Spring 5-18-2023

# Responding to a Deteriorating Patient: An Educational Intervention for Outpatient Clinic Nurses

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**Responding to a Deteriorating Patient:**

**An Educational Intervention for Outpatient Clinic Nurses**

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**ACKNOWLEDGMENTS**

I acknowledge and sincerely express my gratitude to God, who sustained me through this rigorous program through His infinite love and mercy. To my husband, Goddy, and my sons, Jesse, Chima and Casey, for their love, unwavering support, encouragement, prayers, patience, and sacrifices throughout this journey. I sincerely thank Dr. Nick Webb, my Chair and mentor, for his belief in me and his encouragement. I thank my committee member, Dr. Elena Capella, for her support and guidance. Thanks to my editor, Susan, for her guidance and commitment to ensuring my paper was written to a doctoral standard. I thank my former manager, Mr. Stephens, and the nurses at the project site for their critical role in executing this project. Finally, to my DNP Cohort XII, for their friendship and positive energy exhibited throughout this journey.

**Abstract**

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**Background**: Dynamic and evolving healthcare practices require nurses to continually acquire knowledge and confidence to provide optimal care. Organizations that recognize nurses' educational needs and develop strategies to meet them empower nurses to improve the quality and safety of patient care.

**Local Problem:** The need for a continuing education program to improve outpatient clinic nurses' knowledge, skills, and self-confidence prompted the implementation of this project.

**Method:** Single cohort education intervention as a test of change to assess the knowledge and confidence participants acquired in a pre- and post-survey using Berning's 2018 questionnaire on nurses' knowledge and recognition of early signs of clinical deterioration.

**Intervention:** Two discrete educational intervention sessions, including (1) one-hour didactic session that reviewed vital signs and signs and symptoms of hypoglycemia, stroke, and cardiac arrest and (2) two hours of mock code using case scenarios of a patient with changes in vital signs of hypoglycemia, stroke, and cardiac arrest.

**Result:** Twenty-one participants responded to the pre-implementation questionnaire, and sixteen responded to the post-implementation questionnaire. A non-statistically significant five percent increase in knowledge and confidence scores suggests improvement.

**Conclusion:** An effective educational process with the support of stakeholders is an ongoing opportunity to build on nurses' knowledge and confidence in the outpatient care setting.

*Keywords:* educational intervention, low fidelity simulation, nurse's knowledge, nurse's self-confidence

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**Background**

Patients depend on their clinicians' knowledge, skills, and attitudes to ensure safe and effective care. In 1999, the Institute of Medicine (IOM) published *To Err Is Human, which* called attention to medical errors and their consequences, and provided the impetus to move patient safety to the forefront of health care (IOM, 1999). *A subsequent IOM report, Crossing the Global Quality Chasm,* made an urgent call to close the quality gap in patient care to improve safety and outcomes (IOM, 2001). The Institute of Medicine (renamed the National Academy of Medicine in 2015) established six aims for patient care: that it be safe, effective, patient-centered, timely, efficient, and equitable (IOM, 2001; Kohn et al., 2000). Both *To Err is Human* and *Crossing the Global Quality Chasm* focused on the clinical aspects of safe patient care. In the following decades, patient safety came to be viewed broadly as a holistic practice influenced by environment, culture, processes, behaviors, and technologies (Bohrer et al., 2021).

Quality and Safety Education for Nurses (QSEN) is an evidence-based approach to reducing preventable harm that incorporates the core quality and safety competencies for health professionals set forth by IOM and published in *Health Professions Education: A Bridge to Quality* (IOM, 2003). The QSEN framework defines six competencies that nurses must acquire to be able to lead and transform practice to improve patient care quality and safety: (a) patient-centered care; (b) teamwork and collaboration; (c) evidence-based practice; (d) quality improvement; (e) safety; and (f) informatics (Cronenwett et al., 2007). Each competency contains specific targets for knowledge, skills, and attitudes to be developed in pre-licensure programs to prepare student nurses for the transition to practice. While these six competencies

are embedded in the standards for nursing schools in the United States, several studies have demonstrated uneven application of patient safety and quality content in nursing education globally, accompanied by a lack of regulatory guidelines for curriculum integration and demonstration of competencies (Kirwan et al., 2019). Thus, formal nursing education may not prepare nurses to demonstrate the competencies, knowledge, and confidence required in their professional capacities. This DNP quality improvement project addressed a knowledge and self-confidence gap through an educational intervention for nurses on assessing patient deterioration and activating appropriate intervention in outpatient clinics. The intervention is a component of an organizational system process to empower nurses to improve patient care quality and safety.

**Problem Description**

Nurses are the backbone of care delivery in outpatient settings (Campbell et al., 2021). Delivering high-quality care depends on good working relationships, effective teamwork, and the clinical competencies of all team members relative to their professional roles and responsibilities. Dynamic and evolving healthcare practices require nurses to acquire knowledge to provide care continuity; and gaps in nursing knowledge have been shown to negatively impact the quality of care (Mlambo et al, 2021).

Different role classifications in the nursing team require different levels and types of knowledge to ensure the delivery of safe and effective care. In ambulatory settings, gaps in nurses' knowledge and confidence may not be apparent when nurses are engaged in repetitious practices such as rooming-in and discharging patients. However, an unrecognized lack of either knowledge or self-confidence can hinder early recognition of deterioration in a patient's condition and activation of an intervention critical for positive patient outcomes (Elder, 2017; Norris et al., 2019; Pereira-Salgado et al., 2019). Massey et al. (2017) identified patient

assessment, patient knowledge, nurse education, and equipment as additional factors that impede nurses' recognition of patient deterioration. Even when the need for ongoing education is recognized, barriers such as limited resources, time constraints, lack of funding, and lack of support from managers may prevent organizations from providing ongoing education (Hakvoort et al., 2022; Mlambo et al., 2021).

Deficiencies in knowledge and confidence of nurses who work in the outpatient clinic of a county-operated healthcare system where this DNP project was implemented negatively impact workflow, safe care processes, and patient care quality. No continuing nursing education was in place to help nurses recognize the early deterioration of a patient's condition and intervene appropriately. A medical emergency at the project site clinic highlighted the need for all nurses to have adequate knowledge and self-confidence to recognize a change in a patient's condition and be able to activate an appropriate response or support the team as needed. A patient presenting to the clinic with complaints of tiredness, shortness of breath, diaphoresis, and palpitations began to deteriorate. As the event occurred during lunchtime, fewer staff were present in the clinic. The nurse assessed the situation, called for the Medical Alert Response (MAR) team, and delegated responsibilities to other available nurses. Some nurses were unsure how to respond to the emergency, even though their roles included that responsibility. Fortunately, the 911 emergency response team was able to resuscitate the patient. The patient was transferred to a high level of care with a positive outcome. This situation, and the fact that the clinic nurses call and respond to an average of three medical alerts every month, highlighted the need for an educational intervention to imbue all nurses with the knowledge and self-confidence needed to provide high-quality and safe care to patients who present to outpatient clinics and whose conditions may deteriorate rapidly.

The nurses at the project site have had various experiences and levels of training to recognize and respond to rapid changes in a patient's condition. Some of the nurses started their careers in medical/surgical and critical care units, as such, have more knowledge in assessing, recognizing, and activating appropriate responses when a patient's condition deteriorates. Other nurses came from long-term care facilities and had less knowledge and confidence to recognize and activate an appropriate intervention when a patient's condition acutely deteriorates. The DNP project addressed the challenges that nurses in ambulatory care face by bridging gaps in knowledge and self-confidence. With the help of the organization's staff developer, a two-day educational intervention using didactic and case scenario/simulation training and learning modalities was developed and implemented. The healthcare organization's director of ambulatory services was aware of the need and supported the project.

### *Setting*

The mission of the county healthcare organization where this DNP project was implemented is to provide quality, compassionate healthcare accessible to all individuals who seek it. The organization seeks to answer the call from the Institute of Medicine to give healthcare professionals the knowledge and tools they need to deliver high-quality, safe, timely, effective, efficient, equitable, and patient-centered care (IOM, 2011). The project setting is an outpatient clinic offering primary care and specialty services as part of a county-run medical center with a public tertiary, teaching, and research hospital, three community hospitals, and fifteen ambulatory and urgent care clinics. The clinic is in a rural community of the county, and sees about 200 patients per day, the majority of whom are Medicare or Medicaid recipients. Twenty-one nurses from the six outpatient departments of family medicine, internal medicine, pediatrics, obstetrics/gynecology, behavioral health, and ophthalmology were expected to

participate in the intervention. Nurses at the project site are cross trained to float to all these departments.

As a Federally Qualified Health Center in a rural community, the healthcare providers are expected to provide comprehensive, high-quality care and preventive services to a patient despite a patient's inability to pay (CMS, 2021). Although the clinic serves infants through geriatric patients, the educational intervention focused on the nurses for the adults and geriatric population, as their assessment and needs are distinct from those of pediatric patients.

The leaders at the project site support the staff development project as it adds value to the quality of patient care, improves the organization's reputation, and minimizes potential financial and legal consequences attributable to negligence. With the intertwining social, economic, environmental, and business perspectives of the project, it was imperative to identify and engage stakeholders from serval disciplines. Stakeholders buy-in was critical for conceptualizing the project, moving it forward, and sustaining it post-implementation. Early identification of the stakeholders and establishment of clear lines of communication throughout the project cycle contributed to the project's success.

**Specific Aim**

The project's purpose was to improve the knowledge and self-confidence of nurses in the outpatient clinic to recognize early deterioration, intervene, and evaluate changes in patient conditions. The aim was to achieve a 10% improvement from baseline to post-intervention using Berning's 2018 questionnaire on nurses' knowledge and recognition of early signs of clinical deterioration.

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**Available Knowledge**

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**PICO(T) Question**

For nurses in an outpatient clinic (P), how will an educational intervention that includes didactic and low fidelity simulation education (I) compared to current state of education (C) enhance nurses' knowledge and self-confidence in their ability to recognize early deterioration in a patient's condition and activate appropriate interventions (O) immediately post-intervention (T)?

**Search Methodology**

A literature search for peer-reviewed articles relevant to the PICOT question was performed on the Cumulative Index to Nursing and Allied Health (CINAHL) Complete, PubMed, and Google Scholar.  Searches on CINAHL and PubMed were filtered for publication dates between 2014 and 2022. Keywords used in the searches were educational intervention, nurse's knowledge, nurse's self-confidence, low fidelity simulation. The yield was 107 articles. Adding the search terms pre-hospital and outpatient reduced the yield to 37. Studies involving children and studies without full texts were excluded, leaving six studies that met the inclusion criteria.

A supplemental search was performed on PubMed using the title keywords "nursing, "simulation intervention," or "education intervention" and "emergency," "rapid," "acute," "deterioration," or "decline" which yielded 33 results. Studies in this search were not excluded based on inpatient or outpatient setting. Results not related to adults, acute diagnoses not representing ongoing deterioration, and graduated nurses were excluded, leaving four additional sources.

Each study was appraised for the level and quality of evidence using the Johns Hopkins Nursing Evidence-Based Practice tools (Melnyk & Fineout-Overholt, 2019). Three studies were

appraised at Level II quality A, three at II quality B, two at Level III quality B, one at Level III quality A/B, and two at Level V quality A. See Appendix A for the Evidence Evaluation Table.

**Integrated Review of the Literature**

The literature search yielded evidence supporting the relationship between nurses' knowledge and self-confidence in recognizing patient deterioration, activating appropriate intervention, and improving patient outcomes. Two themes emerged: nursing education and low-fidelity simulation (case scenario). Hence, the educational intervention focused on nursing education and low-fidelity simulation.

The complexity of caring for patients with multiple chronic health conditions requires nurses to be versed in technology and evidence-based practices and have adequate knowledge, confidence, and competence to provide patients safe, quality care in outpatient clinics. Additionally, evidence in the literature suggested that nurses' knowledge, self-confidence, early recognition of patient deterioration, and communication with a provider about the change are integral to quality care and reflected in patient outcomes.

*Nursing Education*

Mlambo et al. (2021) performed a meta-synthesis of qualitative studies on nurses' experiences with continuing professional development. The study suggested that nurses' continuing education enhances their knowledge, improves their skills, and keeps them up to date with recent evidence from the literature. The study identified a positive association between continuing education and better patient care. Five factors that influence nurses' continuing education were identified: (a) organizational culture; (b) a supportive environment; (c) attitudes and motivation that reflect nurses' professional values; (d) professional barriers; and (e) perceived impact on practice as a core value. Therefore, to enhance nurses' knowledge and self-

confidence and promote lifelong learning, nurse leaders and their organizations should create a supportive environment for nurses that includes sustainable educational programs.

Parker (2014) conducted a descriptive, cross-sectional, correlational study to ascertain if a correlation existed between nurses' decision-making and the frequency of rapid response team (RRT) calls. The study suggested that analytical decision-making correlated with an increase in the frequency of RRT activation. The study also highlighted the role of nurses in the surveillance and recognition of deterioration in a patient's conditions as initial steps for nurses to promote safe care. In the study, timely recognition of patient deterioration prompted the nurses to activate an appropriate intervention, such as early communication with the provider or calling RRT, Medical Alert Response (MAR), or Code Blue, or 911.

### *Low Fidelity Simulation*

Studies have shown that incorporating simulation in training has become an effective strategy to teach nurses to recognize patient condition changes. A quality improvement study by Elder (2017) used simulation in an educational intervention to build nurses' knowledge and confidence in recognizing changes in patient conditions. The study included 40 nurses in a medical-surgical unit of an acute hospital. The study findings demonstrated that nurses gained significant knowledge and confidence after completion of the training (Elder, 2017).

A quality improvement study by Lee et al. (2019) found that nurses felt more confident in their knowledge, skills, and ability to recognize and activate intervention after attending a simulation educational intervention. Using simulation in educational intervention and incorporating specialty-specific scenarios allows nurses to improve teamwork, communication, and critical thinking in an environment familiar to them (Lee et al., 2019). Scaramuzzo et al. (2014) reported that after completing a simulation educational intervention in an outpatient

Oncology department, the nurses recognized and intervened effectively in multiple hypersensitivity reactions within one hour after medication administration.

Joho et al. (2021) conducted a quantitative quasi-experimental study using low-fidelity simulation-based training for nursing skills in active labor situations in a hospital setting. The study examined the impact of training on 172 randomly selected nurses, measured at baseline, immediately post- intervention, and six months post-intervention. The study indicated improved nurses' knowledge and skills, resulting in positive patient outcome changes.

