design	RCT I n=192 RCT 2 N=178 T=370 Physical Therapy students from x6 Australian Universities volunteered		EG=SLE* 2-4 weeks CG – Traditional 4 weeks of full time clinical Both spent equal time in the learning environment	2 tailed alpha of 0.05 and assumed (SD) of 0.8 (p.659) all RC T mentioned a 0.93 power to detect a difference in 0.4 between group means = 10% dropout	SLE can replace traditional clinical time 25% *APP mean score :2.61 (SE 0.05) in SLE and 2.58 (SE 0.05) in Trad alternative hypothesis supported 95% CI of difference in means -0.11 to 0.16, upper bound CI <0.4 No difference	worth in professional practice Yes - Academic JHNEBP research evidence appraisal Level = I Quality = B

Citation	Conceptual Framework	Design Method	Sample Setting	Major Variables and Definitions	Measurement Variables	Data Analysis	Finding	Worth to Practice
Yuan, Williams & Fang (2011)	Systematic review studies 2000-2011	Systematic review Quantitative studies using HFS e.g. descriptive experimental qualitative quasi-experimental RCT Non-RCTs	(18) English (6) Chinese Nursing Students, Nurses participates in SBL programs with HFS	EG – Received scenarios' based simulation with HFS CG – Traditional Without– HFS learning e.g. lectures combined with demo and student practice		Jadad scale quality of control trials statistical meta-analysis with review manager from Cochrane v 4.3 Chi-square for heterogeneity Narrative form-descriptive, quasi-experimental	Positive results, but deficits of formal tools for measurement of HFS No consistent research outcomes effectiveness, Without methodological Rigor	Yes JHNEBP Research tool Level = II Quality = B

Appendix B

Evidence SynthesisTable

Studies	Design	Sample	Outcome
Darragh, Traynor& Joyce-McCoach 2016	Systematic review of nurse leadership skill development.	Nurses in or preparing for leadership roles: DON, NM, Administrators, Operational Coordinators, Supervisors Relevant published and unpublished studies: experimental, quasi-experimental, epidemiological RCTs, Non-RCT Before & after (BAS), prospective & retrospective, cohort & case studies	In progress
El Amouri& O'Neill 2014	Quantitative descriptive	Nurse leaders in UAE N= 153 Female (n)= 143 Male =(n) 10 Purposive sample of 10 hospitals: with 100 – 500 Beds Government Hospitals (n)= 6 Private Hospital (n)=4	Multifactor leadership questionnaire 36 items 5 point Likert scale There was a statistically significant difference between the (2) groups' rating on the total set of 36 items (p< 0.05, non-parametric Mann-Whitney U-test, two tailed). No statistical significance on rating of Transformational versus Transactional leadership

Appendix B

Evidence Synthesis Table- continued

Studies	Design	Sample	Outcome
Fransen, Banga van de Ven, Mol and Oei 2015	Systematic review protocol to evaluate simulation based, multi-professional obstetric team training… especially the impact on maternal & neonatal outcomes	n = unable to determine review protocol	unable to determine- protocol for review/evaluation of multi-professional OB team training on patient outcomes
Merién, van de Ven, Mol, Houterman and Oei 2010	Systematic Review of "literature on the effectiveness of multi-disciplinary simulation training in the reduction of poor outcomes in obstetric emergencies."	n = 8 articles n = 4 RCT n = 4 compared pre/post training without control group multidisciplinary teams, used low & high fidelity simulation models x1 retrospective	5 minute Apgar score or less Hypoxic Ischemic Encephalopathy Retrospective cohort study = Decrease from 86.06 to 44.6 per 10, 000 births (p<. 001), RR 95% CI decrease from 27.3 to 13.6 per 10, 000 births (p=.032), pre-training & post-training respectively

Evidence Synthesis Table- continued

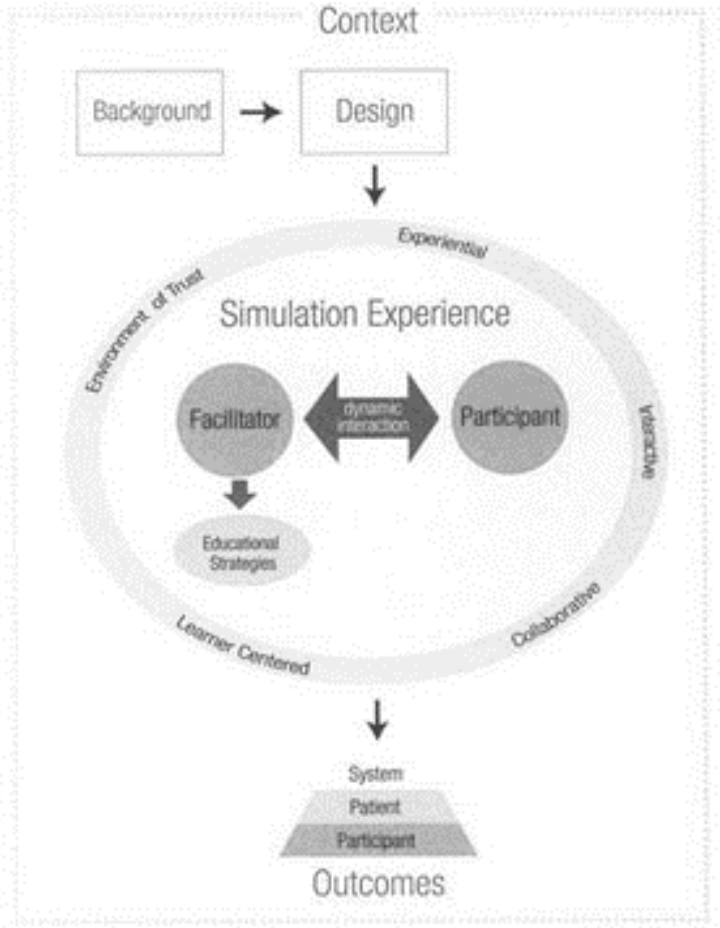
Studies	Design	Sample	Outcome
Merriel, van de Nelson, Lenguerrand, Chung Soar, Ficquet, Grey Winter, Draycott&Siassakos 2016	Systematic Review to examine training interventions for healthcare professionals in emergency situations	RCT (Cluster & Step-wedge Randomization) Non-RCTs Observational studies controlled Before & After with x2 interventions and x2 control groups Interrupted Time Series (ITS)	Protocol for the review- in progress
Reeves, Perrier, Goldman, Freeth and Zwarenstein 2013	Systematic Review of (15) articles (update) (9) from this article (6) from 2008 to assess the effectiveness of IPE interventions8) RCT (3) Cluster RCT (1) Cluster RCT: 15 Hospitals RCT=(8) Cluster RCT=(3)	n = 15 studies Hospital=(15) n=7 Intervention (IG) n=8 Control (CG) Labor & delivery staff (n)= 1307	Overall, no statistically significant differences between intervention & control groups. Adverse outcomes prevalence was similar in both groups at baseline & after implementation of training: (94% versus 90% and 7.2% versus 83% respectively). Time from decision to incision for emergency caesarean delivery decreased in the IG: (p value = 0.03) n=6: IPE may lead to better care n=3: IPE may help n=2: IPE may impact patient outcome n=3: no change n=1: IPE may effect decisions n=1: unclear results n=1: unable to determine effect of IPE

Evidence Synthesis Table-continued

Studies	Design	Sample	Outcome
Watson, Wright, Morris, McMeeken, Rivett, Blackstock … Jull (2012)	(2) parallel RCTs simulated learning program in musculoskeletal practice for physiotherapy students RCT I Model I - x1 week in SLE and x3 weeks clinical immersion RCT 2 Model 2 – SLE was in parallel with clinical immersion for 2 weeks of 4 weeks placement x2 single-blind multicentre RCTs non-inferiority design	RCT 1 (Model 1) N=192 RCT 2 9Model 2) N=178 from (6) Australian Universities stratified by GPA	Students' achievements in SLE group versus traditional group were no worse. (margin [Δ] ≥ 0.4 difference on APP* score, RCT I : 95% CI – 0.07 to 0.17 RCT 2 : 95% CI – 0.11 to 0.16 no difference noted between (2) cohorts: ($^{t}(93) = 1.43, p = 0.16$)
Yuan, Williams and Fang (2011)	Systematic Review of Quantitative studies using HFS • Descriptive • Experimental • Qualitative • Quasi-experimental • RCTs • Non-RCT	n=24 Descriptive n=13 RCT n =1 Non-RCT n =4 Quasi experimental n =3	Quality of controlled studies was assessed by JADAD scoring Quasi experimental$n$ =20 students reported increase confidence in postpartum & newborn nursing. Mean score of self-efficacy was escalated from 28.66 ± 7.72 to 42.14 ± 7.45 ($p < 0.01$). Students felt more confident in nursing skills after simulation (mean difference $0.58 \pm 1.20, p < 0.1$) p.29

Appendix C

Jeffries Simulation Theory



Appendix D

Agreement Between the University of San Francisco and Mohammed Bin Abdulaziz Hospital in Saudi Arabia

UNIVERSITY OF
SAN FRANCISCO

[redacted]

Dr. Abdulhadi A. Tashkandi
Regional Director of Postgraduate Education & Academic Affairs
c/o Prince Mohammed Bin Abdulaziz Hospital
[redacted] Arabia

Dear Dr. Tashkandi,

The University of San Francisco ("University") requests placement for Executive Leader Doctor of Nursing Practice (ELDNP) program student, Amira Amatullah, at the Prince Mohammed Bin Abdulaziz Hospital ("Agency").

Amira's practicum focus is centered on micro-systems in a clinical setting. As this clinical practice course allows the student to implement the role of the clinical systems leader under the supervision of a preceptor, the student will select a setting (hospital, long term or community health agency) where concepts, theories, and principles of administration and management can be applied. Additionally, the student will determine individual goals and learning objectives consistent with a learning contract negotiated with a preceptor and approved by faculty.

Term
This mutual agreement will become effective on 11/24/16 and terminates on 11/24/18.

I. University Responsibilities and Understandings

A. University shall comply with appropriate accrediting agencies' standards and guidelines.
B. University shall be responsible for the academic content of the program and shall provide necessary instruction and academic supervision.
C. University shall be responsible for clear and specific objectives and planned learning activities for the instruction, manuals for students, and appropriate evaluation instruments for student learning.
D. University shall conduct the practicum/internship in a manner satisfactory to Agency and the time, place and subject matter of all such training shall be subject to Agency approval. Agency personnel may participate in the instruction of students, where University considers such instruction of particular value, and when mutually agreed upon by the parties in writing.
E. University understands, that the Agency may limit the number of students who may be allowed to participate at any one time.
F. University and Agency share in the responsibility for the selection and assignment of the student to the practicum/internship experience.

UNIVERSITY OF
SAN FRANCISCO

II. Agency Responsibilities and Understanding

A. Agency shall ensure that students are familiar with and observe all rules, regulations, and policies of the Agency.
B. The Agency shall have the right, after notifying the University, to terminate the participation of any student for failure to abide by its rules, regulations, and policies. Such notifications must be in writing and must include a statement as to the reason or reasons for the Agency's request. The University shall comply with the written request within five (5) days after receipt of the request.
C. Agency shall permit University personnel to participate in the instruction of students on Agency premises when, in the opinion of the Agency, such participation will not interfere with Agency operations.
D. The Agency is not required to provide monetary compensation to the student during the placement for work towards her degree.
E. Any research or activities that require sharing patients/hospital information must obtain all the necessary approvals. Additionally, student should present goals, objective and plan of any other activities in advance for approvals.

III. Indemnification

Agency shall defend, indemnify and hold the University, its officers, employees and agents harmless from and against any and all liability, loss, expense (including reasonable attorneys' fees), or claims for injury or damages arising out of the performance of this Agreement but only in proportion to and to the extent such liability, loss, expense, attorneys' fees, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of Agency, its officers, employees and agents.

The University shall defend, indemnify and hold Agency, its officers, employees, agents, guests or invitees harmless from and against any and all liability, loss, expense (including reasonable attorneys' fees), or claims for injury or damages arising out of the performance of this Agreement but only in proportion to and to the extent such liability, loss, expense, attorneys' fees, or claims for injury or damages are caused by or result from the negligent or intentional acts or omissions of the University, its officers, employees and agents.

University:

Margaret M Bale [redacted] 12/1/16

Agency

Tasha [redacted] Nov 24th 2016

Appendix E

Non-Research Statement

UNIVERSITY OF SAN FRANCISCO | School of Nursing and Health Professions

DNP Statement of Non-Research Determination Form

Student Name: Amira F. Amatullah

Title of Project: Improving Patient Safety: Using Simulation-based Interprofessional Training for Obstetric Emergencies

Brief Description of Project: The issue of mismanagement of obstetric emergencies (OB) is a worldwide concern. A review of studies related to the subject span the globe from the UK, America, Australia, Scandinavia, the African continent and the Middle East (Ameh and van den Broek, 2015; Fransen, Banga, van de Ven, Moi, & Oei, 2015; Merién, van de Ven, Mol, Houterman & Oei, 2010). In 2013, the United Nations introduced an initiative focused on safety in maternity care across the globe and as a result there was a dramatic decrease in maternal deaths worldwide by approximately 47% from 543,000 in 1990 to 287,000 by 2010 (World Health Organization [WHO], 2012). Inadequate staff training was the most commonly identified cause of adverse events in OB emergencies (Ameh & van den Broek, 2015; Fransen, Banga, van de Ven, Moi, & Oei, 2015; Merién, van de Ven, Mol, Houterman & Oei, 2010). There is evidence supporting the use of interprofessional simulation-based training specifically in the management of obstetric emergencies. For example, "coordination and quick assessment of critically patients by well-trained interprofessional teams has been shown to reduce maternal/neonatal morbidity and mortalities (Gjerra, Møller, & Østergaard, 2014). In addition, the use of simulation-based interprofessional training has been recommended as a method for improving perinatal outcomes (Goldman, Freeth, Perrier, Reeves, and Zwarenstein, 2013; Watson et al., 2012; Yuan, Williams & Fang, 2011).

