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Effectiveness of Education on Modified Early Warning System for Nurses

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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2020

Abstract

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MS, Walden University, 2014

BS, Indira Gandhi National University, 2004

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

The research problem at the practicum site was a delay in recognizing patient's deterioration due to lack of nurses' knowledge with early warning signs. It is important to address the problem as the Quality Department noted the delay in identification of patient decline and treatment from mortality case reviews, rapid response team and Code Blue debriefing analysis and missed sepsis identification. A further gap analysis revealed an inadequacy of staff knowledge with warning signs. The purpose of this project was to educate nurses on the Modified Early Warning System (MEWS), a patient assessment scoring system based on six physiological parameters. The theoretical foundation for the project was Knowles' adult learning theory also called as theory of Andragogy. The research question searched the effectiveness of MEWS education for Registered Nurses (RNs). The methodology for the MEWS education entailed a Power Point Presentation, MEWS flow sheet practice, pre and a posttest in classroom setting. The inclusion criteria were 26 RNs of the pilot medical unit despite of their education, experience, or the employment status. The data analytic procedure included a paired *t*-test to calculate mean and standard deviation. The key results of pretest were *Mean (M)* = 0.41, *Standard D*eviation (SD) = 0.1696 and the posttest were $M = 0.97$, $SD = 0.0507$. In posttest 24 RNs scored above 90% and two RNs scored above 80% which had determined the effectiveness of MEWS education. The recommendation is to expand MEWS education to other units of the community hospital. The positive social change is improved patient outcomes within the organization and reduction of nation's health care cost by limiting patient transfer to a higher level of care and decreased mortality rates.

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Dedication

To my husband and my son for the motivation, love, and support offered to achieve my dream. You both were very understanding and served as my pillars of strength throughout my journey.

To my parents for all their hardship and sacrifices to give education to their children, making me the first one in our family to pursue a doctoral degree. I miss you, Mom and Dad; I am sure you both are very proud and bless me from Heaven.

Acknowledgments

I would like to thank God for all his blessings and for providing me strength in achieving the significant milestone of pursuing my doctoral degree. I take this opportunity to thank my chair Dr. Nichols, my second committee member Dr. Schweickert, Dr. Minnick, and Dr. Long for guiding me through the process of completing my DNP project. Thank you, Dr. Nichols and Dr. Schweickert, for being patient in answering all my questions, texts, and e-mails. I would also like to thank my family and friends for their motivational quotes and talks when I was down.

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Section 1: Nature of the Project

Introduction

In the United States, approximately 292,000 adult cardiac arrests occur every year (Holmberg et al., 2019). The subtle changes appear 6 to 8 hours before the patient's condition clearly worsens. Early recognition of decline will reduce Code Blue alerts, ICU transfers, length of stay, and healthcare costs (Bunkenborg et al., 2016). Nurses are frontline staff, assessing patients using a standard nursing process to determine care plans and interventions. To effectively and consistently identify patient deterioration, nurses need the proper resources.

In 1997, the United Kingdom created an early warning system to prevent delays in early identification of patient deterioration. Changes made to patients' fundamental physiological parameters led to the system's renaming as the Modified Early Warning System (MEWS; Weenk et al., 2018). The MEWS score assists healthcare providers in early recognition of changes in the patient's physiologic parameters, which are indicators of patient deterioration. The MEWS selected for this DNP project measures heart rate, level of consciousness, oxygen saturation, respiratory rate, systolic blood pressure, and temperature, with each parameter scored from 0 to 3. Adding them up results in a total MEWS score. A nurse will act on the MEWS algorithm—monitoring patients more frequently, notifying physician or physician assistant, and calling a rapid-response team (RRT), when necessary. MEWS helps nurses predict a patient's prognosis, prevents cardiac arrests, and decreases patient transfers to higher levels of care (Zografakis-Sfakianakis et al., 2018).

Understanding the MEWS system is critical for nurses in continuously assessing their patients and monitoring vital signs. This staff education project sought to improve knowledge of MEWS among the nursing staff, empowering them to make clinical decisions based on a patient's MEWS score. An identified gap in the practicum site was that nurses often failed to recognize the subtle signs of patient deterioration, as indicated by the MEWS' six specified physiologic parameters. Any delay in identifying changes in these parameters increases the frequency of cardiopulmonary arrest (Code Blue), transfers to the intensive care unit (ICU), organ failure, and death (Al-Kalaldeh, Suleiman, Abu-Shahroor, & Al-Mawajdah, 2019). Novice nurses are not confident enough in making a decision to call a physician or RRT with changes in the vital signs. Therefore, the goal of this staff education project was to enhance the knowledge among the nursing staff and improve their competency in using MEWS.

The Institute for Healthcare Improvement (2013) estimated that 35–40% of unexpected deaths in hospitals were due to the failure to detect subtle signs of patient deterioration. Any delay can lead to poor patient outcomes and increased rates of mortality and morbidity. An evidence-based screening tool will help nurses identify the subtle signs and make the proper clinical decisions to prevent complications (Roney et al., 2015).

Problem Statement

Quality data from this organization's records—including Code Blue documents, electronic medical record reviews, and sepsis documentation— showed a decline in patients' vital signs for more than 6 hours before the RRT was called, thus indicating a

delay in identifying patient deterioration. This delay indicated the need for quality improvement through staff education.

In U.S. hospitals, a nurse calls an RRT upon identifying a significant change in a patient's vital signs (Institute for Healthcare Improvement, n.d.). Checking patient vital signs varies in frequency at the practicum site, which yields a gap in practice: Due to the nursing staff's lack of knowledge, they failed to identify patient decline. Sometimes, increased workload can compromise nurses' critical thinking in identifying patient deterioration and escalating the case (Margo, 2019). In hospitals, patient attrition could be due to an infection or to an exacerbation of symptoms. Careful observation of physiological changes, such as sepsis, and a timely response require critical thinking (Jacob, Duffield, & Jacob, 2017). Novice nurses often do not have the mentorship of seasoned nurses due to high turnover rates with seasoned nurses and they lack the confidence to call an RRT. Therefore, this staff education project focused on improving nursing staff knowledge in identifying patient deterioration and escalating the case to avert patient decline.

