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Briefing and TeamStepps reduce Decision to Incision Time: A Pilot Study

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Briefing and TeamStepps reduce Decision to Incision Time: A Pilot Study

A dissertation submitted in partial satisfaction of the

requirements for the degree

Doctor of Nursing Practice

by

Terri Lynn Cole

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ABSTRACT OF THE DISSERTATION

Briefing and TeamStepps reduce Decision to Incision Time: A Pilot Study

by

Terri Lynn Cole

Doctor of Nursing Practice

University of California, Los Angeles, 2023

Professor Nancy T. Blake, Committee Co-Chair

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Background: Interdisciplinary collaboration of the labor & delivery team during their urgent cesarean huddles was not conducive to prompt decision-making. These delays led to unfavorable outcomes for the mother and baby, signifying a need for improvement in their process and a shared mental model in conducting this important huddle and their decision process. **Objectives**: An estimated 47% of cesarean delivery complications are attributed to delayed or fractured communication. This quality improvement project objective, using a pre and post survey, is to improve the shared mental model of the team through their values, beliefs, and attitudes. **Methods:** A convenience sample of 24 participants, consisting of registered nurses

and physicians, the Jefferson Scale of Attitudes Towards Nurse/Physician Collaboration (JSATNPC) was distributed as a pre and post survey before and after role-play simulation exercises. The teams used a briefing checklist and the TeamStepps concepts of checkback, the two-challenge rule, and Concern, Uncomfortable, and Safety. **Results:** This QI project did not improve the decision-to-incision times of the labor and delivery team. The pre-intervention mean and median time were 66.1 and 28 minutes, respectively; and the post-intervention scores were a mean of 116.6 and a median of 98 minutes. There were 24 pre-surveys of the (JSATNPC) and one post-survey completed. **Conclusion:** Several physicians and nurses were supportive and appreciative of the structured applied to their briefing. The team held the same concern for the safety of the mother and baby, but did not have the support in organizing their process. The DNP student has returned to the project site to organize a team and revisit implementing the project with an assigned team and committed stakeholders.

The dissertation of Terri Lynn Cole is approved.

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This dissertation is dedicated to my daughter and son. The love I feel for the two of you fills my soul! To my daughter, I enjoy our adult relationship, the thoughtful conversations, and the beautiful woman you are. My son, you graced my life for 16 years and now you are blessed in heaven…I love and miss you!!

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VITA

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CHAPTER ONE: INTRODUCTION

Briefing and TeamStepps Reduce Decision to Incision Time: A Pilot Study

Critical responses by the labor and delivery team result in better patient outcomes when role-specific expectations are coordinated in huddles (TeamStepps, 2019). Complications for cesarean deliveries (Roy et al., 2019) are estimated at 47% for the expectant mother due to delayed or fractured communication. Expectant mothers identified as potential or actively hemorrhaging, experiencing pre-eclampsia, eclampsia, and deep vein thrombosis or pulmonary embolism (*Center for Disease Control, 2021*) are at high risk of escalating to an urgent delivery or perish if not treated in a timely manner. In 2018, the mortality rate for expectant mothers reached 17.3 per 100,000 live births. Of those deaths, 20% represent three of the risk factors above: hemorrhage, eclampsia, and deep vein thrombosis (Center for Disease Control, 2021). TeamStepps education improved interprofessional collaboration in a trauma center team by teaching and practicing communication skills during simulation exercises. The team expressed feelings of confidence in their roles and the valuable contribution from every team member during emergent care (Peters et al., 2018). Role-play simulation increased team-based clinical performance during emergency response education for medical residents (Bertrand et al., 2018). It decreased psychological stress responses to pediatric laryngospasm, an event that can escalate to intubation. The simulation included kindness in the tone of the provider handing off the patient.

Positive communication among the team improved and decreased psychological stress during this emergency. These two examples contrast other studies that only applied the education of TeamStepps®. Improving the safety of patients is strongly associated with using

TeamStepps® communication tools, and the nurses and supervisors in the intensive care setting did not improve their communication for urgent responses with education only, just as with the surgical teams (Leong et al., 2017) who wanted the use of the communication tools to improve their post-surgical debriefings. Neither group improved team communication via education only for a small cohort of nurses and their supervisors nor the surgical teams with the physician as the designated leader for each debriefing. These two studies support the need for an additional intervention to practice the information learned and allow other disciplines to lead the conversations for performance improvement from a varied perspective.

Background

Huddling is a structured forum adopted from the military to develop a structure via information sharing aimed at the inclusion of every healthcare member involved in the preparation and care of the patient (Papadakis et al., 2019). Huddles, called briefings, are pre-procedure gatherings, typically in the operating room or critical treatment areas (TeamStepps, 2019). The goals of huddling are to create awareness and facilitate improvement of processes. Interprofessional collaboration improved in 67% of studies (Pimentel et al., 2019) when huddles were implemented and maintained. These studies reported safer work environments and improved process outcomes due to situation awareness and team coordination. Huddling also engaged the frontline staff in discussing and contemplating work-related issues to improve collaboration, thus initiating an attitude change in the team (Pimentel et al., 2019).

A nursing home in Norway addressed the communication of essential and risky medication change reporting using a huddle board instead of the traditional huddling process. Their attending physician and nursing team collaborated on which medications to feature for each patient and placed the information on the board for one week. The expectation was for staff

to view the board daily and add updated information on medication safety for each patient (Ore et al., 2019). Within six months, all staff members were 100% compliant in viewing and updating the huddle boards, from initial compliance of 20% – 30%. This demonstration in augmenting the five- or ten-minute traditional verbal huddling to a huddle board was innovative in meeting their team engagement and evolving the communication process.

Papadakis et al. (2019) report briefing as a form of huddling used by teams in the operating room for accuracy in patient information and procedures. It is a concise flow of efficient actions and is time-saving in providing urgent or emergent care responses. Briefings are a standard practice recommended by The Joint Commission and the World Health Organization to decrease harm to patients undergoing critical procedures (Papadakis et al., 2019). Coordination of a daily briefing requires organizing procedural and safety elements to deliver the care expected and eliminate errors. Synergy is evident when the team experiences a shared mental model of respect and acknowledgment for one another professionally in the care of the patient. In the absence of a formal collaboration and efficient communication process, adverse outcomes will ensue (Phadnis & Templeton-Ward, 2018).

The fear of speaking up is a potential for error and threatens the safety of patients who require an urgent response. These delays are the impetus for poor outcomes. Due to a physician-to-nurse hierarchy, Rainey et al. (2019) discovered knowledge gaps in their standardized process. Many nurse practitioners in training did not follow the standardized care for expectant mothers for fear of the physicians in the primary health clinic. In Kenya, the delayed response to urgent cesarean deliveries during a retrospective study discovered poor documentation, inadequate staffing, and delayed consenting, resulting in providers needing the correct information and staff to expedite the decision for cesarean delivery. A routine practice of

tested techniques like briefing, role-play simulation, and the TeamStepps® will improve the labor and delivery team response to decrease the decision to incision times. Repetitive actions improve responses to critical emergencies, and practicing suitable communication means improves the participants' psychological safety and patient care. Peng et al. (2019) intentionally added a kind tone to their simulation exercises and measured a decrease in the anxiety level of the pediatricians.

TeamStepps is an evidenced-based communication strategy developed over 20 years by the military to focus on training teams in highly stressed situations. The practical phases of the program (1) assessment, (2) planning, training, and implementation, and (3) reinforcement and sustainment have demonstrated efficiency in team communication and respect (Clancy & Tornberg, 2007). The competencies developed from TeamStepps training are desirable elements of a high-functioning healthcare team: team leadership, situation monitoring, mutual support, and communication. *Team leadership* is informal and therefore designated to the individual in the group with the most knowledge and skills to oversee the situation. *Situation monitoring* is the expectation of everyone present during the critical event to heighten awareness of their role. As each team member does this, it extends awareness among the team and helps capture any possibilities for error, bringing about the *mutual support* experienced while working together. The team assesses the needs and wellness of the group to keep the interactions healthy by offering help and preserving a cohesive team. Strong support from organizational leadership is integral for briefings to reach effectiveness. Leadership presence is recommended to encourage each member to speak up when there is an important message or information to share with the team related to the procedure (Donnelly, 2017). Information sharing or communication is vital for the inclusion of all members when there are varying levels of professions.

Statement of the Problem

The labor and delivery team at a large academic medical center, comprised of registered nurses, attending and resident physicians from obstetrics and anesthesia services, along with certified nurse midwives and anesthetists, has described their briefing as poorly attended, unprepared, and unstructured. Such behavior requires engagement in team collaboration (Schwendimann et al., 2019). One certified nurse midwive believed deciding when to perform a cesarean delivery was outside their professional scope of practice, however, they are aware of when patient care should transfer to a medical provider. Contrary to their statement, this point seems to be the beginning of a decision for a cesarean delivery. The disengagement of each of the professional teams prolongs the time from the decision to perform a cesarean delivery up to the time of the initial incision, known as the decision-to-incision (DTI) time. The American College of Obstetrics believes 20 minutes is the best practice for the DTI time for an urgent cesarean birth ("American College of Obstetrics and Gynecology Committee Opinion No. 447: Patient Safety in Obstetrics and Gynecology," 2009). However, the Labor and Delivery team noted that their average time is greater than 30 minutes. The nurse leader of the labor and delivery department aspires to a DTI time of fewer than 30 minutes and for all the stakeholders involved with the procedure to attend the briefing daily. This DNP project will respect the chosen DTI time frame of 30 minutes as an initial goal to avoid discouraging the team and allow for incremental improvements. The desire is to have the briefing meet the intended purpose of thoughtful input of all the services with direct involvement of the expectant mother and father and a DTI time consistently at 30 minutes or less (Leong et al., 2017).

Population, Intervention, Comparison, Outcomes, and Time (PICOT) Statement

This Doctorate of Nursing (DNP) evidence-based quality improvement (QI) project will apply the PICOT framework for the clinical intervention: population, intervention, comparison, outcome, and time. "The labor and delivery team (P) will perform a structured daily team briefing utilizing TeamStepps communication tools and a briefing checklist (I) as compared to the current standard of practice of an unstructured briefing (C) to reach a decision-to-incision time of 30 minutes (O), in 3 months (T)".

CHAPTER TWO: THEORETICAL FRAMEWORK

Leininger's Culture Care Theory (CCT), developed in 1966, focuses on culture as the influencer and facilitator of healing by integrating the cultural diversities between the patient, care provider, and healthcare professionals (McFarland & Wehbe-Alamah, 2019). Leininger & MacFarland (2015) suggest that the care provider and healthcare professionals be aware of their values, patterns of beliefs, and attitudes, which interconnect with those of the patient. This interconnection develops commonalities, or universalities, to move toward a plan of care or action for improved participation and outcomes. Leininger developed the Sunrise Enabler diagram to guide providers in incorporating those important cultural influences for holistic health, well-being, support of disabilities, illnesses, death, and dying (McFarland & Wehbe-Alamah, 2019). The diagram commences focusing on the entity and the healthcare team and flows downward (See Figure 1).