Norris et al. (2019), in an experimental quantitative study consisting of didactic sessions, case studies, and simulations on patient rescues with the aim of improving nurses' self-confidence and competence. The findings demonstrated that nurses who participated in the educational intervention improved their knowledge and self-confidence in recognizing and activating appropriate responses. They also demonstrated competency and self-confidence in managing patient deterioration. Nurses are positioned to be the first to recognize a change in a patient's condition. Therefore, using didactic and case study simulation training has been shown to increase nurses' knowledge and confidence in recognizing and intervening during a change in patient condition (Norris et al., 2019).

Roh et al. (2013) used the experimental design study to examine self-efficacy and satisfaction among 38 clinical nurses after two simulation-based resuscitation training modalities. The authors did not observe a difference between computer-based and mannequin-based simulations. However, they noted that nurses positively embraced simulation-based resuscitation training. This study suggests that the benefits of simulation-based training extend beyond knowledge and confidence to other self-rated domains, such as nurses in outpatient clinics.

Sok et al. (2020) used a quasi-experimental pretest-posttest control group design to study the effect of a simulation-based CPR on CPR knowledge and performance among 60 clinical nurses in a Korean hospital. The four-hour simulation-based CPR training program was conducted with half the participants in the study between two assessments of knowledge and performance using scales from Korean Association of Cardiopulmonary Resuscitation with a significant increase in knowledge observed after the program. The study also assessed CPR-related stress in participants and found that it had decreased after the training program. The study findings indicated that simulation-based training effectively improves nurses' knowledge and decreases their stress level (Sok et al., 2020).

Sterner et al. (2022), in their quantitative method of pretest and post-test study design, found that a simulation-based education increased nurses' perceptions of their ability to care in acute situations. In their study, 102 newly graduated nurses participated in a simulation-based educational component of an introductory program. When scores on the Perception to Care in Acute Situations scale were compared before and after the intervention were compared, a statistically significant increase was seen after the educational program.

Takashiki et al. (2023), in their single-site, single-cohort educational intervention study design, demonstrated improved performance and self-efficacy of novice nurses in caring for acute chest pain after participating in an educational intervention using hands-on simulation training. The study examined the effect of a multi-stage hybrid mastery learning educational intervention in 37 clinical nurses in their second year of practice. Clinical performance and self-efficacy were assessed immediately after post-intervention and five months later with improved scores in clinical performance and self-efficacy in both post-intervention assessments compared to pre-intervention.

**Summary/Synthesis of the Evidence**

Evidence in the literature supports the underpinning aim of the project - nurses' knowledge and self-confidence. The studies reviewed provided evidence-based support for an educational intervention using simulation for nurses to enhance their knowledge and self-confidence in detecting patient's deterioration, interpreting the changes, and promptly applying appropriate intervention. Even though most of the studies were based on inpatient settings, the concept is generalizable and can be translated to the outpatient settings.

Mlambo et al. (2021) noted that an environment that supports learning is a prerequisite for continuing professional development. Providing nurses, the opportunity to study while working, employer-sponsored funding for nurses' professional development, and availability of workplace learning opportunities are essential in keeping nurses up to date with knowledge, confidence, and evidence-based practice information that could improve patients' outcomes and reduce cost. The complexity of caring for patients with multiple chronic health conditions requires nurses to be well-versed in technology, evidence-based practices, knowledge, confidence, and competence to provide safe and effective care to high-needs patients in outpatient clinics.

Early recognition of patient deterioration in addition to nurses' knowledge and early activation of intervention is critical to minimize failure to resuscitate (Parker, 2014; Smith, et al. 2014). The ability to surveil a patient's condition and respond appropriately to change is a competency for nurses that involves sufficient knowledge and self-confidence to detect change, accurately interpret data, and effectively communicate information to the care team (Parker, 2014). Timely recognition of patient deterioration prompts the nurse to activate proper intervention such as early communication with the provider or calling MAR, Code Blue, or 911.

Parker (2014) suggested that an increase in activation of RRT/MAR is associated with a decrease in the hospital mortality rate, because monitoring and early detection of patient deterioration diminishes negative patient outcomes, such as failure to rescue.

Jenkins et al. (2015) and Parker (2014) emphasized the importance of nurses' knowledge and critical thinking in decision-making and intervening appropriately to achieve positive patient outcomes. Mlambo et al. (2021) suggested that continual education for nurses enhances their knowledge, improves their skills, and keeps them current with evidence in the literature.

Nurses' knowledge, intuition, and clinical judgment, combined with objective quantitative data, are essential to correctly interpret information and convey it to the provider or care team (Ludikhuize et al., 2014). Providing a safe learning environment to develop and practice skills gives nurses the opportunity to learn while avoiding patient harm (Norris et al. 2019). Even though recognizing and managing a deteriorating patient is complex and multifaceted, educating nurses through deliberate practice using low fidelity simulation/case scenarios to recognize and activate intervention can enhance knowledge and self-confidence to recognize deterioration and activate applicable interventions, promoting positive patient outcomes (Elder, 2017; Joho et al., 2021; Norris et al., 2019; Scaramuzzo et al., 2014). Additionally, (Roh et al., 2013; Sok et al., 2020; Sterner et al., 2022; Takashiki, et al., 2023) noted that simulation-based training improved nurses' knowledge, confidence, performance, and self-efficacy in clinical intervention. The evidence reviewed supports the test of change as stated in the PICOT question for the DNP project and recommends ongoing education to continuously build on acquired knowledge, self-confidence, and competence.

**Rationale**

Tanner's Clinical Judgment Model of noticing, interpreting, responding, and reflecting is a theoretical framework that aligns with the nursing process of assessment, diagnosis, planning, implementation, and evaluation (Tanner, 2006). The model was developed from over 200 research studies Tanner examined to investigate the reasoning process for nurses' clinical judgments (Tanner, 2006). Tanner's Clinical Judgment Model is one of the widely used models for educational scenarios involving nurse decision-making and has been used to guide quality improvement projects in preventing deterioration in a patient's condition and failure to rescue (Hanley et al., 2016). The noticing, interpreting, and responding concepts of Tanner's model have been used in clinical practice to improve patient safety by teaching the nurses how to operationalize the model in clinical practice (Hanley et al., 2016).

Tanner's Clinical Judgment Model guided the design and implementation of the educational intervention. See Appendix B for Tanner's Clinical Judgment Model. Specifically, the model was used to (a) recognize, interpret, and address gaps in nurses' knowledge and practice, and their resource needs; (b) develop training guidelines; (c) design the intervention; (e) create a work breakdown structure for project implementation; and (f) reflect on the outcome of the intervention and its effectiveness.

Nursing care is a process of assessing a patient's situation, providing a nursing diagnosis, planning an intervention, implementing plan, and evaluating an intervention. The ability of nurses to recognize a change in a patient's condition, interpret clinical and objective data, and activate a proper response is critical to determining patient outcomes (Massey et al., 2016). The Tanner model employs concepts and terminology nurses are familiar with, which helped project participants conceptualize the model and apply it directly to the training scenarios. During training, nurses recognized changes in a patient's condition, interpreted the change,

responded by activating the MAR team or notifying a provider, and reflected on the intervention's outcome. Following the Tanner model, the first step in clinical judgment was "noticing." This was followed by "interpreting," which required participants to analyze, summarize and reason based on the clinical presentations provided. The participants then "responded by activating the MAR team, notifying a provider, or calling 911. The final element was a post-case "reflection" of clinical judgments employed in the scenario and opportunities presented for different decisions.

## Methods

### Context

The project site clinic is a primary care clinic in a rural community in northern California. The Federally Qualified Health Center is a clinic serving Medicaid, Medicare, and uninsured patients. The patient population ranges from zero age and above. The clinic has twenty-six nurses, eight registration clerks, and three members of an administrative team including one Health Center Manager. It is staffed with fourteen nurses per day with an average daily census of 140 patients. The clinic nurses float to all the departments, which consist of family medicine, internal medicine, pediatrics, obstetrics/gynecology, behavioral health, and ophthalmology. Patients present with multiple complex chronic health conditions that require the nurses to be knowledgeable and have good assessment skills to recognize changes in a patient's condition during a clinic visit. However, clinic management is routinely beset by nurse shortages due to high nurse turnover and scheduled and unscheduled absences especially, since the COVID-19 pandemic. The nurses' turnover rate has risen to 13%. These shortages have made it necessary to hire nurses with less-than-optimal knowledge and experience, contributing to a gap in knowledge

and confidence to recognize deterioration in a patient's condition and activate an appropriate intervention.

Due to the unpredictability of patients' conditions and ongoing changes in care delivery practices and standards of care, nurses need better preparation to recognize the deterioration of a patient's condition and activate an appropriate response (Granito et al., 2020). Inadequate nurses' knowledge and confidence and lack of continual education program for nurses at the clinic provided an opportunity to develop and implement an educational intervention that improved their knowledge and self-confidence. Critical thinking skills and clinical judgment were covered in the educational intervention. These skills helped nurses to recognize patient deterioration, and quickly implement life-saving intervention. Empowering nurses with knowledge gives them the confidence to make accurate and timely assessments of a patient's condition, communicate effectively to the provider or care team, and manage the staffing challenges of the clinic's care team. Evidence from the literature supports empowering nurses in outpatient settings, such as this project site, with knowledge and confidence to provide high-quality, safe care as an effective approach to improve the quality of care, promote healing, and reduce hospitalization costs (Bohrer et al., 2021).

Several stakeholders supported the project throughout the entire project cycle. The director of ambulatory services endorsed the project and was periodically updated on progress. The organization's staff development supervisor provided guidance to the project and backed the collaboration with the clinic's staff developer on the implementation. The health center manager of the project site clinic understood the need for educational intervention, approved the project, and assisted with the resources needed for the project to succeed. The nurses, as both project participants and direct beneficiaries, supported the project and its contribution to their skills,

expertise, and professional growth. Staying up to date with new knowledge, skills and technology requires nurses to be life-longer learners (Mlambo). Continual education for nurses has been shown to keep nurses up to date with new evidence-based knowledge, and foster their growth and responsibilities (Bera, 2022 & Mlambo, 2021). Therefore, providing an environment within the organization that offers nurses opportunity to engage in learning was a welcoming strategy to support professional development.

**Intervention**

The purpose of this nurse education process improvement project was to enhance knowledge and self-confidence to recognize and respond to deterioration of a patient's condition. The DNP student designed and developed the project and evaluated its implementation. The DNP student collaborated with the organization's staff developer, an MSN-prepared RN, to facilitate the training.

The clinic had seen an increase in patients experiencing hypoglycemic symptoms while in the clinic. An incident that underscored the need for the educational intervention was a patient who experienced signs and symptoms of cardiac arrest while in the clinic. Therefore, basing training on case scenarios that the nurses could relate to was vital to engage them in the training. The intervention consisted of two discrete in-person educational sessions delivered at the project site during work hours. A didactic session was held on the first day followed by a simulation session on the second day. During the one-hour didactic session, the facilitator reviewed vital signs and signs and symptoms of hypoglycemia, stroke, and cardiac arrest. The participants actively engaged in asking questions and contributing answers to questions posed by the facilitator and other participants.

The second session was a two-hour mock code using case scenarios of a patient with changes in vital signs including hypoglycemia, stroke, and impending cardiac arrest. The participants applied knowledge of signs and symptoms of patient deterioration gained during the didactic training, activated appropriate interventions, and provided the necessary support to their team in a critical situation. During the mock code case scenarios, the participants were divided into small groups of four to five participants per group. The small group of four to five participants offers an environment that creates a forum for active participation, listening, and learning. They were given case scenarios of patients with deteriorating signs and symptoms of hyperglycemia, stroke, and cardiac arrest. They assessed the patient, collected vital data, notified providers, and called the medical alert response (MAR) team and 911. The team leader delegated roles to team members to bring supplies needed to treat the patient. They also relayed patients' information to the responding provider and emergency services team that responded.

A pre-intervention survey was sent electronically to all the participants one day before the educational (didactic) session to assess baseline knowledge and confidence levels. There was a 100% response to the pre-intervention survey from the participants. This was a positive response supporting the aim of the intervention. A post-intervention survey was sent to the participants after the mock code to assess acquired knowledge and confidence. See Appendix C for pre-and post-questionnaires.

### *Gap Analysis*

An informal survey of 10 assistant nurse managers at the organization's outpatient clinics identified the absence of ongoing education to increase nurses' knowledge and confidence in recognizing patient deterioration and activating an appropriate intervention. Additionally, in an informal survey of 10 clinic nurses, seven responses suggested a lack of knowledge and self-

confidence to recognize a change in a patient's condition and implement an appropriate

intervention.  Additionally, the high rate of nurse turnover and frequent onboarding of nurses

with different levels of education, knowledge, and clinical experiences highlighted the need for

continuing nurse education to build on and enhance nurses' knowledge and confidence in caring

for patients coming into the outpatient clinic.

In outpatient settings where patients with exacerbated chronic health conditions come to

the clinic to seek care, continuing professional development for nurses is crucial to prepare them

to deliver care that will result in positive patient outcomes. However, lack of time, limited access

to educational resources, and the cost of professional development hinder efforts to engage

nurses in outpatient settings in the education and training they need. Ongoing education is central

to nurses' lifelong learning and is vital to maintaining knowledge, confidence, and skills

(Mlambo et al., 2021). Nurses need professional development through didactic and simulation

training to update their knowledge and skills to align with evidence-based practices in patient

care.

The most important gap identified between the current and desired states was the lack of

continuing nursing education to enhance nurses' knowledge in recognizing and intervening when

a patient's condition changes.  The consequence of having such a gap was compounded by the

challenges nurses face in an outpatient setting to deliver effective and timely care to a

deteriorating patient. A nurse's knowledge and confidence in their role in an outpatient setting

influences patient care and interaction with patients, colleagues, and other care team members. A

discipline-specific training model employing didactic and simulation education to boost nurses'

knowledge and confidence was selected to close the gap between the current and desired states.

See Appendix D for the Gap Analysis.

***Gantt Chart***

The project Gantt chart depicts the timeline of activities needed to complete the project from beginning to end and describes the key project deliverables. The development and implementation of the educational intervention proceeded in three phases: assessment, development (which included design), and implementation (which included post-implementation analysis).

The assessment phase involved project site identification, preliminary assessments, and project timeline development. The assessment phase included an informal survey of 10 assistant nurse managers organization's outpatient clinics and an unofficial survey of clinic nurses, both to assess knowledge and self-confidence for recognizing and implementing appropriate intervention when a patient's condition changes. Evidence in the literature was collected and analyzed to answer the PICOT question and inform the project. The project's strengths, weaknesses, opportunities, and threats (SWOT) were identified. The Collaborative Institutional Training Initiative (CITI) program basic course on human subject research and the University of San Francisco statement of non-research determination were completed. A letter of organizational support and project approval was obtained.