Purpose

The purpose of the project was to educate nurses on the MEWS. The MEWS education project seeks to improve nurses' knowledge about the early warning signs of patient decline, leading to better assessment skills and decision making in addressing the alerts. An improved assessment and decision-making will help prevent patient deterioration or complications. The education project was outlined, followed the project steps, and implemented as per the Walden University (2019) DNP staff education manual

guidelines. The MEWS education project objective was to educate the nurses, in the practicum site medical unit, on MEWS by means of a 30-minute classroom education session using a PowerPoint presentation (see Appendix A) and the MEWS flow-sheet practice (see Appendix B). The practice-focused question was whether the 30-minute presentation and MEWS flow sheet practice would improve staff knowledge to calculate the MEWS score, identify patient deterioration, and escalate care according to the MEWS algorithm. The RNs who attended the class would be able to meet the following learning objectives:

- Recognize early warning signs using the MEWS.
- Calculate MEWS scores using the MEWS flow sheet for documentation.
- Describe their intervention based on MEWS.
- Discuss MEWS policy.

The MEWS staff education project helped bridge the nurses' knowledge gap, teach best practices, and empower providers to make the right decisions according to a patient's condition. The MEWS algorithm standardized patient-monitoring based on patients' vital signs, established a consistent communication process and escalated the patient's condition to physicians and advanced practitioners (Race, 2015).

Staff education is critical in achieving the practicum site's goals, including positive patient outcomes. Nurses must have updated theoretical and practical knowledge to be able to recognize, and address patient decline. Improved understanding empowers the nurses and enhances their competencies in delivering high-quality care to patients

(Gagnon et al., 2015). Site leadership and the Nursing Professional Development (NPD) department must provide nurses with the knowledge and confidence to proceed. The capstone project expanded the nurses' competency, bridging the gap between evidence and practice. Implementing best practices in the organization included empowering nurses to use a standardized algorithm to make clinical decisions and notify physicians of patient decline.

Nature of the Doctoral Project

Using MEWS scores leads to early identification of a significant portion of patient deterioration. The providers will take actions based on the patient's MEWS score to prevent significant adverse events during the hospital stay (Smith et al., 2012). An early warning scoring system like MEWS will assist in the initial identification of patient decline (Alam et al., 2014). Subtle changes in patient deterioration appear 6–8 hours before the patient's condition clearly worsens. Early recognition will promote patient safety and improved outcomes (Bunkenborg, Poulsen, Samuelson, Ladelund, & Akeson, 2016). MEWS implementation reduces the number of Code Blue alerts, improving patient outcomes by decreasing mortality rates and length of stay (Parrish, Hravnak, Dudjak, & Guttendorf, 2017). Further, MEWS empowers nurses to identify patient deterioration (Zografakis-Sfakianakis et al., 2018).

The MEWS score has extensive use in the United States and internationally. The system generates a score for six physiological parameters: heart rate, level of consciousness, oxygen saturation, respiratory rate, systolic blood pressure, and temperature. Calculating the total score entails adding the individual parameter scores.

Providers may take action based on the overall score, including increased patient monitoring, physician notification, or RRT. It is critical to train nurses to use MEWS to identify patient deterioration effectively. Early recognition and treatment promote better outcomes and minimizes complications. Therefore, MEWS education by NPD is essential for this hospital.

The project took place in the Northeastern United States. The suburban acute-care community hospital has around 300 beds and serves a diverse population. Staff education was given to 26 of the 27 registered nurses (RNs) in the 39-bed pilot unit. Staff education took place over a 2-week period to accommodate day shift, night shift, and per diem nurses. It was presented in a classroom setting with a PowerPoint presentation and the MEWS practice flowsheet. Nurses completed a pre- and posttest to evaluate the effectiveness of the MEWS education.

Significance

Healthcare organizations use the MEWS in adult, pediatric, and obstetrics populations. The practicum project was a staff education specific to the adult MEWS. Before this DNP project, the practicum site had not used MEWS, thus indicating the need for training and education to promote nurses' competency. The MEWS algorithm guides nurses to make a clinical decision based on a MEWS score. The practicum project's goal was to empower the nurses with adequate training, promoting their competency in using the tool as needed to improve patient outcomes and reduce adverse events.

Near-constant upgrades in healthcare lead to changes in nursing practice and competencies. Staff education is imperative to keep RNs informed of best practices to

deliver evidence-based care (Schneider & Good, 2018). The staff education project on MEWS sought to create awareness among the nursing staff about early warning signs of patient deterioration, increasing the providers' competency in calculating the MEWS score and timely escalation of any patient decline like calling the house PA/NP for an assessment or calling an RRT. Further, the findings of this staff education project suggested the benefit of future educational offerings to the staff to keep current with healthcare updates.

Summary

Nurses at the practicum site were often late recognizing the signs of patient deterioration due to a knowledge deficit of early warning signs. Many healthcare organizations have implemented tools and resources to help and to empower nurses in making appropriate clinical decisions in the delivery of safe patient care. MEWS helps RNs in early recognition of changes in vital signs, enabling the RNs to take action by escalating the situation to physicians before an RRT or Code Blue. Additionally, based on the MEWS score, nurses will monitor patients more frequently, taking additional steps like calling the house PA/NP to assess the patient, or calling an RRT. This DNP project improved nurses' knowledge in the early identification of patient decline by growing their competency in using the MEWS. Besides, the project will promote better quality care in the organization, decreasing Code Blue alerts and ICU transfers.