Jeffries et al. (2018) explain that the cultural characteristics of healthcare workers are a combination of generic (influenced by family and growth experience) and professional care

knowledge (a learned culture from informal and formal education). These cultural characteristics mature to form professionals who give their best care, contrasting with cultural imposition (Jeffries et al., 2018), where the healthcare professional forces individual beliefs and attitudes upon others. Positive experiences that shape one's personality to express and accept the opinions of others verbally are lifelong learning processes. Collaboration is not evident in the setting of cultural imposition. Consequently, poor attendance and a failure to value the team process of sharing information to establish the best decisions for the safety of the expectant mother are not achieved.

A participatory action research study of women in rural Cameroon, Africa (Tadzong-Awasum et al., 2021) demonstrated an absence of power and a voice to prevent infections of sexual diseases and Human Immunodeficiency Virus/Autoimmune Deficiency Syndrome in their community due to their husbands' sexual practices with multiple partners. Therefore, the women take on the shame of disease and intentionally avoid getting tested not to disgrace their families. Instead, the women choose folk remedies to treat sexual diseases and other illnesses, which lead to their death. When the Labor and Delivery team members miss the opportunity to convene for their daily briefing, they relinquish their power and voice in affording the best care to the expectant mother, resulting in potential feelings of shortcomings should an adverse event occur. For the African cultural beliefs, Leininger recommends that healthcare professionals negotiate, restructure, and repattern such behaviors through preventive education on the benefits and risks of folk medicine to cure diseases and address the capacity the women have in managing their health issues (MacFarland & Wehbe-Alamah, 2015). The same intervention applies to the labor and delivery team. Utilizing the recommendations of negotiation, restructuring, and repatterning to change the accepted norm can create a dynamic response in their briefing. The labor and

delivery team leaders can assist one another to participate in the daily briefings with the hope of a cascading effect of developing a voice and power from the healthcare team filtering down to the patient and promoting proactive decision-making in their care.

Application of the CCT leads to the hypothesis that using the path of integrative care practices and the combination of generic and professional care is most fitting to bring cohesion to daily briefings of the labor and delivery team. The daily briefing team must explore culture care repatterning or how the group can integrate their beliefs and behaviors to collaborate in decision-making during the daily briefing (MacFarland & Wehbe-Alamah, 2015). The framework will augment the reporting of responsibilities in a meaningful way and engage all those in attendance efficiently on when to transport the expectant mother for an urgent cesarean section procedure. The holistic group factors of CCT are technological, philosophical, social, cultural, political, economic, and educational values (McFarland & Wehbe-Alamah, 2019); integrated into developing a structured team and briefing. As the team transforms its thoughts on cultural contributions, an appreciation of their value can mature in the direction of synergy.

CHAPTER THREE: REVIEW OF LITERATURE

The search for original research articles was conducted using Google Scholar, PubMed, and Web of Science, yielding 15,057 results. The key words and terms used were: TeamStepps®, situation awareness, simulation, briefing, and cesarean delivery; and the filters used were: randomized control trials, peer-reviewed, and a time frame of the past five years. Each article was critically appraised for inclusion and exclusion by titles, abstract, and methodology until 21 articles with the components to support this DNP lead project were identified (Mazurek Melnyk & Fineout-Overholt, 2019). The subject category of the 21 articles

are: TeamStepps® full course, less than full course, no course, briefing, and simulation. (See Table 1 Randomized Control Trials by Category). Every article supports the use of briefing, simulation, and TeamStepps as an intervention for change in interprofessional collaboration in the labor and delivery unit (American association of colleges of nursing, 2006).

A structured bedside huddle and communication tools improved the shared mental model of addressing clinical decisions and discharge planning (Liaw et al., 2019). This three-arm quantitative study included two intervention groups: one received a 30-minute online didactic course on the cognitive tools of identity, situation, background, assessment, and recommendation (ISBAR); and biophysical models of health for medical, functional, psychological, and social dimensions of health. The second intervention group received the education above in addition to a two-hour virtual simulation training and orientation on using simulation avatars.

The simulation exercise intervention tools used by raters were the Attitudes Towards Interprofessional Healthcare Teams (ATIHCT) scale and the Interprofessional Socialization and Valuing System scale (ISVS); Cronbach's 0.82 & 0.95, respectively. Raters were blinded to the groups and were expected to rate behaviors performed using ATIHCT, and overall team performance, using ISVS. A total of 40 teams, 5-6 subjects on each team, participated in simulation rounds for 1) An elderly patient with pain and fever on postoperative day 3; and 2) A family conference to discuss discharge plans for a patient. Demographic data were not significant for any differences between groups based on a p-value of <0.05.

A Kruskal-Wallis test measured the team performance (ATIHCT) as a significant difference between all three groups, $p<0.05$. There was significance in the mean scores between the control and the second intervention group, $p=0.08$; but none between the first and second intervention groups, $p=0.96$. Outcome measures for interprofessional attitudes were significantly

different among all three groups, $p<0.01$ ($n2=0.25$) & ATIHCT, $p<0.01$, ($n2=0.07$). ISVS mean scores ($p <0.001$) and ATIHCT mean scores ($p <0.05$) were comparatively higher in significance than the control group, but there was no significant difference between the mean scores of the two intervention groups. In this study, didactic training only did not improve team performance. Therefore, it does support that simulation team training paired with didactics optimizes interprofessional teamwork.

A randomized control quantitative observational study used videography in the operating room to test if team performance improved, as opposed to live observations (Bui et al., 2018), during their physician-led operating room briefs and debriefs. Randomly selected videos (briefing 1085; debriefing 1232) were reviewed by the quality improvement department for compliance with their standard briefing and a check back process. The live observers were randomly assigned to procedures in the operating room for a total of 325 briefings and 166 debriefings. Feedback for live observations was given in person, after the procedure, and in writing for the video observations. The facility customized the TeamStepps evaluation tool, Medical Team Performance Assessment Tool (MTPAT), for electronic access and for quick documentation in capturing TeamStepps communication during briefings and debriefings in the operating room. Every staff member received TeamStepps education as a facility requirement prior to the study.

Data was measured using descriptive statistics, Fisher Exact Tests, multilevel mixed-effects logistic regression (due to the uneven number of live vs. video cases), and adjusted odds ratios to compare conformity in the live vs. video observations. Descriptive statistics measured full compliance for all the TeamStepps skills at 18.8% for all briefings and 22.6% for the

debriefings. Overall, there were more videotaped check backs observed as compliant, at 85.5%, than the live observations, 70.2% compliant ($p<0.001$).

Compliance with using each TeamStepps® element of briefing and debriefing, using the Fisher Exact Tests, found four data elements that were significant in the briefing element and five in the debriefing element. Those observations with TeamStepps element during the briefings were: recognition of team membership ($p<0.001$), the anticipation of the complexity of procedure ($p<0.001$), the status of resources, i.e., staff or equipment ($p<0.001$), and check back ($p<0.001$). Compliant observations under the TeamStepps element during debriefing were: a leader is established and sign-out is called ($p<0.001$), discussion of the postoperative plan ($p<0.001$), what went well and what needs improvement ($p<0.001$), active engagement of all team members ($p<0.001$), and check back ($p<0.001$). Barriers to compliance were measured using descriptive statistics and the statistically significant findings during the briefing were: workload at 62% during the video briefings; $p<0.001$, and conventional thinking at 39%; $p<0.001$ during the video briefings; there were no statistically significant findings during the debriefings. An adjusted odds ratio of greater than 1 to measure the probability of compliance during the briefing was: check back 2.87 (2.04-4.04), active engagement of all team members 1.02 (0.68-1.52), anticipation of medical status change 1.25 (0.88-1.78), and discussion of the plan of care 1.05 (0.42-2.40). There were no predicted ratios greater than 1 for the debriefings.

Results from this study support a lack of safety culture in their operating room based on the feedback from participants in the study. For example, the team is always led by the physician when TeamStepps believes anyone with the most information can be the briefing leader (*TeamStepps*, 2019). Other feedback statements demonstrate the physician lead believes everything needed for the case is available. The briefings and debriefings waste time reviewing

information that should already be known. Even though the team was under general observation, attitudes that were not in support of patient safety practices were shared. The safety of all patients requires a team effort, and without it, errors will occur.

A prospective, randomized control three-arm blinded study questioned whether leadership education and high-fidelity simulation would improve the leadership skills of medical residents (Hansen et al., 2022). Medical residents, blinded to the assignment arm, from five academic medical centers. The participants were divided into three study arms: 20 medical residents who received no intervention at the control site facility; among the four intervention sites, 48 medical residents received 60-minutes of Leadership Education Advanced during Simulation (LEADS) web-based education; 42 medical residents received 60-minutes of TeamStepps web-based education. Both intervention groups participated in four simulation exercises: the cardiac arrest of a non-pregnant female; a combination simulation of a neonatal resuscitation post birth; management of a pregnant patient with eclampsia; and a female patient with pyelonephritis and sepsis. All simulation exercises were videotaped, and their performance was rated by blinded reviewers and simulation facilitators whose reliability was rated using three videos until each provided the same score. The clinical teamwork scale (CTS) and the detailed leadership evaluation (DLE) were used to rate the participants' leadership performance.

Data for this study were evaluated using descriptive statistics, Pearson's chi-square for demographic results, means with standard deviations for the CTS and DLE performance measurement tools, and linear mixed effects models for the leadership performance scores among the groups. CTS outcome measures for leadership performance were measured at two points, during the second simulation exercise and within six weeks of the initial simulation. The intervention groups demonstrated significant improvement in team performance, LEADS

(p=0.04) and TeamStepps (p=0.05) and again six months post-intervention, LEADS (p=.03) and TeamStepps (p=.001). Significant DLE outcome measures post-intervention for the LEADS participants were: degree of leadership (p=0.003), problem-solving (p=0.02), and shared knowledge (p=0.001). The TeamStepps group shared knowledge was significant at (p=0.007). Three to six months later, repeat measures for both intervention groups had the following results, LEADS: decided what should be done (p=0.02), timely communication (p=0.03), problem-solving (p=0.04), and shared knowledge (p=0.03). TeamStepps outcome post-follow-up measured increased in many areas: degree of leadership (p=0.01), decided what should be done (p=0.003), assign group tasks (p=0.004), frequent communication (p=0.02), timely communication (p=0.02), problem-solving (p<0.001), and shared knowledge (p=0.03).

Leadership behaviors for both intervention groups improved, suggesting that using formal or evidence-based communication skills during simulation is beneficial in other settings. There was no significant difference between the LEADS and TeamStepps intervention groups initially. Six months post intervention the TeamStepps groups did improve in more areas compared to the LEAD intervention group. The authors mentioned their small sample size as a limitation, and a missed opportunity to monitor and measure the amount of time spent during leadership education for the intervention groups.

Six adult intensive care units participated in a randomized control study to measure the effects of TeamStepps® education on patient safety and staff empowerment (Amiri et al., 2018). Following a two-day TeamStepps® course, eight hours each day, 21 staff nurses and nine nursing supervisors, the intervention group, were asked to distribute TeamStepps® posters throughout their units and share weekly pamphlets on different TeamStepps concepts for the following six weeks. The 27 nurses in the control group received no intervention.