A) Aim Statement: To improve interprofessional staff management of OB emergencies using simulation-based teamwork training. The introduction of interprofessional high fidelity simulated (HFS) training, integrated with acute obstetric training interventions in a simulation setting in order to decrease errors in management of OB emergencies thereby improving patient outcomes and quality of care.

B) Description of Intervention: The intervention will be conducted in three (3) phases:

Phase 1: Training of staff who will conduct the simulations. The selected staff from the Department of Nursing Education and Professional Development (NE/PD) include:

(a) Director, Clinical Nursing, PhD, prepared with university nursing teaching experience;

DNP Department Approval 5/8/14 1

UNIVERSITY OF SAN FRANCISCO | School of Nursing and Health Professions

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

STUDENT NAME (Please print): Amira F. Amatullah

Signature of Student: *Amira Amatullah* **DATE 24 /11/2016**

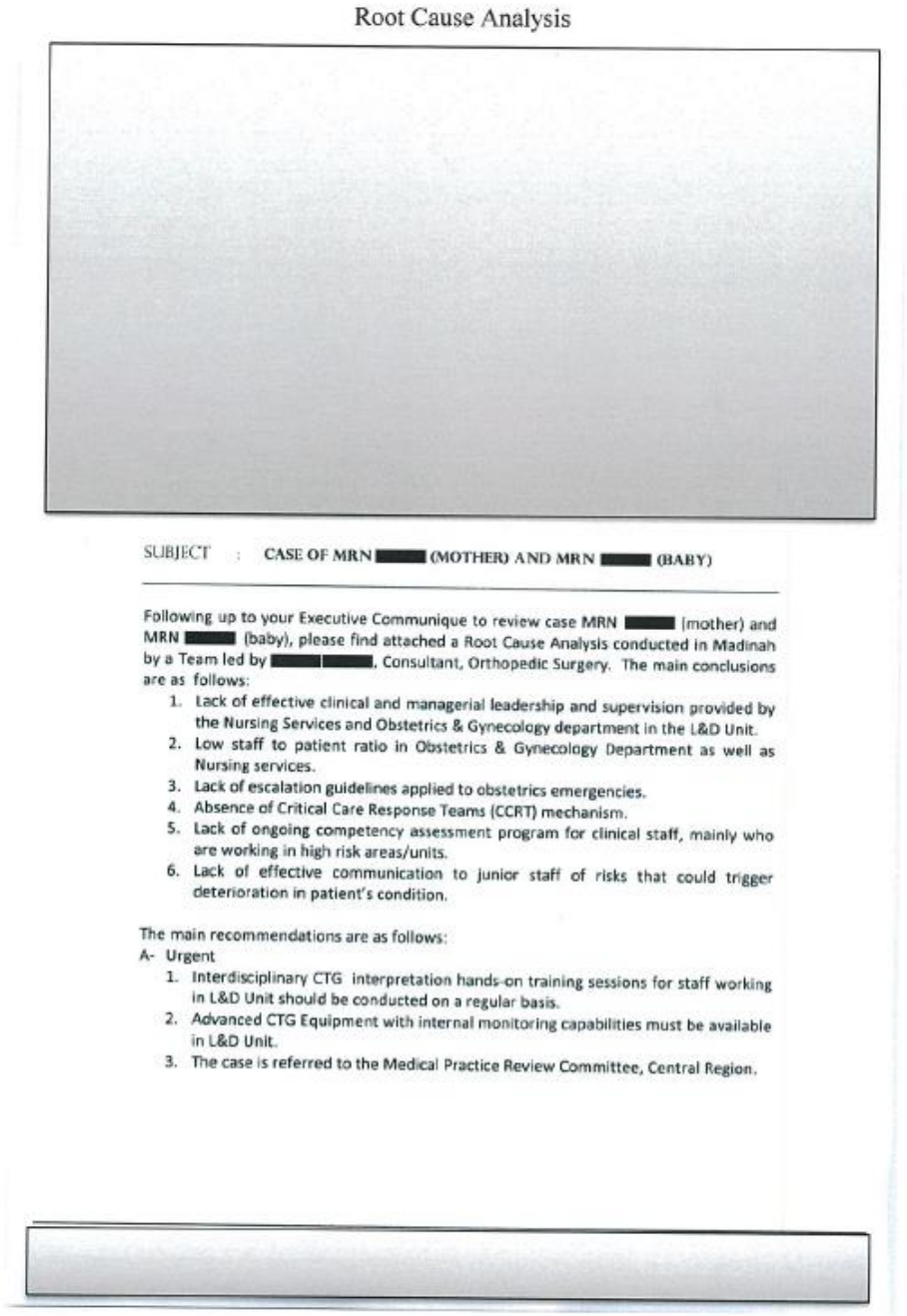
SUPERVISING FACULTY MEMBER (CHAIR) NAME (Please print):

Robin Buccheri, PhD, RN, Professor

Signature of Supervising Faculty Member (Chair):

Robin Buccheri **DATE 11-24-16**

AppendixF: Root Cause Analysis



Root Cause Analysis

[redacted]

SUBJECT : CASE OF MRN [redacted] (MOTHER) AND MRN [redacted] (BABY)

Following up to your Executive Communique to review case MRN [redacted] (mother) and MRN [redacted] (baby), please find attached a Root Cause Analysis conducted in Madinah by a Team led by [redacted], Consultant, Orthopedic Surgery. The main conclusions are as follows:

1. Lack of effective clinical and managerial leadership and supervision provided by the Nursing Services and Obstetrics & Gynecology department in the L&D Unit.
2. Low staff to patient ratio in Obstetrics & Gynecology Department as well as Nursing services.
3. Lack of escalation guidelines applied to obstetrics emergencies.
4. Absence of Critical Care Response Teams (CCRT) mechanism.
5. Lack of ongoing competency assessment program for clinical staff, mainly who are working in high risk areas/units.
6. Lack of effective communication to junior staff of risks that could trigger deterioration in patient's condition.

The main recommendations are as follows:

A- Urgent

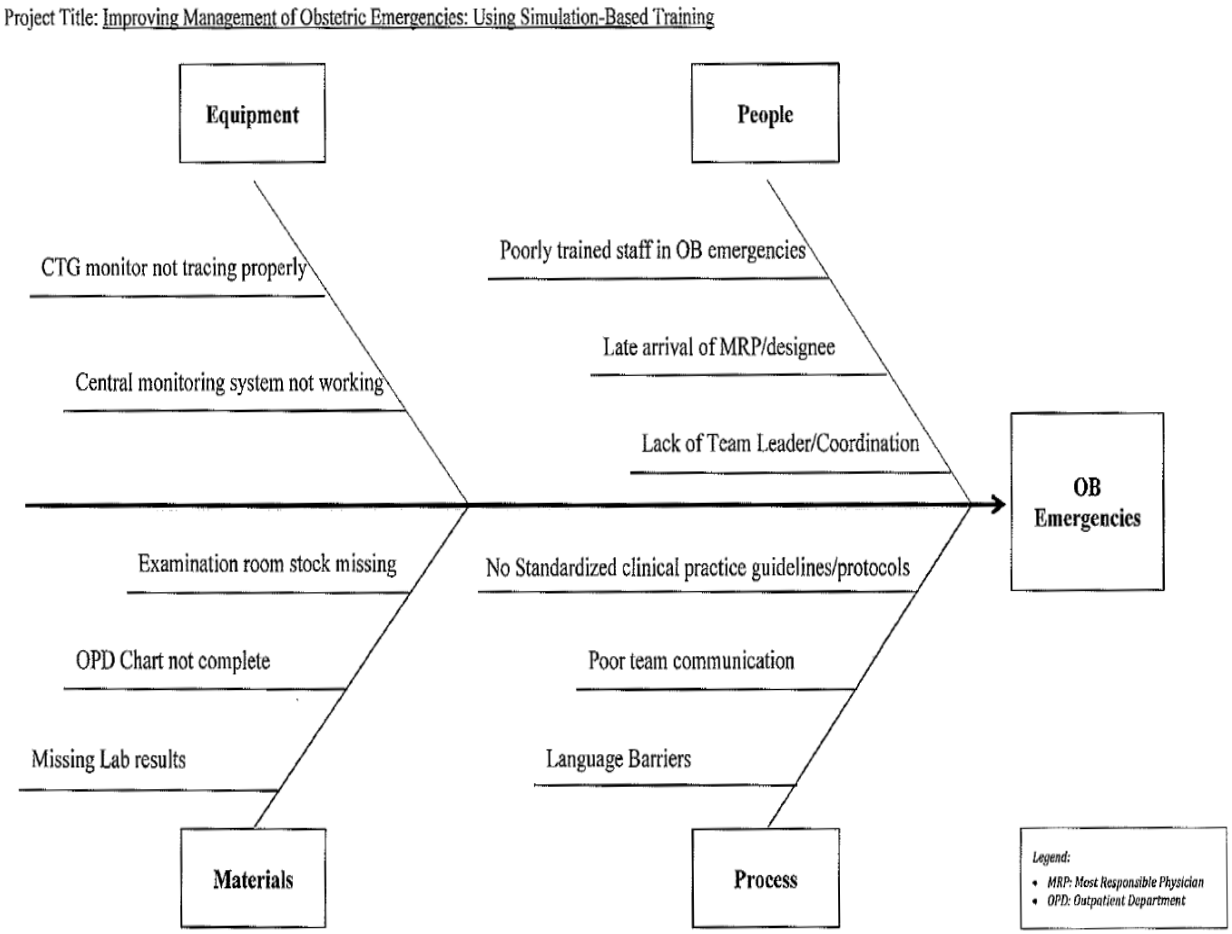
1. Interdisciplinary CTG interpretation hands-on training sessions for staff working in L&D Unit should be conducted on a regular basis.
2. Advanced CTG Equipment with internal monitoring capabilities must be available in L&D Unit.
3. The case is referred to the Medical Practice Review Committee, Central Region.

[redacted]

Note: Identifying patient information has been redacted to ensure patient privacy and to adhere to HIPAA regulations.

Appendix G

Cause and Effect Diagram



AppendixH

Interprofessional Simulation Training Center (IPSTC)Executive Summary

The Interprofessional Simulation Training Center (IPSTC) project incorporates the use of manikin-based high-fidelity simulators into a laboratory setting. The project is designed to provide ongoing hands-on training opportunities for interprofessional workers and health care students, and residents in a safe environment.

Computerized mannequins are used to create patient care scenarios that enable health care professionals to practice for both common situations and emergencies. Manikins can be programmed to replicate human traits such as changes in blood pressure, heart sounds, and pupil response to light. Abnormal conditions such as heart attacks, allergic reactions, respiratory conditions, and trauma issues can be created to allow staff to practice these skills. This training also provides the opportunity to repeat the training session multiple times in order to improve the reaction time, knowledge, skills, and confidence of the respondents when faced with real life emergencies. Thus, this proposal for an interprofessional healthcare education and training center is vital to the community. The simulation lab will provide opportunities for interprofessional healthcare workers to enhance their skills, sharpen their critical thinking, and prepare for unexpected events. The IPSTC project will prepare staff for life and death situations that will serve the community.

Significance

Simulation has been around for nearly fifty years, however the use of manikin based high-fidelity simulators (HFS) has gained popularity because it offers training opportunities in real-life like scenarios. In addition to the innovative learning experiences and training HFS offers an avenue to assess clinical judgment and skills without bringing harm to patients. Thus,

patient safety and quality care are not jeopardized but rather enhanced. There is a wealth of research-based evidence supporting use of interprofessionalsimulation training specifically in the management of emergencies.

Background

The impetus for this project arose from the increased number of obstetric (OB) emergencies observed in our facilities across the regions. OB emergencies are stressful and unpredictable; they can pose ethical dilemmas and require immediate actions, which may challenge the skills and expertise of staff (Fransen et al. 2015). The QPS report and inquiries into the situation indicates that "the majority of the reportable harm events were preventable instances of substandard care." The inappropriate management of OB emergencies can lead to maternal and neonatal death and/or serious injury.

