4-29-2019

Problem Based Learning with TeamSTEPPS®

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Recommended Citation

Problem Based Learning with TeamSTEPPS®

by

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An Independent Study Project submitted in partial fulfillment of

A project submitted in partial fulfillment of the requirements

for the degree of

Master of Science

Submitted to the Graduate Faculty

of the

University of North Dakota

Spring, 2019

PERMISSION

Title   Problem Based Learning with TeamSTEPPS®

Department   Nursing

Degree   Master of Science

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Abstract

Keeping the disciplines of healthcare siloed contributes to ongoing difficulties with miscommunication indicated as one of the leading causes for patient harm or medical error. The value of learning effective teamwork skills is an important measure for interdisciplinary professionals. Literature suggested that teaching teamwork and communication skill building is critical in nursing and can build confidence. Communication training in health care has been evolving in order to save lives, as well as ensuring positive working environments. The purpose of this project was to create an evidence-based lesson plan for undergraduate nursing students using problem-based learning and the TeamSTEPPS® model to emphasize communication skill in teamwork. Literature search included CINAHL, EBSCOhost, ProQuest, PubMed, Scopus, PsychInfo, and Science Direct databases. Thirty-two sources were retained to contribute evidence to the lesson plan.

Key search words: Interprofessional learning, nursing, interdisciplinary learning, TeamSTEPPS®, problem-based learning, communication, miscommunication and education.

Problem Based Learning with TeamSTEPPS®

The goal of patient safety is to keep patient's safe and as defined by The Institute of Medicine it is being free from accidental injury when patients receive health care (IOM, 2001). Miscommunication within the healthcare professionals interdisciplinary team continues to be implicated as a leading cause for patient harm and causes for healthcare errors (Shekelle, Sarkar, Shojania, Wachter, McDonald, Motala, Smith, Zipperer, & Shanman, 2016) (The Joint Commission, 2017). Self-reporting of sentinel events is double from 2005 (The Joint Commission, 2019) with 78% of these having occurrence within the hospital setting.

One of the domains addressed for patient safety involved miscommunication within the healthcare team. This continued to be a problem which affected the patient, the nurse, the other healthcare team members, and the community. Errors caused by miscommunication is a serious problem that may, in worse case scenarios, lead to death, deformity, disability, and long-term mental health effects of workers (Mayo & Woolley, 2016; Pye, Meltzer, & Liu, 2017). Miscommunication is important to address in order to stop the cause of many errors at the source.

Previous work addressing miscommunication included new employee training units, model training interventions, in-situ training sessions and interprofessional education seminars. These methods are valuable because they address the problem and offer training opportunities to workers. TeamSTEPPS® was a model which had been explored for communication skills training and will be used to guide the training towards effective and consistent communication in this project.

Evidence was identified from a literature search and TeamSTEPPS® core training principles to begin to address the problem of miscommunication with the healthcare team. The

project for this independent study was designed for improving communication within the healthcare team and was for nursing students. Application of core training within the TeamSTEPPS® model during undergraduate nursing education may enhance nursing students' ability to communicate in professional practice after graduation and licensure. The design of the lesson plan uses Problem Based Learning theory in order to measure the effectiveness of the TeamSTEPPS® training. The TeamSTEPPS® model has the benefit of being driven by evidence gathered in healthcare which has resulted in positive changes in teamwork, attitude, leadership, situation monitoring, as well as mutual support and communication (Sweigart, L. et al, 2016). The focus of this independent study uses evidence which support development of a lesson plan. Nursing students were given a project-based learning assignment which highlighted the skills reflected in the TeamSTEPPS® module. Mutual dialogue is incorporated into the TeamSTEPPS® training to establish collaborative interprofessional partnerships. Learning these important skills was for preparing nursing students with skills to benefit them in categories of knowledge, skill, and attitudes. Leadership skills were components within this module and important for any area of nursing towards effective communication.

Purpose

The purpose of this independent study project was to design an evidence-based lesson plan at the baccalaureate fourth semester level to address the problem of miscommunication within the interdisciplinary team. The lesson was developed with the hope to improve future nursing clinical practice. Effective communication training requires skills that are much more than simple exchange of information. Because this was a problem-based lesson plan it demonstrated the nursing students' ability to work together to solve a problem. The conclusions from the literature review pinpointed problems which are directly focused on communication and

collaboration. Students often lack communication skills and confidence will find practice methods of instruction on communication skills an effective means towards better communication and confidence (Granheim, Shaw, & Mansah, 2018). Research suggested that the use of high-fidelity simulation education that includes a performance scale and participation were key regarding collaboration and teamwork.

Communication tools are used widely in healthcare, it is important for nursing students to be able to use and recognize them. Umoren et al. (2017) guided student learning with virtual simulation cases of communication tools. This type of education was effective and was demonstrated in role-play which offered choices to improve transmission of information which potentially prevent medical error or patient harm (Umoren et al. 2017).

Significance

Ineffective team practice, incompetent team performance, and lack of experience contribute to problems with effective communication. Poor interpersonal communication is associated with clinical error, improper care delivery, and frustration among nurses (Crawford, Omery, & Seago, 2012). Using case-studies benefited learning experiences and improved nurses' knowledge of a nurse's role within the health care team (Clapper et al. 2018). The knowledge gained improves the ability to work with multiple health care professions and the ability to use effective team practices, communication and team performance.

This project was one step to influence nursing science and practice by creating a systematic lesson plan for fourth semester baccalaureate nursing students to improve communication skills within the interdisciplinary team. The importance of this work was the opportunity for the students to learn and practice effective team communication within the TeamSTEPPS® model.

The conceptual basis from this project comes from a vested background of experience. When students enter the healthcare arena, they lack the experience in communication skills with a team environment. Despite having a role as a student nurse and part of the healthcare team while learning, nursing students find themselves to be passive in communication, learning that hierarchy matters in socialization, and indicated that not everyone would hear about errors made (Noland & Carmack, 2015). Which demonstrated that although nursing students have knowledge of bedside needs for individual patient care, as well as supportive communication with patient and families, working within the healthcare arena involves an interdisciplinary teamwork environment with skill that requires concise and clear communication skills. Nursing students need these strong interdisciplinary communication skills in their role as a leader towards problem solving in the healthcare team.

This independent study facilitated a lesson plan, which emphasizes using an evidence-based communication model in practice. Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) skills training introduced nursing students to communication specific tools designed to enhance patient safety. It is important because communication may help or hinder effective teamwork within the healthcare arena and within their own nursing group interactions. Within the problem-based learning lesson plan, nursing students are provided opportunity to use these skills and evaluate the effectiveness of the TeamSTEPPS® training they have been learning. Thus, engaging the nursing student in an active learning method for building team communication skills.

Theoretical Framework

TeamSTEPPS® model was created by the United States Department of Defense (DoD) Health Care Team Coordination Program (HCTCP), the Agency for Healthcare Research and

Quality (AHRQ) (Ferguson, 2008). The original implementation of TeamSTEPPS® for healthcare was in 2005-2007 in 68 military treatment facilities worldwide (Ferguson, 2008). This evidence-based framework was designed to optimize team performance for health care professionals.

Within the design of TeamSTEPPS® model were four skills including: (a) communication; (b) leadership; (c) situation monitoring; and (d) mutual support. The model diagram (see also Figure 1.1)), represented these as plus sign which intersect to form points. Surrounding this is a circle which was the patient care team that has dual pointing arrows that point to the three points of a triangle representing knowledge and attitude at the base of the triangle points, and performance at the top of the triangle (AHRQ, n.d.)

Competency outcomes from TeamSTEPPS® was from having knowledge, attitudes and performance skills. This is a shared mental model with demonstration of attitudes of mutual trust and team orientation. Skills in performance are demonstrated with adaptability, accuracy, productivity, efficiency and safety (AHRQ, n.d.). Within this model, communication, decision making, performance expectations, division of labor, and leadership were addressed (Clapper, 2016). Quality and improvement were addressed through implementing ongoing research and publication (Clapper, 2016).

TeamSTEPPS® training included a set of learning modules which require practice and skill (Clapper, 2016). One example of this was Situational Monitoring where students learn how to effectively work with the team by doing scans of the clinical environment, the patient, the equipment, and the actions and status of the other team members. Call Out was another skill where students are instructed to make their observations shared with the other team members in a brief and concise manner (Clapper, 2016; Ferguson, 2008). All components for training

healthcare professionals built into the TeamSTEPPS® model were designed to keep the team focused on the patient and the goal (Clapper, 2016).

Team structure was built into TeamSTEPPS® as a multi-team system all working towards safe and efficient care involved coordinated activities for the multi-team system. Communication training is built into TeamSTEPPS® model training with the use of SBAR; Call-Out; Check-Back; Handoff; and "I PASS THE BATON", all tools which enhance information exchange during transitions in care (AHRQ, n.d.).

Leadership skills including training for effective team leading are outlined within the TeamSTEPPS® training as well as team events and checklists for briefing and debriefing. This model is built to utilize a well-defined leadership role for team organization, goals, monitoring and modifying plans, review of performance, providing feedback, managing, and allocating resources, facilitating information sharing, encouraging team members to assist one another, facilitating conflict resolution in a learning environment, and modeling effective teamwork (AHRQ, n.d).

Situation monitoring included the shared mental model of individual monitoring and awareness of skill, with that of the team. STEP was the tool for monitoring situations with healthcare delivery and indicated status of the patient, team members, environment, and progress toward goal. For harm reduction, the team has the strategy to use cross-monitoring to ensure that mistakes are caught quickly and easily. "I'M SAFE" within situation monitoring is where team members look at illness, medication, stress, alcohol and drugs, fatigue, and eating and elimination to determine their effectiveness (AHRQ, n.d.).

Task assistance within TeamSTEPPS® training helps the team members build the strength of the team and protect each other. All offers and requests for assistance are in the

context of patient safety. The Climate is that assistance will actively be sought and offered to other team members. Further quality improvement measures within TeamSTEPPS® model included follow up questionnaires such as the T-TPQ, which allowed individual perceptions of teamwork performances within the team, unit or department to be measured and tracked (Tibbs & Moss, 2014).

For nursing students and new nurses, it was important for them to develop socialization and solidify collaborative partnerships (Noland & Carmack, 2015). The TeamSTEPPS® model has been shown to work with team-driven patient care design for the purpose of producing highly effective medical teams (Kaiser Permanente, 2018; Kristen-Peters et al. 2017; Natafgi et al., 2016; Obenrader, C., Broome, M., Yap, T., & Jamison, F., 2019). However, TeamSTEPPS® training required practice and skill (Plonien & Williams, 2015).

Theory-based teaching strategies were an important part of understanding how students learn. One such theory was the Problem-Based Learning (PBL) teaching method (Onyon, 2012). This method introduces learners who are in a small group to a case study approach where they are presented with a situation and are required to identify and seek out knowledge in order to address the case. (McKee, D'Eon, & Trinder, 2013). Within PBL method the learners become active and become both the teacher and the learner in a cooperative environment (Onyon, 2012; McKee, D'Eon, & Trinder, 2013). Cooperative learning has been shown to be more effective and resulting in higher quality problem solving (Onyon, 2012).