No significant differences were found among the groups' demographic data (Amiri et al., 2018). A Mann-Whitney Test was used to measure statistical differences in patient safety culture, and the Wilcoxon test was used for all other items measured. Statistically significant differences between the intervention and control groups, $p<0.001$, were in the categories of patient safety culture, teamwork within groups, manager expectations and action promote patient safety, organizational learning and continuous improvement, communication openness, and handoffs and transitions. Post-study teamwork across units did not significantly improve but communication openness verified staff feel comfortable speaking up. The authors noted the self-reporting instrument as a limitation in measuring patient safety and staff empowerment. The authors also indicated that the one-time education did not affect non-punitive responses to errors.

Radiology residents were randomized to use a contrast reaction checklist during their routine high-fidelity simulation education (Parsian et al., 2018). The intervention and control groups participated in a one-hour lecture on contrast reaction and a one-hour lecture on TeamStepps communication tools CUS and check back. CUS is used when a person feels "concerned," "uncomfortable," or believes there is a "safety" issue involved, and check back is repeating information to confirm the message was received. Each simulation exercise lasted 30 minutes and was reviewed by validated raters that held professional experience at managing contrast reactions. A Wilcoxon Rank Sum Test measured the following objective scores revealed the intervention group outperformed the control group as significant as follows: contrast management ($p=0.001$), treatment of bronchospasm ($p=0.035$), epinephrine administration ($p=0.021$) and other treatments ($p=0.001$).

Overall, the study demonstrated that using the checklist and TeamStepps improved the intervention group's performance in managing contrast reactions even though it was observed

that the intervention group did not review the list during simulation, which the authors believe would have improved their scores. The failure to follow the checklist during simulation will be a lesson learned for the facilitators to address in future exercises before the simulation begins. For example, the checklist contained the dosage and steps in the safe administration of epinephrine, and the participants chose not to review the list and continue providing care on memory. Simulation is a forum to learn at the pace of the learner and improve practice with expert oversite, over time.

Various nursing homes in New York implemented TeamStepps for long-term care and End-of-Life Nursing Education Course (ELNEC) to determine the effects on end-of-life outcomes, care processes, and staff satisfaction (Temkin-Greener et al., 2017). In this randomized controlled study, 14 nursing homes were assigned to the intervention and 11 nursing homes in the control group. A two-day TeamStepps education course and six one-hour ELNEC courses were provided in a stagnate manner to the nursing homes who agreed to participate. Additional educational support was provided via online continuing education, and an ELNEC expert was available onsite as needed.

Care process domains measuring significance among the intervention and control groups, using the Wilcoxon rank-sum test, were communication/coordination ($p=0.08$) and team cohesion ($p=0.27$). No significant findings were detected in the quality measures for the report of pain, death in the hospital, depressive symptoms, and the number of hospitalizations in the past 90 days. This study expected to encourage nursing homes to institute palliative care services for their residents for improvements in their quality measures. Unfortunately, those goals were unmet due to the competing priorities of the nursing homes involved in the study. Many obstacles met the research team in procuring data to support the need for palliative care

services in these nursing homes. For instance, executive leadership changes and changes in the agreement to continue in the study for fear of unfavorable published results. Others refused to participate as a result of staffing shortages, attendance to the training, or repeated training with each change of ownership and leadership.

Synthesis of Literature Review

Liaw et al. (2019) demonstrated didactic and interactive simulation education improved the shared mental model during interdisciplinary team rounds. The study did not mention a standard of practice as to who usually leads these rounds, such as other disciplines, or the structure for discharge planning. Structured rounding assists the team in succinct care planning, reduced errors and delays in care. This project would benefit from a DNP leader using evidence-based interventions reinforcing the benefits of engaging all healthcare providers and staff voice to improve clinical performance through interprofessional collaboration toward better patient outcomes.

Bui et al. (2018) discovered low compliance of the surgical team in the operating room briefings and debriefing, even when participants were aware they were being watched. The Hawthorne effect did not change their adherence to their patient's surgical safety culture. The article did not provide the qualifications of the TeamStepps trainer at the facility or if the decision was for the physician to, exclusively, lead the briefings and debriefings. The article did not highlight equity of any member of the healthcare team leading the briefings and debriefings, thus creating the potential for not carrying out the philosophy of TeamStepps. According to this philosophy, any member of the healthcare team can lead a briefing or debriefing, but if the briefings are tailored to only one profession leading, there is not much chance for a change in behavior and safe care.

The intervention to implement the LEADS vs. TeamStepps communication tools in Hansen et al. (2022) leadership study successfully demonstrated how education and simulation improved leadership skills in medical students. High-fidelity simulation is an excellent venue for students to learn and respond to situations close to real life in a more relaxed educational environment. Even though it was a condensed, one-hour, educational course on LEADS and TeamStepps, both groups scored well on the leadership evaluations. The authors did not state if there was prior leadership training in the demographic data. If so, that prior knowledge could possibly influence the leadership outcome measure.

TeamStepps education established significant results but did not influence the overall culture of safety for the critical care areas in the study by Amiri et al. (2018). The addition of simulation to reinforce the education may have had a lasting effect on the intervention. Furthermore, the study did not indicate whether the participants were expected to disseminate the education to their peers, which may have increased the culture of safety. Alternatively, if the expectation was that a change in their behavior would stimulate curiosity in others to the concepts, educating others may have inspired some change in the work area, or educating the control group post-study contributed to cultural changes.

Radiologists promoted safety in contrast management using a standardized checklist, simulation, and TeamStepps during simulation exercises for radiology students (Parsian et al., 2018). The results validated the safety of patients when all three interventions were used in an emergent situation and the comfort level in managing these situations. Thus, the radiology team decided to institute ongoing education utilizing all three interventions to sustain a culture of safe practices during contrast reaction management. The leadership team's decision to integrate the checklist also speaks to their commitment in reducing patient harm and the potential risk to the

psychological safety of providers after a medical error. Providing this education illustrates the department's ownership in promoting highly reliable practices.

Temkin-Greener et al. (2017) presented a well-prepared examination of the benefits of intervention on palliative care for nursing home residents during the end-of-life process and staff satisfaction. The study design included in-depth research toward developing an educational program to address decision-making of the elderly resident related to pain, depression, and multiple hospitalizations through the implementation of palliative care services. The participants at the point of care were very enthusiastic and insisted the intervention include non-professional team members. Enculturating the educational techniques during a regularly scheduled venue, such as a daily huddle or an interdisciplinary team meeting, may have improved the use of the intervention.

CHAPTER FOUR: METHODS

Ethics

The academic medical facility and school of nursing approved this DNP led scholarly project for the labor and delivery unit. The privacy of the patients and participants were undisclosed and the Health Insurance Portability and Accountability Act (HIPAA) requirements were maintained, throughout project implementation.

Project Design

The study design for this DNP-led quality improvement project used an interventional study with pre- and post-intervention, design without reference group with aims to improve team communication and collaboration, increase attendance to the daily briefing, and to meet the goal

of a DTI time of 30 minutes or less (American association of colleges of nursing, 2006). Email notifications were sent to the facility leadership, medical directors, and nursing leadership to introduce the DNP leader and explain the project purpose, interventions, and timeline. The project was implemented in the labor and delivery unit of a 600-bed academic medical center. The population consisted of nurses (registered nurses, and certified nurse anesthetists), and medical residents/fellows from obstetrics and anesthesiology. Inclusion criteria were L & D staff who works 7a to 7p and 7p to 7a, in the labor and delivery unit, completion of the facility required TeamStepps course and a willingness to participate in the project. Exclusion criteria included declining to participate, an inability to participate due to schedule conflicts, and patient care needs.

The DNP essentials II, III, IV, and VI were applied to guide the DNP lead through this project. A rigorous appraisal of the literature for briefing, TeamStepps®, and role-play simulation studies assisted in developing the interventions for the project. Knowledge gained from this appraisal led to selecting the critical elements recognized by national organizations of when an urgent cesarean delivery was best for the safety of the mother and baby. Those critical elements that were significant in determining the decline of mother and baby were integral to the team decision for a surgical intervention and were listed in the briefing checklist for review during their daily huddle (CMQCC). Practicing TeamStepps® communication tools while using the briefing checklist during role-play simulation created a succinct flow of information, the briefing checklist added relevance to the huddle, and improved collaboration. The interprofessional team planned to monitor and benchmark data for comparison with professional organizations; continuous improvement of their outcomes to match best practices for cesarean deliveries; and a DTI of 30 minutes or less.

Sample and Setting

This project was implemented on a ten 10-bed labor and delivery unit of a 600-bed academic medical center. A convenience sample of nurses, anesthesia residents/fellows, and obstetric residents/fellows who met the inclusion criteria volunteered to participate in the project. Copies of the role-play simulation and the briefing checklist were given to the provider and nurse assigned to the mock patient. The nurse began the conversation identifying the critical concerns of the expectant mother using the CUS tool and the provider read the checklist to verify and assign duties to the other team in preparation for the cesarean delivery within 30 minutes. During the review of the checklist, the provider used check back, and the two-challenge rule. At the end of the checklist, the provider asked if any member had questions and answered accordingly. The simulated briefing ended by the provider with a thank you and confirmation the team would arrive to the OR in 30 minutes. A total of 30 participants, attended the role-play simulation exercises and 24 completed the pre-intervention survey: 16 nurses and 8 physicians, but one survey had no unique identifier and was discarded, decreasing the total to 23. Four nurses completed the post-intervention survey two weeks after the intervention was introduced and three were discarded due to no unique identifier provided, leaving one post-intervention survey. During the review of the checklist, the provider used check back, and the two-challenge rule. At the end of the checklist, the provider asked if any member had questions and answered accordingly. The simulated briefing ended by the provider with a thank you and confirmation the team would arrive to the operating room in 30 minutes.

Protocol/Intervention

The project committee, consisting of two nurse educators and the DNP leader, introduced the project purpose, terms for participation, simulation schedule, and instructions how to access an electronic version of the JSAPNC survey to the participants. Notification and instruction to the stakeholders occurred one month before the start of the project to encourage staffing preparations and scheduling of participants. Division of the participants into groups of five, each consisting of an obstetrician, an anesthesiologist, and three nurses balanced the mixture of professionals. When there were more nurses than physicians, only the nurses were exchanged in the role-play simulation. Participants were encouraged to complete the JSAPNC immediately before the role-play simulation if they had access to a computer or phone, if this was not available, an email notification was sent with access to the survey tool. The nurse educator instructed the participants that each role-play simulation would include two scenarios, one practice with direction from the nurse educator and the second without. Each scenario included a three-minute briefing, a two-minute role-play simulation exercise, and a 10-minute debriefing. The simulation exercises were planned to occur in a private classroom to deter interruptions and distractions. One nurse educator preferred the simulation outside an unoccupied patient room for a more realistic creation of actual event, therefore the location alternated from the door of an unoccupied patient room to a classroom, based on the patient census. A briefing checklist and the communication tools of CUS, check back, and the two-challenge rule were monitored for use during each role-play simulation. After the two simulation sessions, the DNP project lead shared the results of the monitored use of the communication tools after each debriefing. Simulation sessions were offered once a week on the same day over a two-hour time frame for six weeks. Of those six weeks, 4 days of role-play simulation were provided to the staff.