Project Goals

Using the TeamSTEPPS® strategies and tools to enhance performance with the patient safety and Quality Safety Education for Nurses (QSEN) core competencies,the proposed project is well supported by evidence-based practice recommendations. Our goals are:

- Improved safety and patient care
- Improved communication
- Improved teamwork/collaboration in management of emergencies

Facility/Stakeholders

The port-a-cabins located near the Project Management Offices site is currently unoccupied and meets the space/accommodation needs for the simulation laboratory at present. Following a site inspection by the concerned stakeholders, it has been determined the location is well-suited for the IPSTC. The facility will be equally shared by:

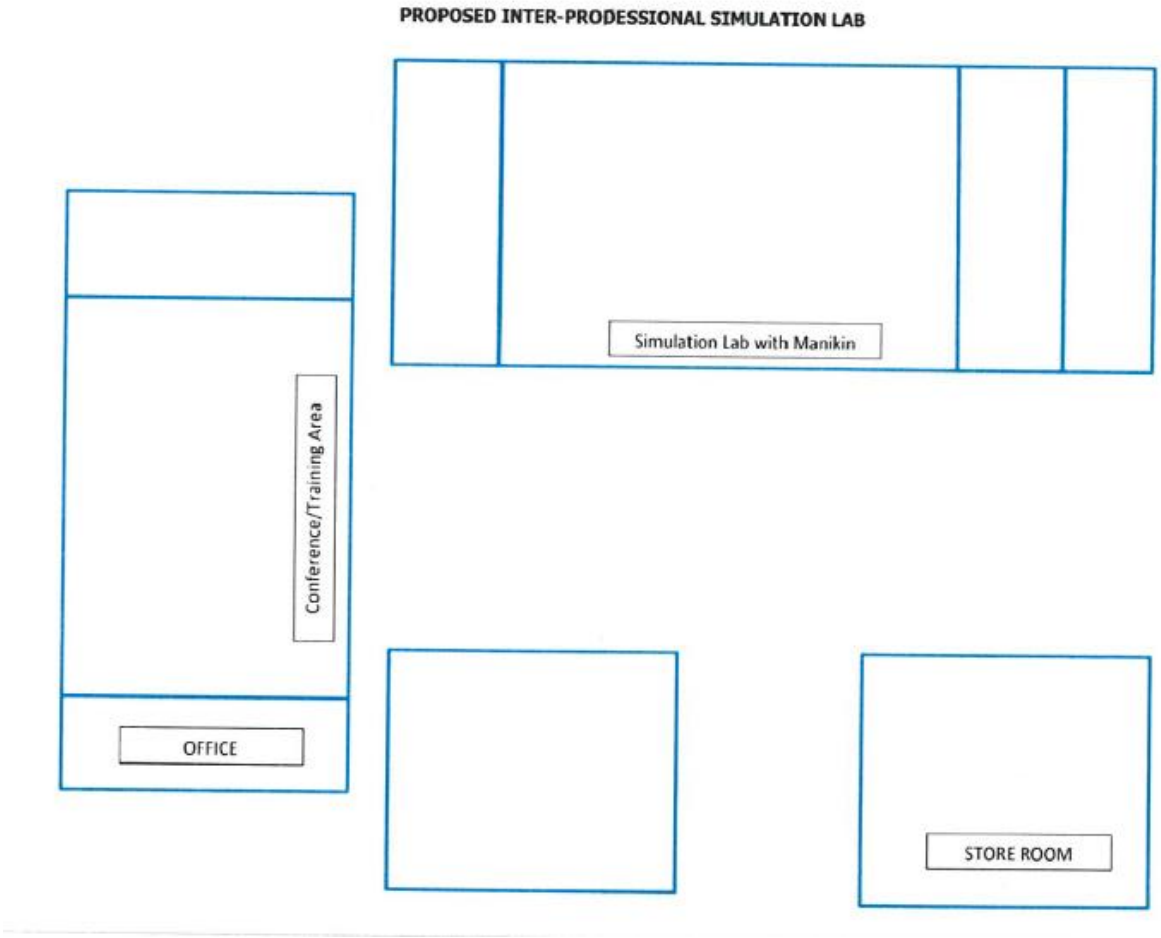
- Nursing Services- Nursing Education and Professional Development
- Academic Affairs/Postgraduate Training

Budgetary /Financial Impact

The costs associated with the establishment of the IPSTL will have minimal to zero impact on the budget, because:

- Utilization of existing building/facility on the compound
- Commissioning for use and occupation will be done by our Project Tasks Force and Building services at no cost
- Utilities and Maintenance department will oversee their related aspects of buildings preparation for commissioning
- Communications department will provide all the equipment required for start- up: phones, faxes, photocopiers, mobile/wireless phones
- ISID department will provide the computer equipment from their existing inventory
- Logistics/Property/Materials will provide all office and lab furniture and required supplies
- Pharmacy Department as agreed to supply the center with expired items for utilization in the simulations

Facility Design



AppendixI

Industry Analysis

	Facts/Data About Your Target Industry	Industry Score
Current industry segment/niche size		7
Industry segment growth rate		10
Favorable trends sweeping across Industry		10
Fragmented competition		7
A feasible, money-making business model in the industry		10
Activity in startups, financing, and deals in the segment/niche		9
A favorable industry life cycle stage (not too early, not too late!)		10
Existing channels of distribution in the industry		10
Reasonably priced, widely available components, technologies, and ingredients		7
No barriers to entry in terms of capital needed, production, and distribution		10
	Total Score	90

Scoring Key: 1 to 10, where 1 is "a potential show-stopper for a new venture"; 5 is "neither a barrier nor supporting success;" 7 is "conducive to a new venture;" and 10 is an "individual setup for venture success" . (Adapted from Meyer & Crane, 2014)

Appendix J

SWOT Analysis

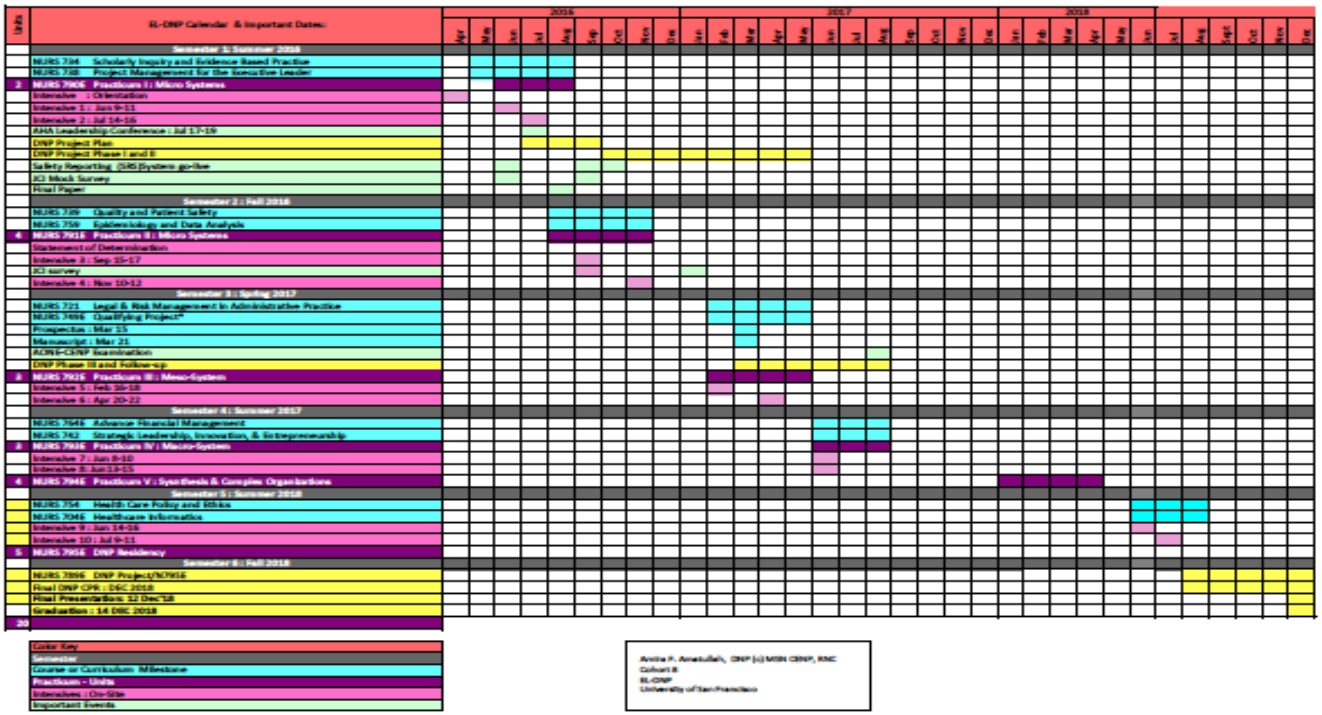
	Strengths	Weaknesses
Internal	• Human Resources Diversity • Financial Stability • Positive Industry analysis • Equipment and space availability • Low start up costs	• Lack of training facility • Ineffective communication skills • Lack of leadership • Language barriers • Lack of CHSE accredited faculty
	Threats	**Opportunities**
External	• Loss of reputation • Competitors • Malpractice litigation • Increased adverse patient outcomes	• Establishment of IPSTC • First healthcare simulation program in the area • Large number of colleges and healthcare facilities in region • Huge growth potential • Increase in staff technical skills & knowledge • Decrease in medical errors • Better patient outcomes

Adopted from Houston-Raasikh (2014)


IINTERNAL
STRENGTHS
Assets of NGHA
EMR
SRS
Facilities
Human Resources
Diversity
WEAKNESSES
Lack of teamwork/ collaboration
Lack of training in OB emergencies
Lack of leadership
Poor communication
SWOT
EXTERNAL
THREATS
Challenges- lack of training/upskilling
Reputation of HA
Medico-legal
Competitors
Budget Constraints
OPPORTUNITIES
Organizational support
Resources
IPSTC - for all interprofessional education/training

Appendix K

EL-DNP GANTT CHART



Appendix L

Project Phases

Initiation	Planning	Execution	Closure
Business case developed	Scope statement	Progress report	Final report
Obtaining approvals	WBS	Change Process	Change Log
Define the project	Responsibility Matrix	Develop & manage team	Post Mortem Report
Initial scope	Cost estimate	Cost Burn down	
Project charter	Gantt chart	Risk Register	
Identify stakeholders	Risk Plan	Review business case	

Table 1. Proposed Project Phases

Adapted from Martinelli& Milosevic (2011)

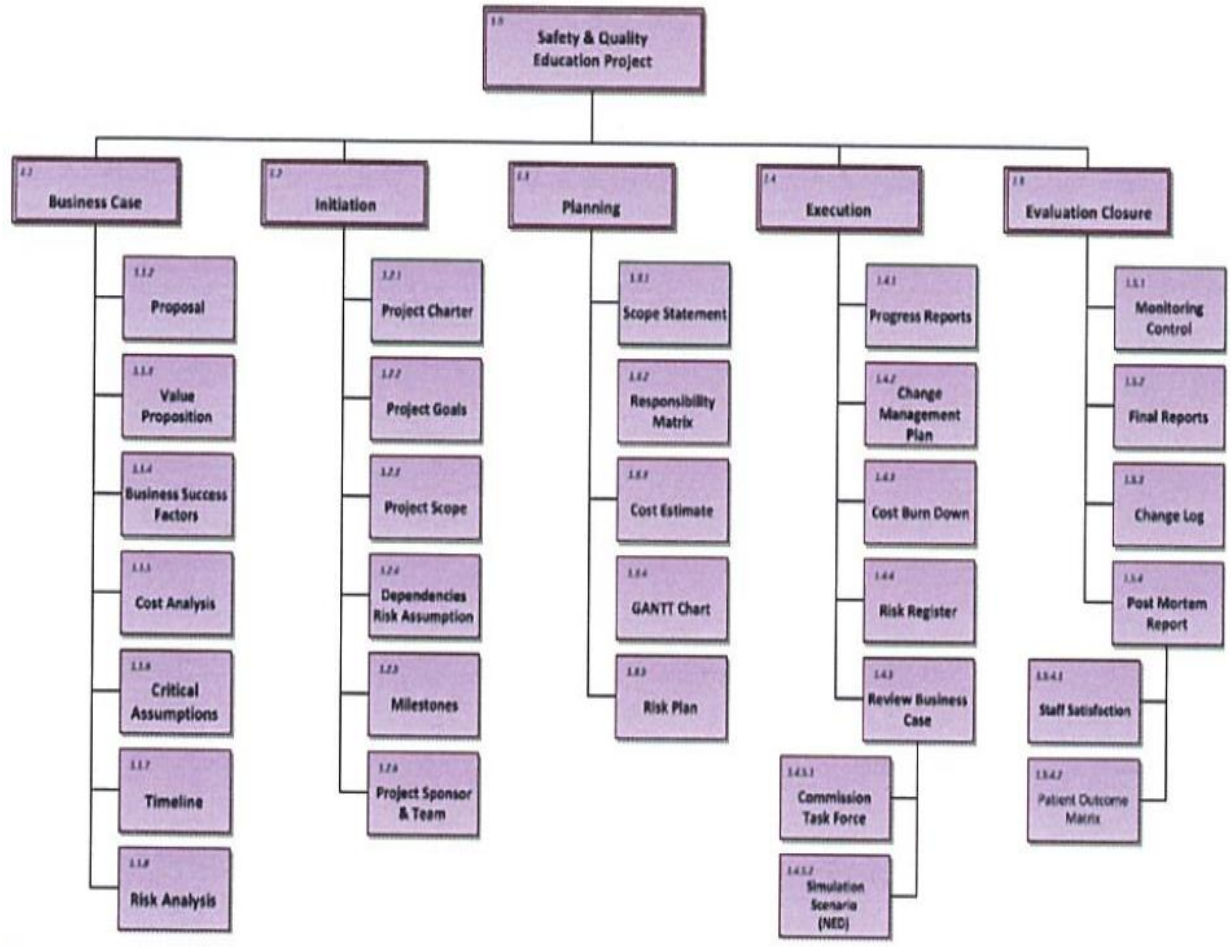
Appendix M

Operational Plan

From Al Yateem (2016)