Section 2: Background and Context

Introduction

At the practicum site, the nurses could not spot the early warning signs of patient decline due to a lack of both knowledge and tools. At times, critical thinking skills were lacking due to nurses' heavy workloads and mentorship. Nurses are frontline staff in assessing and monitoring patients, making it essential for them to recognize early warning signs in a patient's physiologic parameters. Implementation of the MEWS staff education project contributed to improving nurses' knowledge in the detection of patient worsening and their competency in utilizing the MEWS score to take action.

Healthcare organizations must provide the education and resources necessary for staff to fulfill their duties. Organizational and leadership support was required for a successful DNP project. The MEWS education project, developed in adherence with the Walden University (2019) DNP staff education manual, empowered the nursing staff, and improved their knowledge to provide better patient care. The practice question of the staff education project was whether the 30-minute presentation and MEWS flow sheet practice would improve staff knowledge to calculate the MEWS score, identify patient deterioration, and escalate care according to the MEWS algorithm.

Concepts, Models, and Theories

The theoretical foundation for the MEWS staff education project was Knowles' (1970) adult learning theory. According to Knowles, adults have different skills and thus learn differently than do children. The teacher promotes a learning environment with adults rather than just presenting the topic (Henschke, 2011). Adult learners participate in

learning according to their needs, unlike children, who attend classes in response to pressure from parents, teachers, and society. Knowles' six adult learning principles are: "learners' need to know, self-concept of the learner, prior experience of the learner, readiness to learn, orientation to learning, and motivation to learn" (Knowles, Holton, & Swanson, 2012, p. 4).

Nurses are adult learners in need of the most current knowledge to guide their practice. Their professional responsibility is to recognize the importance of learning and to maintain competencies, as required. According to Knowles' (1970) second principle, the self-concept of the learner, adults move from dependency and become self-directed to learn. The learners' prior practice served as a resource for the MEWS educational session. RNs can draw upon their experiences to respond to situations, thus improving the learning environment. The principle of readiness to learn applied to the RNs in the MEWS education project, because they must remain competent to deliver the best patient care. The nursing profession requires lifelong learning to practice as changes in healthcare are inevitable.

In adopting Knowles' (1970) fifth principle, orientation to learn, the nurses could better understand and apply MEWS concepts in their practice. With the MEWS staff education project, the RNs gained knowledge about the subtle signs of patient deterioration and calculating the MEWS score. Knowles' last principle, motivation to learn, applied to the RNs participating in the interactive sessions and practicing with the MEWS tool. Overall, the use of Knowles' adult learning theory promotes a trustworthy

learning environment that supports adults in collaborative learning experiences (Henschke, 2011).

Relevance to Nursing Practice

The MEWS staff education project's purpose was to promote nurses' knowledge and improve their competencies in identifying the subtle signs of patient deterioration and preventing adverse patient outcomes. A delay or failure in recognizing patient deterioration adversely affects patient outcomes and increases mortality and morbidity rates. Bridging the gap of organizational best practices was possible by providing staff education about MEWS. Ongoing education and training are critical to upgrade nurses' competencies and keep them abreast of nursing trends (Schneider & Good, 2018).

Over 200,000 cardiac arrests occur each year among hospitalized patients in the United States (Merchant, Yang, & Becker, 2011; Stewart, Carman, Spegman, & Sabol, 2014). Between one and five of 1,000 patients suffer a cardiac event during hospitalization (Sandroni, Nolan, Cavallaro, & Antonelli, 2007; Stewart et al., 2014). Many organizations have implemented preventive cardiopulmonary arrest protocols to minimize adverse events. The research indicates that patients demonstrate subtle changes in vital signs for several hours before they deteriorate. Assessing and scoring multiple parameters that would otherwise trigger an RRT could lead to a reduction in the number of RRTs. Additionally, with proper identification of symptoms, nurses can recognize signs of deterioration early, responding to the situation by more frequently monitoring vital signs or alerting physicians to the need for evaluation and treatment.

Approximately 80% of cardiac arrests are due to a delay in accurately assessing patient decline (Marshall et al., 2011; Stewart et al., 2014). Inadequate monitoring of vital signs may lead to poor patient outcomes and the reduced effectiveness of RRTs (Wenqi, Wenru, Simon, Ang, & Liaw, 2015). Anecdotal data of RRTs, Code Blues, and missed sepsis identification from the practicum site indicates a delay in identifying subtle signs of patient deterioration. Gagne and Fetzer (2018) proved that MEWS implementation led to early patient deterioration. In a retrospective observational study, Zografakis-Sfakianakis et al. (2018) showed MEWS assisted the nurses in early identification of patient deterioration, with the patient's condition improving by the time RRT arrived. Following a systemic review, Jayasundera, Neilly, Smith, and Myint (2018) confirmed a correlation between MEWS and mortality and morbidity rates among elderly patients admitted to hospitals. MEWS implementation in an academic hospital increased the RRT system's utilization, decreased the use of Code Blues, reduced the mortality rate, and promoted patient safety (Mathukia, Fan, Vadyak, Beige, & Krishnamurthy, 2015).

The practicum site organization had attempted prior initiatives to train the nursing staff in early recognition of patient decline with simulated scenarios, including one for sepsis identification. The hospital also updated RRT criteria with additional indications to assist the nurses in calling the RRT. Despite these efforts, delays in recognizing patient decline remained. The MEWS staff education project was a priority due to its potentially positive impact on patient safety and quality of care. The staff education project prepared the nurses to make correct and timely clinical decisions using an evidence-based early warning scoring system to identify patient decline. Additionally, the staff education

project empowered the nursing staff to use the decision-making algorithm based on the MEWS score.

Local Background and Context

The context of the problem was the delay in early identification of patient decline. Nurses did not monitor vital signs enough to recognize the changes in physiological parameters, including heart rate, level of consciousness, oxygen saturation, respiratory rate, systolic blood pressure, and temperature. The data and information from mortality and morbidity chart review and analyses of RRT, Code Blue, and sepsis code sheets, showed a practice gap in the organization. Additionally, the chart audits indicated that nurses could have more quickly informed physicians or called RRT before the patient's health declined. Any single event of the failure to recognize patient deterioration is an opportunity for improvement.