Measurement tool, instrument, and data collection

The Jefferson Scale of Attitudes Towards Physician-Nurse Collaboration (JSAPNC) survey was developed in 1999 as validated and reliable, Cronbach's >0.72, and has been used in other studies (Hojat et al., 1997; Jones et al., 2013 & Ward et al., 2009). The 15-item tool measures collaboration between nurses and doctors using a 4-point Likert scale to measure four specific domains: (1) Shares education and collaboration, (2) Caring vs. curing, (3) Nurse's autonomy, and (4) Physician's authority. Completion of twelve items is the minimum number for an appropriate measurement of collaboration. It was used as a pre- and post-measurement of collaboration among the labor and delivery team and was distributed before role-play simulation session, along with a briefing checklist and TeamStepps communication tools as a pretest. As mentioned above, the nurse educator developed the simulation scenarios and the briefing checklist. The physician leading the briefing was responsible for documenting the decision time on the briefing checklist and the circulating nurse documented when the team arrived to the operating room, as this was defined the "incision" time by the nurse manager. The DTI times were collated by an employee in the labor and delivery team for tracking the mean and median scores for comparative improvement.

Analysis

Data from the surveys and DTI times were analyzed using Microsoft Excel software. A total of 24 pre-intervention JSATPNC survey tools were collected and all 15 questions were completed, but one was discarded as it had no unique identifier. However, four post-intervention JSATPNC survey tools were completed and three were discarded because an incorrect unique identifier was entered, thus 23 subjects had valid data for the pre-intervention survey and one with valid data for the post-intervention survey. The pre-intervention mean and median scores

were tracked from August 1, 2022 to April 23, 2023, measuring at 66.1 minutes and 28 minutes, respectively. Post-intervention measurements for the mean and median were tracked from April 24, 2023 through May 24, 2023 and are 116.6 minutes and 98 minutes, respectively. The DNP lead concluded the median as the best indicator of measurement due to the large range of DTI times, 1-466 minutes. Also, there were 59 DTI data points prior to the intervention and 10 data points after the intervention. The JSATPNC pre-survey results for shared educational and collaborative relationships are 96%; for caring as opposed to caring are 67%; for nurse's autonomy are 92%; and for physician authority are 75%. An analysis of the JSATPNC tool was not conducted due to the lack of post surveys available for comparison. The non-parametric descriptive statistic ANOVA, Wilcoxon rank sum test, a two-tailed t-test, measured a p-value of 0.0668 ($p < 0.05$) demonstrating no significant difference between the pre and post intervention DTI times. The p value may not reflect a correct measure since there were an unequal number of pairs.

CHAPTER FIVE: RESULTS

This interventional study with pre- and post-interventional design, without a reference group was not effective at measuring an improvement of the attitudes of interprofessional collaboration among the interdisciplinary labor and delivery team, as evidenced by JSAPNC scores and the attrition of participants for the JSATPNC post-intervention survey. In addition, the team increased their DTI time mean and median times to greater than 30 minutes; which indicates the collaboration among the team needs improvement to measure closer to the recommended 20-minute time (American association of colleges of nursing, 2006). One

registered nurse recommended the briefing checklist be added to their report sheet for expediency in identifying the elements and as encouragement to notify a provider immediately to expedite the briefing. The JSATPNC tool can be used periodically as a recommendation, and as a comparison to the facilities employee culture of safety survey.

Limitations

Expected limitations of this project were the study design, a certified simulation expert, social distancing, and unexpected emergencies. This DNP project was not original research; therefore, it is not generalizable. The role-play simulation facilitator was not certified as a simulation instructor and it was understood that best practices for role-play simulation were not in place. The intervention was conducted in the same manner each time, but the engagement of the leadership team was distracted and rushed when their understanding developed. The intent of the DNP student was to implement the intervention from January to April, but due to staffing constrictions, the intervention was postponed to March. COVID-19 pandemic recommendations, adherence to the social distancing policy at the project site posed difficulties in having all five participants in one room and understanding the dialogue while wearing masks. The patient population does not routinely have scheduled admissions so the team was not available every week and this decreased the number of participants. Participant attrition was also a factor that affected the JSAPNC outcome data.

Discussion/Implications for Practice

The structured daily briefings did not measure improvement in team collaboration and DTI time mean and median measurements for an urgent cesarean delivery. The data seems to represent the multiple distraction of the nurse leader ability to engage the staff: multiple regulatory visits and staffing needs of the unit, placing the DNP project further away from the

planned timeline. The literature review for this project found few articles specific to structured briefings for DTI time utilizing checklists to determine which critical elements to assess when determining the need for an urgent cesarean delivery. The dissemination of the findings of this project may enable other healthcare facilities to improve their practice. Dissemination through public presentations for others to apply the briefing interventions as a process improvement strategy in response to urgent cesarean deliveries is a plan for the team.

Timeline for Project

Position	Start Date	End Date	Milestone/Activity	Start on Day	Task Duration
1	11/1/22	11/15/22	Develop a team for checklist	0	15
2	11/15/22	11/30/22	Create briefing checklist	14	16
3	11/30/22	12/5/22	Presentation to stakeholders	29	6
4	12/5/22	12/10/22	Assign project champions	34	6
5	12/5/22	12/10/22	Reserve rooms for simulation	34	6
6	12/10/22	12/15/22	Presentation to participants	39	6
7	12/10/22	12/15/22	Create simulation exercise	39	6
8	1/5/23	3/30/23	Simulation w/staff (1/week)	65	85
9	4/1/23	4/23/23	Data analysis	151	23

Budget

The financial costs for this project included the DNP lead time, staff time to attend the role-play simulation exercises, champion participation, and the printed QR code for the JSAPNC tool. Communication between the DNP lead and the medical and nursing directors resulted in an

agreement to have attendance to the simulation exercises costed as education in their fiscal budget. Costs for printing the QR coded JSAPNC tool was estimated at $30.

Figure 1: *Madeleine Leininger's Transcultural Nursing Theory*

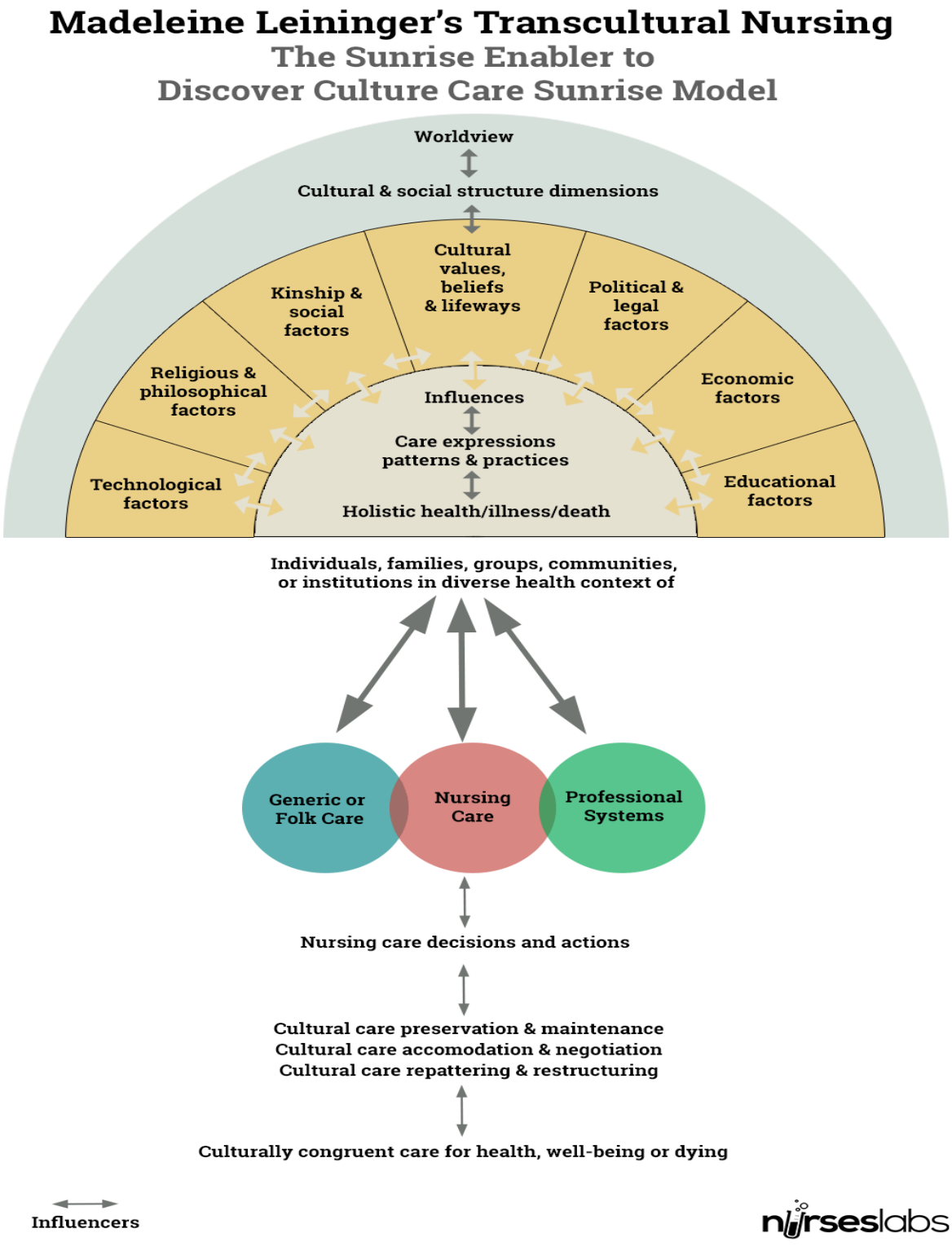
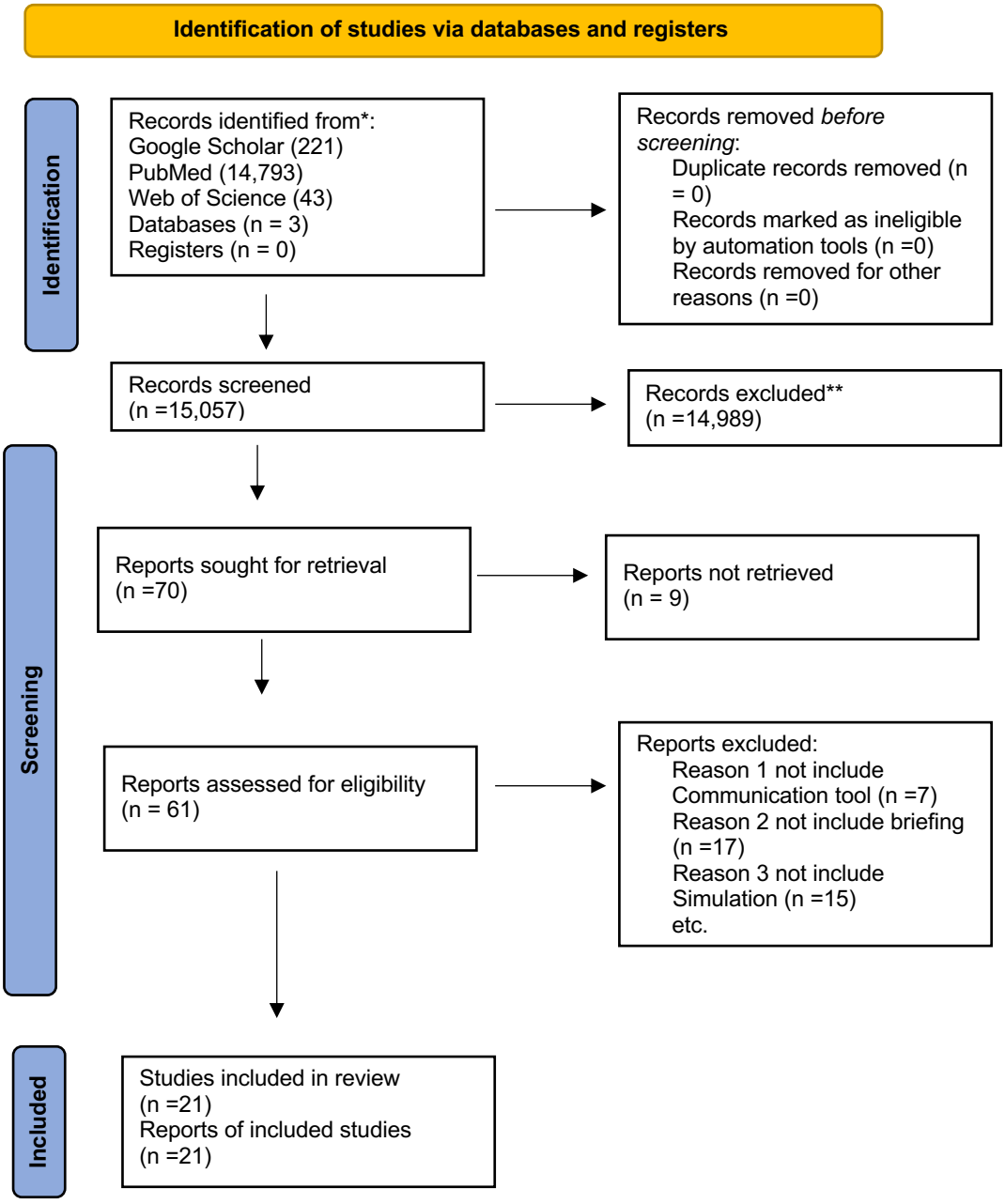