The second phase involved the development, which covered project design. In this phase, the pre-and post-intervention questionnaires were adapted from the Berning (2018) tool to measure outcomes were identified, and the curriculum and educational materials developed. The final phase included the educational intervention, with didactic and simulation components; administration of the pre- and post-intervention surveys; and analysis of the data. The didactic training reviewed vital signs and helped participants identify changes and activate appropriate interventions. A two-hour mock code enabled the participants to practice recognizing,

responding, and activating appropriate interventions. The pre- and post-intervention surveys were collected and analyzed. Results were reported, reflected on, and the project analyzed for recommendations to sustain and spread of the test of change. See Appendix E for the Gantt Chart.

***Work Breakdown Structure***

A Work Breakdown Structure (WBS) was designed to organize the project and avoid costly project delays. This project's WBS provided clear guidance and instructions to the team members responsible for task completion before they began their task. The work breakdown for this project comprised five phases: initiation, planning, execution, control, and closeout phases.

During the initiation phase, the lack of nurses' knowledge and self-confidence was identified, and gap and SWOT analyses conducted. The literature review to collect evidence to support the project was completed. The second phase was planning, which included stakeholder identification, communication with project site leadership, and the plan to develop and implement the project at the site. In addition, education materials for the intervention were developed. Pre- and post-intervention questionnaires were created, adapted from Berning's (2018) validated questionnaire on nurses' knowledge and recognition of early signs of clinical deterioration. Phase three covered implementation of the educational interventions. During this phase, the participants were given the pre-intervention questionnaire. The first day of training was didactic training, followed by the mock code simulations on the second day. The post-intervention questionnaire was administered immediately after the simulation-based training. Phase four of the project involved analysis of the data collected during the pre- and post-intervention and final evaluation of the project. Phase five involved presenting the outcome implementation and outcome at the organizations primary care departmental meeting and

recommending spread to the entire organization's ambulatory clinic nurses as an annual competency, See Appendix F for the Work Breakdown Structure.

***Responsibility/Communication Matrix***

The Responsibility/Communication Matrix depicts the key communication activities among the DNP project lead, the project team, and the stakeholders. This project tool was important because it delineated who was responsible for the deliverables from start to finish. As quality of care, social, economic, and business perspectives intertwined in this project, it was imperative to identify and engage stakeholders and gain their support (Armenia, et al., 2019). Stakeholders can positively or negatively influence the outcome of a project. Involving stakeholders during all project stages led to early buy-in, successful program implementation, and project sustainability. Stakeholders were engaged from the outset through in-person, telephone, email communications, and presentations, which gave them insight into the project and helped the project manager gauge their perceptions. Regular check-ins were held throughout the project to check on the status of deliverables and to ensure all stakeholders were engaged and informed of the progress.

Five key stakeholders were involved in this DNP project in addition to the DNP student as the project manager: (1) the project site health center manager; (2) the director of ambulatory care health services; (3) the ambulatory services staff developer; (4) the project site nursing team; and (5) the DNP student's chairperson. Addressing project cost, cost avoidance impact, and sustainability were instrumental in gaining the support of senior leadership. Aligning the project with the organization's mission and vision was vital in gaining support from the Director and health center manager. As one goal of this staff development project was to spread and sustain it across the entire ambulatory clinic, support from the director of ambulatory care services and

ambulatory staff developers was essential. The director of ambulatory services and the health center manager had decision-making power over resources to support the project, such as human capital and clinic space. The clinic manager of the project site was instrumental in mitigating project barriers that arose. The manager of the project site was the DNP project lead's supervisor; thus, it was important to preserve a positive relationship with the supervisor over the course of the project. The ambulatory services staff developer was instrumental in supporting the DPN student to facilitate the training on the implementation days. The DNP project lead met with the staff developer frequently in person, by email, or by phone and ensured the expectations for the education deliverables were met. To secure the continued support of the staff developer, the DNP project lead maintained constant contact with the director of staff development, who was responsible for allocating staff development resources, such as the mannequin used during the low fidelity simulation. Extending the project to the entire nursing team required gaining the nursing team's buy in on the importance of participating in the project to increase their knowledge and confidence. Nurses were engaged through constant communication and reminders via emails, meetings, and huddles about the relevance of training.

Even though the project site manager and the participants supported the project, they were concerned about the impact of nurses attending the training on covering the clinic and maintaining patient care flow. This challenge was mitigated by scheduling the didactic training on the day and time already set for a nurses' meeting. For simulation training, the participants were scheduled in small groups and returned to the assignments after their training. See Appendix G for the Responsibility/Communication Matrix.

*SWOT Analysis*

A SWOT (strengths, weaknesses, opportunities, threats) analysis was performed to identify positive and negative factors within and beyond the project setting that could affect the development, implementation, and evaluation phases of the project (Teoli et al., 2020). The SWOT analysis identified several internal and external factors and provided sufficient evidence to support the development and implementation of the project. The project's two strengths were support by organization leadership, and alignment with the organization's objectives, mission, and vision. The weaknesses identified were: (a) extra staff workload; (b) a nurse knowledge and care delivery gap; (c) possible alarm fatigue in urgent care, especially when a patient is on a continuous pulse and oxygen saturation monitor if they are out of normal range while waiting for transfer to a high level of care; (d) absence of staff from work due to scheduled and unscheduled absences; and (e) insufficient nursing staff to cover the clinic during the educational intervention. Opportunities identified included: (a) standardization of nurses' continuing education and training across the organization's ambulatory and urgent care clinics; (b) bridging the nurse knowledge gap; (c) improving the reputation of the larger organization; and (d) improving the quality of patient care. Potential labor union resistance to the training was identified as a threat beyond the control of the project site. As a non-mandatory pilot education intervention, this threat did not impact the project implementation. Another threat that could have impacted the training was COVID-19 social distance restriction. Fortunately, the organization had approved in-person training prior to the implementation day with guidelines to maintain safe training. Therefore, the training was done in a large conference room that provided adequate distance between participants on both training days. See Appendix H for the SWOT Analysis.

***Comprehensive Financial Analysis/ROI***

The educational intervention took place during clinic operating hours, and during participants' regular work shifts, avoiding the cost of overtime pay. All communications and interactions with stakeholders and participants occurred during regular working hours. The DNP project lead designed the project with a projected labor cost of $21,584. The entire project implementation cost was less than $22,000.

It is crucial that every patient who comes to the outpatient clinic leaves with a positive outcome. Cost avoidance by preventing patient deterioration with cardiac arrest, loss of life, or loss of function presents an attractive opportunity for the organization to benefit financially from delivering safe and effective care. Lurie et al. (2017) estimated the cost of prehospital cardiac arrest per patient to be $37,000, amount used as the basis for the return on investment (ROI) projection for avoiding just one such event. Even though the organization receives reimbursement from private insurance, Medicare, and Medical, incorporating the prehospital cost of cardiac arrest was important in gaining support from the Director. By investing in training for nurses for early recognition and application of appropriate intervention when a patient's condition deteriorates, the organization can anticipate lower risk and costs associated with failure to resuscitate. Nurses are integral to healthcare services and potentially have a broad and enduring impact on patient health outcomes (Coster et al., 2018) and cost to the healthcare organization. Lack of continuing education or professional development may impact the provision of safe quality care, job satisfaction, maintenance of professional license, recruitment, and retention of nurses. Additionally, there could be financial, legal, and reputational burdens on the organization and community if there is an adverse outcome due to nurse incompetence or negligence. For example, the cost of a hypoglycemic emergency due to untimely recognition and

timely intervention averages $664 for ambulance transportation, $3,106 for emergency room treatment, and $3,551 for 1.7 days of hospitalization, for a total cost of $7,321 (Shi et al., 2021).

Avoiding a single pre-hospital cardiac arrest would save the organization approximately $37,000. Preventing multiple hypoglycemic or cardiac arrest adverse outcomes could lead to hiring a project quality coordinator to oversee the project's sustainability and more significant ROI. The financial cost of adverse outcomes due to nurses not recognizing patient deterioration can amount to millions of dollars—liability and malpractice costs due to incompetency or negligence average $1 million. Avoidance of a single instance of unrecognized patient deterioration that requires ambulance transportation, emergency room treatment, and hospitalization of a hypoglycemic or cardiac arrest patient, plus avoidance of a single malpractice claim cost at $1 million, for a total of $1,344,321, results in a net ROI to the organization of $1,322,737. See Appendix I for the Comprehensive Financial Analysis.

**Study of Intervention**

The original plan for this project was to implement modified early warning signs (MEWS), as a tool for the nurses to use in recognizing deterioration and activating an intervention. Unfortunately, the director of ambulatory services objected to this concept citing that MEWS was an inpatient tool. The director acknowledged the need for a continual education improvement program for nurses and supported a redesigned project to use vital signs tools available in the outpatient clinic to recognize patient deterioration.

The gap analysis indicated nurses had insufficient knowledge and confidence to recognize deterioration in a patient's condition and activate an appropriate response. The goal of the educational intervention was to close the gap between the current and desired states. The approach chosen was a combination of didactic and scenario-based simulation education.

Evidence from the literature supports didactic and simulation strategies to train nurses. A didactic approach enables participants to learn skills, solve problems, and develop critical thinking (Westin et al., 2015). An educational intervention through simulations or case scenarios reflects cases to apply knowledge, recall previous experiences, and examine the impact of a decision (Sherwood, 2021). Joho et al., (2021) provided evidence that educational interventions such as low-fidelity simulations or case scenarios improve nurses' knowledge and skill. Incorporating both strategies offered participants learning opportunities that impacted their critical thinking and clinical judgment. The use of didactic education in the intervention provided an opportunity to review the signs and symptoms of hypoglycemia, stroke, and impending cardiac arrest. The low fidelity simulations approach used in the intervention offered the nurses the opportunity to practice assessment and activate necessary interventions in a non-threatening educational environment.

Berning's 2018 survey tool on measuring nurses' knowledge in recognizing patient deterioration was adopted and used during the intervention. The pre- and post-intervention questionnaires assessed the participants' knowledge in recognizing patient deterioration and applying appropriate responses. The surveys were administered before and after the intervention to assess the knowledge and confidence of participants. Differences in survey responses after intervention were assessed as reflections of knowledge and confidence acquired through the intervention. The project was not a mandatory educational intervention for nurses. Even though 100 % participation of all the clinics would have been ideal, due to scheduled and unscheduled absences, 81% of the nurses participated in the training.

**Outcome Measures**

The outcomes measured for the educational intervention were nurses' knowledge and confidence. These were assessed using surveys adapted from a validated tool developed by Berning (2018), the Questionnaire on Nurses' Knowledge and Recognition of Early Signs of Clinical Deterioration (Berning, 2018). Berning's questionnaire is a researcher-developed questionnaire that used a content validity index (CVI) to measure the tool's validity. The questionnaire assessed nurses' ability to recognize and respond to patient deterioration. Reliability was measured by the stability of the self-administered question and Kappa statistic was used to assess its reproducibility and reliability. Therefore, it was found suitable to be used in this training to evaluate nurses' baseline and knowledge, and confidence because it was appropriate to the intervention, short, and easy to score. Permission to use the tool was not required.

The pre-intervention survey responses established the baseline for knowledge and confidence, while the post-intervention survey responses indicated knowledge and confidence acquired during the didactic and simulation education sessions. The surveys included (a) demographic questions to ascertain the level of education and department worked, (b) a Likert scale questionnaire to measure self-confidence and knowledge with five sub-scale questions on confidence and seven sub-scale questions on knowledge, and (c) a nurse's knowledge of knowledge of patient deterioration with three sub-scale questions.

Demographic information was collected on participants' role classification, department, work location, and educational level. The questionnaires contain three subscales of 14 questions to assess knowledge and confidence in recognizing and responding to early signs of clinical deterioration. The questionnaire template was adopted but the questions were rephrased for the training objective. The confidence scale consisted of four questions with a Likert scale response

range of no confidence (1) to very confident (5). The knowledge scale consisted of seven

questions with a Likert scale response range from strongly disagree (1) to strongly agree (5).

Knowledge of escalation was assessed with three questions with response options of "notify the

provider," "notify the MAR," and "call 911". In the pre-intervention survey, participants were

asked about their previous experience calling MAR or 911, responding to MAR or 911, if they

would like to participate in mock code, and any topics they would like included in the mock

code.

### *CQI/Data Collection Tools*

The surveys were created, uploaded, and administered online via SurveyMonkey. Even

though the survey was not coded prior to being sent to participants to ensure the anonymity of

responses, participants were encouraged to provide candid, unbiased responses to the questions

(Polit & Beck, 2017). The survey was sent individually to participants via individual emails.

The surveys were exported from the Survey Monkey application to an Excel database. The data

was uploaded to IBM SPSS version 28 for data analysis. Inclusion criteria for data collection and

analysis included participants who responded to the pre- and post-questionnaires and participated

in the didactic and simulation training. The data collected were entered into the Statistical

Package for Social Sciences (SPSS) database.

### Analysis

The pre- intervention data N=21 and post intervention data N=16 were entered into an

SPSS version 28 database for analysis. The categorical descriptive data were reported using

numbers and percentages for the pre- and post-intervention groups. The number of participants in

specific practice areas was plotted. The surveys were scored using a Likert scale. The confidence

scale was four questions with scales of no confidence (1) to very (5). Higher scores indicated

higher confidence (range 4 - 20). The knowledge scale included seven questions with responses of strongly disagree (1) to strongly agree (5). Higher scores indicate higher knowledge.

The means and standard deviations for total confidence and knowledge responses were reported pre- and post-intervention. The means and standard deviations for individual questions were also reported. Differences in mean scores were reported as an effect size using Cohen's *d* statistic. Differences were tested for statistical significance using an independent sample *t* test. A p-value of less than .05 was used to determine the significance of the difference in the confidence and knowledge between the pre- and post-implementation questionnaires.  The assumptions for parametric testing were also tested using standardized z scores created for each variable by group. The results of the analysis are shown in Appendix J.

**Ethical Considerations**

Like the Jesuit values of equality and commitment to diversity, the project site organization values and promotes equal treatment of patients and employees and embraces diversity. The rural community where the project site is located has one of the lowest socioeconomic profiles of the entire county. The Jesuit values of appreciation of differences, seeing beauty in mixtures, and finding strength in common humanity (University of San Francisco, 2022), reflect values nurses share. Nurses at the project site have stated they enjoy working at the clinic because of the diversity of patients and staff. The team appreciates the richness of different cultures and strives to provide culturally competent care irrespective of a patient's background.