Within the PBL learning environment learning progresses in a constructivist approach with allows the learner to build on and integrate a prior knowledge base (Onyon, 2012). Outcomes research review of nursing education with PBL have shown to have had positive effects offering many benefits when compared to traditional methods (Shin & Kim, 2013). This

teaching method was built into a lesson plan for this independent study which offered nursing student learners opportunity to practice the TeamSTEPPS® communication skills. Within the group PBL effort nursing students employed communication modalities which were built into the TeamSTEPPS® training. A benefit of using PBL was that this lesson plan could be adapted to online, didactic, as well as clinical learning environments.

Problems which are identified in healthcare were highlighted in case scenarios that nursing student learners chose to work through. During the effort of working together in groups these learners develop an understanding of the case scenario as well as the skill set developed for intragroup communication. Other learning such as improvement in thinking skills and meaningful learning experiences would be developed as a result of the active learning. Student reflection was built into this lesson plan for student nurse learners to gain insight into their effectiveness in communication skills during the group assignment as well as the cumulative period at the end of the assignment.

Process

A literature search was initiated to determine evidence to include in the lessons for communication skills building and TeamSTEPPS®. The search terms interprofessional learning, nursing, communication, miscommunication, interdisciplinary learning, TeamSTEPPS®, problem-based learning, and education were used. Whittemore and Knafl's five step process guided the integrative review of quantitative and qualitative literature (Whittemore & Knafl, 2005). Articles that were peer reviewed, English, relevant to nursing education, and addressed communication skills building including that of knowledge, attitudes and skills were included in the review.

Databases included the Cumulative Index for Nursing and Allied Health Literature (CINAHL), Education Research Complete, and Professional Development Collection databases using the EBSCOhost, ProQuest, PubMed, Scopus, PsychInfo, and Science Direct. Articles were identified from years 2013 until 2019 unless primary research or historically relevant articles were pertinent.

Studies included were related to teamwork and communication within healthcare arenas. Additionally, studies were included which addressed educational interventions designed to improve communication. Using these qualifiers there were 9 articles included from the CINAHL database, 13 from PubMed, 4 from Scopus, 2 from PsychInfo, 2 from EBSCOhost, and 2 additional articles were included after a review by hand in the Journal of Interprofessional Education & Practice.

The articles selected were examined to determine the level of the study, design, learning type, learning theory, and implications for nursing education. It was determined that TeamSTEPPS® was used to guide research in the arena of healthcare for communication skills building in several studies. Nursing's use of this in the interdisciplinary healthcare education and use of simulation was demonstrated in several studies. Studies included healthcare professional integration which included nursing, occupational therapy, pharmacy, medicine, dentistry, physical therapy, medicine, speech therapy, nutrition sciences and public health among them. Themes of improving communication skills and the satisfaction of the healthcare team emerged.

Literature Review

Models for Interdisciplinary Communication Skills Education

Original research with the model for interprofessional education organization had initially been reviewed in order to gain understanding of how to integrate the process for learning within the team of health professionals for TeamSTEPPS®. The Linköping model was presented for Faculty of Health Sciences at Linköping University in Sweden to establish the beginnings of interdisciplinary healthcare education (Wilhelmsson, et al., 2009). The Linköping model was inspired during representation by Linköping University faculty who were also part of The World Health Organization (WHO). The WHO is represented by 194 Member States, across six regions, and from more than 150 offices with the shared commitment to achieving better health for everyone, everywhere (WHO, n.d.). Team training and respect for the knowledge and skills of all professionals was part of this model and were relevant to this independent study project. This model emphasized student-centered learning with students responsible for their own learning.

Medical University of South Carolina researchers Wise et al. (2015) studied the use of TeamSTEPPS® training at six colleges in order to initiate healthcare improvements and skill necessary for collaborative practice. The study of 57 students who were in an interprofessional education and team training course within an inpatient clinical setting were instructed through videotaped behaviors of team performance which students rated using the Team Performance Observation Tool as a component of TeamSTEPPS® training. Using a repeated measures analysis of outcomes during 3-month intervals, findings suggested changes in behaviors associated with leadership. All students perceived teamwork skills to have improved. Limitations with this study were the required repeated measure to evaluate how teamwork

training persisted. Implication is that TeamSTEPPS® training in clinical settings improved leadership and communication behaviors.

Interprofessional training was also emphasized through use of another model which was the trademarked COMFORT$^{TM\,SM}$ (Communication, Orientation and options, Mindful communication, Family, Openings, Relating, Team) communication model (Wittenberg et al. 2016) who found it beneficial for palliative care team communication and collaboration skills training. This model included a component which guided the process of communication in a way that includes literacy, culture, and nonverbal communication and could be instructed as a two-day course. Wittenberg et al. (2016), evaluated the effectiveness of the communication training using the COMFORT$^{TM\,SM}$ model by comparing the team members performance score ratings pre-course training, then at six, and nine months post-training. It was found that the training increased attention to communication with family caregivers and improved communication processes of team communication skills (Wittenberg et al. 2016).

Problem-Based Learning

The use of problem-based learning (PBL) in relation to nursing education was shown to have positive effects on clinical education, student satisfaction, and psychomotor factors. Shin & Kim (2013) synthesized literature from 1972-2012 from twenty-two studies which were designed to determine the effect problem-based learning had in the areas of learning and included learning domains of cognitive, affective and psychomotor. Findings indicated a medium to large effect size for PBL in nursing education compared to traditional methods, and a large effect size reaction of students having a positive attitude toward learning and satisfaction (Shin & Kim, 2013). Largest learning effect size was in psychomotor domains, followed by affective and cognitive. Clinical education had larger effect sizes and better outcomes than the theoretical

approach. Implications for nursing education were positive effects on clinical education with the PBL method, and student satisfaction outcomes. Limitations discussed by researchers were the need for more evidence of effects of PBL in application of knowledge and skills in novel situations, and studies to ascertain whether effects of PBL endure past training (Shin & Kim, 2013).

Problem-based learning was often built into lessons using simulation. Granheim, Shaw, and Mansah (2018) appraised research to identify how the use of simulation could address the need for collaboration in undergraduate nursing programs. Findings indicated that simulation in both high and low fidelity types for interprofessional undergraduate nursing education could be used. Most of the studies reviewed focused on communication and collaboration. Also, many of the participants had 'mandatory' participation which could have caused bias. Another area of potential bias identified as the self-reporting measures due to participant attitude. The researchers concluded that simulation and interprofessional learning were avenues that could improve communication, student confidence, and student knowledge of other disciplines. Use of communication tools would prepare students for communication if practiced during simulation activities.

Rachwal, Langer, Trainor, Bell, Browning, & Meyer (2018) explored team education within critical care and cardiovascular areas of hospital care. Focus was on challenges faced in different situations which were defined by learners. The learning platform was that of an interdisciplinary educational round program they shortened to the acronym 'PERCS' (Program to Enhance Relational Communication Skills). Teaching methodologies for the training included problem-based learning methods where adult learners identify areas of practice they wish to explore further.

Program to Enhance Relational and Communication Skills (PERCS) offered to providers monthly between 2010 and 2016 have had positive reports from participants with 92% of the participants of this type of learning program who found the information as valuable, and 100% of participants recommending it. Limitations were due to the voluntary participation which may cause sampling and selection bias. In addition, physician participation was low at 2% and their input as to practice issues was therefore limited (Rachwal et al. 2018).

Thompson, Bratzler, Fisher, Torres, & Sparks (2016) explored the experiences of thirteen healthcare professions from a population of 80 students who were randomly assigned to teams of ten students. The healthcare students came from disciplines including third year medical students, second year PA students, fourth year dental students, second year dental hygiene students, fourth year undergraduate nursing students, first and second year clinical nurse specialists, fourth year pharmacy students, second and third year physical therapy, occupational therapy, and nutrition therapy students, first and second year social work students, and second year public health students. During two semesters these small teams of students engaged in interactive service-learning opportunities where they were managing 29 complex patients over a four-month period.

Assessments were completed pre-, mid-, and post-experience using the TeamSTEPPS® teamwork attitudes questionnaire (T-TAQ), healthcare professionals circles diagrams (HCPCDs), and the readiness for interprofessional learning scale (RIPLS). (Thompson, et al., 2016). Outcomes measures from all three time points indicated these students experienced improved relationships and communication for competency in interprofessional roles and responsibilities, values/ethics for interprofessional practice, communication, teams and teamwork (Thompson et al., 2016).

According to researchers at the University of Saskatchewan, problem-based learning fit well with their interprofessional education module on palliative care. McKee, D´Eon, & Trinder (2013) focused their research on how problem-based learning about palliative care could be employed by their undergraduate health science education students. Participant students from medicine, nursing, pharmacy, nutrition, social work, physical therapy, and clinical psychology worked in groups of 8 to 12 members on a problem-based learning study. The results of this four-year study which ended in 2011 had an 85% response rate. The type of data collected was qualitative and measured gains in knowledge of palliative care, knowledge of other professions, and student satisfaction. Highest score measures were in knowledge of other professions and student satisfaction. Nursing participant comments suggested that it was relevant and applicable for them to grow from and use.

Nurse Dissatisfaction

Price, Doucet, & Hall (2014) used a literature review methodology with a historical context to explore early interprofessional socialization. Price, et al., (2014), found that the nurse-physician relationship and portrayal of these two professionals in the literature demonstrated a dominant and subordinate relationship which had been in conflict since early 19th century. This finding suggested a relationship such that males most often made the important decisions and women were tending to environmental or emotional needs. Thus, it was not simply hierarchical, rather it was patriarchal. When nursing education transitioned from hospital-based to university-base this shifted that power balance.

Despite the change in power where nursing employed a university-based education, a relationship pattern persisted, including the perception in which nursing was admired for caring and making a difference rather than for a professional aspiration. (Price, et al., 2014). True

collaboration continued to remain elusive despite interprofessional relations as a vital measure of effective care. Patient rounds were still specific to the profession and indirect to the interprofessional entities. There continued to be a lack of messaging linking collaboration to patient outcomes. Linkages with interprofessional education in the curriculum was lacking (Price, Doucet, & Hall, 2014).

Pyc, Meltzer, & Liu (2017) studied leadership in healthcare in relevance to communication. Nurses who had experienced supervisors who were authoritative or abusive with ineffective leadership skills had negative outcomes including anxiety, depression, job dissatisfaction, poor performance, and intent to quit. Having practitioners trained for effective communication and leadership skills, including non-abusive or authoritative supervisory skills was considerably more effective (Pyc, Meltzer, & Liu (2017).

Tuckett, Winthers-Chang, Bogossian, & Wood (2015) studied reasons for nurses' leaving the profession. Postings from an electronic newsletter from a large, longitudinal web-based study entitled, 'The Nurses and Midwives e-cohort Study' were explored to identify a shared understanding of meaning. Sixty-six posting from nurses who responded to the open-ended questions which probe reasons why nurses and midwives were leaving the profession? How clinical staff could be retained? Finally, why nursing students were leaving studies of nursing? Six key themes emerged: a) lack of supportive leadership that stifled individual and independent nursing growth by nurse managers; b) nurse manager incompetence who were seen as "higher on ladder", uncaring, drowning in policies governing practice; c) unsupportive within work groups; d) new graduate nurses with no further on job education; e) no voice in hospital governance; f) nurses who do not support other nurses; and g) newer nurses who take on leadership roles before they are ready. Implications from this study suggested that support comes from guidance,

assistance and collegiality. Nurses and managers must develop mutual support and develop this within their culture to prevent negative distal outcomes (Pyc, Meltzer, & Liu, 2017; Tuckett, Winthers-Chang, Bogossian, & Wood, 2015).