The project was carried out at a suburban community hospital setting in the Northeastern United States. The acute care hospital has around 300 beds and serves a diverse population. The emergency department can hold up to 63 patients. There are 24 ICU beds and 12 stepdown beds, with 180 beds on the medical and surgical floors. MEWS implementation occurred in all units except the ICU, emergency department, behavioral health, and stepdown units. The DNP student measured MEWS education's effectiveness in a medical unit with 27 RNs and 39 beds. The pilot unit also served patients with substance use disorders, with a department staffed with novice nurses and a high turnover rate. Often, a timely escalation of patient decline does not occur, adversely affecting patient outcomes in the unit.

Role of the DNP Student

An inconsistency in the frequency of monitoring vital signs in the organization led to a delay in recognizing the subtle signs of patient deterioration. Due to a genuine possibility for rapid changes among admitted patients' physiological parameters, implementing staff education on MEWS was critical. The MEWS education, MEWS algorithm, and updated policy for monitoring vital signs contributed to the organization's practice change. As a long-term critical care nurse with unit educator experience, I realized the nurses would benefit from an evidence-based tool to guide their practice. Evaluated from an informatics specialist's perspective, the chart review and data analysis reflected the need for frequent monitoring of vital signs and early identification of patient deterioration to eliminate delays in care. Further root cause analysis indicated a knowledge deficit among nurses about the profound signs of patient worsening and a lack of critical thinking secondary to increased workload. Subsequently, the MEWS staff education project enabled analysis of how nurses will recognize the early warning signs of patient deterioration and take action with the MEWS system's assistance.

As the DNP student, I used the staff education project to train the nurses to use the MEWS system, calculating the MEWS score based on the patient's physiological parameters. I prepared a PowerPoint presentation and MEWS flow sheet practice for classroom training, educating the RNs in the selected medical unit on MEWS and the MEWS scoring tool. The RNs completed pre- and posttests using a sample patient scenario, answering 15 questions regarding the physiological parameters, policy, documentation, and actions taken based on the MEWS score. Analyzing and comparing

pre- and posttest scores provided an understanding of the RNs' knowledge and competency in utilizing the tool to make clinical decisions and their engagement with the MEWS project.

Summary

The organization's identified practice gap was that the nurses did not recognize the early warning signs of patient deterioration and were thus not competent to take action based on patient worsening. Consequently, it was critical to promoting MEWS staff education to advance knowledge and awareness of the early signs of patient worsening. With this training, RNs can take action based on the MEWS algorithm, which will vastly reduce Code Blues and higher patient care level transfers. As the bedside nurses continuously assess and monitor hospitalized patients, they must have advanced knowledge and competency to deliver efficient care. The staff education project on MEWS should decrease the number of Code Blues, shorten the length of stay, reduce the amount of ICU transfers, and increase sepsis identification.

Section 3: Collection and Analysis of Evidence

Introduction

The delay in recognizing patient deterioration at the practicum site was apparent through the mortality and morbidity case review and chart reviews. Also evident was a knowledge deficit among the nurses regarding early recognition. A delay in early identification of patient decline could lead to Code Blue situations, increasing mortality and morbidity rates, escalations in care level, and patients' length of stay, and thus adversely affecting patient outcomes. The MEWS staff education project promoted staff knowledge and improved competencies in early recognition of patient deterioration. The project took place in a medical unit of a community hospital in the Northeastern United States. Twenty-six registered nurses attended the 30-minute educational session and took pre- and posttests. A comparison of the pre- and posttest scores indicated the effectiveness of staff education on MEWS.

Practice-Focused Question

Early identification of patient deterioration will reduce the number of RRTs and help recognize and treat sepsis (Malcolm et al., 2018). Delayed identification of subtle changes in patients' physiological parameters leads to increased RRTs and Code Blues. The practicum site showed a lag in addressing early warning signs, thus impacting mortality and morbidity rates, and affecting patients' quality of care and safety. Furthermore, the site lacked an evidence-based practice tool to empower and assist nurses in clinical decision-making based on patients' physiological parameters. The identified gap and current practice toward the escalation of patient deterioration created an impetus

for providing staff education on MEWS and implementing the MEWS system at the practicum site. This DNP project entailed evaluating the impact of staff MEWS education on early recognition of patient deterioration. The practice-focused question for the project was whether the 30-minute presentation and MEWS flow sheet practice would improve staff knowledge to calculate the MEWS score, identify patient deterioration, and escalate care according to the MEWS algorithm. Successful MEWS implementation requires the RNs' confidence in, and commitment to, using the system and addressing patient decline based on the MEWS score algorithm.

Measuring the success of the staff education project was by determining the effectiveness of MEWS classroom training. The practice question for the staff education project was whether the 30-minute presentation and practice with the MEWS flow sheet would improve staff knowledge to calculate the MEWS score, identify patient deterioration, and escalate care according to the MEWS algorithm. The practice-focused question emerged from the evidence that staff knowledge about MEWS assisted in early identification of patient worsening, with fewer RRTs, early sepsis identification, reduced Code Blue notifications, and decreased length of stay (Parrish et al., 2017).

It is necessary to understand some operational definitions as used in this project.

Code Blue: A cardiac or respiratory arrest situation that requires immediate patient resuscitation.

Evidence-based practice: "Evidence-based practice is the conscientious use of current best evidence in making decisions about patient care" (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000).

Modified Early Warning System: Administration of the MEWS generates a score based on patients' physiological parameters, including heart rate, level of consciousness, oxygen saturation, respiratory rate, systolic blood pressure, and temperature. MEWS scores for each parameter range from 0 to 3, with a total score computed by summing all six parameters. Calculating MEWS is according to the following scale:

Scores	0–2: GREEN	3: YELLOW	4: ORANGE	≥ 5: RED
Nursing actions	Continue to monitor per unit standard	Monitor vital signs frequently (every 2 hours) x 3. If MEWS score is 3, notify the PA/NP	Take action! RN will notify PA/NP to evaluate the patient	CODE RRT

PA = physician assistant; NP = nurse practitioner; RN = registered nurse; RRT = rapid response team.