Socio-political challenges that nurses face provoke philosophical thinking in approaching daily problems in caring for patients (Bruce et al., 2014). Consequently, there is a thoughtful call for action for nurses to see beyond a patient's superficial presentation and see God in the

challenges of caring for a patient (Jesuit Institute, 1993). Understanding the spiritual aspect of caring for the sick enhances a nurse's spiritual knowing and clinical judgment during patient care.

Nurses were the participants in this quality improvement project. No patients were involved. The Doctor of Nursing Practice Statement of Non-Research Determination was completed, attesting that the project was non-research and did not involve the use of human subjects. See Appendix K Statement of Non-Research Determination. The project lead gained the approval and support of the organization's leadership to implement the test of change at the project site. See Appendix L for the Letter of Organizational Support.

Participants' identities were protected in the pre- and post- implementation surveys. Responses were anonymous, and information was reported in the aggregate to remove any possibility of tying responses to demographic characteristics. All nurses at the project site were encouraged to attend the educational interventions; however, participation was voluntary. Participants were assured their participation or lack thereof would not affect their employment status. Prior to the administration of the pre-intervention survey, prospective participants were informed that their survey responses would be confidential, anonymous, and reported as aggregate data.

Nursing involves promoting quality, safe patient care (American Nurses Association [ANA], 2015). Furthermore, ongoing education is integral to the nursing profession (ANA, 2015). Nurse leaders have an ethical responsibility to ensure that nurses have the knowledge, skills, disposition, and clinical experience required to provide high-quality and safe care to patients. Using their nursing knowledge and competencies, the staff developer, in collaboration with nurse leaders, set the education standard and ensured nurses were provided the necessary

education. The DNP project lead collaborated with the organization's leadership to ensure the implementation environment was safe and conducive to teaching and learning.

Even though literature has shown that nurses' knowledge and confidence are vital in recognizing, responding to patient deterioration, and reducing negative outcomes, providing a supportive culture through continual education programs is important to nurses' self-esteem and retention. According to the ANA code of ethics for nurses, "competence is a self-regarding duty that affects not only the quality of care rendered but also one's self-respect, self-esteem, and meaningfulness of work" (ANA, 2015, p. 22). Therefore, nurse leaders must ensure that nurses a provided with a cultural environment and opportunities that support and engage them in continual education to promote their gain of new knowledge, confidence, and competency to deliver quality care in the evolving and complex healthcare system.

## Results

### Intervention Planning and Evolution.

This intervention allowed participants to assess and recognize a decompensating patient, objectively evaluate the condition, activate the medical alert or emergency response team, and notify the provider. The data collected showed a five percent non-statistical significance in gain of knowledge and confidence. The nurses showed confidence to assist the care team by bringing necessary equipment and following directions from the team lead and other care team members.

Project planning started in September 2021 when patients who had not been seen by their primary care provider for more than a year due to in-person visit restrictions imposed by the COVID-19 pandemic started returning to the clinic. Concurrently, the clinic started experiencing frequent calls to the MAR team for patients experiencing hypoglycemia, high blood pressure, and other subtle signs of deterioration. A gap in knowledge was evident in the

nurses responding to the MAR calls. The unintended consequence of the COVID-19 pandemic was that patients were now coming to the clinic sicker than the outpatient service nurses were able to manage with their existing levels of knowledge and confidence.

The educational intervention was carried out in two sessions, a didactic teaching session and a low-fidelity simulation session where the participants participated in mock code. During the training, participants used the components of noticing, interpreting, responding, and reflecting as presented in Tanner's Clinical Judgment Model (Tanner, 2006). The project's original plan was to introduce the use of an early warning sign score (MEWS) to recognize deterioration in a patient's condition.  Based on feedback from the organization's director of quality for ambulatory services, MEWS was replaced by basic vital signs and the participants' ability to recognize sudden changes, such as unresponsiveness and a decrease in the function of sensory organs. Staff absences were a barrier to the project identified in the SWOT analysis encountered early in the educational intervention session. Despite the challenge imposed by removing MEWS from the training and staff absences, project objectives were met.

**Process Measures**

The implementation questionnaire, adapted from Berning (2018), the Questionnaire on Nurses' Knowledge and Recognition of Early Signs of Clinical Deterioration scores, included the confidence and knowledge scale group. The criterion for full participation was that the participants would complete all aspects of the intervention, including completing the pre- and post- intervention surveys used for data collection. The process measure required participants to complete the pre-intervention survey one day before the didactic session to participate in the sessions. The post-intervention survey was sent to everyone who completed the pre-intervention survey and participated in both educational sessions. Participants' knowledge and

confidence levels were ascertained from the survey data collected and analyzed during the project's implementation phase.

**Participant Characteristics**

The outpatient primary care clinic at the DNP's project site has multiple departments. All departments that see adult patients were represented, with 22% of patients seen by Internal Medicine, 32% by Family Medicine, 19% by Pediatrics, 14% by OBGYN, 6% by Ophthalmology, and 3% by Behavioral Health practice areas. See Appendix J for the Results analysis narrative graph, table, and figures.

The highest level of education attained by most participants was that of a licensed vocational nurse in the pre-implementation survey (52%) and the post-implementation survey (56%) groups. Six out of twenty-one (29%) respondents to the pre-implementation survey and four out of sixteen (25%) respondents to the post-implementation survey were registered nurses. Seventeen out of twenty-one participants (81%) who responded to the pre-intervention questionnaire participated in the two intervention sessions (didactic and simulation). Sixteen of the seventeen participants (94%) completed the pre-intervention survey and both educational sessions responded to the post-intervention survey.

**Pre- and Post-Intervention Knowledge**

The knowledge questionnaire assessed the ability to measure vital signs, identify abnormal vital signs, recognize changes in vital signs, call MAR 911, provide information to the responding team, and know where emergency response equipment is stored. The mean scores for individual knowledge questions in the pre-intervention group (n=21) ranged from 4.19 (SD = 1.078) for "Knowledge to call MAR" to 4.81 (SD = 0.402) for "Knowledge to measure a patient's vital signs." The mean total knowledge score in the pre-implementation survey was

31.43 (SD = 5.418). The mean scores for individual questions in the post-intervention group

ranged from 4.44 in "Knowledge to call the MAR" (SD = 1.031) and "Knowledge to call 911

and provide vital information to paramedics" (SD = 0.892) to 4.81 (SD = 0.403) in "Knowledge

to measure a patient's vital signs." The mean total knowledge score on the post-implementation

survey was 32.31 (SD = 4.159), which represents a 5% increase from pre-intervention scores. An

independent sample t-test of the difference between the pre-intervention and post-intervention

total knowledge score did not show a statistically significant difference (difference = -0.88, 95%

CI -4.08 to 2.43, Cohen's $d$ = -0.18, p = 0.30). See Appendix J for the Results analysis narrative

graph, table, and figures.

**Pre- and Post-Intervention Confidence**

The mean scores for individual confidence questions in the pre-intervention group (n=21)

ranged from 3.57 (SD = 1.0121) for "Confidence in evaluating the effectiveness of intervention

or response" to 3.90 (SD = 1.044) for "Confidence in assessing." The mean total confidence

score in the pre-implementation survey was 15.05 (SD = 4.117). The mean scores for individual

questions in the post-intervention group ranged from 4.13 (SD = 0.806) in "Confidence in

evaluating the effectiveness of intervention or response" to 4.44 (SD = 0.892) in "Confidence in

recognizing signs/symptoms." A t-test of the difference between scores pre- and post-

intervention for "Confidence in recognizing signs/symptoms" showed a significant increase in

mean scores (difference = -0.63, 95% CI -1.26 to 0.01, Cohen's $d$ = -0.66, p = 0.026), which

represents a 5% increase from pre-intervention scores.  The mean total confidence score in the

post-implementation survey was 17.13 (SD = 3.304). An independent sample t-test of the

difference between the pre-intervention and post-intervention total confidence score showed a

difference which approached but did not achieve statistical significance (difference = -2.08, 95%

CI -4.63 to 0.48, Cohen's *d* = -0.55, p = 0.054). See Appendix J for the Results analysis narrative graph, table, and figures.

## Discussion

### Summary

Due to the unpredictability of patient conditions, nurses need adequate preparation to recognize deterioration and intervene appropriately when a patient's condition changes (Granitto et al., 2020). The literature reviewed provided evidence that educational interventions featuring didactic and low-fidelity simulation or case scenarios improve nurses' knowledge and self-confidence. Norris et al. (2016) and Van Houwelingen et al. (2021), a study supported the use of educational intervention to improve nurses' knowledge, confidence, and skills. Educational interventions that employ a standardized curriculum and approach for recognizing patient deterioration and activating appropriate interventions provide consistent training for the nurses across an organization's provider sites.

Nurses in outpatient clinics may lack sufficient knowledge and self-confidence to care for patients with exacerbated health conditions. Scaramuzzo et al. (2014) emphasized the need for nurses in ambulatory clinics to be competent, knowledgeable, and confident, and not be intimidated by patient deterioration when sicker patients come to outpatient clinics. Research evidence supports the use of simulation-based educational programs to increase nurses' knowledge, confidence, and competence. This project was a test of change to determine if developing a routine continual educational intervention where nurses in outpatient clinic can use didactic and case scenario/low fidelity simulation to practice recognizing, responding, and activating appropriate intervention would enhance their knowledge and self-confidence when dealing with actual patient deterioration.

Continuing education is vital to lifelong learning and represents the important aspect of keeping nurses' knowledge and competencies current (Mlambo et al., 2021). Education is vital when nurses with varying experiences and training care for all patients presenting to a facility. The COVID-19 pandemic prompted nurses with many years of work experience at the project site to retire. Newly hired nurses had minimal experience in ambulatory care. Therefore, creating a continuing education program that supports these nurses in building their ambulatory care knowledge and confidence was vital. The competence and professional performance improvements that accrued produced positive benefits for individual nurses, care teams, and patients. Even though the specific aim of the project of 10% increase in knowledge and confidence was not achieved, a five percent non-statistical increase in knowledge showed progress and suggested both opportunity for improvement and the need to establish a continuing education process for the nurses in the outpatient clinics.

A strength of the project was the participants sharing their knowledge during and after the education sessions. The organization's staff developer expressed interest in spreading the project to the other clinics. The project site manager and providers at the project site acknowledged the evolution of the nurses when responding to MARs and viewed this project as a catalyst for professional development. Given the unforeseen impact of the COVID-19 pandemic on patients coming to the clinic with exacerbated chronic health conditions, the nurses acknowledged that the training was greatly needed to prepare them to care for the patients.

**Interpretation**

The specific aim of the project of a 10% increase in knowledge and confidence was not achieved. However, the non-statistically significant five percent increase in knowledge and confidence showed progress and suggested improvements needed in the project design and

implementation. The outcome indicated the need for ongoing education and training for the nurses in the ambulatory clinic to prepare them to provide safe, high-quality care. Even though most of the nurses who participated in the training were experienced nurses, there is a parallel need for continual education for less experienced nurses or those just entering the profession. As healthcare continuously evolves, nurses need to expand their knowledge and competencies to meet the standards of care expected of their roles (Beilner, 2017). Based on the knowledge and confidence nurses gained and their enthusiasm for annual case scenario simulation sessions, the project site organization staff development department intends to add the educational intervention to annual skill training for nurses in the ambulatory clinics.

**Limitations**

The project was implemented at a single outpatient clinic located in a rural community of northern California. The generalizability of the results to other settings is limited by characteristics of the participating clinic nurses which may be greatly influenced by the rural setting, such as location of the clinic and distance from other clinics. In addition, the educational content of the didactic and simulation sessions was targeted to the nurses in outpatient clinics. Although outpatient clinic nurses are not advanced care life support practitioners, they are required to recognize patient deterioration and activate appropriate intervention such as calling 911 using their basic life support knowledge and skills. Nurses have the most immediate responsibility for assessing and responding to patients with signs and symptoms of deteriorating conditions such as hypoglycemia, stroke, or cardia arrest. For example, a nurse in an outpatient clinic ought to recognize that a patient presenting to the clinic with chest pain, dizziness and palpitation will require immediate MAR team and 911 assistance for a better outcome. This limits the transferability of the intervention to other care settings, such as hospital emergency

departments or inpatient departments where different didactic content or simulation scenarios would be more relevant to the participants.

The challenges encountered in project implementation included an unexpected staff shortage due to absences from illness, resulting in reduced participation. The project was designed for approximately 21 nurse participants. Scheduled vacation times and unpredictable circumstances, such as absence due to illness, reduced participation to 17 in the training, with 16 responding to the post-implementation survey.

The survey responses were originally planned to be coded and analyzed as a paired sample test. However, due to non-coding of the pre- and post-survey respondents, a group independent sample test was used to analyze the samples. Although this did not impact the results, it precluded visualization of knowledge and confidence acquisition in individual participants.

**Conclusion**

The aim of this DNP project was to develop and implement an educational intervention for nurses to improve their knowledge and confidence in recognizing deteriorating patients and activating an appropriate intervention. The project was successful in that 81% of the clinic nurses participated in the educational intervention. Due to the success of this project and the support from the stakeholders, the plan is to spread the project to other outpatient clinics within the organization and sustain the project through annual continuing education for nurses in the organization's outpatient clinics.

The complex conditions and care needs of patients presenting to the outpatient clinic requires clinic nurses to acquire new knowledge and competencies r to provide quality and safe care. Outpatient nurses are in a unique position to recognize patients in the clinic with

deteriorating symptoms and initiate the necessary support needed for improved patient's positive outcomes. Therefore, engaging nurses in continual education through appropriate training increases knowledge, translates acquired knowledge into clinical practice, and provides support for the team. Additionally, by closing the knowledge and confidence gap, the nurses become empowered to implement interventions to save lives.  While changes in knowledge and confidence were not paired to individual participants, the overall non-statistically significant five percent increase in knowledge supports providing ongoing education for nurses in outpatient clinics. Further studies are needed on barriers to knowledge and confidence acquisition for nurses in outpatient clinics. A strong collaboration with clinic nurse managers, staff developers, and organization executive leadership is essential to spreading the project to another clinic site and sustaining it to translate knowledge acquisition into practices that provide high-quality care and better patient outcomes in the ambulatory clinics.

## Funding

The project received no direct funding from the organization. Time and effort allocated to the project for the DNP student, staff developer, and participants were within normal work hours. No additional compensation was provided.