Miscommunication

Much of the literature investigating communication failures focused on ways to improve; however, there was evidence related to analysis of miscommunication using approaches from language and social psychology. Watson, Manias, Geddes, Della, & Jones (2015) found the problem involved more than communication training alone. Human factors including underlying tensions, conflict, and hierarchical situations also effected the dialogue. Watson, et al., (2015), solicited health professionals by online questionnaires asking the following questions; (a) What are the major barriers to engaging senior staff as effective role models?" ; (b) "What aspect of clinical handovers do junior health professional find most difficult?"; and (c) "Can you suggest any ways in which clinical handover could be improved in your working context?" (Watson et al., 2015, p. 92). Seven hundred and seven healthcare professionals responded to their online questionnaires which allowed for a synthesis of qualitative descriptive information.

Watson, et al., (2015) found that healthcare professional participants in their study were not confident that a standardized handover tool would solve problems with handover due to associated group conflicts and time constraints. Health professionals in the study demonstrated group differentiation and division rather than a united staff. This finding continued into the statements, which indicated a hierarchical division between senior staff who were perceived as "too busy". There was also indication of a "silo" mentality of division of disciplines. This study highlighted handover communication involves much more than individual skill, there also needs be social change, interdisciplinary communication and safe communication within an appropriate

theoretical model (Watson, et al., 2015). Limitations to this study was identified as a lack of inclusion of hospital management input.

Wilson (2015) surveyed a core team of frontline intensive care unit (ICU) nurses at Overton Brooks Veterans Administration Medical Center in order to discover the individual nurse understanding of how to improve compliance with the National Patient Safety Goals (NPSG). Less than 60% of the respondents could identify the action plan for at least one of the NPSGs. Tools within TeamSTEPPS® were initiated to address miscommunication barriers. Miscommunication and the associated barriers were found to be related to staff not routinely reading emails or participating in meetings. TeamSTEPPS® training and tools were applied, as well as initiation of a poster campaign, Mardi Gras fair, and a hospital-wide NPSGs fair resulted in a 54% increase in staff awareness and demonstrated a change agent process for nursing to align the NPSGs in one facility (Wilson, 2015).

Cognitive scientists continue to explore meaning about communication as well as miscommunication in philosophical, experimental, and computational approaches. Healey, de Ruiter, & Mills (2018), sought to understand mutually human interaction intelligibility. Studying it becomes difficult due to collecting appropriate quality response measures of how individuals process and communicate other than memory recall and retelling scenarios. Miscommunication is inherently a multi-person phenomenon and is defined by an inter-relationship about what is produced and their audience's reactions. (Healy, de Ruiter, & Mills, 2018).

Lesson Plans

Moore-Cox (2017) described the utility of having a template to use as a map for activities and in which all class participants, students, pairs, teams as well as faculty could use. A lesson

plan served as an itinerary and map for the class period and could be of benefit for the next person teaching the course. A lesson plan provides a template for each class period to include planned time on task, resources needed, such as equipment, technology, and people for the activities. Within a well-designed lesson plan the goals and objectives of the class period are mapped out in sequence and duration of the individual learning activities. Moore-Cox (2017) emphasized the importance of incorporating NCLEX Client Needs Categories, QSEN competencies, and outcomes as well as the AACN Essentials outcomes statements into baccalaureate level nursing program lesson plans.

The competencies such as QSEN, NCLEX Client Needs Categories, and the AACN Essentials are also framed into the nursing education curriculum. Each individual lesson is a thread that works within that framework that is situated towards the context of becoming a nurse (Moore-Cox, 2017). Making the lesson plan and resource list available to student learners would allow student preparation in advance of the class. Pre-class activities and independent preparation and practice are important elements to successful learning.

Clapper, et al., (2018) designed a lesson plan incorporating TeamSTEPPS® course knowledge and 4-phase brain-based simulations. This level II research used Bandura's Social Learning Theory with team training for teamwork and communication. It was a quantitative pretest/posttest design for pilot research in an urban hospital. Clapper, et al., (2018) was interested in training 90% of all healthcare personal who have direct care responsibility. The intervention required 547 people to complete TeamSTEPPS® training over three months. Results after completing TeamSTEPPS® demonstrated differences in scoring for day and night shift employees with leadership training and debriefing tools more saturated in those TeamSTEPPS® trained employees with more opportunities for practice. This research suggested

a shorter period of training was appropriate for TeamSTEPPS® course training and can therefore be achieved in shorter timeframes. In addition, having opportunity for practice reinforced the expected team behaviors.

Carson et al. (2018) designed a lesson on teamwork using the TeamSTEPPS® Teamwork Perceptions Questionnaire to measure student views on the intervention designed to enhance teamwork in 181 undergraduate second year nursing students during their inter-professional and collaborative working module. The learning strategies used collaborative learning theory and learning that included a team-led poster development. This experiential type learning was designed to teach students about team working and social practice. The researchers found a weak but positive relationship between age and teamwork perception.

Umoren, et al., (2017) utilized the TeamSTEPPS® model through use of interactive virtual team training to prepare 144 learners for providing safe and effective care in clinical teams. This study was implemented in two midwestern universities using Unity 3D application or web-based experiences. Learners were able to recognize the communication tools in all the scenarios related to the TeamSTEPPS® tools including 'Call-out', 'SBAR', 'Handoff', 'Brief', and 'Check-Back'.

Tibbs & Moss (2014) developed a study using a quality improvement project. Specifically, the study implemented protocols and algorithms in a gynecology surgical specialty team to promote teamwork. The use of TeamSTEPPS® training in combination with the team protocols was designed to optimize surgical workflow and times, improve surgical times, compliance with time outs, huddles, and perception of teamwork. Eighteen members of the surgical specialty team participated, including GYN surgeons, CRNAs, RN circulators, and scrub personnel. There were improvements in all measures previously mentioned, but also in the

process improvement of documentation and understanding of definitions of final time out. Natafgi, Zhu, Baloh, Vellinga, Vaughn, and Ward (2016) found similar outcomes after implementing tools from TeamSTEPPS® training in eight critical access hospitals with the goal to improve shift change communication. This group found having champion and team training facilitators' whom staff supported and recognized were helpful. Unfortunately, lack of physician support and involvement as well as leadership turnover made implementation difficult and slowed progress toward the goals.

TeamSTEPPS® training as a basis of a lesson plan can be integrated into virtual learning environments with TeamSTEPPS® based-scenarios. Sweigart, et al., (2016) used virtual learning with 5-minute scenarios with an avatar allowed for the strategies in TeamSTEPPS®. The researchers included 'SBAR', 'Check-back', 'call out', 'two challenge rules', 'CUS', 'handoff', 'conflict resolution', and 'DESC script'. A game platform with 3-dimensional avatars were used and measures included the T-TAQ from TeamSTEPPS® model to determine effectiveness and findings indicated positive changes in teamwork and attitude among health professions students instructed using this method. Students expressed feelings of limitations in professional avatar representation due to limits on professional avatar facial expression and numbers of professions represented in the scenarios. For nursing the virtual teams may be considered suitable for impacting teamwork and attitudes in learners.

Discussion

Interpretation

Evidence from studies that used TeamSTEPPS® and measured perceptions of participants indicated improved understanding of the roles of other healthcare professionals (Carson, et al., 2018; Clapper, et al., 2018; Natafgi, et al., 2016; Sweigart et al., 2016; Thompson

et al., 2016; Tibbs & Moss, 2014; Truman & Gossett, 2016; Umoren et al., 2016; Wilson, 2015; Wise et al., 2015). sources). Furthermore, this effect was increased both during and after learning (Carson, et al., 2018; Clapper, et al., 2018; Natafgi, et al., 2016; Sweigart et al., 2016; Thompson et al., 2016; Tibbs & Moss, 2014; Truman & Gossett, 2016; Umoren et al., 2016; Wilson, 2015; Wise et al., 2015). Nursing often has the primary role for care of patients at the bedside and therefore it is of vital importance to have the skills in teamwork training.

For studies involving nurses, the themes of 'lack of support', 'lack of collegiality', and 'having no voice' indicated the need for nurses to feel mutually supported. Themes of hierarchy affecting teamwork, a silo mentality, and lack of appropriate leadership ability for nursing were also apparent in the literature with true interdisciplinary collaboration remaining elusive (Price, Doucet, & Hall, 2014; Pyc, Meltzer, & Liu, 2017; Tuckett et al., 2015).

Communication training assisted nurses to increase their awareness of how they interdependently work to address patient safety goals (Granheim, Shaw, & Mansah, 2018). On the other hand, miscommunication was caused from complex interactions, as well as the variability of individual memory and meanings. Protocols and algorithms were designed to enhance communication skills for the healthcare team (Rachwal, et al., 2018; Maryniak, Markantes, & Murphy, 2017; Wittenberg, et al., 2016). In healthcare having effective, concise and orderly information flow among healthcare team members protects patients.

The literature demonstrated the benefits of PBL in nursing education. Students perceived this method to be useful to evaluate skill required within profession as a nurse (Forsgren, Christensen, & Hedemalm, 2014; Granheim, Shaw, & Mansah, 2018; Rachwal, et al., 2018; Shin & Kim, 2013; Thompson, et al., 2016). Interprofessional learning with problem-based methods

has an added benefit, which allows for understanding roles and responsibilities within the

collective practice of healthcare (Imafuku et al. 2018).

Outcome

The outcome of the literature review was an evidence-based lesson plan. The lesson plan

was designed using a template structure which was discussed by Moore-Cox, (2017) and

included in Appendix A of this paper. Within the lesson TeamSTEPPS® training is introduced to

students in order to guide them in practice for communication. Because working in a team

develops with practice, this lesson builds on that practice through introduction of a problem for

each of the teams to work on together. This will not only enable them to work together in a

group towards the outcome of effective communication, it offers them opportunity to reflect on

this before the project, as well as after the project.

During the pre-learning phase of this lesson plan a rubric will be given to students. Prins,

de Kleijn, & van Tartwijk (2016) demonstrated use of a rubric for students, which was used as a

tool to guide and support the learning, as well as to serve for assessing the student learning

outcomes. The criteria within the rubric for team communication was structured by

TeamSTEPPS® model, with measured outcomes for each of the aspects of learning (see also

Appendix B). This rubric will function to reinforce the lesson to students formatively, and for

instructor use for assessment and evaluation.

Rubric has sections on the left-hand column highlighting those features included in the

lesson plan. The first section was the general structure of the training which included the

knowledge, skill, and attitudes. This section highlighted the importance of a unified group

process which works in collaboration in synchrony with the TeamSTEPPS® guidance and

training principles. The second section was the communication section and is the backbone of

the teaching principles included in TeamSTEPPS® training and included team structure, communication, leadership, situation monitoring and mutual support. Because this is a presented and shared project, the third section is the sense of audience and purpose. The student learner will work in collaboration towards completion and presenting to other student groups and instructor. The fourth section of the rubric was used to assist the student learner with development of grammar, semantics, style and formatting. In much of learning nurses are guided towards professionalism which follows to demonstrate quality writing ability. Process is the final section which included the completion of the T-TAQ's, discussion, electronic notes, and utilization of feedback.