Figure 1. *MEWS calculation scale.*

Nursing Professional Development: *The NPD department identifies the educational needs in the organization, and then plan and implements the educational sessions.*

Performance improvement team: The PI team performs mortality and morbidity chart reviews on a regular basis.

Rapid response team: Hospital staff call the RRT when there is a change in a patient's condition specific to vital signs, chest pain, suspected sepsis, or any acute changes in mental status.

Sources of Evidence

The MEWS staff education project was necessary based on the delay in early recognition of patient deterioration and timely response. The practice gap was identified through mortality and morbidity chart reviews in the patient's electronic medical record (EMR), RRT and Code Blue data analysis, and sepsis identification data review. As a clinical informatics specialist, I determined that RNs could have addressed the subtle signs earlier to improve patient outcomes from these reviews. The rapid response and the Code Blue debriefing information supports the identified gap in patient monitoring. Vital signs were not performed or documented in the EMR for a while.

Pre-implementation reviews and analyses incorporated charts and data for the six months from June 2019 to December 2019 to support implementing MEWS in the organization to improve patient outcomes. In general, patients' vital signs declined in the 4–6 hours before RNs called for RRT. Most of the time, the RRTs were called due to changes in the patient's mental status or abnormal vital signs, such as increased or decreased heart rate, high respiratory rate, or low oxygen saturation levels. The 6-month review also showed delayed identification of sepsis in patients. Further assessment of staff knowledge indicated a lack of competency and critical thinking in escalating patient decline and subtle signs of physiological parameters. A short-staffing situation and high

turnover rate also impacted the nurses' critical thinking skills. The novice nurses in the selected medical unit lacked mentoring or support from the experienced nurses.

The practice-focused question emerged based on available evidence that staff knowledge about MEWS assisted in early identification of patient deterioration, thus reducing RRTs, Code Blue alerts, and patient length of stay and increasing early sepsis identification (Parrish et al., 2017). I administered a 30-minute classroom training module with a PPT presentation, MEWS flow sheet practice, and the MEWS algorithm review. RNs completed a pre- and posttest containing 15 questions about the MEWS score, MEWS policy, calculated physiological parameters, and clinical decision based on the algorithm. Comparing pre- and posttest scores contributed to answering the practice question.

Published Outcomes and Research

To obtain background information on MEWS, I conducted a comprehensive literature search using healthcare databases such as Medline with Full Text, PubMed, Cochrane Database of Systemic Reviews, and CINAHL. Keywords and phrases searched were *Modified Early Warning System*, *MEWS*, *MEWS education*, *MEWS outcomes*, and *MEWS effectiveness*, *failure to rescue, early recognition of patient deterioration, modified early warning system, patient safety,* and *rapid response*. To obtain the most current information on improved patient outcomes with MEWS implementation, I looked for English-language articles published between 2010 and 2020 as the information found could be recent and aligned with current standards in the patient care.

I found more than 50 articles with various methodologies and designs and selected 22 for review and evaluation in this DNP project. Qualitative research included a combined prospective–retrospective observational study, scale development with psychometric testing, and a descriptive study. The mixed-methods inquiries were prospective cohort and randomized trial designs, with a quasi-experimental study in the quantitative tradition. Some articles included a systemic review, which are Level A for an EBP.

The literature search and a review of selected articles supported the DNP project of implementing MEWS at the practicum site to address the practice issue. There was substantial evidence found to reinforce the importance of staff education on MEWS and adult learning theory for the DNP project. Transforming care at bedside is an initiative from IHI to improve patient safety by utilizing different strategies. 84% of patients showed early signs of clinical decline 8 hours before Code Blue, and 70% of those patients had changes in respiratory status or mental status (Mathukia et al., 2015). One strategy is to utilize the RRT to prevent sentinel events (IHI, 2013).

The MEWS concept has been used in the United Kingdom, which led to better patient outcomes. MEWS system will assist the nurses in recognizing and calling RRT without delay. A delay in getting an RRT could lead to a Code Blue situation in which the patient prognosis is affected (IHI, n.d.). Holmberg et al. (2019), mentioned in their article that there are about 292,000 in-patient adult pulseless and non-pulseless cardiac arrests occur annually in the United States (Sandroni et al., 2007). Additionally, around 15,200 in-patient pediatric cardiac arrests result during hospitalization based on the

American Hospital Association database (Holmberg et al., 2019). The data reported in the article is particular that these cardiac arrests could be prevented in the hospital where the patients are being monitored frequently during their stay, and the hospitals must implement preventive measures in reducing cardiac arrests (Holmber et al., 2009; Merchant et al., 2011).

A systemic review conducted by Alam et al. compared seven studies that assessed the impacts of patient outcomes before and after implementation of MEWS. Even though there was a piece of contradicting information about the length of stay, the systemic review identified that the patient outcomes were improved with early recognition of patient decline. Furthermore, the discussion included proper nursing staff training, and utilizing an action-based algorithm will make the MEWS score meaningful and generate positive patient outcomes by minimizing the cardiac arrest and early identification of sepsis. With appropriate training, the nursing staff recognized the warning signs, and the MEWS score triggered the nurses to call for patient assessment by the physician, the PA, or NP (2014). A quasi-experimental study in an emergency room had proven that an early warning score system is beneficial in early detection of patient decline and management of the situation to prevent adverse impacts.