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**Appendix A**

**Evidence Evaluation Table**

Glossary of Abbreviations

| | | |
|---|---|---|
| RRT – Rapid Response Team | VSS – Vital Signs Score | PPH – Postpartum Hemorrhage |
| RN – Registered Nurse | PAR – Patient at risk | ENs – Enrolled Nurses with certificate level of nursing professional |
| IV – Independent Variable | POTTS – Physiological Observation Track and Trigger systems. | |
| DV – Dependent Variable | PSS – Physiological Scoring System | RNs – Registered Nurses |
| NDMI – Nurse Decision-Making Instrument | ViEWS - VitalPAC early warning score. | LVNs – Licensed Vocational Nurses |
| ANOVA – Analysis of Variance. | | MAs – Medical Assistants |
| CI – Cognitive Interviewing | QUIPS – Quality in Progress Studies | OSCE – Objective structured exam |
| CV - Content Validation | AUROC – Area under the receiver operator characteristic curve. | qSOFA – quick Sequential organ failure assessment |
| CVI – Content Validity Criteria. | PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analysis | CASP – Critical appraisal skills program |
| IRT – Inter-rated Reliability Testing | | RCT – Randomized controlled test |
| ICU – Intensive Care Unit | RRT – Rapid Response Team | |
| | AMTSL – Active management of third stage of labor | |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Elder, L. (2017). Simulation: A tool to assist nursing professional development practitioners to help nurses to better recognize early signs of clinical deterioration of patients. *Journal for Nurses in Professional Development*, *33*(3), 127–130. https://doi.org/10.1097/NND.0000000000000342 | | | | | | | |
| To use simulation as an educational intervention to increase nurses' knowledge, self-confidence, and competency when caring for patients exhibiting signs of clinical deterioration | **Quality improvement project** | **Sample:** 40 nurses **Setting:** Medical-surgical unit of an acute hospital | **IV:** Nurses **DV:** knowledge, self-confidence, and competency | Detecting patient education knowledge test (Developed by the facility), Creighton competency evaluation instrument (C-CEI) and Clinical Decision-making self-confidence scale | SPSS version 23 used to analyze data. The knowledge test was administered pre-and post-intervention. The score ranged from maximum of ten points to minimum of one point. The C-CEI reliability was .952 and the | A significant improvement in nurse knowledge and self-confidence after a simulation based educational intervention | **Level of evidence:** V A **Worth to practice:** Use of simulation as a training modality enhances nurse's knowledge, confidence, and competency. This training can be modified to train outpatient nurses. **Strengths:** The use of C-CEI evaluation tool was effective for simulation activities. The training accorded participants a one-hour CEU. **Weaknesses:** There was no colleague interaction during the simulation because the nurses worked alone. **Feasibility:** This training can be generalized to other inpatient and outpatient settings. Information from this training can be used to |

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|---|---|---|---|---|---|---|---|
| APA Reference: Elder, L. (2017). Simulation: A tool to assist nursing professional development practitioners to help nurses to better recognize early signs of clinical deterioration of patients. *Journal for Nurses in Professional Development*, *33*(3), 127–130. https://doi.org/10.1097/NND.0000000000000342 | | | | | | | |
| | | | | | Cronbach's alpha of .979. | | plan educational intervention for nurses in other areas.<br><br>**Conclusion:** There was a significant improvement in nurse knowledge and self-confidence after the training. Competency evaluation during the simulation provided information to help nurses when caring for a deteriorating patient. The training validated the use of simulation as an effective training strategy for nurses' education.<br><br>**Recommendations:** Future simulation with a minimum of two nurses participating to enhance teamwork and interaction. Plan for other simulation events such as mock codes. |

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|---|---|---|---|---|---|---|---|
| APA Reference: Joho, A. A., Kibusi, S. M., & Mwampagatwa, I. (2021). The Impact of Low Fidelity Simulation on Nurse Competence in Active Management of Third Stage of Labor: An Intervention Study in Primary HealthCare Settings in Tanzania. Clinical Simulation in Nursing, 56, 10–21. https://doi.org/https://doi.org/10.1016/j.ecns.2021.03.009 | | | | | | | |
| To evaluate the effectiveness of low-fidelity simulation-based training on improving knowledge and skills of ENs and or RNs in AMTSL in selected rural and peri-urban primary health care centers in Dodoma | Design - Quantitative quasi-experimental study<br><br>Method – Pre and post assessment, and simulation-based training intervention<br><br>Framework - | Sample – 176 ENs and RNs<br><br>Inclusion criteria – At least one year experience in labor ward.<br><br>No prior exposure to in-service training of PPH prevention and management. | IV – ENs and RNs<br><br>DV –<br><br>Low fidelity simulation, knowledge, and skills assessment | AMTSL data collect using OSCE and standardized observational checklist by Jhpiego (2014).<br><br>Cronbach's alpha for verification and validation. | SPSS version 23.0 used for statistical analysis.<br><br>Two-sided p-value <0.05 was statistically significant.<br><br>AMTSL Baseline knowledge – SD 2.07 | The findings indicated that AMTSL knowledge immediately following the simulation intervention increased from baseline. Although, the knowledge declined 6 months post training due | Level – II-B<br><br>Worth to practice – This study suggested that ENs have more clinical skill than the RNs due to the RNs are engaged in more administrative and leadership skills and less in practical skills due to being too far from patient bedside. This is like LVNs and MAs versus the RNs in the outpatient setting where the LVNs and MAs are more involved with practical care of patients while the RNs are engaged with administrative, patient education and care |

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| Tanzania | | Exclusion criteria – EN or RN who did not complete pre-questionn aire. Setting - Rural and peri-urban primary health care centers in Dodoma Tanzania | | | | to lack of team collaboratio n and ineffective communica tion. AMTSL skills increased from baseline and skills were retained 6 months post simulation due to the rehearsal of practice of | coordination. Strengths – use of Simulation-based training which has been reported to be a good strategy in teaching, fosters knowledge and skills development. Weakness – The training program did not include evidence based. There was no regular supervision to identify gaps. Feasibility – Nurses gain and retain knowledge and skill from simulation-based training. Therefore, |

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| APA Reference: Joho, A. A., Kibusi, S. M., & Mwampagatwa, I. (2021). The Impact of Low Fidelity Simulation on Nurse Competence in Active Management of Third Stage of Labor: An Intervention Study in Primary HealthCare Settings in Tanzania. Clinical Simulation in Nursing, 56, 10–21. https://doi.org/https://doi.org/10.1016/j.ecns.2021.03.009 | | | | | | | |
| | | | | | | tasks learned. | including simulation-based training in annual competency will be beneficial for nurses in enhancing their knowledge and skills. Conclusion – The study concluded that low-fidelity simulation-based training improved nurses' knowledge and skills on AMTSL for prevention of postpartum hemorrhage. Recommendation – The recommendation is to include simulation-based training in nursing educational curriculum and in-services |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Lee, C., Mowry, J. L., Maycock, S. E., Colaianne-Wolfer, M. E., Knight, S. W., & Wyse, D. M. (2019). The impact of hospital-based in situ simulation on nurses' recognition and intervention of patient deterioration. *Journal for Nurses in Professional Development*, *35*(1), 18–24. https://doi.org/10.1097/NND.0000000000000507 | | | | | | | |
| Discussion of development, implementation and evaluation of an in-situ simulation program and the positive impact on nurses' confidence level in the recognition and initiation of interventions for a deteriorating patient | **Design:** Development of Simulation Program<br><br>**Framework:** NPD Practice Model,<br><br>The Iowa Model of Evidence-Based Practice,<br><br>Jeffries Simulation Theory, and<br><br>Brinkerhoff's High Impact Learning | **Sample:** Three adult care units as pilot,<br><br>Five additional adult care units following pilot.<br><br>(Total of 8 units over 4-year period)<br><br>**Setting: Large** Academic | **IV:** Nurses<br><br>**DV:** Simulation Scenarios,<br><br>Pre and post evaluation | Analysis of qualitative data using SPSS 21,<br><br>Wilcoxon single-ranked test to determine confidence level. | **Nurses (n = 176):** 76.1% participated,<br><br>79% completed pre and post evaluation.<br><br>**Nurses Confidence level pre and post assessment:**<br><br>**Pre:** Very confident – 41.8%<br>**Post:** | More than 98% of participants expressed that working with peers were beneficial in learning.<br><br>99% participants expressed that the simulation was constructive and applicable to practice | **Level:** V-A<br><br>**Worth to practice:** It is essential to train and prepare nurses to recognize deterioration in patients and activate appropriate intervention. So can be achieved through educational intervention for the nurses as exhibited in this article.<br><br>**Strengths:** The involvement of major stakeholders of the tertiary health center such as the directors, managers, and nursing staff. |

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|---|---|---|---|---|---|---|---|
| APA Reference: Lee, C., Mowry, J. L., Maycock, S. E., Colaianne-Wolfer, M. E., Knight, S. W., & Wyse, D. M. (2019). The impact of hospital-based in situ simulation on nurses' recognition and intervention of patient deterioration. *Journal for Nurses in Professional Development*, *35*(1), 18–24. https://doi.org/10.1097/NND.0000000000000507 | | | | | | | |
|  |  | Tertiary Health Center |  |  | Very confident – 77.2% $P$=.000 |  | Utilization of evidence-based frameworks to guide the development, implementation, and evaluation of the simulation program. Using the workplace, an environment the participants (nurses) are familiar to and safe. Organizing the simulation for the nurses to train with their peers they are familiar with. Including nurses with more than 3 year and less than three experiences in the |

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| APA Reference: Lee, C., Mowry, J. L., Maycock, S. E., Colaianne-Wolfer, M. E., Knight, S. W., & Wyse, D. M. (2019). The impact of hospital-based in situ simulation on nurses' recognition and intervention of patient deterioration. *Journal for Nurses in Professional Development*, *35*(1), 18–24. https://doi.org/10.1097/NND.0000000000000507 | | | | | | | |
| | | | | | | | training **Weaknesses:** The majority of the participants were confused with the pre assessment paperwork believing it was actual scenario. Although, this assumption was corrected in subsequent simulation sessions. **Feasibility:** Developing, implementing, and evaluating educational intervention to improve nurses' knowledge and self-confidence can be done in ambulatory |

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| APA Reference: Lee, C., Mowry, J. L., Maycock, S. E., Colaianne-Wolfer, M. E., Knight, S. W., & Wyse, D. M. (2019). The impact of hospital-based in situ simulation on nurses' recognition and intervention of patient deterioration. *Journal for Nurses in Professional Development*, *35*(1), 18–24. https://doi.org/10.1097/NND.0000000000000507 | | | | | | | |
| | | | | | | | and urgent care clinics. The educational program will empower the nurse to recognize and provide them with the self-confidence to notify a provider, call medical alert team, or call 911 when they recognize a deterioration in patient condition. **Conclusion**: A culture that supports teamwork and effective communication is vital in promoting quality of care and patient safety. Hence the simulation program offered nurses the ability to learn with |

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| APA Reference: Lee, C., Mowry, J. L., Maycock, S. E., Colaianne-Wolfer, M. E., Knight, S. W., & Wyse, D. M. (2019). The impact of hospital-based in situ simulation on nurses' recognition and intervention of patient deterioration. *Journal for Nurses in Professional Development*, *35*(1), 18–24. https://doi.org/10.1097/NND.0000000000000507 | | | | | | | |
| | | | | | | | their peers in a safe and familiar environment. **Recommendation:** Preparing nurses to effectively recognize signs and symptoms of patient deterioration and activation appropriate intervention is significant in improving patient outcomes. Therefore, implementing an evidence-based educational intervention to improve nurses' knowledge and self-confidence is essential in providing nurses the required knowledge, |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
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| APA Reference: Lee, C., Mowry, J. L., Maycock, S. E., Colaianne-Wolfer, M. E., Knight, S. W., & Wyse, D. M. (2019). The impact of hospital-based in situ simulation on nurses' recognition and intervention of patient deterioration. *Journal for Nurses in Professional Development*, *35*(1), 18–24. https://doi.org/10.1097/NND.0000000000000507 | | | | | | | |
| | | | | | | | attitude and skills they need to provide high quality and safe care to their patients. |

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|---|---|---|---|---|---|---|---|
| APA Reference: Mlambo, M., Silén, C., & McGrath, C. (2021). Lifelong learning and nurses' continuing professional development, a metasynthesis of the literature. *BMC Nursing*, *20*(1), 62. https://doi.org/10.1186/s12912-021-00579-2 | | | | | | | |
| To conduct investigative research on nurses' experience of continuing professional development (CPD) | **Design:** Metasynthesis investigative qualitative research **Method**: Literature Search and review **Framework:** PRISMA flow chart | **Sample**: 25 articles **Setting:** Articles pulled from OVID, PubMed, CINAHL, Clarivate, and ProQuest | **IV**: Nurses **DV:** Nurses experience, nurses view on continuing education | CASP criteria and PRISMA flow chart | None | Five overarching themes that were identified include organizational culture, supportive environment, attitudes, and motivation reflect nurses' professional values, nurses' professional barriers and perceived impact on practice as a core value. Nurses value professional development | **Level**: III A/B **Worth to practice**: The study suggests CPD enhances knowledge, improves their skills, and keep them up to date with recent evidence. CPD also has a positive impact on patient care. Therefore, with these findings, it is worth implementing CPD for nurses in supportive learning environment and support from the organization. **Strengths:** The literature search was comprehensive and was done by an experienced search engine expert. **Weaknesses**: The questions and themes overlapped. The study was focused on qualitative studies. Quantitative and mixed |