Scoring for the rubric is based on columns, which are numbered one, two and three, with one representing did not meet expected outcomes, two met expected outcomes and three exceeded expected outcomes. Scoring was calculated on each section, with the first column scoring of possibly 5 points, second section maximum total 10 points, and the third section maximum scoring 15 points.

Billings & Halstead (2016) found utilizing a lesson plan offers the educator a guided strategy for teaching. The lesson plan created from this scholarly work, included specific, measurable, achievable, realistic, and timed (SMART) learning outcomes, from three domains of learning in Blooms' taxonomy. This intentional plan guided students' engagement in cognitive, affective, and psychomotor learning. This lesson plan intentionally planned for students to achieve the learning outcomes.

In the initial class period, the instructor had opportunity to engage student learners in the value of the activity by playing some live video of the use of TeamSTEPPS® communication model training, as well as to provide students with access to other tools for use when not in class.

One example was communication tools and checklists from TeamSTEPPS® (AHRQ, 2019). These are available as an app for smartphones, or other computer devices including tablets. Students or faculty may download this at no cost through the Apple iTunes Store and Google Play Store. These were included in the lesson plan as tools for student reference.   It was important that students have tools that offer ease of use, but also by repeating use of the tools serves to reinforce information and encourage reflection to give students personal understanding and memory retention (Billings & Halstead, 2016)

Assessment of student learning was completed as a multiple assessment technique because as discussed by Oermann & Gaberson, (2017), one assessment strategy was unlikely to provide enough information about outcomes measures. TeamSTEPPS® training T-TAQ assessment matched learning goals to student ratings of performance. Self-learning assessment was completed pre and post learning by using the T-TAQ from TeamSTEPPS® (AHRQ, n.d.). This is an instrument which measures individual performance within the team in the areas of team structure, leadership, situation monitoring, and mutual support (AHRQ, n.d.). During the lesson, students completed the T-TAQ twice. The first was prior to the initial class period, then at the end of the project.

Components of the lesson plan (Appendix A) are class objectives, time frame and timing, topical outline, teaching strategies, resources for learning, resources for additional assistance, and evaluation. Prior to beginning the lesson students will access the pre-learning activities which include the T-TAQ. They will have information to read about for team communication and skills for leadership and mutual support after taking the T-TAQ. Students will be provided with electronic based readings of which the faculty also have access to and can validate student reading through mutual notes exchanged. The student is expected to complete the

interprofessional learning module readings prior to being assigned to their student group to begin the problem-based learning assignment.

During the class students are assigned into teams by nurse educators who are charged with ensuring groups are diverse and allow for student growth in interdisciplinary communication. The groups in each of the teams are between five and eight students. Students within their team are provided with a case-based scenario from one of the eight options including; (a) hand-off communication; (b) duty to respond; (c) workplace violence prevention; (d) sentinel event resulting in death; (e) family empowerment; (f) patient falls; (g) inadequate staffing; and (h) patient abandonment. Students groups must organize their team according to guidelines from TeamSTEPPS® which involved appointing roles to each member of the team. Data for these cases are from sentinel event case events and are provided for nursing students learning and involved situations where there was communication breakdown.

McLean & Arrigoni (2016) found instructors who engaged students during the work within a shared document were able to give feedback and provide genuine support for student success. During this problem-based learning group work students will initially begin a unique electronic document, which is shared between the group members and the instructor to show live work effort and communication within the document.

This lesson was structured with a final project for the teams to complete collaboratively as a group and presented to the rest of the class. Student groups will work collaboratively to decide upon the format of the presentation, i.e. a PowerPoint presentation, a poster, a live in-class presentation, or a recorded video presentation. This active learning was planned to achieve the greatest level of learning outcomes. Chen et al. (2018) found active learning, such as the flipped classroom method, to result in higher-level learning outcomes.

After students are assigned to their groups a rubric for their problem-based learning assignment becomes available to them. Within this document are guidelines that represents the effectiveness of individual student communication within their groupwork assignment using TeamSTEPPS® model of knowledge, performance, and attitude. Content in each of the TeamSTEPPS® constructs include; (a) team structure; (b) leadership; (c) situation monitoring; (d) mutual support; and (e) communication.

Reflective learning was incorporated into the lesson plan to create student awareness of their own learning. This lesson allowed student opportunity to journal an individual response to the team learning experience within their group project.   Thus, students will individually reflect on the learning of teamwork and communication. Instructors will review this posted document for student reflection of the components within the TeamSTEPPS® lesson plan as they were promoted during the lesson.

Upon completion of the lesson students are to complete the final T-TAQ to determine the extent to which each individual student learner has attained learning on communication and teamwork. The T-TAQ would be accessed by students through a Learning Management System (LMS) The initial T-TAQ will not be available to students for review until after it has been completed and not until the final T-TAQ is finished. T-TAQ tool will be used to evaluate the effectiveness of the TeamSTEPPS® lesson. For aggregate evaluation of the effectiveness of student learning from this lesson, the T-TAQ can be linked to a database for scoring for more global assessment of the effectiveness in TeamSTEPPS® training.

Dissemination of this project is planned to be a poster presentation at a nurse educator conference. An abstract was submitted to NurseTim Inc Nuts and Bolts for Nurse Educators

Next Gen Learning: From Critical Thinking to Clinical Judgement and Beyond at Hilton

Minneapolis/St. Paul Airport Mall of America August 8-11, 2019 in Minneapolis, Minnesota.

Implications for Nursing

   Practice.

   Problem based learning and including TeamSTEPPS® training theory allowed students

to use clinical cases within eight topic scenarios including; (a) hand-off communication; (b) duty

to respond; (c) workplace violence prevention; (d) sentinel event resulting in death; (e) family

empowerment; (f) patient fall; (g) inadequate staffing; and (h) patient abandonment. These areas

are highlighted for relevance to problem solving. Skills learned in this lesson plan are practice

such as team work and delegation, and use of medical literature. Students learn the benefits of

cooperation and challenging conflicts through engaging in discussion to develop important

teamwork skills for effective communication to reduce medical error and improve care quality

(Mayo, & Woolley, 2016; Onyon, 2012; Pyc, Meltzer, & Liu, 2017)

   Fourth semester baccalaureate nursing students may not be able to master all parts of

TeamSTEPPS® because it was designed for skill building that will continue in their careers.

Some healthcare agencies have incorporated specific training components that offer continued

use of advanced levels of training with the essential skills of TeamSTEPPS® and give those who

complete the advanced training a certificate (Peters, Harvey, Wright, Bath, Freeman, & Collier,

2017). Using evidence about the success of TeamSTEPPS® training could be an effective

method to persuade more healthcare agencies to include it in staff development.

   Education.

   Despite nursing students having higher scores in program areas, improvements are

needed in the ability to work with and value working with others (IOM, 2015; Rossler et al.

2017). Problem based learning in nursing education has positive effects on clinical education. (Shin & Kim, 2013). Learning shifts from individual to collective affording student's skill in use of as well as understanding of the importance of communication (Imafuku, et al. 2018). Peer engagement, multiple perspectives, and mindful reflection are other aspects of this learning which help to gain greater insight into challenging situations (Rachwal, et al. 2018). Teamwork and collaboration were identified by the Quality and Safety Education for Nurses (QSEN) as a function that fosters open communication, mutual respect, and shared-decision making which ultimately achieve quality patient care (QSEN, n.d.). Many schools of nursing have policies related to courses that are in alignment with the QSEN framework as a guide.

Policy.

Having consistent and ongoing student development across a range of learning environments in nursing is an important aspect of communication skills training (IOM, 2015). Achievement in leadership, improved attitude across professions can be acquired through concepts and elements of the TeamSTEPPS® training. Many schools do not have faculty to develop and facilitate one course to cover all aspects of necessary training and this must therefore be woven into a curriculum as part of professional and interprofessional development. Within the nursing curriculum faculty must establish policy that requires learning experiences to enhance outcomes of communication skill necessary for interprofessional socialization and professional development. TeamSTEPPS® training could serve as the framework for this policy, because it is a research-based teamwork and communication skills training method, which has been implemented in many healthcare facilities (Kristen-Peters, et al., 2017; Plonien & Williams, 2015; Natafgi, et al., 2016; Tibbs & Moss, 2014; Wilson, 2015) where there is

ongoing evidence of quality communication skills and teamwork affecting improvement in life saving measures.

Research.

Little has been studied about the success of using TeamSTEPPS® training in nursing education. Research into the success of student learners who have been trained with TeamSTEPPS® and effectiveness of communication skills both interprofessional and individual development is recommended. Measures of how nursing students benefited through team learning experiences, especially in the ability to gain greater insight into challenging situations through the shared differences in perspectives may also benefit from further research.

Summary/Conclusions

This project utilized one nursing educational lesson to introduce nurses to use of problem-based learning and teamwork and cannot be overemphasized. The need for further implementation of communication and interdisciplinary skills training for nursing education was emphasized in the literature. This teaching strategy-oriented nursing students to TeamSTEPPS® for enhancing the teamwork and communication skills necessary for nurses in an interdisciplinary healthcare team. Interdisciplinary teamwork and communication with guidance and evidenced based training. To ensure that patient care is safe and effective having effective interprofessional communication skill is implicated for nursing education. Expectations for practice were included to reinforce students with the skill which offers evidence from practice and added value to student learner education.

This organized lesson plan was one teaching approach that involved guided use of the cognitive, psychomotor, and affective aspects of learning during skills training. This method

was essential because it helps educators to have detailed planning which is flexible and provided structure to the lesson.

Nursing education would benefit further with lesson plans that emphasize building teamwork and communication skills within the entire learning curriculum. Guided communication skills training, such as TeamSTEPPS® used in nursing education builds a foundation, which will be used in professional practice to maintain and promote safe care. Further evaluation research on TeamSTEPPS® training, such as completion of T-TAQ questions and follow up on students after graduation may be helpful to determine ongoing effectiveness.

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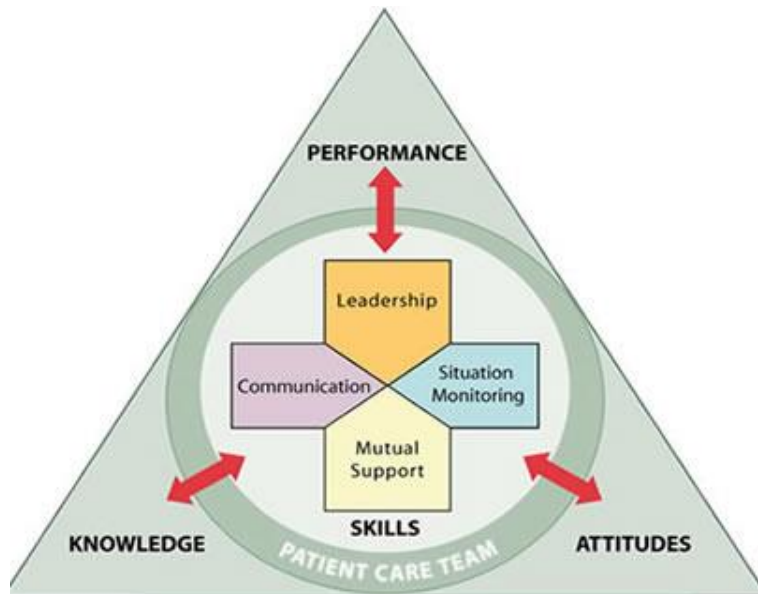
Figure 1.1 TeamSTEPPS® Triangle Logo

Figure X. Visual model that represents critical concepts related to teamwork training. TeamSTEPPS® Logo. Agency for Healthcare Research and Quality, Rockville, MD. From http://www.ahrq.gov/teamstepps/images/tslogotxt.html

Appendix A

Title of Lesson: PBL Team Project

Course: Fourth Semester Nursing Baccalaureate.   **Content Focus:** Teamwork and communication. (Can overlap other content areas within this semester in order to fulfill outcomes for learning).