Appendix N

Work Breakdown Structure for Improving Patient Safety



Appendix O

Fiscal Year 2017 Budget

REVENUE	**2016** (Reg. Fee x 25 Students x 12 months)	**2017** (Reg. Fee x 25 Students x 12 months)	**DIFFERENCE**
BLS	SR 30, 000 *(100x25x12)*	SR 105, 000 *(350x25x12)*	SR 75, 000
PALS	SR 45, 000 *(150x25x12)*	210, 000 *(700x25x12)*	SR 165, 000
Other Course(s)	SR 105, 000 *(350x25x12)*	270, 000 *(900x25x12)*	SR 165, 000
Total revenue	**SR 180, 000**	**SR 585, 000**	**SR 405, 000**
EXPENSES			
Salaries and Wages (Position & Titles)	**MONTHLY SALARY**	**IPSTC – YEARLY BUDGET**	
1. Director Clinical Nursing (DCN)	SR 26, 224	SR 314, 688	
2. Manager Nursing Education Department	SR 16, 706	SR 200, 472	
3. Project Manager – Interprofessional Simulation Training Center (IPSTC)	SR 16, 706	SR 200, 472	
4. Assistant manager	SR 14, 466 x 2	SR 173, 592	
5. Clinical resource Nurses (CRN) x2 [1 Western WE; 1 Malaysian MA]	SR 14, 466 x 2	SR 347, 784	
6. Nurse Educators (NE) x2	SR 14, 466 x 2	SR 347, 784	
7. Technician	SR 3, 524	SR 42, 288	
8. Administrator Assistant (AA)	SR 4, 014	SR 48, 168	
Total	**SR 139, 504**	**SR 1, 674, 048**	
Supplies Expense (laptop, desk, supplies, etc.)			
Products & supplies & spare parts	SR 50, 000		
Office supplies (forms & general)	SR 25, 000		
Textbooks/Printing(s)	SR 25, 000		
Office Furniture & spare parts	SR 15, 000		
Food & refreshment	SR 5, 000		
Special Events	SR 10, 000		
Subtotal supplies	**SR 130, 000**		
Equipment			
Medical Equipment & spare parts	SR 100, 000		
Other medical supplies	SR 75, 000		
Audiovisual equipment	SR 1, 500		
Other paraphernalia	SR 1, 000		
Total revenue from lifesaving courses	**SR 405, 000**		
Total expenses	**SR 307, 500**		
Total revenue (profit)	**SR 97, 500**		

Appendix P Manpower Status Report, Monthly Salary

POSITION/TITLE		MONTHLY SALARY	IPSTC - YEARLY BUDGET
1 – Director Clinical Nursing (DCN)		SR 26,224	SR 314,688
2 - Manager Nursing Education Department		SR 16,706	SR 200,472
3 – Project Manager - Interprofessional Simulation Training Center (IPSTC)		SR 16,706	SR 200,472
4 – Assistant Manager		SR 14,466	SR 173,592
5 - Clinical Resource Nurses (CRN) x 2	(1) Westerner WE (1) Malaysian MA	SR 14,466 x 2	SR 347,184
6 – Nurse Educators (NE) x 2		SR 14,466 x 2	SR 347,184
7 – Technician		SR 3,524	SR 42,288
8 – Administrator Assistant (AA)		SR 4,014	SR 48,168
	Total	SR 139,504	SR 1,674,048

Appendix Q

Three-Year Profit/Loss Assumptions

2016 (Initial Year)	Number of Courses	Participants	Average Fee per Course	Revenue per Course
Life Support Courses	80	300	750	18000000
Simulation Courses	76	400	900	27360000
Other Courses	65	200	500	6500000
Total Income				51860000

PROFIT AND LOSS ASSUMPTION

	2016	+3 Months	+6 Months	Year 2	Year 3
Cumulative price (revenue) increase	0%	5%	10%	30%	50%
Cumulative inflation (expense) increase	0%	5%	10%	30%	50%

Estimated Annual Activity Expenditures

	2016	+3 Months	+6 Months	Year 2	Year 3
Life Support Courses	105000	110250	121275	157657.5	236486.25
Simulation Courses	106600	111930	123123	160059.9	240089.85
Other Courses	90000	94500	103950	135135	202702.5
Total Expenditures	**301600**	**316680**	**348348**	**452852.4**	**679278.6**

Estimated (Net) Revenue

	2016	+3 Months	+6 Months	Year 2	Year 3
Life Support Courses	17895000	18789750	20668725	26869342.5	40304013.75
Simulation Courses	27253400	28616070	31477677	40920980.1	61381470.15
Other Courses	6410000	6730500	7403550	9624615	14436922.5
Total Net Revenue	**51558400**	**54136320**	**59549952**	**77414937.6**	**116122406**

Estimated Operating Expenses

Life Support Courses	80	300	750	18000000
Simulation Courses	76	400	900	27360000
Other Courses	65	200	500	6500000
Total Income				51860000

PROFIT AND LOSS ASSUMPTION

	2016	+3 Months	+6 Months	Year 2	Year 3
Cumulative price (revenue) increase	0%	5%	10%	30%	50%
Cumulative inflation (expense) increase	0%	5%	10%	30%	50%

Estimated Annual Activity Expenditures

	2016	+3 Months	+6 Months	Year 2	Year 3
Life Support Courses	105000	110250	121275	157657.5	236486.25
Simulation Courses	106600	111930	123123	160059.9	240089.85
Other Courses	90000	94500	103950	135135	202702.5
Total Expenditures	**301600**	**316680**	**348348**	**452852.4**	**679278.6**

Estimated (Net) Revenue

	2016	+3 Months	+6 Months	Year 2	Year 3
Life Support Courses	17895000	18789750	20668725	26869342.5	40304013.75
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Other Courses	6410000	6730500	7403550	9624615	14436922.5
Total Net Revenue	**51558400**	**54136320**	**59549952**	**77414937.6**	**116122406**

Salaries and Wages	**2016**	**+3 Mos.**	**+6 Mos.**	**Year 2 (3% Increment)**	**Year 3 (4% Increment)**
Director Clinical Nursing (DCN)	26224	0	0	27010.72	28091.1488
Manager Nursing Education Department	16706	0	0	17207.18	17895.4672
Project Manager – Interprofessional Simulation Training Center (IPSTC)	16706	0	0	17207.18	17895.4672
Assistant manager	14466	0	0	14899.98	15495.9792
Clinical resource Nurses (CRN) x2 [1 Western WE; 1 Malaysian MA]	14466	0	0	14899.98	15495.9792
Nurse Educators (NE) x2	14466	0	0	14899.98	15495.9792
Technician	3524	0	0	3629.72	3774.9088
Administrative Assistant (AA)	4014	0	0	4134.42	4299.7968
Supplies Expense (laptop, desk, etc.)					
Products, supplies & spare parts	30000	0	0	0	0
Office supplies (forms & general)	25000	0	0	0	0
Textbooks/Printing(s)	25000	0	0	0	0
Office Furniture & spare parts	15000	0	0	0	0
Food & refreshment	5000	0	0	0	0
Special Events	5000	0	0	0	0
Equipment					
Medical Equipment & spare parts	45000	0	0	0	0
Audiovisual equipment	2000	0	0	0	0
Other paraphernalia	1000	0	0	0	0
Total Operating Expenses	**263572**	0	0	**113889.16**	**118444.726**

IPSTC Initial Non-Salary Budget: 1, 674, 048

	Initial Year 2016	+3 Months	+6 Months	Year 2	Year 3
Total Income	51860000				
Total expenses	301600	316680	348348	452852.4	679278.6
Difference (ROI)	**51558400**	**54136320**	**59549952**	**77414937.6**	**116122406**

Appendix R

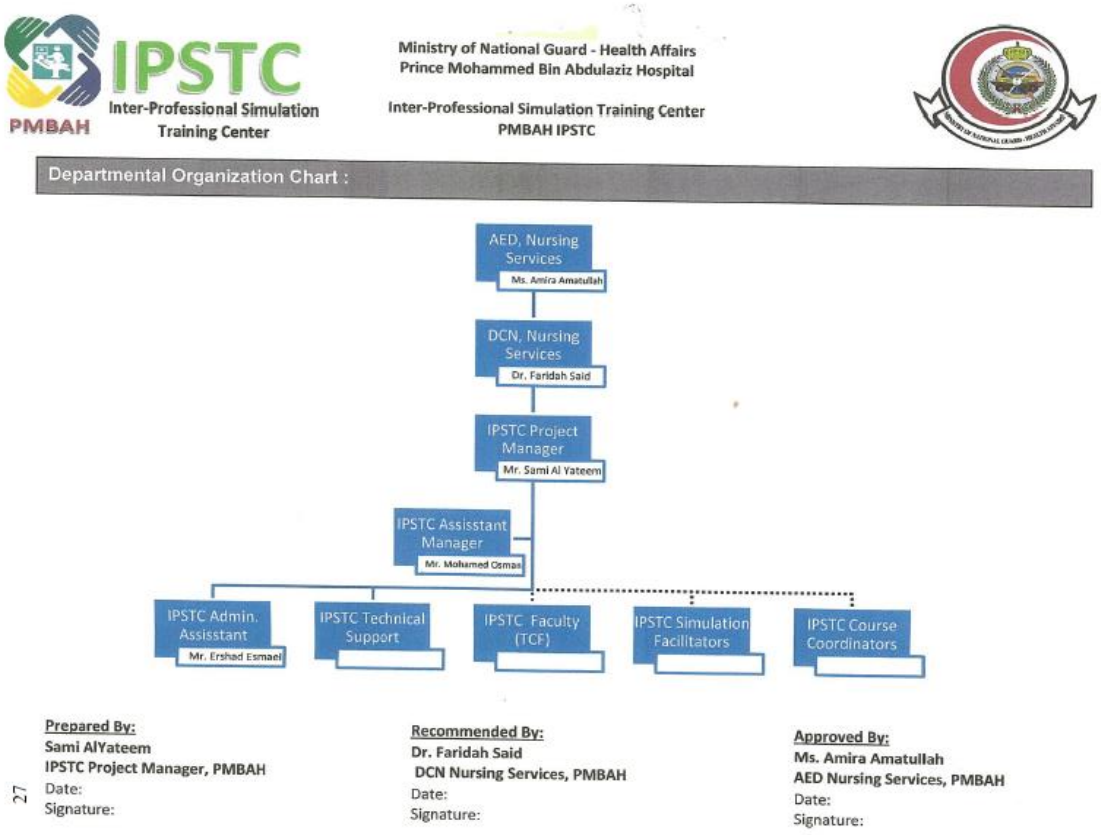
Descriptive Demographic Variables

DVI	Variable	Variable Description	Data Source	Possible Range of Values	Measurement Level	Collection Timeframe
Population	Employee ID	Unique ID	Employee File	N/A	Text	With start of Intervention
	Age	Age at start of intervention		20-64	Continuous	With start of intervention
	Gender	Gender		1= Female 0= Male	Dichotomous	With start of intervention
	Ethnicity	Country of Origin		0= American 1= Saudi 2= UK 3= Pakistan 4= Malaysian 5= Sudan 6= South African	Categorical	At time of intervention
	Position Title	Position category includes education		0= MD 1= MW 2= SN 3= CRN 4= NM/ANM 5= PCT 6= UA	Categorical	At start of intervention

Note. Data was taken from employee files at the time of the intervention. Adapted from Sylvia &Terhaar (2014).

Appendix S

Organizational Chart



Appendix T

Concept Message Map

Interprofessional Simulation training Center (IPSTC)

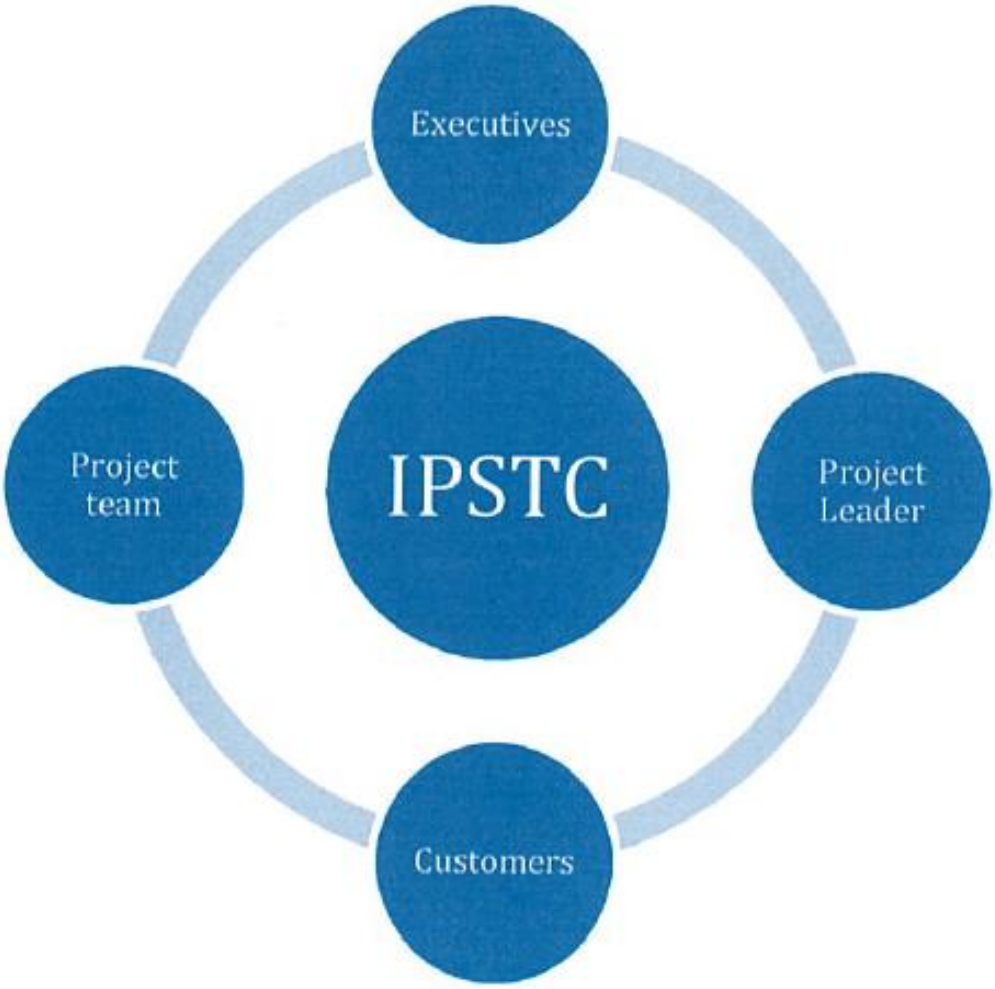
The IPSTC project incorporates the use of manikin based high-fidelity simulators into a laboratory setting at PMBAH-MR. The project is designed to provide ongoing hands on training opportunities for interprofessionals and health care students and medical residents in a safe environment.