Figure 2: *PRISMA Diagram*



*Consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers).
**If automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools.
From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. DOI: 10.1136/BMJ.n71

For more information, visit: http://www.prisma-statement.org

Figure 3: *The Jefferson Scale of Attitudes Toward Physician-Nurse Collaboration*

JEFFERSON SCALE OF ATTITUDES

TOWARD PHYSICIAN-NURSE COLLABORATION

INSTRUCTIONS*:* Please indicate the extent of your ***agreement*** or ***disagreement*** with each of the following statements by circling the appropriate number. For the purposes of this survey, a nurse is defined as "a registered nurse (RN) who is engaged in providing or directly supervising the care of hospitalized patients."

Gender: [1] Male. [2] Female. **Age** (22-30 years): ___; 31-44 years___; > 45years___

You are a: [1] **Nurse** (Please specify your degree:

[2] **Physician** (Please specify your primary specialty:

1.	A nurse should be viewed as a collaborator and colleague with a physician rather than his/her assistant….	4	3	2	1
2.	Nurses are qualified to assess and respond to psychological aspects of patients' needs…….	4	3	2	1
3.	During their education, medical and nursing students should be involved in teamwork in order to understand their respective roles……..	4	3	2	1
4.	Nurses should be involved in making policy decisions affecting their working conditions……..	4	3	2	1
5.	Nurses should be accountable to patients for the nursing care they provide……..	4	3	2	1
6.	There are many overlapping areas of responsibility between physicians and nurses……..	4	3	2	1
7.	Nurses have special expertise in patient education and psychological counseling……..	4	3	2	1
8.	Doctors should be the dominant authority in all health care matters……..	4	3	2	1
9.	Physicians and nurses should contribute to decisions regarding the hospital discharge of patients……..	4	3	2	1
10.	The primary function of the nurse is to carry out the physician's orders……	4	3	2	1
11.	Nurses should be involved in making policy decisions concerning the hospital support services upon which their work depends…….	4	3	2	1
12.	Nurses should also have responsibility for monitoring the effects of medical treatment……	4	3	2	1
13.	Nurses should clarify a physician's order when they feel that it might have the potential for detrimental effects on the patient……	4	3	2	1
14.	Physicians should be educated to establish collaborative relationships with nurses……..	4	3	2	1
15.	Interprofessional relationships between physicians and nurses should be included in their educational programs……...	4	3	2	1

Table 1: *Randomized Control Trials by Category*

TeamStepps full course	3
TeamStepps partial course	7
Briefing	4
Simulation	5
Simulation with TeamStepps	8
Briefing/TeamStepps/Simulation	1
Simulation with certified expert	13
Simulation without certified expert	1

CHAPTER SIX: DISCUSSION

The structured daily briefings did not measure improvement in team collaboration and DTI time mean and median measurements for an urgent cesarean delivery. The data seems to represent the multiple distraction of the nurse leader ability to engage the staff: multiple regulatory visits and staffing needs of the unit, placing the DNP project further away from the planned timeline. The literature review for this project found few articles specific to structured briefings for DTI time utilizing checklists to determine which critical elements to assess when determining the need for an urgent cesarean delivery. The dissemination of the findings of this project may enable other healthcare facilities to improve their practice. Dissemination through public presentations for others to apply the briefing interventions as a process improvement strategy in response to urgent cesarean deliveries is a plan for the team.

Limitations

Expected limitations of this project were the study design, a certified simulation expert, social distancing, and unexpected emergencies. This DNP project was not original research; therefore, it is not generalizable. The role-play simulation facilitator was not certified as a

simulation instructor and it was understood that best practices for role-play simulation were not in place. The intervention was conducted in the same manner each time, but the engagement of the leadership team was distracted and rushed when their understanding developed. The intent of the DNP student was to implement the intervention from January to April, but due to staffing constrictions, the intervention was postponed to March. COVID-19 pandemic recommendations, adherence to the social distancing policy at the project site posed difficulties in having all five participants in one room and understanding the dialogue while wearing masks. The patient population does not routinely have scheduled admissions so the team was not available every week and this decreased the number of participants. Participant attrition was also a factor that affected the JSAPNC outcome data.

CONCLUSION

In conclusion, the structured daily briefings did not measure improvement in team collaboration and DTI time mean and median measurements for an urgent cesarean delivery. The data seems to represent the multiple distraction of the nurse leader ability to engage the staff: multiple regulatory visits and staffing needs of the unit, placing the DNP project further away from the planned timeline. The literature review for this project found few articles specific to structured briefings for DTI time utilizing checklists to determine which critical elements to assess when determining the need for an urgent cesarean delivery. The dissemination of the findings of this project may enable other healthcare facilities to improve their practice. Dissemination through public presentations for others to apply the briefing interventions as a process improvement strategy in response to urgent cesarean deliveries is a plan for the team.

TABLE OF EVIDENCE

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Leong et al., (2017)	Create an interest in mutual support of the current day's tasks in the operating room; resolve expected technical or logistical problems; and improve team performance & operation processes from lessons learned.	Sample: 5 surgical teams; general, orthopedic, gynecological, neurosurgery/plastics; ENT surgery/mouth-jaw-facial surgery Setting: 875-bed hospital in the Netherlands Inclusion: worked 4 times during implementation period Age: Sex: Duration: 7/2012 to 1/2014	Prospective intervention quantitative study Intervention: Perioperative briefing & debriefing; with briefing card Team Climate Inventory (1 month before, 4 months after implementation; 2.5yrs later) Standardized questionnaire (distributed w/TCI) Linear mixed model ($p \leq 0.05$) for TCI; median w/SD for questionnaire	TCI response rates: 1mth before-27.0%; 4mths after-16.4%; 2.5yrs after-28.6% Data @ 4mths: Clarity significant p=0.05 (0.24; 95% CI 0 to 0.48) Data @ 2.5 yrs: TCI significant p=0.05 (0.18; 95% CI -0.01 to 0.38). Participative safety p=0.02 (0.28; 95% CI 0.06 to -0.50); vision p=0.04 (0.24; 95% CI 0.01 to 0.46) Experience Questionnaire response rates: 17.7% & 28.6% 2.5yrs. scale 1-10 Mean scores: Efficiency – 6.8 SD 1.5 in 2014 & 7.2 SD 1.4 in 2016; cooperation 7.5 SD 1.4 & in 2016 7.6 SD 1.3	The team became comfortable during the briefings & debriefings, but found the debriefings not useful. Not randomized or a control group used. Low response rates & observations not objective. The addition of education on benefits of briefing & debriefing could address the lack of buy in for debriefing (TeamStepps)

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Amiri et al., (2018)	To compare the effect an education program has on patient safety and the empowerment of nurses.	Sample: Sample population 160 nurses & 20 supervisors Age: Mean 33.64 SD +/- 7.91; P=0.70 Sex: Female-53 Male - 8 Education: Bachelor's Degree - 56 (Supervisors-Bachelor's degree required & oversight of nursing services in an ICU) Inclusion criteria – 6 months experience in an adult ICU Exclusion criteria – unwillingness to participate, failure to complete the pre-test & lack of participation in training sessions Setting: 6 Adult ICUs (surgical, 2-neurosurgical, 2-general, medical) Namazi Hospital, Shiraz, Iran Duration: April-September 2015	21 adult ICU nurses & 9 supervisors completed intervention 27 adult ICU nurses 4 supervisors of control group completed a study 2-day (8hr) TeamStepps training taught by one of the researchers Poster of TeamStepps principles displayed in areas of experimental staff workplace Weekly sharing of educational pamphlets to the nurses and supervisors of the experimental group Persian version of Hospital Survey on Patient Safety Culture (HSOPSC) with 5-point Likert scale; Cronbach's = 0.84 One-sample Kolmogorov-Smirnov Descriptive Statistics Mann-Whitney test Wilcoxon test	Patient safety culture 3.46 ±0.26 vs 2.84±0.37, p<0.001 Teamwork within units 3.95±0.43 vs 2.91±0.74, p<0.001 Manager expectations & actions promoting safety 4.22±0.31 vs 3.48±0.83, p<0.001 Organizational learning & continuous improvement 4.45±0.45 vs 3.83±0.65, p<0.001 Communication openness 4.22±0.44 vs 2.72±0.67, p<0.001 Handoff transitions 4.23±0.44 vs 2.75±0.9, p<0.001. No statistical significance among demographic data	Communication openness = greater ability to speak up = increased pt. safety Effect size was large, so the effect of the intervention is strong & clinically important Teamwork across the units did not improve significantly after intervention Study unable to conclude that education improves the non-punitive response to errors Limitation was the use of the self-reported instrument for the effects of empowerment on the patient safety culture