Problem Based Learning (TeamSTEPPS®)

Date Created_____ Revised_____

In Class Time: 2 hours. Out of Class time: 4 hours   **Venue:** Optional   **Session Style:** Didactic Learning/Asynchronous or synchronous

Modality: Optional

Previous Relevant Knowledge: TeamSTEPPS® training; nursing ethics and professional competencies**.**

Materials: (LMS for student use to develop the project for presentation, PowerPoint program; TeamSTEPPS® training guide app)

Objectives	Duration	Content & Development	Method & Materials Needed	Student Activity	Assessment	Rationale
Learner will: Describe how communication effects team processes and outcomes (Measured evidence: in the discussion within the electronic worksheet and journal entry) *(Affective domain: Receiving Phenomena)* Identify the TeamSTEPPS® tools and strategies which may improve a team's communication. learning module. (Measured evidence: journal entry listing) *(Cognitive domain: remember)*	50 minutes	Introduction to the Interprofessional educational (IPE) simulation for collaborative learning and practice Safety Module. TeamStepps®	Internet access Electronic book access from TeamSTEPPS®. Notes for class and PowerPoint.	Readings assigned on communication skills in interprofessional care. Electronic worksheet which explains TeamSTEPPS® principles which the students may write notes on and the instructor will review. Student to review rubric for peer exchanges and problem-based learning project.	Discussion post at the end of this lesson plan is the measured evidence.	Learning theory: Cognitive based on discovering meaning. Strategy: Lecture/Cooperative learning. Electronic readings. Pre-assigned teams for each module.

				Instructor to do in class presentation as well as recording on TeamSTEPPS® strategies in a series of 3 recorded 15-minute videos. Students will access the AHRQ TeamSTEPPS® website for two assigned recorded video training series 45 minutes. Students will have option of printed copy of TeamSTEPPS® skills and communication guidelines and may also download the app. Students are assigned into their problem-based learning group.		
Learner will describe the resources from TeamSTEPPS® tools and strategies that may be accessed in future learning assignments.						
Learner will complete the T-TAQ teamwork questionnaire. (Measured evidence: (*Affective Domain: Valuing*)	**10 Minutes**	**T-TAQ questionnaire.**	**T-TAQ pre-teamwork questionnaire which is linked to the LMS for students to complete.**	**Student will perform self-assessment of the T-TAQ questionnaire before engaging in the learning assignment with team.**	**Pre-**	**Assessment**
Learner will identify poor safety practices in interprofessional practice.	**20 minutes** (*out of class work*)	**Video link on interprofessional practice poor safety vs quality.**	**Adobe or Tegrity with imbedded video link.**	**View the video that is embedded into the PowerPoint slide.**	**Discussion post at the end of this lesson plan.**	**Learning theory:** **Strategy:**
Learner will review content they will work on within their team. (*Cognitive Domain: Interpret*)	**15 minutes**	**Instructor provided hot topics or students may**	**Handouts to each group of individual cases for**	(*Peer Learning*) **Group to assign roles to each team member.**		

| | | select one of their own with instructor approval.

8 topic scenarios learning groups will build their PowerPoint, poster, or in class teaching on.
(a)**Hand-off communication**

(b)**Duty to respond**

(c)**Workplace violence prevention**

(d)**Sentinel event resulting in death**

(e) **Family empowerment**

(f) **Patient falls**

(g)**Inadequate staffing**

(h) **Patient abandonment** | each team who will work on to which identify how they will work together to present them to their other classmates. problem-based learning assignment they may choose and work through from listed items. One topic per group. | **Leadership role and assigned duties to be given to instructor and all team members by same week Sunday by 2359 pm.** | | |
| **Learner assist in coordination with their group for construction of PowerPoint, Poster, or in-class** | **Out of class work.** | **Each group assignment is presented to** | **PowerPoint** | **Completion of team assignment in mutual** | **Work is completed on time with** | **Learning theory: Problem-based learning theory.** |

presentation to present in class to other students. (*Psychomotor Domain: Mechanism*) (*Cognitive Domain: Synthesis*)	(*Approximately 4 hours of out of course work*).	the other student learners	Poster or live class group presentation. **Shared document with live interactive content for instructor access.**	assignment before following Sunday at 2359. (*video time limited to 14 minutes*)	evidence of group work as guided by TeamSTEPPS®	Skills practice.
Learner will appraise experience with use of TeamSTEPPS® during the problem-based learning within the team. (*Cognitive Domain: Analysis*)	30 minutes	Reflective journal entry.	Instructor forum link	Review the electronic feedback for team-based learning assignment. Complete reflective journal entry. This is a blog post for each student and only has instructor access. It is cumulative and has conceptual points highlighted.	Student comprehension of the communication skills within the TeamSTEPPS® model.	Learning theory: Experiential learning theory. Reflective practice (Jacobs, 2016).
Learner will complete the T-TAQ teamwork questionnaire. (Measured evidence: (*Affective Domain: Valuing*)	Out of class work to be handed in through the LMS		T-TAQ post-teamwork questionnaire	Student will perform the self-assessment of the T-TAQ questionnaire after engaging in the learning assignment with the team	Post-	

Table adapted from Dix & Hughes (2005)

Appendix B

Rubric for Teamwork and Communication Skills and project development.	Does Not Meet Expectations (1)	Meets Expectations (2)	Exceeds Expectations (3)
General Structure Knowledge Attitudes Performance	• Lacking clear understanding of concepts of TeamSTEPPS training. • No evidence of unity in working on shared documentation for final product. • Understanding of the relevance of communication breakdown in the sentinel event cases is absent and not present in final project.	• Clear understanding of concepts introduced in TeamSTEPPS training. • United group work on shared document. • Clear understanding of the communication breakdown during sentinel event case is present and discussed during project.	Everything under meets expectation. **In addition.** • TeamSTEPPS training methods are present in discussion such as use of specific structured communication process. • Presents additional information in sentinel event case that shows further how communication breakdown has happened in historical documentation.
Communication • Team Structure • Communication • Leadership • Situation Monitoring • Mutual Support	• Lack formation of roles on the team during project. • Lack discussion of assigned parts of the work. • Lack of assigned timeline for work completion. • Failure to follow structure during communication exchange. • Failure to show mutual support and value for all members of your team.	• Formation of roles on the team initiated prior to working on project. • Discussion of assigned parts of work evident. • Timeline for work completion discussed and made available to all team members. • Structure during communication exchange is agreed upon and allocated to all team members.	Everything under meets expectation. **In addition.** • Evidence of use of TeamSTEPPS tools that highlight role formation during project. • Evidence of closed-loop communication techniques.

	• Leadership role failure to ensure the team understands plan, changes in information sharing, and the resources necessary for the project. • Failure to ask for feedback and assess elements within the project which require clarification, understanding or further mutual support.	• Showing of mutual support and value for all team members is evident by all members of the team. • Leadership ensures team understanding of plan, any changes in information, resources list is exchanged for project. • All team members give and receive feedback and assess elements within the project which require clarification, understanding, or further mutual support.	
Sense of Audience and Purpose	• Fail to show ownership of work is evident of groups equal participation. • Shared communication was inappropriate or unprofessional. • Carelessness in communicating within the team and in the project itself. • Fails to include instructor in any discussion and does not initiate shared documentation of work.	• Work is assigned equally amongst all team members and show evidence of equal participation. • Communication sharing is professional and collaborative. • Communication in the team and in the project is professional.	Everything under meets expectations. In addition. • Bring forth unique aspects to enlighten and inform the audience. Show of artistic effort in project such as a performance or an interview.
Grammar, Semantics, Style, and Formatting	• Length of work is not enough for final product. (Less than 12 minutes).	• Final project completed for a time limit which ensures all elements are captured to show value of	Everything under meets expectations. In addition. • Communication of the project is enhanced for

	• Formatting errors evident. • Deviation from APA style. • Work is showing run-ons or fragments. • Spelling errors.	the case. (Approximately 15 minutes). • Final project work shows all elements of APA style without formatting errors. • No indication of any run-on, fragment, or repetition. • No spelling errors.	diversity of the group. (For example, if students were visually impaired, or not available to view the presentation).
Process	• Does not make comments in the electronic notes to indicate that readings were completed. • Does not make use of feedback from instructor or peers. • Does not complete the T-TAQ initially. • Does not complete the T-TAQ for final submission. • Does not submit final discussion. • Fails to integrate in team process to final product outcome.	• Comments in electronic notes during readings were complete and show evidence of thoughtful discovery. • Feedback from instructor and peers is shown to be valued and discussed. • T-TAQ is completed initially and in a timely manner. • T-TAQ is completed at the final submission time. • Final discussion is submitted. • Team process is integrated and demonstrated in all discussions to final product outcome.	Everything under meets expectations. In addition. • Comments in the electronic notes and readings have closed loop feedback style of communication indicating double-check of message understanding. • Evidence of use of brief, debrief and huddle during the project.
Totals	/5	/10	/15

Instructor Feedback: Instructor will use the rubric above as a guide, student feedback is given formatively and as a process for ensuring the student learning both in the shared document and in the electronic notes shared during readings.

Authors/ Publication Year	Purpose	Design	Sample	Data Collection and Measurement	Findings/Implications for nursing.	Strengths	Limitations	Level of Evidence
Clapper, T., et al., (2018).	Train 90% of pediatric healthcare providers in the department in less than 3 months with TeamSTEPP knowledge and skills.	Pilot study. Pre-test/post-test design.	547 pediatric healthcare personnel with direct patient care responsibilities.

Urban academic center. . | TeamSTEPPS 8-week training course. Five areas: team structure; leadership; situational monitoring; mutual support, and communication.

Tool: Classroom, simulation-based instruction. In-situ simulation in a pediatric department. | Not all teams who received TeamSTEPPS training debriefed their teams. None of the ones without the training debriefed their teams.

Teamwork and communication scores improved for leadership and mutual support.

Team performance observation tool points to the difference between day and overnight shift. | Pre and post training measurements in all five areas. | Saturation-in training model equipped the teams with the TeamSTEPPS knowledge and team behaviors, however, if not reinforced by leaders, educators, and administrators, gains dwindle over time.

Difficulty existed doing training during high census which required clinicians to be busy.