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| APA Reference: Mlambo, M., Silén, C., & McGrath, C. (2021). Lifelong learning and nurses' continuing professional development, a metasynthesis of the literature. *BMC Nursing*, *20*(1), 62. https://doi.org/10.1186/s12912-021-00579-2 | | | | | | | |
| | | | | | | | method studies were not included. **Feasibility**: The study shows the great need for feasibility to establish CPD in workplace for nurses. **Conclusion**: The review revealed CPD is an important element in nurses' lifelong learning. The Study also confirms that lack of funding, time and organizational support are barries for nurses to engage in CPD. **Recommendation**: That policy makers and relevant stakeholders need to put strategies in place to support nurses continuing. professional development and break the barrier of CPD. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Norris, H., New, K., & Hinsberg, F. (2019). Patient deterioration simulation education and new graduate nurses' self-confidence and competence: A pilot study. *Journal for Nurses in Professional Development*, *35*(6), 330–336. https://doi.org/10.1097/NND.0000000000000588. | | | | | | | |
| To implement an educational program to improve the self-confidence and competence of new grade nurses related to patient rescue | **Design** – Experimental quantitative,<br><br>**Method** – cohort observational data collection<br><br>Framework – Patricia Benner's nursing theory | **Sample** - New Grade Nurses (NGNs) – 5 NGNs, 1 ER nurse, 1 ICU nurse<br><br>**Setting** - Medical-surgical and telemetry units in a 105-bed rural | **IV** - New Grade Nurses<br><br>**DV** - 6-hour training<br><br>CDMSCS | Clinical decision-Making Self-confidence Scale (CDMSCS)<br><br>Creighton Competency Evaluation Instrument (C-CEI) | Data analysis with SPSS on pre and post CDMSCS | C-CEI data determined that participants demonstrated essential competence during patient deterioration - 2 groups.<br><br>Scores were:<br><br>14/17 = 82% and 16/17 = 94%. The scores were above 75% passing score determined | **Level of evidence** – II-B<br><br>**Worth to practice** – it is worth to practice where the institution has a simulation lab or willing to invest in a simulation lab.<br><br>**Strengths** – The project leader received funding from the state's association of DNP student scholarship.<br><br>**Weaknesses** – Small sample size. The sample was made up of only NGNs from a single rural |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Norris, H., New, K., & Hinsberg, F. (2019). Patient deterioration simulation education and new graduate nurses' self-confidence and competence: A pilot study. *Journal for Nurses in Professional Development*, *35*(6), 330–336. https://doi.org/10.1097/NND.0000000000000588. | | | | | | | |
| | | community hospital | | | | by Creighton.<br><br>CDMSCS data from pre to post intervention score was not statistically significant.<br><br>Pre –<br><br>M = 39.6<br><br>SD = 10.14<br><br>Post intervention –<br><br>M = 47.8 | community hospital.<br><br>**Feasibility** – The project may be feasible in institutions with partnership to academic practice or a simulation lab for nurses' educational interventions.<br><br>**Conclusion** – The increase in self-confidence score was not statistically significant because of the small sample size. Although, the increase in self-confidence score was clinically significant. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Norris, H., New, K., & Hinsberg, F. (2019). Patient deterioration simulation education and new graduate nurses' self-confidence and competence: A pilot study. *Journal for Nurses in Professional Development*, *35*(6), 330–336. https://doi.org/10.1097/NND.0000000000000588. | | | | | | | |
| | | | | | | SD = 7.46  Mean increase in CDMSCS score = 8.2 95% confidence intervals | **Recommendation** – the authors are recommending that the clinically significant increase in self-confidence score warrants further studies to explore self-confidence and competence with NGNs relating to patient deterioration education. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA reference: Parker, C. G. (2014). Decision-Making Models used by Medical-Surgical Nurses to Activate Rapid Response Teams. *MEDSURG Nursing*, *23*(3), 159–164. | | | | | | | |
| To ascertain the correlation between nurse's decision-making model and frequency of RRT | **Design**: Descriptive, cross-sectional, correlational quantitative study **Method:** Demographic questionnaire and self-reported number of RRT called Reviewed articles from 1999 to 2012 CINAHL and PubMed **Conceptual Framework:** The Decision-making model - analytical-intuitive/intuiti | **Sample:** (n = 87) acute care RNs in medical surgical units that have activated RRT in 12 months **Setting:** 3 hospitals in Southeast Florida with range of beds 283-400 | **IV:** RNs RRT calls **DV:** Nurses Decision-Making (Analytic, mixed, Intuitive) | 24-item version of NDMI used to measure decision-making model of analytic, mixed, or intuitive. Chronbach's Alpha used to measure reliability – 0.81. it was found to be valid. | A one-way ANOVA used to perform statistical difference and result indicated the differences in number of RRT calls among the three decision-making models (p=0.003). | A one-way ANOVA used to perform statistical difference and result indicated the differences in number of RRT calls among the three decision-making models (p=0.003). | **Level:** Quantitative III-B **Strengths/Weaknesses:** All participants were RNs who have activated RRT **Worth to Practice:** Therefore, educating nurses on the analytical decision-making process and RRT activation impact positively impact RRT and activation and patient outcome. **Feasibility:** Further research is required to fully test the clinical effectiveness of the linked SABR, its impact on accuracy of nurse-doctor communication, safety, and patient outcome **Conclusion:** The study suggested that analytical decision-making appeared to correlate with an increase in frequency of RRT activation. Increase in activation of RRT |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA reference: Parker, C. G. (2014). Decision-Making Models used by Medical-Surgical Nurses to Activate Rapid Response Teams. *MEDSURG Nursing*, *23*(3), 159–164. | | | | | | | |
| | ve-analytical (mixed), and intuitive. | | | | | | is related to the decrease in hospital mortality rates. Nurse training in decision-making process that resulted in increased frequency of RRT activation may lead to improved patient outcome. **Recommendation:** The decrease in mortality rate need to be investigated further for the identification of and the nurse training in decision-making process that resulted in the frequency of activation of RRT that led to improved patient outcomes. Nurses in acute care setting should be provided education on analytical decision-making and activation of RRT Experience gained from activation of RRT can be used to develop more education training that can help improve nurses' decision-making process, identification of patient |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA reference: Parker, C. G. (2014). Decision-Making Models used by Medical-Surgical Nurses to Activate Rapid Response Teams. *MEDSURG Nursing*, *23*(3), 159–164. | | | | | | | |
| | | | | | | | deterioration and early intervention to improve patient outcome. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Roh, Y. S., Lee, W. S., Chung, H. S., & Park, Y. M. (2013). The effects of simulation-based resuscitation training on nurses' self-efficacy and satisfaction. *Nurse Education Today*, *33*(2), 123–128. https://doi.org/10.1016/j.nedt.2011.11.008 | | | | | | | |
| To evaluate the efficacy of simulation-based resuscitation training using two modalities for nurses by measuring self-efficacy and satisfaction | **Design:** Quantitative comparative experimental study | **Sample:** 38 nurses enrolled in a nursing course. 18 nurses with computer-based simulation and 20 nurses with mannequin-based simulation **Setting:** | **IV:** Nurses with Computer-based or mannequin-based simulation **DV:** ALS-related knowledge, self-efficacy, and learner satisfaction | Knowledge: Multiple-choice questionnaires based on the American Heart Association Advanced Cardiac Life Support Course Questionnaire Self-efficacy: Likert scale Satisfaction: 20-item self-administered instrument | T-test using SPSS 16.0 | On a 10-point scale, mean overall self-efficacy was 6.50 (SD 1.66) and satisfaction was 7.53 (SD 1.20). There was not a significant difference between computer-based and mannequin-based simulation. | **Level of evidence:** III-B **Worth to practice:** This study suggests multiple simulation methods may be embraced and deemed satisfactory by a nurse population. **Strengths:** Use of multiple simulation modalities. **Weaknesses:** The nurse population and the intervention are not described in detail. **Feasibility:** The training modalities used in the studies can be applied to outpatient settings where there is a designated classroom to set up the computers and mannequins. **Conclusion:** |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Roh, Y. S., Lee, W. S., Chung, H. S., & Park, Y. M. (2013). The effects of simulation-based resuscitation training on nurses' self-efficacy and satisfaction. *Nurse Education Today*, *33*(2), 123–128. https://doi.org/10.1016/j.nedt.2011.11.008 | | | | | | | |
| | | | | | | | Simulation-based training for resuscitation can be embraced by nurses, regardless of the simulation modality.<br><br>**Recommendations:** adopting simulation-based training is needed as an innovative model for resuscitation training. Further study is needed to verify the effects of simulation-based resuscitation training. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Sok, S. R., Kim, J. A., Lee, Y., & Cho, Y. (2020). Effects of a Simulation-Based CPR Training Program on Knowledge, Performance, and Stress in Clinical Nurses. Journal of Continuing Education in Nursing, 51(5), 225–232. https://doi.org/10.3928/00220124-20200415-07 | | | | | | | |
| To examine the effects of a simulation-based CPR training program on knowledge, performance, and stress of CPR in clinical nurses. | **Design**: Quasi-experimental pretest-posttest control group | **Sample:** Total of 60 clinical nurses Experimental group n =30 Control group n = 30 **Setting:** A General hospital in Seoul, South Korea | **IV:** Nurses in simulation-based CPR training program **DV:** CPR knowledge, performance, and stress | Knowledge: 15 question validated quiz based on the *Korean Guidlenes for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care* Performance: 27 questions using a 5-point Likert scale Stress: Post Code Stress Scale | Descriptive statistics, chi-squared and t-test using SPSS 21.0 | Simulation-based CPR training significantly improved CPR performance and knowledge scores, and decreased stress scores | **Level of evidence:** II-B **Worth to practice:** This study suggests simulation-based education can improved objective and subjective elements of care for unstable patients. **Strengths:** Assessment of stress related to CPR is novel. **Weaknesses:** No true control intervention. **Feasibility:** The nurses in outpatient setting can use the knowledge gained during CPR training in recognizing and intervening when a patient's condition deteriorates. **Conclusion:** Simulation-based CPR |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Sok, S. R., Kim, J. A., Lee, Y., & Cho, Y. (2020). Effects of a Simulation-Based CPR Training Program on Knowledge, Performance, and Stress in Clinical Nurses. Journal of Continuing Education in Nursing, 51(5), 225–232. https://doi.org/10.3928/00220124-20200415-07 | | | | | | | |
| | | | | | | | training improved nurses' CPR knowledge and performance. **Recommendations:** It is necessary to develop simulation-based CPR training programs in which various clinical situations are reproduced. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Sterner, A., Skyvell Nilsson, M., Jacobsson, M., & Eklund, A. (2022). Ability to Care in Acute Situations-The Influence of Simulation-Based Education on New Graduate Nurses. *Journal of Emergency Nursing*, *48*(5), 515–524. https://doi.org/10.1016/j.jen.2022.05.005 | | | | | | | |
| To explore the influence of simulation-based education on perceived ability to provide care in acute situations among new graduate nurses | Observational pre-test and post-test design, quantitative, descriptive | **Sample:** 109 nurses within 2 years of graduation **Setting:** university hospital in Southwest region of Sweden | **IV:** Nurses in simulation-based education program on acute clinical situations **DV:** Self-perception of ability to care in acute situations | Perception to Care in Acute Situations scale | Wilcoxon signed-rank test and paired sample t tests using SPSS 27 | Simulation-based training significantly changed nurses' perceptions of their ability to care in acute situations (Z = 7877, p < 0.001). Mean score on the Perception to Care in Acute Situations scale was significantly higher post education (d = -1.24, p < 0.001) | **Level of evidence:** II-A **Worth to practice:** Benefits of simulation training can be observed in a variety of acute clinical scenarios both in outpatient and inpatient settings. **Strengths:** Validated and psychometric-tested instrument for measuring perception of ability. **Weaknesses:** No randomization **Feasibility:** Use of pre- and post-assessment tool to evaluate participants in an educational intervention can be generalized to outpatient setting. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Sterner, A., Skyvell Nilsson, M., Jacobsson, M., & Eklund, A. (2022). Ability to Care in Acute Situations-The Influence of Simulation-Based Education on New Graduate Nurses. *Journal of Emergency Nursing*, *48*(5), 515–524. https://doi.org/10.1016/j.jen.2022.05.005 | | | | | | | |
| | | | | | | | **Conclusion:** Simulation-based training improves newly graduated nurses' perception of their ability to care in acute situations.<br><br>**Recommendations:** Simulation based training is an effective learning opportunity for newly graduated nurses. |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Takashiki, R., Komatsu, J., Nowicki, M., Moritoki, Y., Okazaki, M., Ohshima, S., Hasegawa, H., Nomura, K., Ouchi, G., Berg, B. W., Shirakawa, H., Nakayama, K., & Takahashi, N. (2023). Improving performance and self-efficacy of novice nurses using hybrid simulation-based mastery learning. *Japan Journal of Nursing Science: JJNS*, *20*(2), e12519. https://doi.org/10.1111/jjns.12519 | | | | | | | |
| To investigate the effectiveness of simulation-based mastery learning in improving second-year nurse competence and self-efficacy in caring for acute chest pain | **Design** – Single site, single cohort, educational intervention with pre-, post- and 5 months post-intervention assessment<br><br>**Conceptual framework:** Bloom and Carroll's mastery learning theory and Bandura's social cognitive theory | **Sample:** 37 novice nurses at an advanced acute care.<br>**Setting:** A hospital in Northern Japan | **IV:** Nurses<br>**DV:** Performance and self-efficacy | Study-developed and validated performance evaluation checklist. | Nonparametric Friedman test with post-hoc Dunn's multiple comparison test, and Wilcoxon's signed-rank test using AI-Therapy Statistics BETA | Clinical performance (p <0.0001) and self-efficacy scores (p<0.0001) were higher in the post- and 5 months post-intervention assessment than the pre-intervention assessment. | **Level of evidence:** II-A<br><br>**Worth to practice:** This study shows the benefits of a simulation-based education program may persist beyond the immediate post-intervention period.<br><br>**Strengths:** Well-described validation of instruments used.<br><br>**Weaknesses:** Small sample size<br><br>**Feasibility:** The concept of simulation-based training may be generalized to train nurses in a setting – outpatient or |

| Purpose of article or review | Design / Method / Conceptual framework | Sample / setting | Major variables studied with definitions | Measurement of major variables | Data analysis | Study findings | Level of evidence (critical appraisal score) / Worth to practice / Strengths and weaknesses / Feasibility / Conclusion(s) / Recommendation(s) / |
|---|---|---|---|---|---|---|---|
| APA Reference: Takashiki, R., Komatsu, J., Nowicki, M., Moritoki, Y., Okazaki, M., Ohshima, S., Hasegawa, H., Nomura, K., Ouchi, G., Berg, B. W., Shirakawa, H., Nakayama, K., & Takahashi, N. (2023). Improving performance and self-efficacy of novice nurses using hybrid simulation-based mastery learning. *Japan Journal of Nursing Science: JJNS*, *20*(2), e12519. https://doi.org/10.1111/jjns.12519 | | | | | | | |
| | | | | | | | inpatient.<br><br>**Conclusion:** Simulation-based learning is an effective tool for improving skill and self-efficacy in management of chest pain<br><br>**Recommendations:** Further study on whether improvements in skills and confidence observed after simulation-based learning transfer to the bedside |