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Bertrand et al., (2021)	To establish the effect of positive communication during medical handover have over in a team-based clinical performance simulation exercise.	Sample: 64 volunteer subjects 32 anesthesia residents; 2-3yr resident 32 nurse anesthetists; 2nd year student Age: 31 yrs. avg Gender: 40% women Setting: Medical simulation center Grenoble Alpes University Hospital Exclusion criteria: experience in pediatrics. Duration: November 2017 to March 2018	Prospective RCT w/2 parallel arms 32 teams; 16 pairs in control and intervention Simulation exercise for pediatric laryngospasm performance. Emphasis on kindness & the right to make mistakes were explained as the fundamental principles of simulation learning & research. Certified Instructors 22-itemClinical performance tool Handoff disheveled/abrupt/dismissive/negative tone to control group. Positive, supportive words & tone, clean organized clothing to intervention group. Basal stress tested using STAI-T, PSS, & PLS.	Basal stress at 15-days prior: STAI-T (20-80) Control: residents 42; Nurse 38 Intervention: residents 37; Nurse 32 PSS (10-15) Control: residents 37; Nurse 32 Intervention: residents 34; Nurse 27 Stress at arrival: STAI: Control: residents 36; Nurse 34 Intervention: residents 35; Nurse 30 PLS: Control: residents 50; Nurses 35 Intervention: residents 35; Nurses 46 Crisis management better by 1 minute in intervention group vs control.	Positive communication behavior improved team-based clinical performance. Decreased physiological stress response during a crisis decreased in the intervention group, not in control Residual anxiety at discharge was low, suggesting debriefing was effective. Limitations: single center study with a small number of subjects. Qualitative analysis was not included so mechanisms of action of positive communication could not be explored in detail. Verbal & non-verbal negative communication had a negative effect on the stress levels of the participants. Authors call for additional study to verify if any other reasons for anxiety were present.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Raney et al., (2019)	To understand the impact of simulation training on EBP pre-eclampsia & eclampsia dx & treatment.	Sample: 3422 mentees 40 Mentors; median age 25.5 yrs; 1.5 yrs exp as mentor from 8 different states in India. Setting: 80 Primary health clinics (PHC) in Bihar, India Duration: 4 phases; 8 months/phase March 2015-January 2017	Mixed methods study; RCT & qualitative interviews (randomly selected). 12 mentors interviewed about barriers to care 110 Trained mentees, for one week, on pre-eclampsia & eclampsia diagnosis and management via lectures, skills stations, and simulations. 2 simulation sessions: (1) Preeclampsia & eclampsia w/seizure. Indicators for response to simulation: time from BP measurement to magnesium sulfate give & time from BP measurement to antihypertensive given. 16 videos, randomly selected Generalized estimating equations (with linear regression)	39 paired simulation videos @ an average of 10 minutes; epigastric pain assess 43.6 to 51.3% (p=0.03); foley catheter inserted 38.5 to 56.4%(p=0.06); history questions asked increased from 1 to 2 (p=0.03); number of management steps completed increased from 2 to 3(p=0.03) 12 mentors participated in interviews on barriers students: **knowledge gaps** in understanding diagnostic criteria of pre-eclampsia vs pre-eclampsia w/severe features; **interpersonal issues** r/t hierarchy between nurses & doctors nurses fear of doctors created a barrier to high quality care; **resource limitations** in staffing and medicatons	Epigastric pain questioned was the only EBP that significantly improved. Additional training needed and resource limitations were the probable reasons. Limitations were that 62 days between 1st & 2nd simulation may have affected the knowledge of participants. Potential social desirability bias due to the relationship between mentors and interviewers. Generalizability of the quantitative results based on simulation to clinical practice is unknown.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Kamotho et al., (2019)	To investigate the extent guidelines for the decision to incision time can be achieved in limited resources.	Sample: 330 emergency cesarean deliveries in the hospital retrospectively Inclusion criteria: Maternal death after operation Setting: Hospital in North Eastern Kenya Duration: January 2012 to December 2013.	Document review method secondary data from maternity dept Decision to incision interval calculated from time decision made for cesarean delivery. The interval included consent, prep of mother, to the first dose of anesthesia. Outcome measures were maternal & neonatal complications after delivery. Maternal death is defined as occurring after the operation as recorded in the medical records. Data abstracters trained and 10% of records double checked by one of the authors. Frequency distributions to decide the type of descriptive statistic. Continuous variables and normal distribution used.	Indication for emergency cesarean delivery: obstructive labor, previous scar, fetal distress, malpresentation, delayed second stage, pre-eclampsia/eclampsia, prolonged labor w/fetal distress, intra-uterine fetal death, maternal distress, premature rupture of membranes, ruptured uterus. Decision to incision: of the 74% who gave consent within 30 minutes only 3% of mothers were prepared for operation within 30 minutes; 24% cesarean deliveries within one hour; 34% hemorrhage was main complication. Tendency of bleeding increased as the decision to incision time increases to 61 to 120 minutes	Results indicate the healthcare staff was the cause of delays based on the timing of obtaining consent. Due to the cultural background & low education, author assumed the delay would be due to consenting and education of procedure. Delay related to hospital's incapability to respond to the obstetric emergency. Staffing ratios of 6:1 laboring to midwife during the day and 12:1 during the night. Recommendation is 1:1 to meet the 30-minute guideline. The main limitation is secondary data, based on quality & accuracy of documentation. No information on the precise clinical perception of urgency in decision making by the obstetrician.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Parsian et al., (2018)	To assess if an increase in performance occurs using a contrast reaction checklist during high-fidelity hands-on simulation.	Sample: 46 radiology residents Setting: University of Washington School of Medicine	Randomized Control Study Intervention group 22; Control 21 1 hr didactic lecture on contrast reaction mgmt. & TeamStepps (CUS & 2 challenge rule) 3-6 mths before intervention. Simulation Multiple choice quiz pre (2 months before simulation & post immediately after simulation) Checklist for contrast reaction mgmt. 30 minute, videotaped, hands on simulation. Intervention group given 2 minutes to review checklist before simulation. Confederate in each sim lab to suggest improper medication for emergency to test participant. Debrief @ end Randomized control trial. Control – 14 L&D; 22 postpartum.	**Contrast mgmt:** intervention group=85.1% vs control=64.8% (p=0.001) **Treatment of bronchospasm:** intervention=97% vs control=91.3%; (p=0.035) **Other treatment:** intervention=77.3% vs control=51.2% (p=0.001) **Epinephrine actions:** intervention=77.3 **Conflict resolution:** using CUS: intervention=4.2 vs control=3.4 (p=0.027)	Mistakes made by the residents with the checklist were due not looking at the list during simulation. Taking shortcuts or relying on memory in using the checklist may lead to failure in patient safety. Residents underdosed epinephrine with simulation pt when they did not calculate the dead space in IV tubing. Policy states epinephrine should be given via IM route.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Oner et al., (2018)	To determine the effectiveness of TeamStepps communication tools and simulation-based education for labor & delivery nurses and postpartum nurses	Sample: 99 RNs Age: Control 43/4 +/- 11.3; Intervention 42.4 +/- 12.3. All females Median yrs of experience: 10-13 yrs Setting: Maimonides Medical Center in Brooklyn, NY Inclusion criteria: Participation in departmental education; electronic documentation Exclusion criteria: Not available during training sessions; if assignment too busy; if other nurses were in the immediate area a time of in situ simulation Participation was mandated & monitored by Nursing Leadership Duration: 4/2016 to 7/2016.	Intervention-18 L&D; 16-postpartum Baseline assessment: Maternal abnormal vital signs, Rathus Assertiveness schedule & Gerry assertiveness scale (2) groups (n=22 & n=18) to intervention group received 3-hr simulation w/TeamStepps education tools (2) groups (n=29 & n=30) control group 3-hr simulation with I-PASS hand off tool; 5-10 minutes In-situ simulation Outcome measure: use of 2-challenge rule during in situ simulation encounter of an inappropriate order from attending physician to test nurse response	70 nurses completed the final assessment. All passed the MAVis knowledge assessment. ICC rating of the Pian-Smith (speaking up) range between attending & research asst observer=0.95 (P=0.001), good to excellent agreement. Control group speaking up; L&D=2.9 +/- 0.89 vs postpartum=1.25 +/- 0.43 (P<0.006). Postpartum intervention group showed significantly higher level of speaking up than the postpartum control group; 1.97 +/- 1.07 vs 1.25 +/- 0.43 (P=0.007)	Postpartum nurses educated w/AACT were most likely to speak up when witnessing an inappropriate action by an MD. L&D nurses without AACT training were most likely to speak up than postpartum nurses. Clinical significance unclear due to inability to measure levels of assertiveness.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Temkin-Greener et al., (2017)	To determine if educational interventions are effective in end of life (EOL) outcomes, EOL care processes & staff satisfaction.	Sample: 25 free-standing nursing homes Setting: New York	2-arm RCT Intervention group-14 nursing homes Control-11 nursing homes TeamStepps for long-term care education for the intervention nursing homes by a certified TeamStepps master. Initial end-of-life nursing education course 9ELNEC) Intervention group expected to adhere to the TeamStepps training for a 2-yr period. Quality measures were place of death; number of hospitalizations; self-reported moderate-to-severe pain &n depression during the last 90 days of life. Pre & post-intervention surveys=1018, response rate of 30% between 10/2013 – 9/2014 Wilcoxon rank-sum test	Communication/coordination =Intervention group 3.75 (SD 0.68) vs control group 3.40 (SD 0.66); p=0.08 Team cohesion Intervention grp=3.75 (SD 0.75) vs control 3.81 (SD 0.68); p=0.27. Quality measures: resident reported pain, death in hospital, depressive symptoms, & increased number of hospitalizations in the past 90 days. No significant difference in quality measures between intervention and control groups.	Changes in nursing home leadership and staff turnover resulted in several facilities not following study protocol. This caused an inability to collect data, at times, and provide the intervention to the new staff 7 administrators. Competing value of rehabilitation services outweighed focus on palliative care research.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Peng, Y. et al., (2019)	To utilize objective communication features as an assessment & predictor of clinical performance.	Sample: 40 3rd year medical students. Setting: Simulation center at Indiana University School of Medicine Age: Not disclosed Sex: Not disclosed Duration: Not disclosed	RCT 1 medical student, nurse confederate Randomized into 1 of 6 scenarios: MVA shock; pneumothorax; hyponatremia; leg compartment syndrome; PE, or HIT. Each scenario lasting 10 minutes. Medical student to assess, diagnose, & identify treatment using TeamStepps communication. Scoring for clinical performance rated by Visual analogue Scale from 1 (unacceptable) to 100 (outstanding) T-tests for audio variables between student to nurse or patient; Pearson's correlation to determine associations among individual audio & performance. Regression analysis for statistical significance of audio predictors & intraclass correlation coefficients of video analysis of agreement & consistency.	Clinical performance score avg: Motor vehicle accident=62.8; SD 28 Pneumothorax=65.1; SD 25 Hyponatremia=76.4; SD 13.1 Leg compartment syndrome=71.3; SD 26.2 Pulmonary embolism=72; SD 17.8 Heparin induced thrombocytopenia=45; SD 25.9 67% of communications were initiated by student; 55 of student's communications were unanswered by nurse or patient; 1% of communications not responded to by the student Communication intensity w/patient=62.56 dB (P<0.001) had higher intensity vs nurses=59.6 dB (P<0.001)	Mid-range performance scores matched the midrange of communications measured in the study. Objective communication features can predict medical trainee's clinical performance & provide and objective approach for simulation-based trauma care training.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Litke-Wager et al., (2020)	Evaluation the Task-oriented role assignment (TORA) at improving neonatal resuscitation skills as compared with standard neonatal resuscitation training alone. TORA strategy is to assign a specific role to each member with a specific list of tasks and a specific location to stand to accommodate ergonomics. Assignments are given during a team briefing.	Sample: 65 volunteer participants randomly assigned to intervention (34) or control (31) groups 32 pediatric residents 23 emergency medicine residents 7 OB/GYN residents 3 others 47 PGY 1 14 PGY 2 1 PGY 3 Setting: Tertiary care center in San Antonio Texas Duration: 6/2015 to 12/2016	RCT Participants: 31 control & 34 intervention 116 simulations recorded 108 simulations reviewed & scored (48 control & 60 intervention groups) Control – standard 6Th edition NRP course curriculum. Intervention – NRP 30-minute course curriculum on TORA training & neonatal resuscitation. Practice of TORA encouraged during integrated skills stations; actual use of TORA used during standard simulations & debriefing of NRP course. 4 simulations with 2 blinded reviewers evaluated videos to rate technical & behavioral skills. Unpaired student's t-test Mann-Whitney rank sum test	48 from control group (C) & 60 from intervention (I) Overall technical skills: 77.6 (C) vs 78.1 (I); p=0.74; CI=3.6 to 2.6 Total behavioral skills: 30.1 (C) vs 34.9 (I); p<0.001; CI -7.08 to _2.48. Call for help low in both groups: 0.3 (C); 21% of scenarios vs 0.5 (I) 30% of scenarios.	Intervention group behavior skill scores significantly better. No statistical significance in technical skills.