Computerized manikins create patient care scenarios that enable health care professional to practice for both common and emergency situations. Manikins can be programmed to replicate human traits such as changes in BP, heart sounds and pupil responses to light. Abnormal conditions such as heart attack, allergic reactions, respiratory conditions and trauma issues can be created to allow staff to practice skills. This training also provides the opportunity to repeat the training sessions multiple times in order to improve the reaction time, knowledge and skills and confidence of the respondents when faced with real-life emergencies. Thus, this proposal for establishment of an interprofessionl healthcare education and training center is vital to the PMBAH community. The IPSTC will provide opportunities to all healthcare providers to enhance their knowledge and skills, sharpen their critical thinking and prepare for unexpected events. The IPSTC project will prepare our staff for life and death situations that will serve the community of the city. In addition, the IPSTC will be utilized on a regular basis for our life-support courses and other professional development programs under the auspices of Academic Affairs and the Post Graduate Training Center.

https://cmapscloud.1hmc.us:443/rid=1RGG33HGJ-Z1NR3TGCVB

Appendix U

Communication Route

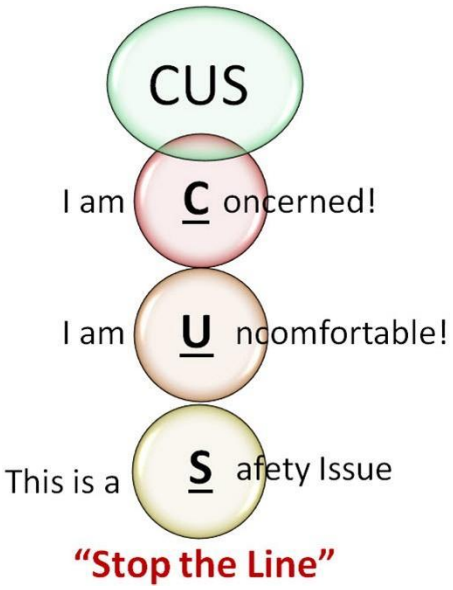


Appendix V

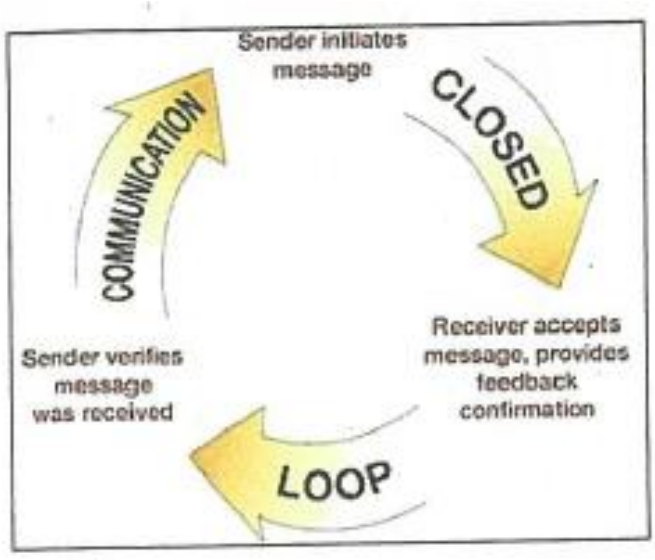
TeamSTEPPS Processes

Communication Processes

SBAR Process (Scotten, Manos, Malicoat, & Paolo, 2015)



CUS Process



Check-Back Process (Scotten, Manos, Malicoat, & Paolo, 2015)

Appendix W

Clinical Simulation Facilitator Training Course (21-21 March 2017)

PMBAH Inter-Professional Simulation Training Center (IPSTC)

Session Title: Introduction To Clinical Simulation and Simulation Terminology	Speaker:					
	0: Completely disagree					5: Completely agree
Item	0	1	2	3	4	5
The subject was made interesting						
The subject was explained clearly						
I developed the required knowledge /skills expected for this subject						
The classroom environment was appropriate and conducive for learning						
The speaker focused on knowledge and skills that were relevant for my learning.						
The speaker used a variety of interactive learning activities to stimulate my learning						
The required resources provided to facilitate my learning was adequate						
I am satisfied with the learning I received						
I would recommend this (session /workshop)						
Comments:						

Session Title: Briefing & Debriefing in Clinical Simulation	Speaker:					
	0: Completely disagree					5: Completely agree
Item	0	1	2	3	4	5
The subject was made interesting						
The subject was explained clearly						
I developed the required knowledge /skills expected for this subject						
The classroom environment was appropriate and conducive for learning						
The speaker focused on knowledge and skills that were relevant for my learning.						
The speaker used a variety of interactive learning activities to stimulate my learning						
The required resources provided to facilitate my learning was adequate						
I am satisfied with the learning I received						
I would recommend this (session /workshop)						
Comments:						

Session Title: Facilitation of Clinical Simulation based learning	Speaker:					
	0: Completely disagree					5: Completely agree
Item	0	1	2	3	4	5
The subject was made interesting						
The subject was explained clearly						
I developed the required knowledge /skills expected for this subject						
The classroom environment was appropriate and conducive for learning						
The speaker focused on knowledge and skills that were relevant for my learning.						
The speaker used a variety of interactive learning activities to stimulate my learning						
The required resources provided to facilitate my learning was adequate						
I am satisfied with the learning I received						
I would recommend this (session /workshop)						
Comments:						

Appendix W

PMBAH IPSTC
Facilitator's Training Workshop
Pre & Post Course knowledge Assessment

Date:

Name: _____ **BN:** _____

The aim of this pre and post course assessment is to measure the effectiveness of this workshop in providing the participants with the intended learning opportunities

Kindly answer the following questions

1. **Simulated-Based Learning Experience**
- Must utilize a simulator in all scenarios
- Focus usually on allow participants to develop or enhance KNOWLEDGE and SKILLS domains
- A group of structured activities that represent actual or potential situations in education and practice

2. **What is correct about "Simulation Briefing"?**
- The purpose of the briefing session in simulation based learning is to conclude and summarize learning
- An information or orientation session held prior to the start of a simulation-based learning experience.
- Suggested activities in briefing include expressing feelings and correct wrong practices

3. **Wrong statement about "Simulation Scenario"**
- The plan of expected events for a simulated clinical experience.
- Can vary in length and complexity, depending on the objectives.
- Can be shared before the simulation process, to maximize the learning outcome of the simulation experience.
- It is allowed to use other organization's scenarios after doing the necessary modifications

4. **What is correct about "Fidelity" in simulation ?**
- The more equipment you use, the fidelity will increase
- The degree to which a simulated experience approaches reality; as it increases, realism increases.
- The level of fidelity is determined only by simulators and the degree of their complexity.

5. **What is true about "Simulation Debriefing"?**
- An activity that Follow a simulation experience
- The process is Lead by a facilitator.
- The purpose is to move toward assimilation and accommodation to transfer learning to future situations
- ALL of the above

PMBAH IPSTC
Facilitator's Training Workshop
Pre & Post Course knowledge Assessment

Date:

Name: _____ **BN:** _____

The aim of this pre and post course assessment is to measure the effectiveness of this workshop in providing the participants with the intended learning opportunities

Kindly answer the following questions

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- Focus usually on allow participants to develop or enhance KNOWLEDGE and SKILLS domains
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- Suggested activities in briefing include expressing feelings and correct wrong practices

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- The plan of expected events for a simulated clinical experience.
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- The degree to which a simulated experience approaches reality; as it increases, realism increases.
- The level of fidelity is determined only by simulators and the degree of their complexity.

5. **What is true about "Simulation Debriefing"?**
- An activity that Follow a simulation experience
- The process is Lead by a facilitator.
- The purpose is to move toward assimilation and accommodation to transfer learning to future situations
- ALL of the above

6. **During "Simulation Debriefing":**
- Participants are encouraged to explore emotions
- Participants' reflective thinking is encouraged
- Feedback is provided regarding the participants' performance.
- All of above are correct

7. **What is true about "Formative Assessment"?**
- Associated only with cognitive and psychomotor areas of learning
- Can be provided after concluding the simulation experience
- Feedback provides information for the purpose of improving performance and behaviors

8. **Summative Evaluation**

Summative evaluation of the participant's performance or occurs at the end of a predetermined time period.
- True
- False

9. **What is true about "Human Patient Simulators" ?**
- IV Hand insertion is an example of hyprid simulators
- Standardized patient is a high fidelity simulator
- Task Trainer simulators are used to perform a psychomotor skill
- All of the above

10. **Simulation Facilitation methods include**

Allowing the simulation scenario to progress without interruption, allowing the participants to problem solve independently
- True
- False

11. **The simulation Facilitator Should be:**
- Flexible and resourceful
- Motivational
- Calm and active and show a sense of trust.
- All of the above

12. **What is true about "Simulation Cues" ?**
- Providing cues to redirect the scenario and guide participants down the path of discovery.
- May include phone calls from providers or other health care departments
- Cues should not distract from the participant focused simulation.

13. **Maintaining Professional Integrity during simulation based experience may include**
- Confidentiality of Scenario content
- Sharing of content, events, and actions in the simulation with those who were not involved in the event may negatively alter future participants' learning experience(s).
- Violation of professional integrity may be viewed as violation of MNGHA Code of conduct with associated consequences.
- All of the above

AppendixX

NursOB Self-Assessment Tool

Nursing Management of OB/Perinatal Complications & Emergency

Directions part 1: Circle the number from 0 -10 that best describes your **KNOWLEDGE** at this time for each of the patient situations below. Circle N/A if the item is not applicable for your practice.

How ***KNOWLEDGEABLE*** are you in addressing these patient situations?

1. **Oxytocin management**

Not at all knowledgeable 0 1 2 3 4 5 6 7 8 9 10 Completely knowledgeable N/A

2. **Operative vaginal delivery**

Not at all knowledgeable 0 1 2 3 4 5 6 7 8 9 10 Completely knowledgeable N/A

3. **Obstetrical hemorrhage**

Not at all knowledgeable 0 1 2 3 4 5 6 7 8 9 10 Completely knowledgeable N/A

4. **Shoulder dystocia**

Not at all knowledgeable 0 1 2 3 4 5 6 7 8 9 10 Completely knowledgeable N/A

5. **Pregnancy induced Hypertension**

Not at all knowledgeable 0 1 2 3 4 5 6 7 8 9 10 Completely knowledgeable N/A

Directions part 2: Circle the number from 0 -10 that best describes your **CONFIDENCE** at this time in each of the patient situations below. Circle N/A if the item is not applicable for your practice.

How ***CONFIDENT*** are you in addressing these patient situations?