The study included the impact of staff training with MEWS and the nurse's competency in calculating the MEWS score and escalation. The training on MEWS had promoted nurses' ability to apprehend primitive notice of patient decline and communication with the multi-disciplinary team to address the deterioration (Al-Kalaldeh et al., 2019). A mixed-methods approach was used in a study to evaluate staff adherence

with vital signs monitoring practice and generating a MEWS score. An increased staff adherence with every four-hour vital signs and MEWS score calculation promoted patient safety by escalating the early warning signs in the physiological parameters. An introduction of MEWS score to nursing staff and establishing compliance with the frequency of vital signs monitoring was linked with a decline in cardiac arrests, intensive care unit transfer, and unexpected patient deaths (Bunkenborg et al., 2016; Zografakis-Sfakianakis et al., 2018). EWS is effective in decreasing the mortality and the morbidity rates in the hospitals. A systemic review performed by Jayasundera et al. found the association of EWS in reducing the ICU admissions, and the mortality rates in the older un-well admitted patients (2017). MEWS score had predicted valid information about the patient decline, ICU transfer, and cardiac arrest situation within 24 hours among the in-patients rather than a single trigger (Malcolm et al., 2018). A change in patient's vital signs must be monitored more often and escalated as needed to implement interventions. The effective interventions will eliminate Code Blues or ICU transfers. A timely called RRT will result in a better prognosis and minimize the mortality and morbidity rates. The barriers to getting RRT could be due to a lack of staff knowledge and awareness. A negative organizational culture and the RRT response may lead to hesitance in calling RRT (Marshall et al., 2011).

In-service training will improve the quality of patient care and the professional skills of the nursing staff. It is assured that staff education and training is critical in healthcare to keep the team updated with the best practices (Chaghari, Saffari, Ebadi, & Ameryoun, 2017). A timely vital sign monitoring is critical to be aware of the changes

and actions to be taken. Staff knowledge and attitude about the role of vital signs in assessing the changes will promote patient safety (Wenqi, Wenru, Simon, Ang, & Liaw, 2015). Nurses must have critical thinking skills to ensure that safe patient care is rendered in hospitals. An assessment and picking up subtle signs in the changes of a physiological parameter is possible with critical thinking skills affected by staff education and training. A positive patient outcome has a direct correlation with staff knowledge and critical thinking (Jacob, Duffield, & Jacob, 2017). An appropriate staffing level will allow utilizing the critical thinking skills of nurses in identifying the subtle changes in the physiological parameters and making clinical decisions (Margo, 2019).

A pilot study conducted in a 189 bedded community hospital in North East had generated a shred of evidence that the staff confidence and communication in recognizing warning signs had increased RRT. Nearly 40% of intensive care unit admissions can be prevented by utilizing the early warning signs. Along with identifying patient decline, an escalation of action must be taken to avoid the cardiac arrest situation or an ICU transfer (Margo 2019). An algorithm or EMR can alert the nurses and the physicians about the patient's decline. Novice nurses may not have adequate experience or confidence in escalating the situation (Race, 2015). With a practical staff training, the nurses will develop confidence in raising concerns about the changes in vital signs and make a clinical decision (Gagnon et al., 2015; Roney et al., 2015). The selected theory for the staff education project is the adult learning theory.

Knowles' adult learning theory or the Andragogy is an existing theory for a long time that engages the adult learner and leads the way that an adult learns. The adult

learners are motivated and self-directed, and the teacher serves as a facilitator rather than an instructor (Knowles et al., 2012; Henschke, 2011). The adult learners are self-motivated, willing to learn, and their orientation moves from person centered to problem centered. Their experience prepares them as a resource for learning (Henschke, 2011). The theory is applicable as most nurses are adult learners who need lifelong learning to keep their competencies updated with the trends about patient care.

Implementing MEWS had reduced the mortality rate from 2.3% in 2011 to 1.5% in 2013 in a hospital in Pennsylvania. Furthermore, the quality of outcomes with RRT and Code Blue had improved as the nurses escalated the patient decline. Also, there was increased confidence among nurses noticed with communication with physicians. MEWS algorithm had assisted the nurses in reporting the patient situation with a quantitative score to the physician or calling an RRT (Mathukia et al., 2015). Nurses must be equipped with the tools and training to notice the patient's initial change and escalate. Most of the hospitals have the RRT called when one parameter has a significant difference. With staff training in the MEWS score calculation, the nurses generate a total score with multiple physiological parameters. The total MEWS score alarms the providers about the patient's worsening (Parrish et al., 2017). The information given above was found with the literature review to support as evidence for the DNP project.

Archival and Operational Data

The chief nursing officer approved for me to receive organizational data on RRTs, Code Blues, and missed sepsis identification. The Nursing Logistics department provided the number of RRTs and Code Blues for 2019; the PI team provided information on

sepsis identification. All data I received were deidentified, with no specific patient information. I utilized the data for staff education to increase awareness among staff about the importance of early recognition of patient decline and escalation. No data was stored in any format as the personal property of the student.

Participants. This DNP project participants were 26 RNs (two males, 24 females) at the selected medical unit. Participants' years of experience ranged from 3 months to 25 years. One participant had a master's degree, some had BSNs, and most held associate degrees. The sample size was adequate, given that it incorporated all but one RN at the practicum site; as such, no sampling procedures were necessary. The nurse manager and the educator of the pilot unit communicated with the RNs to ensure all staff's attendance. Participants attended the MEWS staff education session given during their shifts. I trained the night shift nursing staff of the pilot unit also. This participant group was appropriate to determine whether the training presentation and MEWS flow sheet practice would improve staff knowledge to calculate the MEWS score, identify patient deterioration, and escalate care as per the MEWS algorithm.

Procedures. I created a PowerPoint presentation (see Appendix A) and handouts of the slides and pre- and posttests (see Appendix C), all of which the NPD director-approved; subsequently, I sought and obtained permission from the unit's nurse manager and nurse educator. The NPD director recommended that I also submit the material to the director of licenses individual practitioners, which I did and obtained approval. I included the organizational data in the education materials to create awareness among the RNs. The medical unit's educator assisted with scheduling the RNs to attend the class. The unit

nurse manager suggested giving the participants a numeric identifier to write on the pre- and posttests. Unit managers will be aware of participants' identification numbers in the event; there is a need for reinforcement.