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Hansen, M et al., (2022)	To determine if leadership education with high-fidelity simulation will improve leadership skills in resident physicians.	Sample: 155 obstetrics-gynecology & emergency medicine residents 44 females 66 males 70 PGY 1 28 PGY 2 12 PGY 3 41 OB-GYN 60 EM Setting: 5 academic medical centers in the USA 110 obstetrics-gynecology & emergency medicine residents participated in the 2-yr trial. LEADS & TeamStepps=42; TeamStepps only=20; control=20 Exclusion criteria: residents in their 2nd yr, since study was for 2 yrs.	Prospective, RCT, 3 arm study 42 residents: (6) 10-minute web-based modules on Leadership education advanced during simulation (LEADS) 48 residents: (6) 10-minute web-based modules of a shortened version of TeamStepps; 20 residents: (control) – no leadership curriculum; unstructured debriefing conducted in usual practice & w/out specific leadership training. Blind video revies by, faculty physician subject matter experts. Clinical Teamwork Scale Instrument (CTS); Leadership behavior Description Questionnaire (LBDQ) evaluation 4 high fidelity simulations: female in cardiac arrest of; neonatal resuscitation post birth & 2 pregnant patients (eclampsia & sepsis)	Both intervention groups improved their teamwork. CTS mean scores: LEADS=5.88 baseline & post-intervention=7.86. 3-6 mths post follow up=6.95 CTS mean scores= TeamStepps baseline=5.1; post intervention=7.77; post follow up=7.29 CTS mean scores= Control baseline=5.25; post intervention=6.25; post follow up=5.7 No significance in leadership performance.	Strong impact on leadership behaviors. There was no statistically significant difference among LEADS & TeamStepps groups. TeamStepps worked best in response to implicit bias, but the LEADS training does not incorporate that into their training. Decreased enrollment of residents due t buy schedules. Confederates re not adept at causing an element of confusion for participants o respond as leaders. Control group mostly EM residents. Power not strong enough to detect small differences in groups, bias against females not controlled.

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Bui et al., (2018)	Assess if videography observation will improve performance over live observation operating room.	Sample: 226 surgeons (13 different surgical departments) 1410 briefing videos 1398 debriefing videos Setting: Mount Sinai Beth Israel Hospital	RCT Videos randomized 325 live briefings 1085 recorded briefings 166 live debriefs 1232 video debriefs TeamStepps education provided to all staff over a 2-yr period Medical Team Performance Assessment Tool (MTPAT) Multilevel mixed-effects logistic regressions	TS full compliance for live & video briefs=18.8%; p<0.001 Briefs: recognition of team54%l anticipating complex procedure 48%; status of resources 45.9%; checkback 82%; (all p<0.001) Debriefs: leader established 53.6%; post-op plan 51.7%; what went well 34.5%; engagement 43.7%; checkback 47.6%; (all p<0.001) Category of "Barriers" most reason for noncompliance during briefs (p<0.001); specific barriers – workload & conventional thinking (p<0.001) No significant barriers during debriefs Adj odds ratios > 1.0 for briefings: check back 2.87; engagement 1.02; medical status change 1.25; plan of care 1.05; No adjusted odds ratios >1.0 for debriefs	Authors believe engaged leadership from the surgeon can increase compliance in safety culture. Author indicated team behavior during video recording was less compliant tan during live observations. The research ream suggested examining hierarchical behavior in the OR for biased behaviors. Performance compliance was low overall. Improved with direct observation vs video for elements of briefing and debriefing. Participant teams compliant with all TeamStepps and expected performance element during debriefing than briefing.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Manggala, S. K. et al., (2022)	Evaluation of in situ simulation training at improving teamwork, communication, and performance skills in transferring critically ill patients during the pandemic.	Sample: 40 participants 16 Medical Doctors 24 Nurses Age: 23-46 Sex: 11 Males 29 Females Work Experience: 1-27 years No experience caring for COVID positive patients Setting: High-fidelity simulation Center at IMERI University Indonesia	20 in control and 20 in intervention group Control-low fidelity simulation (LFS) Intervention group – high fidelity simulation (HFS) 5 subjects per simulation session; 2 MDs & 3 nurses Online 1 hour lecture & reading material Pre & post online test of cognitive evaluation (2) – 2hr simulation sessions & different simulation scenarios Validated assessment tool to score teamwork, communication & transport skills.	Cognitive & demonstrated no significance in pre & post scores between the groups; no significance in demographics Transfer & communication skills – HFS (89.70 ± 4.5); LFS (77.19 ± 3.61); $p<0.005$. Teamwork performance – HFS 90 (80-90) vs LFS 80 (70-90), $p=0.028$. Pt. preparation – HFS 87.41 ± 7.12; LFS 77.78 ± 7.70, $p=0.048$ Personal protective equipment doffing – HFS 85.83 ± 8.01; LFS 48. 33 ± 23.80; $p=0$	HFS in situ simulation group demonstrated better preparation for transferring the critically ill patient. Psychological stability was more important than patient safety for the COVID positive patient. This agrees with the statical finding of patient preparation vs equipment preparation. The authors believe HFS is best at training for competence that LFS. Self-report of attitudes and collaboration on teamwork not measured.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Liaw, S. Y., et al., (2019)	To appraise the outcome of a shared mental model development in interprofessional rounds after participating in a team training program.	Sample: 207 healthcare students from medicine, nursing, pharmacy, physiotherapy, occupational therapy, and medical social work fields Sex: 65.2% female 34.8% male (p=0.0.81; no significant difference between groups) Gender: p=0.81; no significant difference between groups Qualification: P=0.77; no significance between groups Healthcare course: P=0.19; no significant difference between groups Setting: School of Medicine National University of Singapore	40 interprofessional teams Control – no intervention Intervention (1) full intervention (2) didactic training only on cognitive skills Didactic training on cognitive tools involved Identity SBAR; biopsychological model of health: medical, functional, psychological, & social dimensions of illness Full intervention – didactic training & virtual simulation. An avatar based on profession is used to participate in interprofessional rounds. Pretest for attitudes on interprofessional team care completed before simulation. Video observation checklist (Cr 0.78); Attitudes Towards Interprofessional Healthcare Teams (ATIHCT) Cr-0.82; Interprofessional socialization & valuing scale (ISVS) Cr-0.95	Team performance between all groups resulted α: (H[2,37] =, $p<0.05$, $\pi 2= 0.29$) Team performance mean: Full intervention (28.9), SD 4.58) vs control (24.15, SD 3.63) $p<0.05$ No α in team performance between full & didactic only group no between didactic & control groups. ANOVA α for all 3 groups: ISVS ($F(2, 205) = 34.64$, $p<0.001$, $\eta 2=0.25$) ATIHCT ($F(2, 166) = 6.04$, $p<0.01$, $\eta 2 = 0.07$) Intervention groups α ISVS, $p<0.001$ & ATIHCT, $P<0.05$	Research site developed their own shared mental model simulation education bundle and significantly validated positive effects. An interesting finding that didactics did not significantly demonstrate effectiveness. This is encouraging for the use of simulation as a standard model of education.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Singh et al., (2022)	This study tested and validated an assessment rubric created by the medical facility.	Sample: 40 hospitalists & APPs 300 registered nurses 17 respiratory therapists Setting: White Plains Hospital 4 TeamStepps master trainers	RCT Validating study TeamStepps (3hr didactic course: RRT online module; 20-minutes RRT simulation w/30 minutes debrief) 24 teams (4 to 7 per sim. Session) RRT rubric (8 categories; 2-point score for each) 2 raters randomized to scoring using the rubric during the bedside assessment during RRT (Initiation of RRT (per); arrival of team members (post) Kendall's coefficient (interrater reliability) Intraclass correlation coefficient (ICC; reliability per team of raters) Content validity Wilcoxon signed-rank tests Participant survey	Kendall's coefficient (0.756; $p<0.001$) ICC: 2 rater 0.856; $p<0.001$, 95% CI Post cases 0.738; $p<0.001$; 95% CI Pre & post 0.89; $p<0.001$, CI 955 Content validity: I-CVI (0.8 – 1.0) S-CVI (0.9) Wilcoxon scores for use of TeamStepps (pre, post) – leader assigned (0.67, 1.60), SBAR (0.54, 1.13), situation leader (0.27, 1.08), roles (0.31, 1.58), team huddle (0.46, 1.10), closed-loop communication (1.00, 1.58), call-outs (1.10, 1.71) all significant $P<0.001$	Rubric demonstrated ability to serve as a structured and orderly approach to RRT response and assessment. No data to support a high score on the rubric equates to a successful RRT. Needs testing in clinical area. Low pre-scores on rubric means the didactic education is not adequate for practical skills. Scheduling conflicts caused changes in the professional division of the teams, could have negatively affected the results.