**Appendix B.**

**Tanner's Model of Clinical Judgement: A Theoretical Framework of Noticing, Interpreting, Responding, and Reflecting**
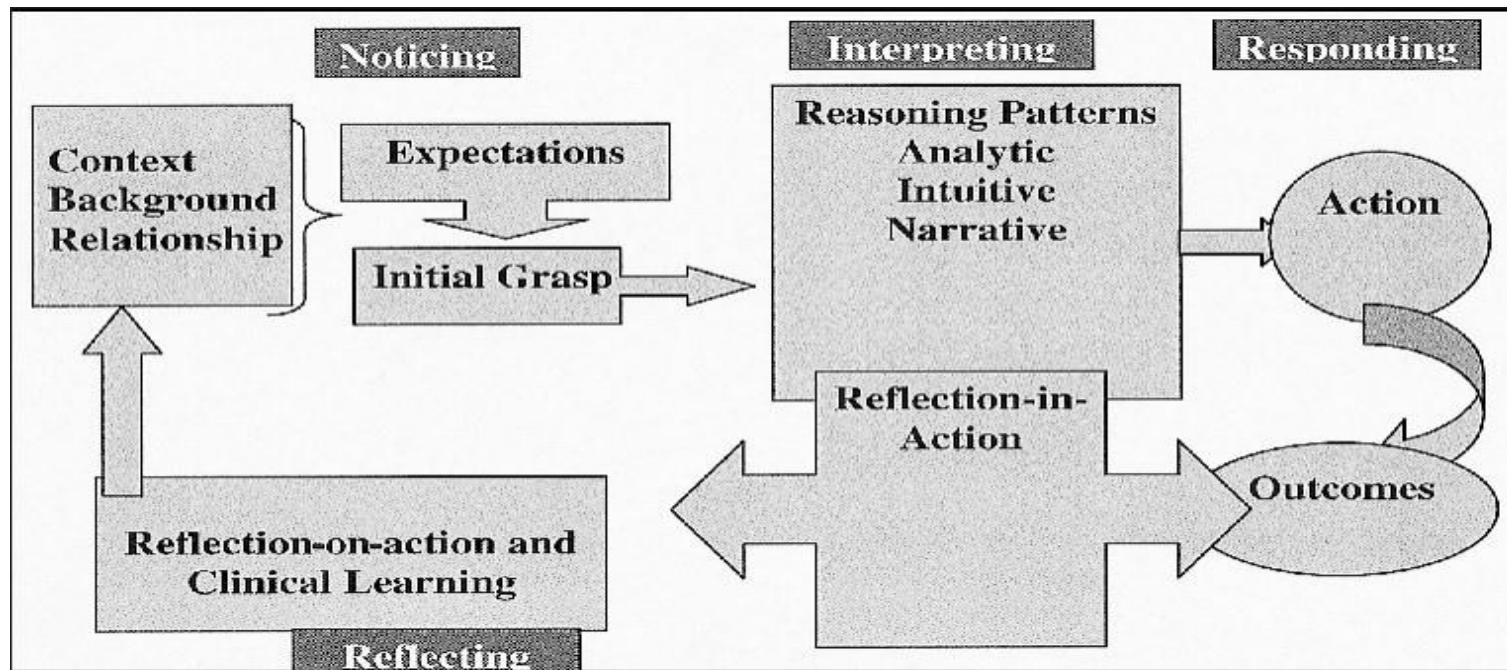
**Appendix C**

**Pre-and Post-Intervention Questionnaire to Improve Nurses' Knowledge and Self-Confidence.**

We are preparing an educational intervention to improve nurses' knowledge and self-confidence in recognizing and intervening appropriately when a patient's condition deteriorates. Therefore, we want to assess staff level of knowledge and confidence and how we can use the information to develop the educational intervention to enhance nurse's knowledge and self-confidence.

**Abbreviations:**

MAR – Medical Alert Response

**Please check the appropriate boxes and fill in the blanks as required.**

1. Highest level of nursing education
   o MA
   o LVN
   o LPT
   o RN

2. What Department are you in?
   o Internal Medicine
   o Family medicine
   o Pediatrics
   o OBGYN
   o Ophthalmology
   o Behavioral Health

- o Urgent care Clinic
- o Administration

3. Have you had any previous experience in calling Medical Alert Response (MAR) or 911 for a patient?
    - o Yes
    - o No
    - o Unsure

4. Have you had any previous experience in responding to MAR call?
    - o Yes
    - o No
    - o Unsure

5. Would you like to participate in a early recognition and intervention teaching and mock code?
    - o Yes
    - o No
    - o Unsure

6. What would you like to include in the mock code?

7. **Self-Confidence Scale**

| Item: How much confidence do you have in | Not Confident 1 | Somewhat not confident 2 | Somewhat confident 3 | Moderately confident 4 | Very confident 5 |
|---|---|---|---|---|---|
| How much confidence do you have in recognizing Signs/symptoms of cardiac arrest, respiratory or neurological event in a | | | | | |

| patient that is deteriorating? | | | | | |
|---|---|---|---|---|---|
| How much confidence do you have in accessing chest pain, shortness of breath, and change in the level of consciousness in a patient that is deteriorating? | | | | | |
| How much confidence do you have in responding to a patient who is complaining of chest pain, shortness of breath, and change in the level of consciousness | | | | | |
| How much confidence do you have in evaluating the effectiveness of intervention or response to chest pain, shortness of breath, and change in the level of consciousness | | | | | |

8. **Nurse's Knowledge of patient deterioration and confidence to intervene.**

| Item | Strongly disagree 1 | Disagree 2 | Neutral 3 | Agree 4 | Strongly agree. 5 |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| I know how to measure a patient's vital signs | | | | | |
| I can identify abnormal vital signs | | | | | |
| I can recognize the change in a patient's vital signs | | | | | |
| I can communicate a patient's vital signs information to the provider | | | | | |
| I know how to call MAR | | | | | |
| I know how to call 911 and provide vital information to paramedics | | | | | |
| I know where AED, oxygen, and respiratory emergency bags are located | | | | | |

Adapted from Berning, B. (2018). Development and validation of a questionnaire on nurses' knowledge and recognition of early signs of clinical deterioration
https://open.uct.ac.za/bitstream/handle/11427/29318/Berning_Developmentvalidation_2018.pdf?sequence=1&isAllowed=y.

9. **Nurse's Knowledge of patient deterioration and applicable intervention**
   Please look at the following three scenarios and pick an appropriate intervention.

   a. I will notify the provider, call MAR or 911 if my patient have the following vital signs.
   Systolic BP **80,** Heart rate **40,** Temperature **95.0F,** O2 saturation **90,** Respiratory rate **8,** Level of Consciousness **confused.**

   - o Notify Provider (Physician/NP)
   - o Call MAR
   - o Call 911

   b. I will notify the provider, call MAR or 911 if my patient have the following vital signs.
   Systolic BP **95,** Heart rate **60,** Temperature **96.0F,** O2 saturation **92,** Respiratory rate **12,** Level of Consciousness **alert**

   - o Notify Provider (Physician/NP)
   - o Call MAR
   - o Call 911

   c. I will notify the provider, call MAR or 911 if my patient have the following vital signs.
   Systolic BP **200,** Heart rate **150,** Temperature **95.0F,** O2 saturation **98,** Respiratory rate **8,** Level of Consciousness **confused.**

   - o Notify Provider (Physician/NP)
   - o Call MAR
   - o Call 911

## Appendix D

## Gap Analysis

| | | |
|---|---|---|
| Area under consideration: This educational intervention is aimed at improving nurses' knowledge and self-confidence and improving the awareness of patients' condition especially in real time situations. | | |
| **Desired State** | **Current State** | **Action Steps** |
| Improve nurses' Knowledge and self-confidence | A lack of knowledge and self-confidence in nurses for recognizing and implementing appropriate intervention when there is a change in patient condition. | provide educational intervention to improve the knowledge and self-confidence of nurses in ambulatory and urgent care clinics in detecting early deterioration, intervening, and evaluating changes in patient condition using a consistent assessment tool. |
| Improve nurses' awareness and support of the team during medical emergency | Lack of support from nurse during medical emergency | Use the pre-assessment questionnaire to evaluate and the educational intervention to enhance their knowledge and awareness. |
| Establish annual educational intervention for nurses | The is no current educational intervention for nurses in the outpatient clinics | Develop educational process using didactic and low fidelity simulation for nurses as annual competency |

**Appendix E**

**Gantt Chart**

| ID # | DNP Project Gannt Chart | 2021 | | | | | | | | 2022 | | | | | | | | | | | | 2023 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | May | June | July | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul |
| | **Phase 1 - Assessment Phase** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | **Identification of Project site** | | | X | | | | | | | | | | | | | | | | | | | | | | | | |
| | GAP Analysis | | | | X | | | | | | | | | | | | | | | | | | | | | | | |
| | Literature Review | | | | | X | X | X | X | X | X | X | | | | | | | | | | | | | | | | |
| | WBS | | | | | | X | | | | | | | | | | | | | | | | | | | | | |
| | SWOT Analysis | | | X | | | | | | | | | | | | | | | | | | | | | | | | |
| | Completion of Online Module - Protecting Human Subjects - IRB Training | | | X | | | | | | | | | | | | | | | | | | | | | | | | |
| | Statement of Non-Research Determination | | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| | Letter of Support from Agency | | | | | | | | | X | | X | | | | | | | | | | | | | | | | |

| Task | 2021 May | June | July | Aug | Sep | Oct | Nov | Dec | 2022 Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | 2023 Jan | Feb | Mar | Apr | May | Jun | Jul |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase 2 - Design Phase** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Development of Pre- and Post-Assessment Questionnaire | | | | | | | | | | | | ■ | | | | | | | | | | | | | | | |
| Identification and letter of permission to use identified measuring tools | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | |
| Development of curriculum and educational materials | | | | | | | | | | | | | ■ | | | | | | | | | | | | | | |
| **Phase 3 - Implementation Phase** | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Pre-assessment and survey questionnaires | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | |
| Didactic session for participants | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | |
| Low fidelity Simulation/Mock Code | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | |
| Post-assessment and survey questionnaire | | | | | | | | | | | | | | | | | | | ■ | | | | | | | | |
| Data Analysis | | | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | |

**Appendix F**

**Work Breakdown Structure**



Responding to a deteriorating patient: An educational intervention for an outpatient clinic nurses

| Literature | Budget | Education | Implementation | Data colection/Evaluatiom |
|---|---|---|---|---|
| PICO | Return on investment/Cost Avooidance | Review current policy on Medical Alert Response | Create staffing schedule for day 1 and 2 of implementation | Data collection tool search |
| Literature search and synthesis | Meet with HCM | Meet with Staff Developer | Distribute Pre-implementation survey | create pre-and post-intervention surveys |
| Appresial of evidence | Meet with Director | Create training Curriculum | Day 1 - Didactic session | Collect surveys |
| Create evidence table | Leadership approval | Review Curriculum with staff developer | Day 2 - Simulation sessions | Analyze survey |
| | | | DIstribute post-intervention survey | Evaluate success |

# Appendix G

## Responsibility/Communication Matrix

| Communication | Who (by/to whom) | Frequency | Goal | Route |
|---|---|---|---|---|
| **Academic Advisors** | | | | |
| Dr. Nicholas Webb | DNP Student Project Lead | Weekly | The weekly check in with between the project manager and the Academic Adviser involve: Review project status, discuss barriers and updates, share progress | The communication is via email, zoom, phone calls, text messages and in-person |
| Dr. Elena Capella | | As needed | To received feedback from draft prospectus | Email, zoom if necessary |
| **Project Sponsors (Corporate/System Nursing Leadership)** | | | | |
| Director of Ambulatory Services | DNP Student Project Lead | As needed | Discussed intention of to use project site for educational intervention | In person meeting, telephone |
| Project Site Manager | DNP Student Project Lead | Twice a week | Review project from a systems perspective, identity barries, strategize ways to mitigate barriers and provide updates | Face to face, Email, phone calls |

| Communication | Who (by/to whom) | Frequency | Goal | Route |
|---|---|---|---|---|
| Director of Staff Development | DNP Student Project Lead | As needed | Discuss educational intervention to improve nurses' knowledge and self-confidence. Discussed curriculum building to facilitate education | In person meeting |
| Ambulatory Services Staff Developer | DNP Student Project Lead | Weekly | Discuss educational intervention, discuss curriculum and building of curriculum, pre and post assessment questionnaire | In person meetings, phone calls |
| Nursing Staff (RNs, LVNs, and MAs) | DNP Student Project Lead | As needed | Informed about the upcoming educational intervention | Microsoft Team meetings, In person team meeting, emails |

# Appendix H

## SWOT Analysis

| | Favorable/Helpful | Unfavorable/Harmful |
|---|---|---|
| **Internal (attributes of the organization)** | **Strengths**<br>• Project site leadership support<br>• Project aligns with organization mission and values.<br>• There is sufficient evidence to support implementation.<br>• Enhanced educational opportunities for nurses to improve their knowledge and self confidence | **Weaknesses**<br>• Exposes gap in nurses' knowledge and care delivery.<br>• Extra staff workload,<br>• Possible alarm fatigue in urgent care, especially when a patient is on a continuous pulse and oxygen saturation monitor.<br>• Absence of staff from work<br>• Insufficient nursing staff to cover the clinic on the day of the educational intervention |
| **External (attributes of the organization)** | **Opportunities**<br>• Standardized activation and intervention process when there is change in patient condition.<br>• Bridging the gap in nurses' knowledge,<br>• Improved organization's reputation,<br>• Improved quality of care to patients | **Threats**<br>• Labor union resistance to training<br>• COVID-19 social distancing restriction |

# Appendix I

## Comprehensive Financial Analysis/ROI

| Items | Cost | Cost Avoidance | ROI | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|---|
| **Planning and Development** (Add up hours for DNP Project Lead and multiply by hourly wage) | $18,000 | | | | | |
| **Supplies** | $100 | | | | | |
| **Equipment** | 0 | | | | | |
| **Information Systems** | 0 | | | | | |
| **Outreach and Communication** | 0 | | | | | |
| **External Consultants** | 0 | | | | | |
| **Training** (Add Up Hours for total number of RNs, LVNs, MAs and multiply by average hourly wage) | $2,830 | | | | | |
| **Data Analysis** (Add up hours for DNP Project Lead and multiply by hourly wage) | $327 | | | | | |
| **Evaluation and Project Report** (Add up hours for DNP Project Lead and multiply by hourly wage) | $327 | | | | | |
| **Ambulance cost to transport patient** | | $664 | | $664 | $683.92 | $703.84 |
| **Average cost hypoglycemia Emergency room treatment** | | $3,106 | | $3,106 | $3,199.18 | $3,292.36 |

| Items | Cost | Cost Avoidance | ROI | Year 1 | Year 2 | Year 3 |
|---|---|---|---|---|---|---|
| **Average cost of hypoglycemia hospital stay at 1.7 days** | | $3,551 | | $3,551 | $3,657.53 | $3,764.06 |
| **Average prehospital cardiac arrest** | | $37,000 | | $37,000 | $38,110 | $39,220 |
| **Average cost of cardiac arrest hospital stay** | | $300,000 | | $300,000 | $309,000 | $318,000 |
| **Average malpractice cost** | | $1,000,000 | | $1,000,000 | $1,030,000 | $1,060,000 |
| **Total Costs** | $21,584 | $1,344,321 | -$1,322,737 | | | |

Assumptions:

Average hourly rate for RN = $90; LVN = $35; MA = $26

Average hourly rate for DNP Student = $109

This is just for one incident of cardiac arrest.