Leadership roles in the team needed reinforcement such as direct assignment of team members.

Study only used one department.

Only 4 teams were used with one team pre and 1 team post intervention for both day and night shifts. | Level IV |
| Crawford, C., Omery, A., & Seago, J. (2012). | Recommendations to improve the nurse-physician communication process. | Integrative review of nurse-physician | Search terms of nurse-physician, RN-MD, and communication | Synthesis of findings | Conversations should focus on the patient.

No specific strategy, tool, or technology | Suggestions in a list are given by authors. | Limited study which had only 16 articles of reference.

Study could benefit from longitudinal | Level V |

		communication.	Summary from 16 articles.		device was recommended.		and retrospective angles.	
					Use of structured tools such as SBAR are supported to provide communication framework.			
					Telephone communication is influenced by timeliness, preparation, interruptions, and or delay of or lack of responses.			
					Silence is used both positive and negative and as a form of power and expression.			
					Physicians often see nurses as nameless and necessary to complete their work.			
					Nurses continue to make recommendations, take initiative and be bold while appearing passive and submissive and when properly done will appear as though the physician has initiated it.			
					Organizational leadership must change the culture to establish collaborative interprofessional partnerships.			

					Non-threatening language in day-to-day communication. Enhanced collegial partnerships between nurses and physicians. Establishing a common ground of nonhierarchical and collaborative nurse-physician communication.			
Ferguson, S. (2008).	Description of TeamSTEPPS® training. Historical documentation.	Descriptive documentation.	n/a	n/a	Goal of TeamSTEPPS described "to produce highly effective medical teams that optimize the use of information, people, and resources to achieve the best clinical outcomes for patients" p. 122.	Author is Colonel, Army Nurse Corps, and Chief, Nursing Administration, Carl R. Darnall Army Medical Center, Fort Hood, TX. (US). Training for TeamSTEPPS originated within military treatment facilities during 2005 and 2007.	TeamSTEPPS® is an evolving scientific application and this document provided baseline information during the integration of TeamSTEPPS training.	Level VI
Forsgren, S., Christensen, T., & Hedemalm, A. (2014).	Support student problem solving ability by integrating theoretical knowledge into clinical practice using case method. (AKA) problem based method.	Qualitative content analysis of process outcome.	103 course evaluations from nursing education in University West in Trollhättan, Sweden. 2nd year nursing education and clinical medicine combined into a single	Case study. Small group process. Seminar leader. Seminar=Large group of 20-25 students. Examination based. Template Student created an individual proposal including a nursing care plan based on the case.	Nursing students reported: Experience helped them think and act like a nurse instead of as a student. Felt a deeper knowledge about symptoms of diseases. Increased confidence in problem-solving abilities.	Large data set including healthcare professionals in nursing. Use of Case method which is also known as problem-based learning.	Study did not include the rubric. Template was simple and design format did not include the nursing process outline as suggested in introduction.	Level V

			integrated course. 100 nursing students. Small groups of 5 to 6 students.	Members in the small groups then meat, discuss, brainstorm, and critically reflect on the case based on the individual proposals. Group members then created a joint proposal based on the template. This should be supported with evidence-based knowledge and sent to seminar leader day before seminar.	Group discussions have also provided practice in collaboration and argumentation. During team work students found it difficulty to differentiate between nursing and medical interventions. Questioning by the instructor was not liked by a few students. Students preferred having open discussion rather than stated with being right, wrong, or assessed harshly. 90% of students strongly agreed that the case encouraged them to perform holistic patient assessment. Students prefer having written information which describes clearly how case work takes place.			
Granheim, B., Shaw, J., & Mansah, M. (2018).	Identify how simulation and interprofessional learning were used together in undergraduate nursing programs.	Integrative literature review.	Undergraduate nursing programs and schools of nursing. Simulation both high and low fidelity types in interprofessional	Whitemore and Knafl's five step process was used to guide the integrative review of qualitative and quantitative literature.	Increases noted in the past few years surrounding this study. Nursing and medical students most often represented with focus on communication and collaboration.	Teaching methods to implement interprofessional learning as an avenue to improve communication and confidence. Students having high ratings for development of	Many studies used convenience sampling due to simple approach which may create bias due to volunteer and being the best participants. Mandatory participation can also cause bias.	Level V

			undergraduate nursing programs.			knowledge of other disciplines. Self-reported measures can also cause bias with exception of participant attitude questionnaire. Limitation in implementation due to resources required for interprofessional learning and simulation as well as timeline of studies.	
Imafuku, R., Kataoka, R., Ogura, H., Suzuki, H., Enokida, M., & Osakabe, K. (2018).	Gain understanding of student perception of interprofessional collaboration and development of skills with participation in an interprofessional education programs.	Convenience sample, exploratory case study design.	616 students from the professions of medicine, dentistry, pharmacy, nursing, physical therapy, occupational therapy. Ages were 18 and older. From students of Showa University japan in 2013 and 2014 as part of first year programming.	Reflective writing across the IPE modules. 4 completed reports: 1) Interprofessional problem-based learning; 2) early exposure care and welfare; 3) early exposure hospital ward; 4) interprofessional problem-based learning.	Using core competencies for IPE in four domains of I) values and ethics; II) roles and responsibilities; III) Interpersonal communication; and IV) teams and teamwork. Better understanding of own roles and professional responsibility. Learning shift from collective with better understanding of the importance of communication. Increased development of professional identity by working out problems. Nursing: incorporation of values and ethics as a key construct. Faculty	Large sample size. Use of core competencies for professional practice.	1st year group did not have understanding or exposure to what values and ethics were as a learning outcome. Only one educational institution was used during the study. Experiences from students with other modules of learning may have lent added strength to the study findings.	Level III

					is needed to effectively facilitate IPE. Students need interconnected IPE experiences.			
Institute of Medicine (IOM) (2015).	Report which examined how to measure the impact of interprofessional education on collaborative practice and health system outcomes.	Literature review.	Tool: IOM committee measures impact of interprofessional education with focus on the links between: • Performance and practice. • Patient population and population health. • Health delivery system outcomes.	Well designed studies that link IPE to patient, population, and system outcomes.	There continues to be a need for studies which link the association with IPE collaborative behavior including teamwork and performance in practice.	Complexity of the potential for exploring relationships among the variables. Variation exists between the education and the healthcare delivery system. Academic partner and the healthcare delivery system would need to work together in order to evaluate the long-term savings within healthcare. Recommendation is having a team of individuals with complementary expertise including an educational evaluator, a health service researcher, and an economist, in addition to an educator and others engaged in IPE.	There was a need for more purposeful well designed and thoughtfully reported studies. Interprofessional stakeholders, funders, and policy makers may need to increase focus to link the association with IPE collaborative behavior including teamwork and performance in practice. Studies need to include focus on how to measure interprofessional collaboration effectively across a range of learning environments, patient populations, and practice settings.	Level V
Kaiser Permanente (2018).	Effects of TeamSTEPPS training on healthcare facilities.	Cross sectional. Case control	82 RNs participated. 16 medical centers in Northern California (US)	TeamSTEPPS training was implemented.	Reduction in labor-inducing drugs by 15% with no increase in C-section rates from 2015 to 2017.	Measurements with outcomes based on NPSG are important aspects of quality care.	Variables such as staff changes, community care, and other education was not considered.	Level VI

			and skilled nursing facility across California trained in TeamSTEPPS. Measure outcomes based on NPSG.					
Kristen-Peters, V., Harvey, E., Wright, A., Bath, J., Freeman, D., & collier, B. (2017).	Trauma teamwork training measuring linkages to knowledge, self-confidence, clinical judgement, team performance, patient outcomes, and quality of care.	Case study with compreh ensive multileve l approach to assess outcome.	Non-profit, 737 bed, Level I trauma center with an additional 60-bed Neonatal Intensive Care unit in the southeastern United States. Criteria must be met which included. 18 months of emergency nursing experience. Successful completion of Trauma Nurse Core Course. Trauma Nurse Crash course. Performance evaluation score of meets all requirement. No disciplinary actions of any kind within the past 18 months.	Essentials of TeamSTEPPS Interactive trauma bay learning. Multidisciplinary didactic learning of equipment and drug use. Assessment included 4 levels of learning. A) Reaction to training. B) Learning C) Team behavior D) Patient Outcomes. Additionally, nurse knowledge, skills, and attitudes. Overall team performance and outcomes.	Impact scores were all positively rated by nurses participating. Knowledge scores increased from 68.29 to 88.48. Behavior in leadership increased from 2.87 to 3.46, p=.003. Situation monitoring 3.30 to 3.91, P=0.009. Mutual support of team members 3.40 to 3.96, p=0.004. Communication 2.90 to 3.46, P=0.001, Overall team performance rating 3.12 to 3.70, p>0.001. Trauma patient efficiency outcomes measured time to arrival in CT scanner from 26.4 to 22.1 minutes, P=0.005. Time to arrival in operating room from 130.1 to 94.5 minutes. Time to endotracheal intubation from 10.1 to 6.6 minutes, P=0.049.	Multiple analysis scoring technique of knowledge behavior, and attitudes. Efficiency with relevance to patient outcomes were included in this study.	Study in one hospital area with no comparative hospital with similar program.	Level IV

			Trauma Nurse Academy application completed and vetted by the academy planning committee Approval from ED director.					
McKee, N., D'Eon, M., & Trinder, K. (2013).	Analysis of Problem Based Learning use for inter-professional education in undergraduate health sciences students.	Retrospective Quasi-experimental qualitative design.	1000 students in health sciences education from University of Saskatchewan, Canada. Surveys collected over 4 years. *Tool*: Likert-style rating scale (0-6) survey of student self-assessment. Room for comments as well. Measures included; learning, usefulness, enjoyment, and facilitator effectiveness.	Palliative care education for undergraduate health science students. Inter-professional learning. End-of-life case. Student groups of 8-12. Represented by nutrition, social work, clinical psychology, medicine, pharmacy, nursing, and physical therapy. Level of students from year 2 in medicine and nursing, year 3 in pharmacy and nutrition, clinical psychology, and year 4 social work.	Medical students reported lower gains in knowledge than those in other programs. Usefulness scores 4.37 Facilitator effectiveness 5.19 Enjoyment 5.25	Instructors trained on same methodology. Pilot study completed. Pre and post testing completed. 85% response rate from students.	Measures do not include application of information in practice. Scheduling conflicts exist due to the members from a variety of professions in health science education.	Level III
Maryniak, K., Markantes, T., & Murphy, C. (2017).	Hospital implementation and evaluation of the implementation of a new employee	Case based longitudinal study	30 bed medical surgical inpatient unit. Tools: NETU, program for new RNs which included	5-week program where they manage at least 4 patients upon completion of the program.	Retention rate target of 79.9% was exceeded to total of 88.8%. HCAPS score target for RN communication for med-surg was 77.1%	Measures were appropriate for study design.	Requires consistency with a preceptor and concrete evidence-based tools for learning.	Level III

training unit (NETU) for new RNs.		designated preceptors, supplemental learning experiences, competency tools.		which increased to 77.3%. New graduate RN onboarding education with designated preceptors including supplementary learning experiences in a dedicated learning environment.		Smaller sample size reduces the generalizability of this study	
Mayo, A.T., & Woolley, A.W. (2016).	Literature review from organizational behavior literature. Looking at group structures and processes that facilitate the use of available expertise for more effective decision making, negotiation, execution of tasks, creativity, and overall team performance.	Focused literature review.	Reviewed literature from a series of studies. Specifically related to collective intelligence and expertise use in teams.	32 studies reviewed.	Collective intelligence factor: team performance on task was only moderately related to individual members' intelligence scores and was more predicative of future team performance. Social perceptiveness of team members was predictive of collective intelligence. Greater amounts of participation and more equal participation were associated with higher collective intelligence. *Expertise Use* Speaking up is benefited by knowing the teams boundaries. Having a clear understanding of membership. *Common knowledge* effect is when a team has a tendency to focus on knowledge that is already shared.	Poor teamwork and incomplete communication including failure to use available expertise are important to understand in order to reduce medical error.	Study was limited to that of organizations and did not include team performance in colleges or university education.	Level I