I collected, reviewed, and analyzed data from pre- and posttests (see Appendix C). They measured the change in participants' knowledge after engaging in the researcher-created MEWS educational session and Institute for Healthcare Improvement's (n.d.) evidence-based MEWS tool. It was crucial to obtain the support of the nurse manager, unit educator, and RNs, all of whom are stakeholders. The medical unit nurse manager and the unit educator were quite supportive, as the project improved their staff's knowledge and competencies in early identification of patient decline. Thus, unit leaders permitted me to provide MEWS staff education in the medical unit.

Protections. One way of protecting the DNP project participants was by first obtaining approval from the Walden University Institutional Review Board (IRB; Approval No. 05-01-20-0375849). Included with the IRB application was a letter of cooperation signed by the organization's Chief Nursing Officer. I also adhered to the principles of The Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) to ensure respect for persons, beneficence, and justice as per its three guiding principles.

Evaluation. The RNs drew a participation number from a bowl and wrote that number on their pretest, posttest, and MEWS flow sheet. The RNs completed the pretest before the presentation and MEWS practice and the posttest after the training. I compared the pre- and posttest scores to measure the effectiveness of staff education on MEWS.

The test had 15 questions based on MEWS scoring, policy, parameters, documentation, and the MEWS algorithm. Also included on the pre- and posttest was the patient scenario with vital signs to calculate the MEWS score.

After all, 26 RNs had attended the MEWS presentation, I compared the pre- and posttest scores to evaluate the education's effectiveness. I checked the MEWS flow sheet to confirm the nurses had calculated an accurate MEWS score based on the patient scenario given during the presentation. I reinforced the information and some key points with some RNs, as suggested by the nurse manager and the unit educator, after discussing the results with them. The nursing education approach, MEWS policy, and use of the algorithm will reduce the knowledge gap among novice nurses, allowing them to use critical thinking and appropriate decision-making in identifying and reporting a patient decline. I evaluated the effectiveness of the MEWS staff education to answer the practice question of whether the 30-minute presentation and MEWS flow sheet practice would improve staff knowledge to calculate the MEWS score, identify patient deterioration, and escalate care as per the MEWS algorithm.

Analysis and Synthesis

MEWS was one of the best practices to reduce the practice gap in the organization. I researched articles about MEWS and reviewed them for the evidence to support the decision of piloting MEWS education in the selected unit. I obtained buy-in from the pilot unit's nurse leaders and recruited 26 out of 27 nurses to attend the MEWS staff education. The project deliverables were the PowerPoint presentation (see Appendix A), MEWS flow sheet (see Appendix B), and the pre- and posttest (see Appendix C).

Staff education occurred in a classroom setting to cover both day shift and night shift RNs. All RNs who attended the training completed a pre and posttest, which is anonymous. A comparison of pre- and posttest scores were performed to reflect the effectiveness of MEWS education. Also, the RN's competency in accurately calculating the MEWS score with the given patient scenario.

Summary

This DNP project as a means to answer the practice-focused question of whether the 30-minute presentation and MEWS flow sheet practice would improve staff knowledge to calculate the MEWS score, identify patient deterioration, and escalate care as per the MEWS algorithm. In line with evidence-based practice and the literature review, I expected that staff MEWS education would reduce the number of RRTs, Code Blues, and ICU transfers and improve patient outcomes. Training participants were 26 RNs in one medical unit at a community hospital for whom the education session was a requirement. I collected data through pre- and post-test administration before and after an educational PowerPoint presentation and MEWS flow sheet practice. To measure the education's success, I compared and analyzing pre- and post-test results and reviewing deidentified patient charts to determine outcomes. Section 4 presents the statistical analysis findings and data comparison, including participants' scores on the pre- and post-tests and the chart audit results. Implications for practice appear to include expanding the MEWS training to other organizational units in the community hospital. I also provided recommendations based on the findings of this study.

Section 4: Findings and Recommendations

Introduction

Section 4 presents the findings and recommendations from the training program evaluation, which entailed administering a training presentation (see Appendix A), a MEWS flow sheet exercise (see Appendix B), and pre- and posttest (see Appendix C) to 26 RNs at the practicum site. Data were analyzed using SPSS to answer the project question and determine whether the 30-minute presentation and MEWS flow sheet practice would improve staff knowledge enough to calculate the MEWS score, identify patient deterioration, and escalate care according to the MEWS algorithm. The findings, recommendations, strengths, and weaknesses of the project follow.

Findings and Implications

All 26 RNs who participated in the MEWS classroom training gained a significant amount of knowledge about MEWS to help identifying patient decline before actual deterioration occurs (see Table 1). Twenty-four participants had a posttest score above 90%; one RN had a score of 80% and one had a score of 86.66%. After providing these scores to the nurse manager and the nurse educator, I reinforced the missing information with the RNs who received less than 100%, as suggested by the nurse manager and the nurse educator. The nurse educator was present during the reinforcement and helped answering any additional questions by the RNs.

Table 1

Participants' Pre- and Posttest Scores

Participant number	Pretest score (%)	Posttest score (%)
1	46.66	100.00
2	53.33	100.00
3	40.00	93.33
4	40.00	100.00
5	26.66	93.33
6	53.33	100.00
7	66.66	100.00
8	93.33	100.00
9	40.00	100.00
10	26.66	93.33
11	46.66	100.00
12	53.33	93.33
13	46.66	93.33
14	53.33	93.33
15	26.66	100.00
16	40.00	100.00
17	26.66	80.00
18	33.33	100.00
19	33.33	86.66
20	46.66	93.33
21	20.00	100.00
22	40.00	100.00
23	40.00	100.00
24	33.33	100.00
25	6.66	100.00
26	20.00	100.00

The lowest pretest score was 6.66% (*n* = 1; 3.85% of participants) and the highest was 93.33% (*n* = 1; 3.85% of participants). Six of 26 RNs (23.08%) scored between 20% and 30%; three RNs (11.54%) scored between 30% and 39%; and 10 RNs (38.46%) scored between 40% and 49%. Four RNs (15.38%) scored 50% to 59% on the pretest, and one participant (3.85%) scored between 60% and 69%. No participants scored above 70% on the pretest. Pretest scores and frequencies are in Table 2.