**Appendix J**

**Results analysis narrative graph, table, and figures**

**SPSS Data Analysis**

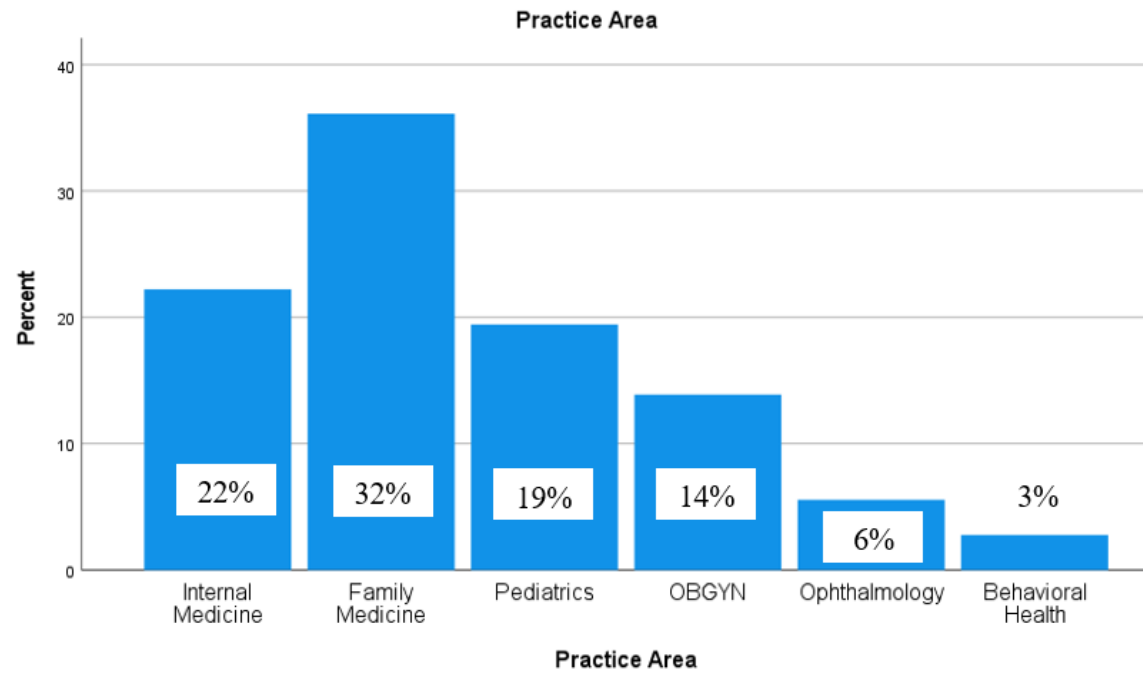**Figure 1 – Practice Areas of total pre- and post-implementation participants**



Practice Area

**Table 1**

*Sociodemographic Characteristics*

| Baseline characteristic | Pre-Implementation (*n* =21) | | Post-Implementation (*n* = 16) | | Full sample (*N* =37) | |
|---|---|---|---|---|---|---|
| | *n* | *%* | *n* | *%* | *N* | *%* |
| Highest Level of Education | | | | | | |
| MA | 3 | 14% | 3 | 19% | 6 | 16% |
| LVN | 11 | 52% | 9 | 56% | 20 | 54% |
| LVT | 1 | 5% | 0 | 0 | 1 | 3% |
| RN | 6 | 29% | 4 | 25% | 10 | 27% |
| Department Worked | | | | | | |
| Internal Medicine | 4 | 20% | 4 | 26% | 8 | 22% |
| Family Medicine | 6 | 30% | 6 | 40% | 12 | 32% |
| Pediatrics | 4 | 20% | 3 | 20% | 7 | 19% |
| OBGYN | 4 | 20% | 1 | 7% | 5 | 14% |
| Ophthalmology | 1 | 5% | 1 | 7% | 2 | 6% |
| Behavioral Health | 1 | 5% | 0 | 0 | 1 | 3% |
| Experience | | | | | | |
| Calling Medical Alert Response (MAR) or 911 for a patient? | | | | | | |
| Yes | 13 | 62% | 8 | 50% | 21 | 57% |
| Responding to MAR call? | | | | | | |
| Yes | 14 | 67% | 8 | 50% | 22 | 60% |
| Participate in early recognition and intervention teaching and mock code? | | | | | | |
| Yes | 16 | 76% | 14 | 88% | 30 | 81% |

**Table 2 - Independent Sample T-Tests of Confidence and Knowledge Between Pre- and Post-Implementation Groups**

| | Pre-Implementation (n =21) | Post Implementation (n =16) | t | p | d |
|---|---|---|---|---|---|
| | Mean SD | Mean SD | | | |
| Overall Confidence | 15.05 (4.11) | 17.13 (3.30) | -1.65 | .054 | -.55 |
| Overall Knowledge | 31.43 (5.41) | 32.31 (4.20) | -.54 | .30 | -.18 |

*Note: T = Independent Sample T-Test, \*p < .05-statistically significant, d – Cohen's d (effect size).*

**Statement of Non-Research Determination**



**Doctor of Nursing Practice**

Statement of Non-Research Determination (SOD) Form263-

*The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E*

General Information

| | | | |
|---|---|---|---|
| **Last Name:** | Ikeme | **First Name:** | Angela |
| **CWID Number:** | 20646764 | **Semester/Year:** | 3rd Semester, Spring 2022 |
| **Course Name & Number:** | Practicum III – Meso System, N792E | | |
| **Chairperson Name:** Dr. Nicholas Webb | | **Advisor Name:** | |
| **Second Reader Name:** | Dr. Elena Capella | | Dr. Nicholas Webb |

Project Description

1. Title of Project: Responding to a deteriorating patient: An educational intervention for outpatient clinic nurses.

    2. Brief Description of Project

This quality improvement project aims to provide educational intervention to improve the

knowledge and self-confidence of nurses in ambulatory and urgent care clinics in detecting early

deterioration, intervening, and evaluating changes in patient condition using a consistent

assessment tool. A review of the organization policy indicated a process to call the Medical Alert Response (MAR) Team. However, there was no established algorithm for nurses to escalate or implement interventions when they notice a change in patient condition. An informal survey of ten assistant nurse managers in the ambulatory and urgent care clinics asked their calling process for MAR and what interventions are used yielded inconsistent practices across the board. An unofficial survey of clinic nurses suggested a lack of knowledge and self-confidence in nurses for recognizing and implementing appropriate intervention when there is a change in patient condition. This is an educational quality improvement project done at a local government healthcare organization. It is developed to enhance nurses' knowledge, self-confidence, critical thinking, and clinical judgment. There is an organizational policy on calling MAR. However, there is no process for continual education program for the nurses to enhance their knowledge and confidence.

3. AIM Statement: What are you trying to accomplish?

The purpose of the project is to improve the knowledge and self-confidence of nurses in the outpatient clinic to recognize early deterioration, intervene, and evaluate changes in patient conditions. The aim is to achieve 10% improvement from baseline to post-intervention using Berning's 2018 questionnaire on nurses' knowledge and recognition of early signs of clinical deterioration.

*Complete the AIM statement by answering the following elements:*

**PICO(T) Question**

For nurses in an outpatient clinic (P), how will an educational intervention that incudes didactic and low fidelity simulation education (I) compared to current baseline education (C) enhance

nurses' knowledge and self-confidence in their ability to recognize early deterioration in a patient's condition and activate appropriate interventions (O) immediately post-intervention (T)?

4.  Brief Description of Intervention (150 words):

**Description of Student Project:**

The intervention is a two-day educational session for nurses in an outpatient clinic. Day one of the intervention is didactic session and day two is case scenario simulation sessions. Pre- and post-questionnaires were given to assess base line knowledge and confidence and post intervention knowledge and confidence acquired. A pre-and post-intervention survey using Berning's nurse's knowledge and confidence tool (Berning, 2018) will be used for the outcome measurement.

4a. How will this intervention be implemented?
- This project will be conducted at a county government operated outpatient clinic in Northern California.
- The focus of the intervention was on nurses with outcome on patients.
- The stakeholders and participants were informed via email, and or during staff meeting.
  5. Outcome measurements: How will you know that a change is an improvement?
     o Berning (2018), the Questionnaire on Nurses' Knowledge and Recognition of Early Signs of Clinical Deterioration (Berning, 2018)
     o Pre- and post-intervention questionnaires
       - Demographic information
       - Likert style questionnaires contain 3-subscales of 14 questions to assess knowledge and confidence in recognizing and responding to early signs of clinical deterioration and confidence.
     o CQI/Data Collection Tools
       - SurveyMonkey
       - Excel database
       - IBM SPSS version 28

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**DNP Statement of Determination**

**Evidence-Based Change of Practice Project Checklist***

*The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E*

Project Title:

| Responding to a deteriorating patient: An educational intervention for an outpatient clinic nurses |
|---|

| Mark an "X" under "Yes" or "No" for each of the following statements: | Yes | No |
|---|---|---|
| The aim of the project is to improve the process or delivery of care with established/ accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes. | X | |
| The specific aim is to improve performance on a specific service or program and **is a part of usual care**. All participants will receive standard of care. | X | |
| The project is **not** designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does **not** follow a protocol that overrides clinical decision-making. | X | |
| The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **not** develop paradigms or untested methods or new untested standards. | X | |
| The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **not** seek to test an intervention that is beyond current science and experience. | X | |
| The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP. | X | |
| The project has **no** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research. | X | |
| The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients. | X | |
| If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: *"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."* | X | |

**Answer Key:**

- If the answer to <u>all</u> of these items is "Yes", the project can be considered an evidence-based activity that does <u>not</u> meet the definition of research. IRB review is not required. Keep a copy of this checklist in your files.

- If the answer to <u>any</u> of these questions is "No", you must submit for IRB approval.

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

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used: http://answers.hhs.gov/ohrp/categories/1569

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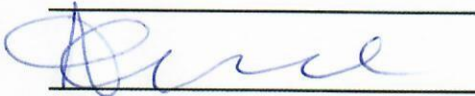
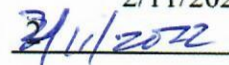**DNP Statement of Determination**

**Evidence-Based Change of Practice Project Checklist Outcome**

*The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E*

X☐ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). **Student may proceed with implementation.**

☐This project involves research with human subjects and **must be submitted for IRB approval before project activity can commence.**

Comments:

| | | | | |
|---|---|---|---|---|
| **Student Last Name:** | Ikeme | **Student First Name:** | Angela | |
| **Student Signature:** | *[signature]* | **Date:** | 2/11/202 / 2/11/2022 | |
| **Chairperson Name:** | Nicholas R. Webb, RN, DNP, ESQ | | | |
| **Chairperson Signature:** | *[signature]* | **Date:** | 4/23/23 | |
| **Second Reader Name:** | *[signature]* 6/2/22 | **Date:** | | |
| **Second Reader Signature:** | | | | |
| **DNP SOD Review Committee Member Name:** | | | | |
| **DNP SOD Review** | | **Date:** | | |

## Appendix L

## Letter of Support from Agency

**GO PUBLIC!**

**SANTA CLARA VALLEY MEDICAL CENTER**
Hospital & Clinics

Valley Health Center Gilroy
7475 Camino Arroyo
Gilroy, CA 95020
Fax: 408-852-2232
scvmc.org

January 14, 2022

To whom it may concern:

This is a letter of support for Angela Ikeme to implement her DNP Comprehensive Project Development and Implementation of Educational Intervention for Nurses Using Modified Early Warning Score (MEWS) Valley Health Center Gilroy.

We may give her permission to use the name of our agency in her DNP Comprehensive Project Paper and in future presentations and publications once the contents have been reviewed and approved. If you have any questions, feel free to contact me at 408.852.2222.

Sincerely,

Tracy E. Stephens, M.S.
Health Center Manager
Valley Health Center Gilroy
Santa Clara County Valley Medical Center

Santa Clara Valley Medical Center is division of the Santa Clara Valley Health & Hospital System.
County of Santa Clara. Affiliated with Stanford University School of Medicine.

**Appendix M**

**Lesson Plan for the Educational Intervention**

The purpose is to use the existing MAR process to develop and implement educational intervention for nurses in ambulatory and urgent care clinic to improve nurse's knowledge and self-confidence with change in patient condition to enhance nurses' knowledge and confidence.

**Objective:**

1. Recognize early signs and symptoms of deterioration in patients. for example, patients with impending cardiac arrest or hypoglycemia
2. Know when to activate MAR/911 when a patient's condition deteriorates.
3. Know how to communicate with medical team.
4. Know available resources in the clinic to manage changes in patient condition.
5. Know where AED, oxygen and respiratory emergency bags are located.

**Plan:**

1. Create an attendance schedule to accommodate staffing for the clinic during training.
2. Set up the training room with equipment and supplies needed for the training.
3. Day one – one-hour didactic training
4. Day two – two-hours per group of 4-5 participants in simulation session

**Implementation:**

- Provide site (website or handouts) to read up diseases, e.g. hypertension and diabetes
- Didactic education by staff developer on the following
- Didactic education signs and symptoms of impending cardiac arrest and or hypoglycemia
- Communicate patient situation.
- Identification of location of AED, oxygen and respiratory emergency bags are located.
- Low fidelity simulation mock code
- Evaluation

**Case Scenarios:**

| #1 Cardiac: | Hypothesis: | Triage Assessment: | Intervention: |
|---|---|---|---|
| A patient came into the clinic with complaint of shortness of breath (dyspnea), mild chest pain radiating to the arm. The patient appears sweaty, and pale in color | Myocardial infarction (heart attack) Pulmonary embolism | Vital signs (temp, BP, resp, HR, O2 sat ACVUP) using MEWS scale | Notify provider, prepare to get EKG, call MAR/911, AED |
| **#2 Hypoglycemia** | **Hypothesis:** | **Triage Assessment:** | **Intervention:** |
| A patient with known type 2 diabetes came to the clinic for routine appointment with c/o fatigue, dizziness, shakiness, sweaty and slightly pale. Patient reported that he did not eat breakfast because he had a fasting lab | Hypoglycemia | Vital signs (temp, BP, resp, HR, O2 sat ACVUP) using MEWS scale, POCT – fingerstick BG | Notify provider, get juice and crackers, call MAR/911, AED, get glucagon |