					Cognitive bias may be triggered by a groups composition and can lead people to withhold knowledge. *Psychological safety* which allows all members to speak up and is not role dependent. Demonstrating inclusive behaviors. Showing appreciation for other team members.			
Natafgi., et al. (2016).	Implementation of handoff as part of TeamSTEPPS initiatives for improving shift change communication.	Qualitative analysis using onsite interviews and process observations. Within-case and across-case analyses of the in-depth interviews.	8 Critical Access Hospitals.	Semi structured interview. Observations of the handoff process during shift change. Interview completed by RN with high experience level who was also a TeamSTEPPS coach. Comparative analysis of low and high performing CAH on 4 themes identified.	Using the four themes; I: *Local and institutional factors*: Leadership support and engagement; staff buy in, staff turnover. Higher performing hospitals had prominent leadership support and staff buy in. II. *Champion and team training*: Facilitators were that staff were supported and recognized as champions, given good work and performance recognition, freedom for staff to be open about problems. Difficulty was a lack of physician support and involvement. III. *Patient factors*. None discussed by lower performing CAHs, in higher performing CAHs had	Sample size. Sampling measures with themes representing factors which affect implementation.	Findings may not generalize to other handoff implementations venues with different organizational structures and characteristics such as trauma, or large research hospitals.	Level III

				included patients on buy in and only concern was to maintain patient confidentiality due to privacy issues of the rooms. IV: *Technical factors*: Lower performing hospitals had focus on implementation and technical processes, considerable facility problems. Higher performing CAH rely on research supported by evidence material by a local college or university and found the only barrier was in time and resources. Materials evolve over time based on staff needs. High added house wide emails. Those with low progress had leadership turnovers and were slow with the tool implementation.			

Noland, C., & Carmack, H. (2015).	Identify memorable measges about communicating about mistakes that nursing students receive during nursing school and how they make sense of	Qualitative	68 nursing students at a 5-year nursing program in a University located in Northeast (US).	*Tool:* Interview tool with 38 questions focusing on perceptions of the importance of communication, explanations for excellent and poor interactions between healthcare providers and patients, accounts of memorable medical mistake they made or participated in, and	Major memorable messages which guide the nursing student communication were.
					  A. Not everyone hears about errors.
					  B. Hierarchy matters.
					  C. Passive communication is the best way to
						Study limits focus to major ideas and meaning rather than on specific speech turns or phrases.
						
						Topic is relevant to nursing students.
							Focus is on nursing students. Others whom interact in this socialization process as students become nurses and may be important to learn from them as well.
							
							We do not know the supervisor reactions or interactions in the
								Level V

	these messages. What messages about communicatio n and medical errors do nursing students learn during their clinical rotations?			informal and formal communication training.	interrupt or report an error.		communication process. We do not know the long-term effect of the errors on student nurses.	
Onyon, C. (2012).	Review evidence of problem-based learning (PBL) curricula for producing better doctors.	Descripti on of educatio nal and psycholo gical theories which support PBL.	Medical student learning with clinical cases and cooperative learning.	Looking carefully at the theory underpinning for PBL and how its benefits students in their future careers as a doctor.	PBL builds upon using clinical cases to make basic sciences relevant and arm students for solving clinical problem by working from first principle and prior knowledge. Skills learned and practice such as team work and delegating, use of medical literature to solve clinical problem Student interaction is an integral part of PBL and is thought to assist learning through the benefits of cooperative learning as well as introducing conflict where a students' prior knowledge is challenged, and conceptual change may occur through the discussion of the problem. This develops	Problem based learning is reviewed theoretically from the backdrop of other educational theories.	No evidence suggested that PBL was more effective than traditional curricula. Downfall is the use of backward reasoning. In curricula and clinical sciences some things improve such as ECG diagnostics.	Level VI

					important teamworking skills.			
Plonien, C., & Williams, M. (2015)	Ensure that preoperative preparation is complete. Promote communication and teamwork throughout the procedure.	Literature Review.	Operating room staff. Tool: TeamSTEPPS skills. Practical application. Learning theory: Brain based learning.	Postoperative debriefings completed before the team left led by the RN circulator. Safety Attitude Questionnaire.	95% overall compliance. 70% individual surgeons achieving 100% compliance. Appropriate use of prophylactic antibiotics achieved at 100% compliance. Improvement of perceptions of management and working conditions. Decreased delays in start times from 32% to 19%. Equipment delay decreased from 24% to 6.8%. Issues requiring follow-up decreased from 44% to 0%. Hand-over issues decreased from 5.4% to 0.3%.	Nursing: Effects achieved in leadership skills acquired through the concepts and elements within the TeamSTEPPS implementation.	Specific to the TeamSTEPPS communication skill training tools with nothing to compare it to during the study.	Level V
Prins, F., de Kleijn, R., & van Tartwijk, J. (2016).	Development of a formative rubric for research theses as a solution for the troubles student encounter with task compliance,		200 Students of two cohorts of educational sciences enrolled in a bachelor's thesis project at a Dutch University.	Effective teacher feedback. Student awareness of what is expected of them. *Top-down approach* design using American Psychology Association				

	quality and criteria.			(APA) publication manual guidelines. User-oriented rubric. Three levels of scoring with listing level 3 as most complete. Holistic system where grades at level 1 would mean a grade of 4 or lower. Level 2 would be grades of 6 and 7.5. Level 3 would translate into an 8 or higher. This was based on Netherlands grading system on a 10 point scale. Feedback and assessment form is added to rubric.			
Pyc, L.S., Meltzer, D.P., & Liu, C. (2017).	Research questions including examination of negative outcomes, including; exhaustion, physical symptoms, job dissatisfaction, intention to quit, and poor job performance as a result of abusive supervision.	Hard copy anonymous survey method.	232 coordinator of care nurses. Average age of 43; working for 9 years; 87.1% female. Non-profit home healthcare agency in North Eastern (US). Tool: Survey with measures of abusive supervision;	Surveys were completed anonymously and scored anonymously.	Findings were that anxiety mediates the relationship between abusive supervision and employees' distal negative outcomes, specifically exhaustion, physical symptoms, job dissatisfaction, intention to quit, and poor job performance. Depression partially mediated the relationship effects. Results suggest that there may be a group of leadership styles that	Descriptive and had high internal reliability coefficients and intercorrelations.	Nurses in this study reported only twice a month to the office and were otherwise isolated from coworkers and supervision. The nature of their job requires strict guidelines adherence which may limit generalization of the results outside of healthcare. Future studies were needed to use a	Level IV

			authoritarian leadership style; anxiety; depression; exhaustion; physical symptoms; job satisfaction; intent to quit; job performance. (supervisor related).		are detrimental to employees' health and well-being. Common features included being controlling, having a lack of mutual respect, enforcing a top-down management. Effects of the authoritative type of leadership to manage subordinates is likely to increase anxiety and depression by subordinates which will int turn result in job strains and negative work outcomes.		longitudinal design or experimental design to examine causal relationships between ineffective leadership, employee outcomes, and the mediating effect of negative emotions on relationships.	
Rachwal, et al., (2018).	PERCS rounds teaching methodology and theoretical underpinnings were used as an educational approach.	Longitudinal study of Situated learning of case-based scenarios on hot topics.	Interprofessional clinicians, patients and family members of a critical care and cardiovascular hospital. *Tool:* Voluntary hour-long interdisciplinary forums called PERCS rounds.	Guided questions for preparation. Monthly Case presentations by floor unit champion and PERCS liaison to clinicians. Likert scale measurement of the usefulness of the programming obtained from participants.	100% of participants recommended PERCS rounds teaching. 92% of participants considered PERCS rounds "quite valuable or very valuable."	Insight is gained in particularly challenging situations from different shared perspectives during the session. Outside information from other aspects relevant such as professional guidelines, articles, research, expert content are added to the PERCS rounds to explore the topic deeper.	Voluntary participation could bias the results. Low physician attendance at 2%. Effects of clinician behavior or implementation of communication or other skills discussed were not confirmed. Facilitators of PERCS rounds much be well trained in communication, debriefing, and group dynamics.	VI
Rossler, K., Buelow, J., Thompson, A., &	Sharing of components and outcomes of an	Pre-test/post-test	118 students of health professions program.	Student learning outcomes evaluated in a pre-test and post-test format using a	Scores measuring ability, value, and comfort working in teams improved	Evaluation of outcomes measured by a standardized instrument with	Respiratory therapy students' perceptions did not	Level III

Knofczynski, G. (2017).	interprofessional team learning experience consisting of students from multiple health professions and programs, such as off-campus, clinicals, online programs, and traditional campus programs.	single group.	1 college of health professions.
			
			Undergraduate and graduate health professions students.
			
			96 students completed the pre-program and post-program team experience surveys.
			
			7-week experience
			
			Tool: Faculty provided a 7-week program with weekly online components and 1 (½ day) simulation workshop. Team of 6 to 8 students and a facilitator from the IPE.
				standardized instrument which focused on the following outcomes:
				  A. Gain knowledge and ability to work with multiple health care professions.
				  B. Be aware of significant outcomes from interdisciplinary health care teams.
				  C. Identify effective team practices.
				  D. Perform as an effective team member.
					significantly from pre-program to post-program among both undergraduate and graduate students. ($p < .001$).	focus on interprofessional practice.	significantly change.
							
							Inclusion of face-to-face half day workshop provided the hands-on experience with teamwork, decision making, and interprofessional communication presented scheduling challenges.
							
							Small numbers in the subgroups of individual health disciplines 10-25 students were not robust enough to produce generalizable results. Suggestions included adding a comparative control group of students, longitudinal survey of program graduates to determine the retention of gains in interprofessional knowledge and teamwork.	