6. **Oxytocin management**

Not at all confident 0 1 2 3 4 5 6 7 8 9 10 Completely confident N/A

7. **Operative vaginal delivery**

Not at all confident 0 1 2 3 4 5 6 7 8 9 10 Completely confident N/A

8. **Obstetrical hemorrhage**

Not at all confident 0 1 2 3 4 5 6 7 8 9 10 Completely confident N/A

9. **Shoulder dystocia**

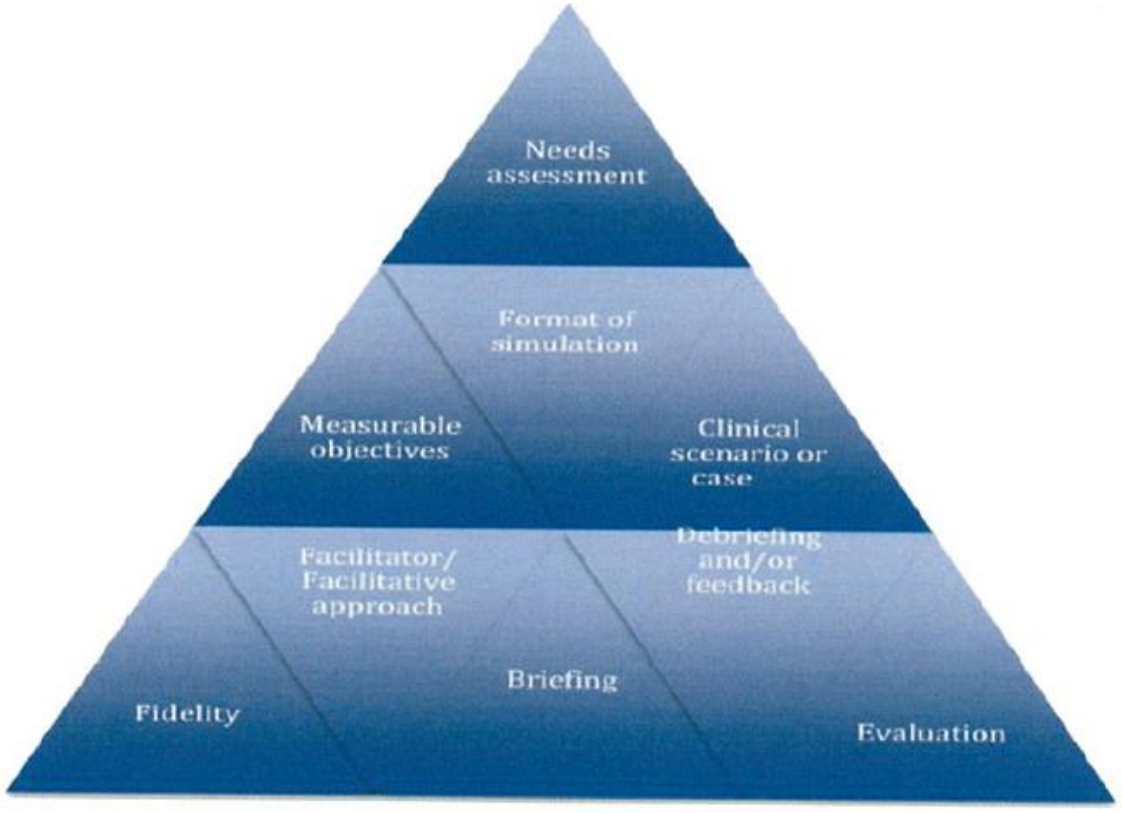
Not at all confident 0 1 2 3 4 5 6 7 8 9 10 Completely confident N/A

10. **Pregnancy induced Hypertension**

Not at all confident 0 1 2 3 4 5 6 7 8 9 10 Completely confident N/A

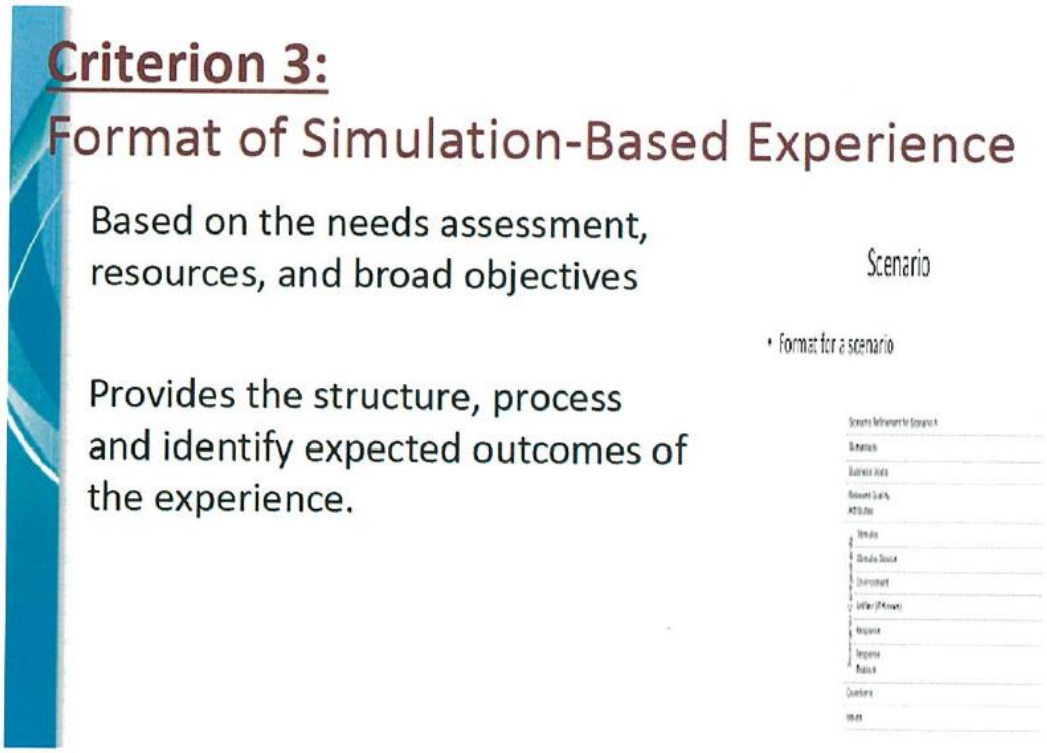
Appendix Y

Simulation Elements



AppendixZ

Simulation Format



APPENDIX AA

Simulation Modalities

Criterion 5: Fidelity

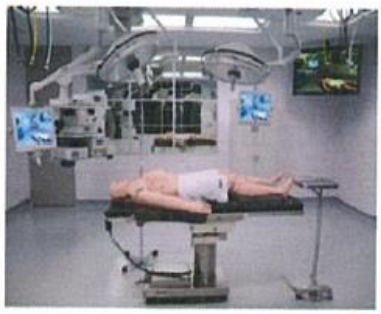
Various types of fidelity should be considered to create the required

PERCEPTION OF REALISM

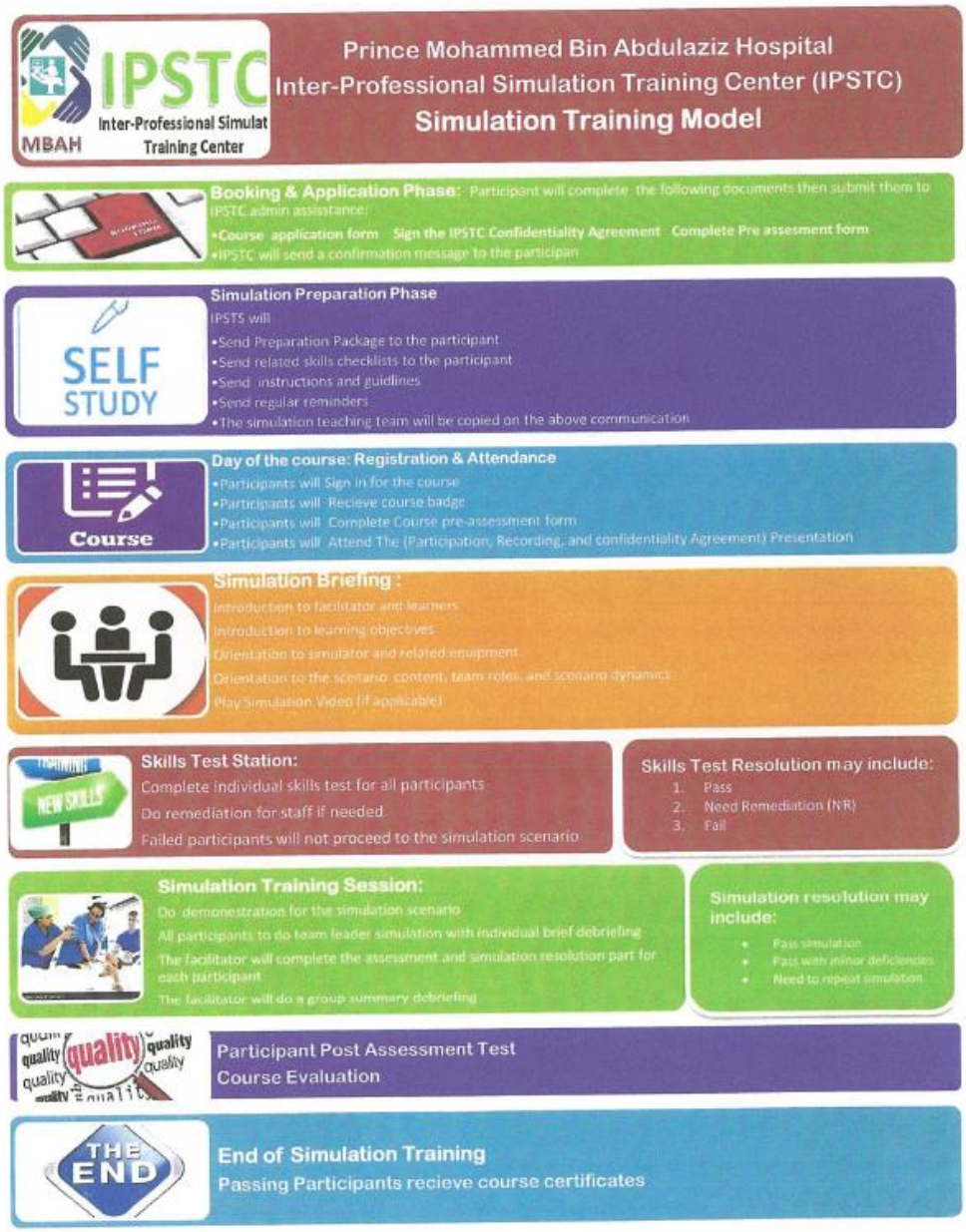
Low Fidelity Simulation

Mid Fidelity Simulations

High Fidelity Simulation



Appendix BB
IPSTC Simulation Training Model



Appendix CC
Shoulder Dystocia Scenario

Scenario Title

SHOULDER DYSTOCIA DRILL

Scenario Data

It is 2 AM, and your patient, a 22-year-old G1PO gestational diabetic with an estimated fetal weight of 3800 grams, has been in labor for what seems like an eternity. She has been pushing for two hours and is becoming exhausted. She tells you she can't go on. You assess that the infant is at +3 station and offer her a vacuum assisted delivery. After consent, the vacuum cup is well applied and, despite one pop-off, the head subsequently delivers with her third assisted contraction. You are about to breathe a sigh of relief, but the head fails to restitute: the anterior shoulder does not deliver. An attempt to facilitate delivery of the anterior shoulder with gentle assistance is unsuccessful. The infant's face and head are retracted against her perineum. The anterior shoulder is stuck, impeded by the pubic bone of the mother's pelvis. You realize that you are dealing with a shoulder dystocia and the atmosphere in the room changes from one of excitement and anticipation to one filled with confusion, anxiety and fear. A focused calm approach to this obstetric emergency is needed. It is essential that you are able to perform the maneuvers to free the impaction skillfully, and that you direct assisting caregivers' efforts effectively.

Simulation Learning Objectives:

1. List the risk factors for shoulder dystocia.
2. Describe a systematic approach to managing a shoulder dystocia using the HELPERR mnemonic.
3. Demonstrate appropriate maneuvers to reduce a shoulder dystocia using a maternal-fetal mannequin.
4. Offer descriptions of management strategies and techniques that could be utilized by clinicians and birth attendants around the globe.
5. Explain how Team STEPPS may be applied in this emergency situation

Fidelity

Setting/Environment

- In L&D room

Equipment available in room

- **Room Setup:**
- The room should be set up similar to a delivery room.
- The simulator is on an examination table, gurney, or bed with the lower torso draped.
- A delivery table should be available with the basic equipment.
- If videotaping is going to be done, then either a staff member will hold this or set up a tripod to the side of the bed. Any commercial camcorder can be used.
- Watch with timer or a second hand.
- Fetal monitoring simulators.
- O2 & suction
- PPE

Simulator Manikin/s Needed: • NOELLE birthing mannequin	**Medications and Fluids** • IV fluids • Oxytocin infusion • Medications
Equipment attached to manikin: • Fetal Heart Monitor • Dynamap • Oxytocin infusion ongoing	**Diagnostics Available** • N/A

Roles / Guidelines for Roles

- Staff to control fetus and maternal mannequin (1)
- Staff to play role of the Nurse (2)
- Staff to do documentation (1)
- Staff to act as runner (1)

Optional

- Staff to video record (1)
- Staff to play role of patient's family (mother, sister or husband) (1)
- Staff to play pediatrician (1)
- Staff to play physician (1)

References, Evidence-Based Practice Guidelines, Protocols, or Algorithms used for this scenario:

- Shoulder dystocia CPG
- K2
- Mosby
- ALSO

Briefing

1. Treat the scenario as real as possible.
2. Use personal protection equipment (gloves, etc.) as needed.
3. Request assistance if needed.
4. Please do not cut the perineum, but indicate if you would make an episiotomy.
5. Ask for medications if you feel that you require them.
6. You may request to move the patient to the OR if you feel this is necessary.