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Evain, et. al., (2019)	To examine if a brief planning discussion improved team performance under a critical care simulation.	Sample: Anesthesia & ICU trainees w/1-5 yrs exp. Setting: Lyon Centre of Medical Simulation in France Duration: November 2015 to June 2016	RCT & quantitative study Intervention – 21 pairs Control – 42 pairs 12 emergency simulation scenarios; adapted to level of post graduated year anesthesiology & critical care residents. Intervention: 4-minute team planning discussion prior to simulation scenario Control: 4-minutes team planning w/normal results not related to pt. Video assessor & simulation facilitator blinded to groups. Clinical team performance checklist; validated Ottawa global rating scale (overall performance, leadership, problem solving, situational awareness, resource utilization, communication) Perceived level of Mental stress, post scenario Q-Q lots, histograms of frequencies & Shapiro Wilk's test Student's paired t-test Post hoc ANOVA Pearson's ® correlation index Univariate analysis	No difference between predictable & unpredictable crisis (3/7 vs 6/10; $p>0.99$) Clinical performance scores increased for intervention group (51, SD 9 vs 46 SD 9); $p<0.001$) 4-minute planning discussion, not significant for intervention group baseline cognitive appraisal ratio 1.32 (1 I) vs 1.49 (C); $p=0.02$ After simulation 1.14 (I) vs 1.48 (C); $p=0.028$ Perceived level of stress: Baseline 64 (I) vs 63 (C); $p=0.73$ After 4-minute period 60 (I) vs 64 (C); $p=0.29$ After simulation 41 (I) vs 41 (C); $p<0.00001$. Compared w/previous time-point	Clinical performance increase is suspected to translate as such during an actual emergency. Reduction of anxiety after simulation can be experienced in real situations with regular practice of simulation. Limitation was the awareness of facilitator during simulation. Low scores possible because all participants were trainees.

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Asberg et al., (2019)	The purpose of this study was to investigate if an interprofessional teamwork intervention would alter opinions on safety culture, teamwork, and the attitudes towards teamwork.	Sample: 5 nursing assistants 7 physicians 17 registered nurses Age: (8) ≤ 30 yrs (24) 31-50 yrs (11) ≥ 51 yrs Sex: 38 females 6 males Setting: Norway 20 bed gastrointestinal surgery & urology unit 26 bed gastrointestinal surgery & ear, nose, & throat unit 2 surgical units in two different hospitals Duration: 12 months	Controlled quasi-experimental study Intervention group – 25 GI surgery & Urology Control group – 19 GI & ENT Kotter's 8 steps for organizational change Phase 1 intervention: TeamStepps Master trainer course Phase 2 intervention: 6hr TeamStepps training & 2 high-fidelity simulation sessions. Change team created action plan & vision for patient safety issues on the unit. Phase 3 intervention: After 5 months, non-MD staff 75 minutes of TeamStepps refresher. 20 minutes physician refresher 11 months later. Hospital survey on patient safety culture (HSOPS) TeamStepps teamwork perceptions questionnaire (T-TPQ) Collaboration & satisfaction about care decisions in team questionnaire (CSACD-T) Mann-Whitney U test sig between groups	Patient safety culture Stat Significance: Teamwork within unit – (I) 4.06↑ 0.27 SD .48; p sig @ .03, from baseline; (C) 3.93↓ 0.13 SD 0.51; p sig@ .02, from baseline Communication openness (I) 4.02 ↑0.26 SD 0.53; p sig @ 0.02 Supervisor/Mgr expectations – 4.33↑ 0.26 SD 0.51; sig @ 0.01. Patient safety grade (C) baseline mean=4.00 SD .47; after 12 mths 3.71 SD 0.85; sig @ p .01 Leadership (C) 4.01 ↑0.38 SD 0.60; p sig@ 0.04 Situation monitoring (I) 4.06↑ 0.40 SD 0.54; p=.001. (C) 4.13↑ 0.12 SD -.36; p sig @ 0.13 Mutual support (I) 4.03 ↑0.21 SD 0.5; p sig @ 0.03 Communication (I) 4.02↑ 0.26 SD 0.53; p sig @ .02 CSACD-T & T-TAQ – no sig change	The authors believed the sample size was too small and there was an unequal distribution of participants in groups. The attending facilitator in simulation (Hawthorne effect) may have influenced the participant responses during simulation. Study affected by attrition and all measures were self-reported.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Fransen et al., (2017)	The authors explored the effects of simulation-based obstetric team training on obstetric patient outcomes.	Sample: 36 obstetric units Professionals: 74 gynecologists/obstetricians 79 midwives 36 residents 282 nurses Pregnancy beyond 24 weeks gestation; single baby Setting Each obstetrics unit was one cluster in the Netherlands Exclusion: Obstetric units already participating in multi-professional team training Duration: November 2009 to July 2011	Cluster randomized controlled trial; no blinded components 24 obstetric units Intervention 12 units Control 12 units 5 teaching & 12 non-teaching for each group 14,500 pregnancies in intervention group & 14, 157 in control group 1 day (8 hr) simulation-based, multi-professional obstetric team training focused on crew resource mgmt. Skills. 15-minute orientation before simulation; 5-minute briefing video, 15-minute simulation (ending based on control of the emergency), 30-minute debriefing 5-clinical scenarios: shoulder dystocia, eclampsia, umbilical cord prolapse, postpartum hemorrhage & resuscitation of pregnant mother Odds ratios	Composite outcome of obstetric complications did not differ between study groups [odds ratio (OR) 1.0, 95% CI 0.80 – 1.3] Team training reduced trauma due to shoulder dystocia (OR 0.5, 95% CI 0.25 – 0.99). Increased invasive treatment for sever postpartum hemorrhage (OR 2.2, 95% CO 1.2 – 3.9)	Teamwork skills improved shoulder dystocia & postpartum hemorrhage only. Obstetric units continued individual skills training during the study; the information was not collected so unable to determine the effects on the study.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Liaw et al., (2020)	The study objective was to appraise a team training program comparing virtual reality vs conventional live simulations on medical & nursing students' communication skill performances and teamwork attitudes.	Sample: 128 undergraduate medical & nursing students Age: 22.17 (mean; SD 2.07) Gender: Male (mean 39; SD 32.5) Female (mean 81; SD 67.5) Profession: Medicine 60 Nursing 60 Year of study: 3rd year 41 (mean 34.2) 4th year 79 (mean 65.8) Duration: 3 months	Prospective randomized controlled trial study 120 undergraduate medical & nursing students All participants attended 3hrs of team training on nurse-physician communication & 20-minute computer-based TeamStepps communication skill strategies CUS, ISBAR, feedback to acknowledge, callout & check back (2) Virtual reality simulation w/avatar scenarios; sepsis & septic shock (2) live simulation scenarios Each simulation: 15-20 minutes w/30 minute debrief ATHCT Cronbach's 0.83; ISVS Cronbach's 0.86 Blinded raters reviewed videos Chi Square, t-test	Demographics not significant Significant ISVS baseline to posttest (mean) scores Virtual Simulation Baseline 131.74 SD 15.81 Posttest 142.92 SD 14.48 p<0.00a Live Simulation Baseline 134.03 SD 16.31 Posttest 143.95 SD 15.47 p<0.001 Significant ISVS posttest to follow up scores Virtual Posttest 131.78 SD 15.81; follow up 136.62 SD 6.43; p=0.047 Increased interprofessional attitudes posttest scores, but no significant differences between groups over 3 time points of measurement.	No difference in virtual vs live simulations. Authors proposed the use of virtual technology vs live to decrease costs and broaden the ability to sustain and increase the application of virtual education. Self-reported attitude questionnaires.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Tygesen et al., (2021)	The purpose of this study was to assess if a situation awareness model vs a conventional emergency warning score would reduce clinical deterioration.	Sample: 34,556 patients Setting: 4 regional emergency departments (ED) in Central Denmark Inclusion: Patients ≥ 18yrs of age with medical or surgical complaints admitted to ED short stay unit. Exclusion: Patients discharge withing 4hrs after arrival. Patients referred to inpatient wards within 4 hours Duration: July – December 2016 (pre-intervention period) and November 2017 – April 2018 (post intervention period)	Controlled pre- and -post interventional study (2) EDs in intervention & control groups Intervention: Situational awareness model Control: Emergency warning score Difference-in-difference regression Logistic regression analysis Sensitivity analysis P=0.005; 95 % CI	Reduced odds of clinical deterioration in composite outcome: 21% (or 0.79, 95% CI [0.79, 95% CI [0.69; 0.90]) in the intervention group Reduced odds of single outcome of CD (22%, crude OR 0.785, 95% CI [0.69; 0.89]) Situation awareness model reduces odds of clinical deteriorations. No effects on secondary outcomes of 7 day or 30-day mortality; ICU admission directly from ED; readmission within 30 days.	Unable to track if there was compliance in documenting SA at 100% EDs in the intervention group had a greater number of CD during pre-intervention compared to control EDs and may have affected the results of the study.

CITATION	PURPOSE	SAMPLE/SETTING	METHODS (Design, Interventions, Measures)	RESULTS	DISCUSSION, INTERPRETATION, LIMITATIONS
Wolk et al., (2019)	This pilot study adopted the use of TeamStepps with the school mental health teams.	Sample: 27 participants (25 team members & 2 leaders) Age: 36.1; SD 12.2 Gender: 8 Males 17 Females Professional role: 6 Clinicians 15 paraprofessional providers 2 Case Managers 2 Missing Highest degree: 9 Master's 13 Bachelor's 3 Missing Duration: August 2015 to June 2016	Randomized pilot study TeamStepps concepts tailored for relevance to the school mental health teams TeamStepps teamwork perceptions questionnaire (T-TPQ) TeamStepps teamwork attitudes questionnaire (T-TAQ) Evidence-based practice attitude scale (EBPAS) Maslach burnout inventory human services survey (MBI) Qualitative interviews & field notes Mixed method analysis; CI used for significance only no p values Cronbach's 0.88 to 0.95 for all questionnaires (post-randomization, 1 mth post training & 5mths post training) Optional one-time in person, semi-structured interview $50/hr participant compensation	5 months post-intervention scores between groups MBI results: emotional exhaustion (mean=0.59(; 95% CI -0.69 to 1.87) depersonalization (mean=0.59; 95% CI -0.53 to 1.52) Personal accomplishment (mean -0.70; 95% CI -1.54 to 0.14) T-TPQ total (mean -20.75; 95% CI -40.86 to -0.64 T-TAQ total (mean -4.01; 95% CI -13.16 to 5.13) Qualitative themes positives: acceptability of TeamStepps (TS), feasibility of TS, communication, mutual support, suggestions to modify TS, culture Less positive: Team structure, leadership, situation monitoring, barriers & facilitators, clinical skills & strategies.	Barriers were lack of resources, staff turnover, and challenges n school mental health team relationships. Small sample size did not lend to significant improvements of team skills, behaviors or provider burnout. Themes in result suggested further enhancements in the Team Steps concepts are needed. Increased burnout possibly due t0 scheduling of the questionnaires.

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