Shekelle, P., Sarkar, U., Shojania, K., Wachter, R., McDonald, K., Motala, A., Smith, P., Zipperer, L.,	Discovery of what evidence-based hospital safety practices may be applicable to ambulatory care settings.	Systematic Review/ Metanalysis.	Task Order Officer listed 55 topics. Input from Key Informants using an online questionnaire;	8 Key Informants. Literature scan of 28 safety topics/strategies. After filtering 1764 documents were selected	Hospital safety practices applicable to the ambulatory setting. Medication safety, safety culture, transitions among providers in ambulatory settings, and timely and	Panel of experts in addition to the extensive literature scan added to the dimension of this study.	Differences exist between inpatient and ambulatory safety. Lack of studies on patient engagement	Level I

& Shanman, R. (2016).	What ambulatory care patient safety practices have been studied in the literature. Which ones have been broadly implemented or studied beyond a single ambulatory care center? What tools, settings and other factors may influence the implementation and spread of ambulatory care patient safety practices.		then scheduled teleconferences. Guiding questions, protocol, list of included/excluded safety practices. Discussions were audio recorded and transcribed after verbal consent. Themes were identified from this information. Literature scan years 2000 to 2015. In addition, grey literature from AHRQ Patient Safety Network, AHRQ Innovations Exchange, Institute of Medicine, the Joint Commission website, the Institute for Safe Medication Practices, Patient Safety Quality Healthcare, and the		accurate diagnosis were issues discovered. Implemented ambulatory patient care safety practices studied. Medication errors and adverse drug events including e-prescribing and pharmacist-led interventions. (Medication reconciliation, review of high-risk medications). Current IT solutions in healthcare do not adequately support medication safely. Reporting and tracking of safety issues continue to be lacking and feedback results are missing in these systems. Fear of speaking up persists. Safety culture surveys and team training was not discussed. Few data was available regarding patient characteristics to support and inform ambulatory safety interventions. Safety between ambulatory providers and emergency department, between healthcare and social services, and managing pediatric to adult		and timely and accurate diagnosis. Recommendation for large-scale studies in diverse ambulatory settings to develop and test ambulatory safety interventions. Recommendation of using an injury prevention perspective rather than an error-based framework.	

			Pennsylvania Patient Safety Authority Site (PA-PSRS).		transitions for the chonically ill is identified as unsafe transition. More research needs on diagnosis, epidemiologic approaches to capture incidence of diagnostic errors in the population, in depth behavioral and cognitive studies to improve the diagnostic process.		
Shin, I., & Kim, J. (2013).	Synthesis of the effects of problem-based learning in relation to nursing education.	Literatur e search 1972-2012	22 studies Tool: Criteria included having quantitative outcomes on student learning, student reasoning processes with data to calculate an effect size.	Meta-analysis using a common metric of effect size in three different data formats.	Medium to large effect size for problem-based learning in nursing education. Many benefits to nursing education research compared to traditional measures. Large effect size reaction shows students have a positive attitude for students and was more effective in improving student attitude towards their learning. Improved student satisfaction with the problem-based learning method. Learning effect size in all domains affective, cognitive, and psychomotor moderately large. Largest in psychomotor	Subgroup analysis measurement obtained using (Kirkpatrick and Kirkpatrick, 2007). Evaluation of learning, transfer and results. Evaluation of cognitive, affective, and psychomotor results. Evaluation of student reaction and satisfaction. Independent coding by two researchers.	Studies that were not in English were not included. Abstracts from conference proceedings, or qualitative research was not included. Unpublished studies including thesis, dissertations were not included. Need existed for more evidence regarding the effect of problem-based learning methods in application of knowledge and skills in novel situations. Need exists for longitudinal studies to ascertain effects	Level I

					followed by affective, and cognitive. Clinical education had larger effect sizes and better outcomes than adult health, maternal health and other nursing courses. Clinical approach effect was larger than that of the theoretical approach.		of problem-based learning endure past training.	
Sweigart, et al., (2016).	Examine changes in teamwork attitudes within interprofessional communication.	Pretest and posttest design.	109 health professional students from two institutions and multiple disciplines. *Tool:* TeamSTEPPS Teamwork Attitudes Questionnaire (T-TAQ).	Descript Unity 3D game development platform used for a virtual learning environment using three TeamSTEPPS based case studies. Scripted non-player characters included healthcare staff. Students participate in 5-minute scenarios using an avatar. Use of TeamSTEPPS strategies including (Check-back, call out, two challenge rule, CUS, handoff, conflict resolution).	4/5 categories show positive changes. Teamwork, attitudes, leadership, situation monitoring, mutual support and communication. Team structure did not reach a statistically significant level.	TeamSTEPPS virtual teams are a methodology suitable for impacting teamwork attitude in learners across professions including nursing.	Limited number of disciplines were represented. Students desired more control over the rate of scenario progression and more animation of facial expressions on the avatars. Students desired more representation of other professions included in each scenario.	Level III
Thompson, et al., 2016).	Evaluate the interprofessional (IPE) experience at an interactive and longitudinal	Quasi-experimental, non-randomized before,	Eighty students representing healthcare professions from the University of Oklahoma	4-8 students from each of the professions including medical students in 3rd year; PA students in 2nd year; dental students in 4th year; 2nd year dental	At all three-time points student identified more healthcare providers as well as more relationships and communication	Multiple measurements of effects in a large variety of healthcare professions students.	Further testing within larger groups of interprofessional students would help the instrument testing.	Level III

		during, after time series design. Longitudinal intervention.	Health Sciences Center. *Tool*: Teamwork Attitudes Questionnaire (T-TAQ). Adaptation of the life circle diagramming technique by (thrower, Bruce, & Walton, 1982).	hygiene; nursing in 4th year undergrad; 1st and 2nd year clinical nurse specialist; pharmacy 4th year; PT and OT in third year; Nutrition in 2nd year; Social work in 1st and 2nd year, and public health in 2nd year. Random assignment to an interprofessional team of 10 students. 2 semesters of service-learning opportunities. • 4-hr classroom • 4-hr clinical patient care • Small group, case-based, and team building activities. 29 complex patients.	between and among providers. Enhanced professional identity formation. Recognition of role on the team of providers during the learning experience.		Psychometric testing could be more rigorous. Longitudinal study could include students' future practice Other consideration such as patient outcomes, and cost of the educational approaches were not included.	
Tibbs, S., & Moss, J. (2014).	Quality improvement project.	Descriptive pre and post intervention comparison.	Convenience sample of 18 members of the gynecology surgical specialty team (GSST). GYN surgeons, CRNAs, RN circulators, Scrub personnel	Team protocol and algorithm initiated.	Decreased turnover time between procedures. Staff members had better perception of teamwork after the process improvement. More team members present during procedures after the improvement process.	Process improvement for a healthcare process which involved healthcare interdisciplinary members. Use of appropriate dependent variables including time measurements, number of team member present,	Study was singular to one department within a hospital area.	Level III

					Compliance with the final time out decreased after the intervention. Improved documentation of the compliance on final time out.	and expected outcomes.	
Umoren, et al., (2017).	Providing learners with virtual simulation in health care teams based on 8 screen based interactive scenarios.	Observational study at 2 Midwestern (US) Universities.	144 Undergraduate pre-licensure baccalaureate nursing and 1st or 2nd year medical students. *Tool:* Unity 3D application or web-based experiences. Virtual simulation in asynchronous type method. Multiple choice type questions to facilitate scenario branching and provide formative feedback.	Learner recognition of communication tools in the scenarios related to TeamSTEPPS tools including (Call-Out, SBAR, Handoff, Brief, and Check-back).	SBAR communication tools was recognized. Learner performance on the questions to elicit knowledge of the component of SBAR was missing across student groups. As strategies progressed during the scenarios most learners recognized correctly the 2-challenge rule rather than the Call out.	Exploration of a teaching methodology for training on communication skills and performance interdisciplinary.	No control group comparing the knowledge and choices of learners using the virtual teamwork simulation with other modalities of teamwork training. Outcomes of teamwork training in learners limited by contribution of learners to clinical decision making.	Level III
Wilson (2015).	Recognize the barriers to institute action plans for National Patient Safety Goals (NPSG). Facilitate strategy to	Intervention with before and after survey.	ICU staff at Overton Brooks Veterans Administration on Medical Center in Shreveport, LA.	Hospital-wide NPSG Fair in the Autumn themed with patient safety. Survey completion on responses.	54% increase in staff awareness post intervention.	Demonstration of change agent process for nursing. Facility involvement in improving patient safety within the	Costs to create this were not included. Leadership needs to be on board with this type of intervention.	Level V

			Levels of each element of performance for NPSG. • Hospital policies • Display boards for each goal. •		guidelines for NPSG.	Longitudinal measurements not considered	
combat this issue.		*Tool*: TeamSTEPPS training.					
(West, et al., 2016)	Improve healthcare for people. Reduce healthcare costs and examine the interprofessional education curriculum.	Mixed methods study using observational and cross sectional by convenience sample	Principle investigators from the 16 medical schools across the United States.	Data was collected using a survey that would help identify the specific designs, barriers, and theoretical frameworks of each school. Data was collected by a workgroup who designed, pilot-tested, and refined the survey. There was literature review completed to inform contact, expert critical review, and then sent electronically through Qualtrics survey software in Bryan, Texas and to the PIs of the 16 schools. There was 100% response rate.	The survey identified challenges in scheduling, logistics, financial support. Suggestions of the use of TeamSTEPPS or a Readiness for Interprofessional Learning Scale (RIPLS) to evaluate. There was a variability in the themes of programs for IPE including 1-hour sessions, peer observation, debriefings, in simulation groups to day long scenarios, task forces and IPE centers. Researchers also found shared didactic instruction did not create interactive learning and kept the disciplines siloed.	One strength was that each medical school was examined using descriptive statistics regarding similarities and differences in IPE activities. Another strength was the amount of research and literature review that went into design of the instrument that made up the survey.	List of study limitations – not just what authors address but what you think too Limitations was the use of a convenience sample. Qualitative analysis is limited due to the survey of individual institutions. Self-reported information can be biased due to recall or social influence.	Level I

Wise, H., Mauldin, M., Ragucci, K., Fowler, T., Su, Z., Zhang, J., Mauldin, J., Scheurer, D., & Borckardt, J. (2015).	Measurement of healthcare students at six colleges at Medical University, South Carolina, (US) have skills necessary for collaborative practice.	Repeated measures pre-post analysis.	21 interprofessional healthcare students in an elective course based on TeamSTEPPS®	Pre and post TeamSTEPPS® training students rated team behaviors observed from videotape of team performance and team performance in the clinical setting. Tool: Team Performance Observation Tool. TeamSTEPPS® training.	Communication and leadership were observed but not team structure, situation monitoring, or mutual support in the initial post-intervention observation. 100% of the students agreed or strongly agreed that their teamwork skills improved and interactions from other professions contributed to their learning.	Measurements were obtained pre and post TeamSTEPPS® training with measures of students learning and feelings about their learning. Appropriate to healthcare team training.	Small sample size was obtained. Need longitudinal study to assess for retention, use, and students perception of ongoing alignment in a variety of healthcare settings.	Level II
Wittenberg, E. et al., (2016).	Pallative care team communication training method investigated.	Voluntary sample. Exploratory sample.	28 nurses 16 social workers. 8 physicians 5 chaplains 1 psychologist.	Survey pre-course that assessed the participant perception of institution-wide communication performance across the continuum of care and resources supporting optimum communication. Post-course evaluations, goal progress, and monitoring.	Weakest areas identified were bereavement and survivorship care in the institution. Team training improved communication processes and increased attention to communication with family caregivers. Curriculum COMFORT was effective training	Multiple healthcare disciplines represented. Studied communication and team training.	Lack of institutional support, absence of leadership or weak funding could affect implementation.	Level II.

				for palliative care communication for interprofessional teams.			