Scenario Progression Outline

Timing **(approximate)**	**Manikin Actions**	**Expected Interventions**	**May use the following Cues:**
10 seconds	Nurse enters room	Prepares for imminent delivery Empties bladder Arranges for assistance	Family announces that patient feels that she has to push.
30 seconds	The fetal head will deliver and then restitute such that one fetal shoulder is anterior. The birthing mechanism will not release and a shoulder dystocia will occur.	Nurse should recognize shoulder dystocia and **call for help.** • Announced "Top-Emergency' • Stepped up as leader • Feel for cord • Gentle traction • Explained to patient • Delegate as appropriate • Stopped Oxytocin infusion • Instructed patient to stop pushing • Uses mnemonic **HELPPER** • Evaluate for **Episiotomy** Begin maneuvers: • **McRoberts** • **Pubic pressure** (Side of Baby's back (Also once head delivered, begin the timer to measure the head-to-body delivery interval).	• Turtle sign
30 – 60 seconds	Obstetric Code activated: Rapid Response Team	Enter rotational maneuver: **Rubin II** **Rubin II & Woodscrew**	Family says the baby is turning blue.
30 – 60 seconds	NICU Team arranged	Rotational maneuver: **Reverse Woodscrew**	
	Arrange for OR Standby	Deliver **posterior arm**	
30 – 60 seconds	Uses Call-out Verifies Mutual Support	**Gaskin**	
30 – 60 seconds	Arranges for Active Management of 3rd stage	**Zavanelli**	

30 – 60 seconds	Baby delivers after 5 minutes	Fracture of clavicle/Symphysiotomy	

Debriefing / Guided Reflection Questions for this Simulation:

1. What went well?
2. What went wrong?
3. What could have been done differently next time?

Comments

Final Resolution

PASS SIMULATION TRAINING	NEEDS MINOR REVIEW IN CLINICAL SETTING	REPEAT SIMULATION TRAINING
☐	☐	☐

Simulation Facilitator's Details

Name	ID/BN	Date	Signature

Shoulder Dystocia Evaluation Form	YES	NO
Assess actual performance during shoulder dystocia drill: **INITIAL TASKS:** **1) Verbalizes diagnosis of a shoulder dystocia Yes No** **2) Asks assistant to mark/keep time of head to delivery interval Yes No** **3) Calls for additional help (Nursing or Physician) within 60 seconds of diagnosis of dystocia Yes No** **4) Calls for personnel to assist in resuscitation of infant (may be pediatrics, nursing, other provider) Yes No** **5) Appears to apply gentle traction to attempt delivery Yes No** **6) Utilizes McRoberts maneuver Yes No** **7) Utilizes Suprapubic pressure in correct direction Yes No** **ADDITIONAL TASKS:** **1) Evaluates need for and/or performs episiotomy Yes No** **2) Attempts additional appropriate maneuver to delivery fetus (circle all that apply): Yes No** **- Posterior arm delivery** **- Oblique maneuver (Woodscrew/Rubin)** **- Gaskins/All-fours maneuver** **3) Stopped Oxytocin infusion/instructed patient to stop pushing? Yes No** **INAPPROPRIATE ACTIONS:** **1) Asks for and/or applies fundal pressure Yes** **2) Appears to apply excessive force while attempting delivery Yes** **3) No diagnosis of shoulder dystocia within 3 minutes of delivery of fetal head Yes** **4) Attempts potential morbid maneuvers Fracture of clavicle/Symphysiotomy) prior to exhausting other maneuvers (Zavanelli/ Yes** **POST-DELIVERY ACTIONS:** **1) Discusses complication and interventions with patient Yes No** **2) States would send for cord gases Yes No** **ACTUAL HEAD-TO-BODY DELIVERY TIME: _____ (seconds)** **SCORING SHEET FOR SHOULDER DYSTOCIA DELIVERY NOTE**		

KEY COMPONENTS OF DELIVERY NOTE	YES	NO
1. Writes date of occurrence YES NO		
2. Writes time of note YES NO		
3. Writes what providers were present at delivery YES NO		
4. Classifies complication as shoulder dystocia YES NO		
5. Correctly notes which shoulder was anterior YES NO		
6. Notes head delivery to body delivery interval YES NO		
7. Notes the infant's birthweight YES NO		
8. Notes if cord gases were sent (and results if sent) YES NO		
9. Notes if the infant was moving arms normally post-delivery YES NO		
10. Includes all maneuvers performed YES NO		
11. Includes correct order maneuvers performed YES NO		
12. Includes estimated blood loss YES NO		
13. Notes that personnel to assist in resuscitation of infant was called or present YES NO		
14. Notes infant's Apgar score YES NO		
15. Notes if patient had epidural YES NO		
*NOTE: If your institution has a template used for documentation, then you may use that to evaluate the completeness of the delivery note.		

(ACOG, 2002; Crofts, Attilakos, Read, Sibanda, &Draycott, 2005; Deering, Poggi, Hodor, Macedonia, & Satin, 2004; Deering, Poggi, Macedonia, Gherman, & Satin, 2004)

Appendix DD

Unit of Analysis

Unit of analysis

Inclusion criteria	**Staff working in OB/GYN, L/D, ED, OR, OPD, involvement in adverse events Population identified if they work/ assigned to clinical units impacting OB services**
Exclusion Criteria	Locum, float staff, 2017 arrivals
Timeframe	The population will include all who met the criteria during 2016

Population as Unit of Analysis

Name of population	OB staff
Subgroup receiving intervention	FTEs in OB/GYN, OPD, OR, ED
Subgroup for comparison	S/A
Sources of data	RCA, SRS, Med Records, employee files
Number expected	190+/_

Appendix EE

Data Management Plan

Using simulation-based interprofessonal training improve staff management of OB emergencies

a) **Project Purpose:** The purpose of this project is to improve interprofessional staff management of OB emergencies using simulation-based teamwork training

b) **Name of the Population:** OB department staff

c) **Subgroup receiving intervention:** FTEs in OB department and clinical areas impacting obstetrical services (N= 429)

(d) **Subgroup for comparison:** FTEs in OB department and clinical areas impacting obstetrical services (N= 429)

d) **Source of data:** Root Cause Analyses (RCA), Safety Reporting System (SRS) Electronic Medical Record (EMR), Employee files

e) **Number Expected:** 429 eligible 2106 (N=429)

f) **Criteria for Inclusion:** All staff working in OB, L/D, GYN, Nurseries; plus ED, OR, OPD staff involved in care of obstetrical patients

g) **Criteria for Exclusion:** Non-permanent staff- locums and float, new arrivals in 2017

h) **Timeframe:** Across (1) year

Adapted from Sylvia &Terhaar (2014)

Appendix FF

Sample Size Calculation

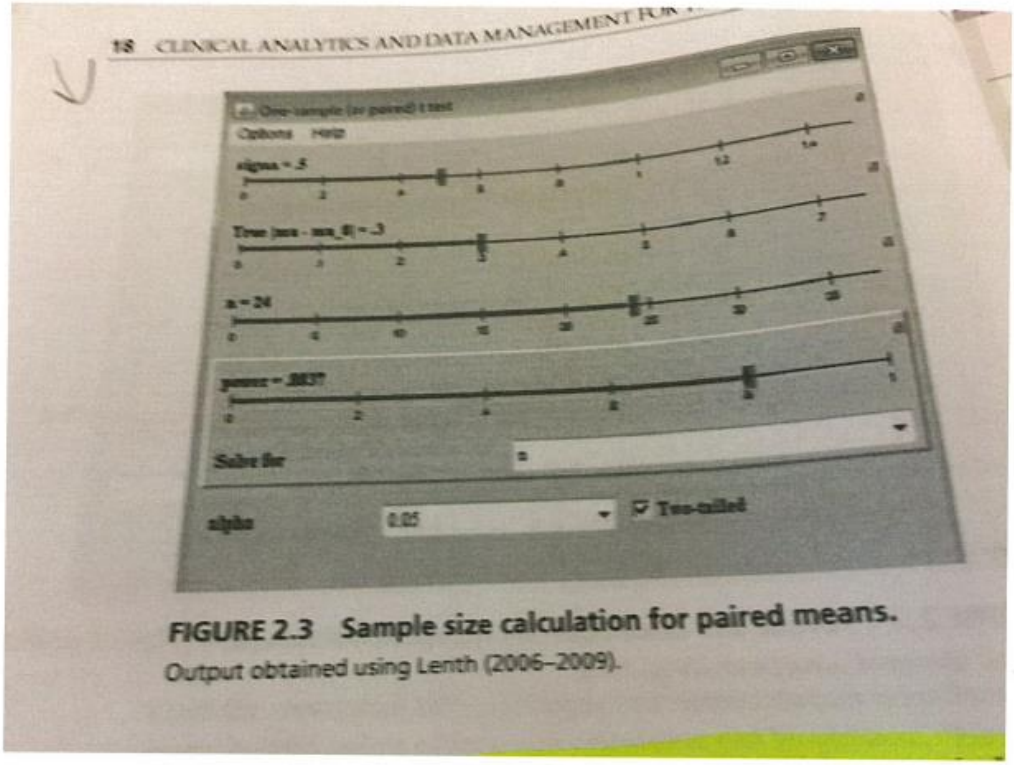


FIGURE 2.3 Sample size calculation for paired means.
Output obtained using Lenth (2006–2009).

Sample size calculation Alpha = .05

- Power = 0.08
- Previous evidence shows with this intervention HbA1C pre/post measurement
    - Mean of differences in pre/post values = 0.3
    - Standard deviation of mean of differences in pre/post values = 0.3

Adapted from Sylvia &Terhaar (2014)

Appendix GG

Internal Review Board (IRB) Approval

Dear **Dr. Sami AlYateem**

After reviewing your submitted research proposal/protocol and related documents, the IRB has APPROVED the submission.

The approval includes the following related documents:

Document/Title	Version	Date
Research Proposal	01	20 Feb 2017
Data Collection	01	20 Feb 2017
Cross-Sectional – Informed Consent Form	01	20 Feb 2017

The approval of the research study is valid for **one year** from the above approval to expiration date.

Terms of Approval:

- **Annual Reports:** An Annual report must be submitted for approval to avoid termination/suspension of your research.
- **Financial report:** If your study is funded project, details financial report should be submitted with the scientific report.
- **Final Report:** After completion of the study, a final report must be forwarded to the IRB.
- **Retention of original data:** The PI is responsible for the storage and retention of original data pertaining to the project for a minimum of five years.
- **Reporting of adverse events or unanticipated problems:** The PI is responsible to report any serious or unexpected adverse events or unanticipated problems, which could involve a risk to participants or others.
- **Biological samples:** No biological samples to be shipped out of the Kingdom of Saudi Arabia without prior IRB approval.
- **Participant incentives:** No financial compensation or gifts to be given to participants without prior IRB approval.
- **Storage of biological samples:** All biological samples collected for the purpose of this research must be stored in the KAIMRC related repository.

26 FEB 2017

Dr. Abdallah Adlan
Chairman, Institutional Review Board (IRB)
Ministry of National Guard - Health Affairs

AA/AS/cad

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تلفون ٨٠١١١١١
تلكس ٤٠٣٤٥٠

Appendix HH

Informed Consent Form

مركز الملك عبدالله العالمي للأبحاث الطبية

Cross-sectional survey

Informed Consent Form

Study Title: Using Simulation-Based Training to Improve Nursing Knowledge and Confidence in Labor and delivery unit at PMBAH in Madinah	
Principal Investigator: Mr. Sami Al Yateem	**Study No.:** RM17/001/M

You are requested to participate in research that will be supervised by Mr. Sami Al Yateem in Prince Mohammed Bin Abdulaziz Hospital in Madinah.

This study is about Evaluating the effectiveness of obstetric emergencies simulation training program on the level of nurse's knowledge and confidence in labor and deliver unit (LDU) in MNGHA-PMBAH. The estimated time duration for your participation in this study is around three hours, in which you will receive a simulation based training program on some main obstetric emergencies.

Your participation is voluntary and you have the right not to accept filling this survey without giving any reason and this will not affect your current or future medical care in MNGHA

You don't have to sign this information sheet only you can choose to agree/disagree; your acceptance to complete the survey will be interpreted as your informed consent to participate.

Your responses will be kept anonymous. However, whenever one works with email/the internet there is always the risk of compromising privacy, confidentiality, and/or anonymity. Despite this possibility, the risks to your physical, emotional, social, professional, or financial well-being are considered to be 'less than minimal'.

If you have any questions about the research, please contact Mr. Sami Al Yateem, PMBAH in Madinah. Mob. 0545331974. Email: yateems@ngha.med.sa.

In case you have enquiries related to your rights as a research subject you can contact the Institutional Review Board on Tel. +966-1142-99999 Ext. 94458.

انت مدعو للانضمام طواعية لدراسة بحثية سوف يشرف عليها سامي اليتيم في مستشفى الأمير محمد بن عبد العزيز في المدينة المنورة

هذه الدراسة تهدف الى تقييم مدى فعالية برنامج تدريبي عن الأمراض النسائية الطارئة يستخدم اسلوب المحاكاة على المستوى المعرفي و الثقة بالنفس عند الممرضات العاملات في قسم الولادة في مستشفى الأمير محمد بن عبد العزيز في المدينة المنورة. الفترة الزمنية المقدرة لمشاركتك في هذه الدراسة هي ثلاث ساعات, تتلقى خلالها تدريب حل التعامل مع اهم الحالات الطارئة في قسم الولادة بأستخدام اسلوب محاكاة الواقع

ان مشاركتك في هذه الدراسة طوعية و لك الحق التام في عدم قبول تعبئه الاستمارة او الانسحاب في اي وقت تشاء بدون ابداء الاسباب و لن يؤثر ذلك على العناية الطبية المقدمة لك حاليا او في المستقبل في الشؤون الصحية بوزارة الحرس الوطني.

لا يجب عليك التوقيع على ورقة المعلومات هذه، فقط عليك الاختيار موافق/غير موافق فمجرد قبولك تعبئة هذا الاستبيان يعتبر بمثابة اقرارك بالموافقة على المشاركه في هذا البحث.

ستبقى الردود على الاسئلة سرية. ومع ذلك، فأن العمل عن طريق البريد الالكتروني و الانترنت يبقى هناك احتمال لاختراق خصوصية البيانات و سريه المعلومات و لكن و بالرغم من هذه الاحتمالية تبقى الاخطار البدنية و العاطفية و الاجتماعية و المهنية و المالية المترتبة عليك ضمن الحد الادنى من الخطورة.

إذا كان لديك أي أسئلة حول هذا البحث، يرجى الاتصال سامي اليتيم مستشفى الأمير محمد بن عبد العزيز في المدينة المنورة / رقم الهاتف 0545331974 /ايميل: yateems@ngha.med.sa

في حال كان لديك الاستفسارات المتعلقة حقوقك كموضوع بحث يمكنك الاتصال مجلس المراجعة المؤسسية على هاتف. +966-1142-99999 تحويلة 94458.

☐Agree to participate
☐Disagree to participate

☐موافق على المشاركة
☐غير موافق على المشاركة

Appendix II

Summary of Results

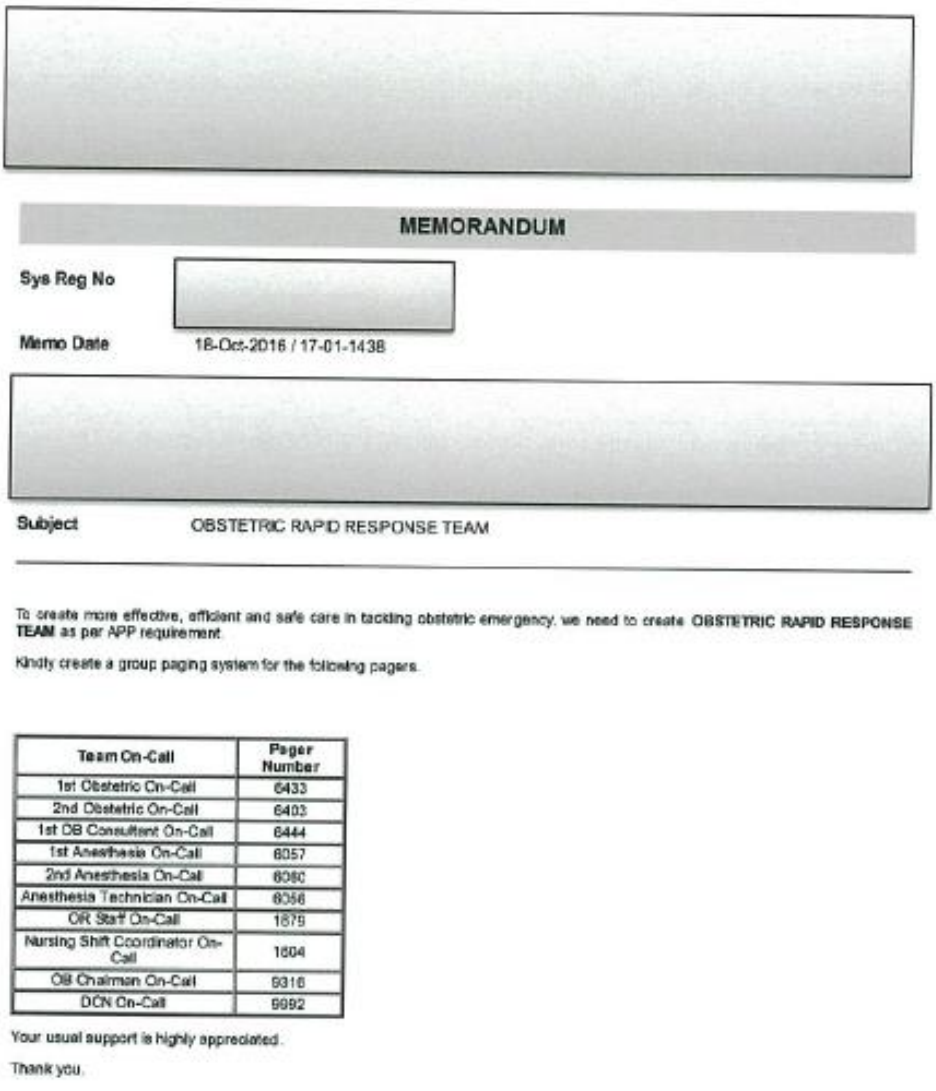
Table 1: The mean scores for participant's knowledge and confidence in different OB/GYN emergencies

	Pre-simulated	Post-simulated	2 months Follow up on
	M	M	M
Knowledge			
Shoulder Dystocia	6	9	9.3
Post-Partum Hemorrhage	7	10	9.3
Uterine inversion	5	9	9.2
Confidence			
Shoulder Dystocia	6	9	9.1
Post-Partum Hemorrhage	7	10	9.4
Uterine inversion	5	10	9.1

Table 2: Proportions of participants in different knowledge and confidence levels pre and post SBT

		Pre-simulated training		Post-simulated training		2 months Follow up	
		N	%	n	%	N	%
Participants reported Knowledge levels							
Shoulder Dystocia	Low	8	27.6%	0	0.0%		
	Moderate	18	62.1%	3	10.3%		
	High	3	10.3%	26	89.7%	18	62%
	Missing					11	38%
Post-Partum Hemorrhage	Low	6	20.7%	0	0.0%		
	Moderate	16	55.2%	1	3.4%		
	High	7	24.1%	28	96.6%	18	62%
	Missing					11	38%
Uterine Inversion	Low	15	51.7%	0	0.0%		
	Moderate	13	44.8%	3	10.3%		
	High	1	3.4%	26	89.7%	18	62%
	Missing					11	38%
Participants reported Confidence levels							
Shoulder Dystocia	Low	10	34.5%	0	0.0%		
	Moderate	16	55.2%	2	6.9%		
	High	3	10.3%	27	93.1%	18	62%
	Missing					11	38%
Post-Partum Hemorrhage	Low	9	31.0%	0	0.0%		
	Moderate	14	48.3%	1	3.6%		
	High	6	20.7%	27	96.4%	18	62%
	Missing					11	38%
Uterine Inversion	Low	14	48.3%	0	0.0%		
	Moderate	14	48.3%	3	10.3%		
	High	1	3.4%	26	89.7%	18	62%
	Missing					11	38%

Appendix JJ
OB Rapid Response Team Roster



MEMORANDUM

Sys Reg No

Memo Date 18-Oct-2016 / 17-01-1438

Subject OBSTETRIC RAPID RESPONSE TEAM

To create more effective, efficient and safe care in tackling obstetric emergency, we need to create **OBSTETRIC RAPID RESPONSE TEAM** as per APP requirement.

Kindly create a group paging system for the following pagers.

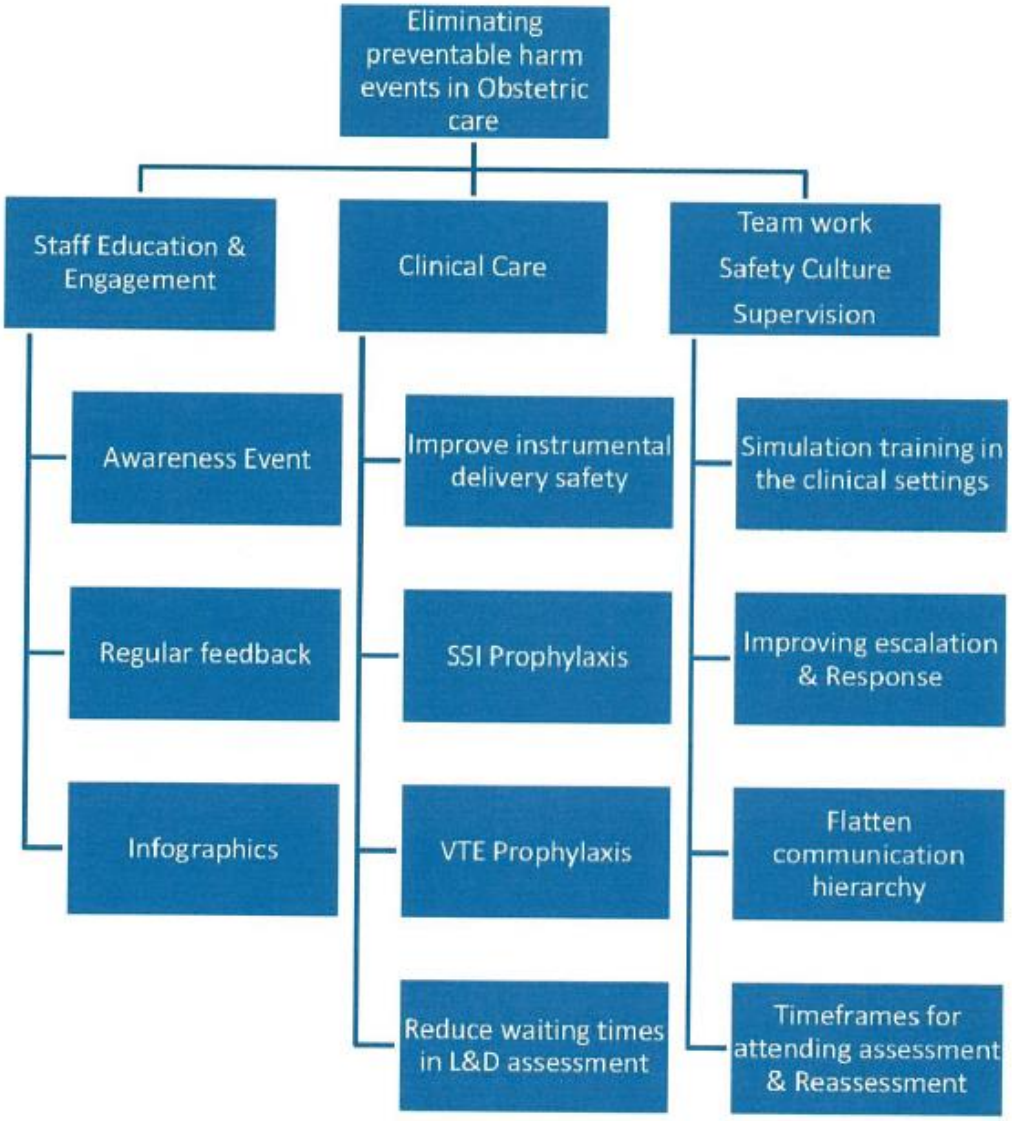
Team On-Call	Pager Number
1st Obstetric On-Call	6433
2nd Obstetric On-Call	6403
1st OB Consultant On-Call	6444
1st Anesthesia On-Call	6057
2nd Anesthesia On-Call	6060
Anesthesia Technician On-Call	6056
OR Staff On-Call	1679
Nursing Shift Coordinator On-Call	1604
OB Chairman On-Call	9316
DCN On-Call	9992

Your usual support is highly appreciated.

Thank you.

Appendix KK

Performance Improvement Project: Obstetrics Flowchart



Adapted from the OB/GYN Department Manual (2016)

Appendix LL

X-Point Data Display

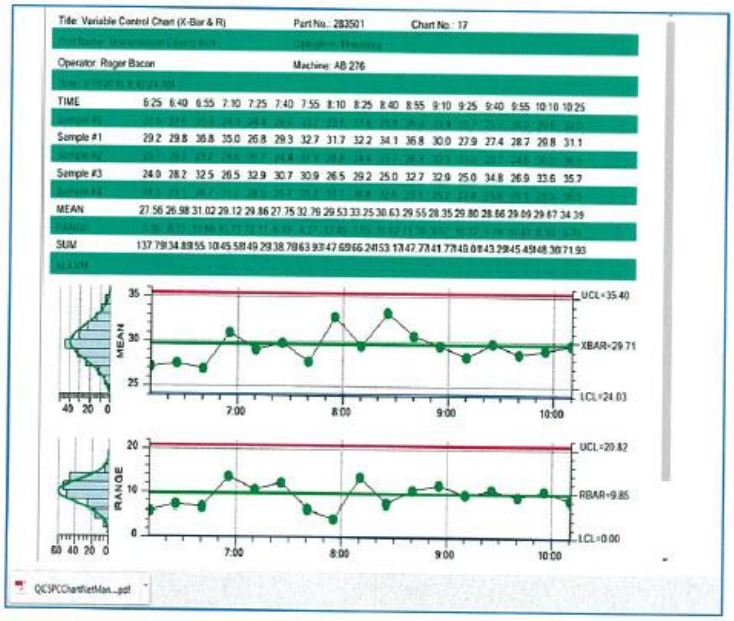
Measures Table

Measure	Description	Type – Variable/Attribute	Location
Discharge time		X-bar Sigma Chart	
Staffing levels		P-chart	
Number of admissions		IR Chart	
Add Edit Delete		Run	

Data Table for: Discharge time (X-bar Sigma type)

Date	Time	X-bar Sigma	R	Sample size
22/3/16	01:00	7	0	1
22/3/16	02:00	6.66	5	3

Add Edit Delete



X-Point enables improvement team to enter their data directly into the system to produce Statistical Process Control Charts or Run Charts

Appendix MM

X-Point Graphical Display