Table 2

Pretest Results Frequency

Score ranges (%)	Frequency	Participants (%)
0–9	1	3.85
20–29	6	23.08
30–39	3	11.54
40–49	10	38.46
50–59	4	15.38
60–69	1	3.85
90–100	1	3.85
Total	26	100.00

The breakdown of posttest scores appears in Table 3. One RN scored 80% and one scored 86.66%, comprising the two participants (7.69%) scoring between 80% and 90%. Of the 24 participants (92.31%) who scored between 90% and 100% on the posttest, seven scored 93.33% and 17 scored 100%. The posttest scores indicate a significant improvement in RNs' knowledge about MEWS, MEWS policy, and the MEWS algorithm. A 30-minute classroom training session was, therefore, effective to improve nursing knowledge and answer the DNP project question. All RNs calculated the MEWS score accurately in the flow sheet using the sample patient data provided during

the presentation. The DNP project was successful in demonstrating the effectiveness of staff education to promote nursing knowledge and improve the quality of patient care.

Table 3

Posttest Results Percentages

Score ranges (%)	Frequency	Participants (%)
80–90	2	7.69
90–100	24	92.31
Total	26	100.00

A paired *t* test was appropriate to compare the two variables of participants' pre- and posttest scores. Analyzing the difference was by calculating the mean and standard deviation of the pretest ($M = 0.41$, $SD = 0.1696$) and posttest ($M = 0.97$, $SD = 0.0507$) scores, which showed a significant difference in standard deviation. The statistical comparisons are in Table 4.

Table 4

*Paired Samples Statistics (*N = *26)*

Statistic	Pretest	Posttest
Mean	0.4100	0.9700
Standard deviation	0.1696	0.0507
Standard error mean	0.0332	0.0099

The evidence generated from the MEWS staff education project could be useful to obtain buy-in from the nurse leaders of other units to implement MEWS. The social change associated with staff education is increasing the quality of care by decreasing patient mortality and morbidity rates. The nursing orientation programs could incorporate MEWS education. An ongoing reinforcement, appointing someone to monitor staff

compliance in calculating the scores and taking appropriate actions, will make a significant change in patient results by reducing Code Blues, RRTs, and ICU transfers and improving early sepsis identification.

Recommendations

The gap in practice was RNs' limited awareness of early patient deterioration warning signs, a concern exacerbated by the lack of a good algorithm to assist nurses in making clinical decisions. This project's findings showed that staff education about MEWS vastly increased the knowledge of RNs in the medical unit, with the nurses becoming competent in calculating the MEWS score using the MEWS flow sheet. I developed the following recommendations based on the data analysis and the results of the project.

The first recommendation is to implement the MEWS education in other units in the hospital. As the data showed increased RN knowledge following MEWS training, the organization would benefit from widespread nurse education, thus improving patient outcomes. A second recommendation is for the unit manager and the nurse educator to monitor MEWS documentation for at least three months to ensure RN compliance with the new process. Also, it is essential to assess the timeliness of documentation and the actions taken based on the MEWS score. Compliance and consistency with MEWS scoring and escalation are critical for positive patient outcomes and decrease Code Blues and ICU transfers.

Additionally, manager and educator oversight will ensure RNs retain and use their knowledge about MEWS and their competency in calculating accurate MEWS score.

Third, the organization should incorporate digital MEWS assessments in the electronic medical records to improve RN workflow, minimize workload, and facilitate monitoring by running daily reports on total MEWS scores, actions taken, and timeliness of documentation based on MEWS policy. A fourth recommendation is to include the MEWS education in nursing orientation programs, with the same information reinforced by the preceptor during new nurses' unit-wide orientation. Nurse orientation leaders could use the same presentation and MEWS flow sheet, administering the pre- and posttest before and after the training, to establish new nurses' competencies. Using education results during orientation testing and practice, unit leaders could modify the material based on the needs assessment. The last recommendation is to conduct future research to assess the quality improvement of the MEWS project. This study might monitor the number of RRTs, Code Blues, sepsis identifications, and ICU transfers. A manager or educator could initiate later studies six months after implementing the MEWS project in all units.

Strengths and Limitations of the Project

The MEWS education project has been a great learning experience. I developed my leadership skills in performing the needs assessment, risk analysis, and policy writing and preparing the education plan for the RNs in the medical unit. The project's key strength was my collaboration with the nurse manager, nurse educator, NPD director, doctoral committee members, and policy approval committee. The assistance from the multidisciplinary team was beneficial for a successful implementation. The NPD director, nurse manager, and nurse educator provided me with the needed information and made

valuable suggestions for creating the PowerPoint presentation and preparing the pre- and post-test. The other strength was the relatively easy acceptance of the MEWS staff education project, which made access to existing organizational data about the RRTs, Code Blues, and missed sepsis cases. Third, because 26 of the 27 RNs in the medical unit took part in the education, the data generated through this project will help obtain buy-in from the nurse leaders of other units in the organization. One of the limitations of this DNP education project was the time constraints in obtaining the postimplementation data to compare the number of RRTs, Code Blues, and missed sepsis occurrences before MEWS implementation. The other limitation was the data specific to the staff's compliance in the documentation and taking actions based on the MEWS score. The monitoring of data on RN's documentation of vital signs and MEWS scores would have helped to further evaluate the nurse's understanding on the MEWS concept.

Section 5: Dissemination Plan

Staff education and training are an ongoing process in healthcare organizations to improve the quality of patient care. The organization must provide training for nurses and ensure that they are competent and confident to deliver high quality patient care. Education is a way to advance nurses' knowledge to achieve organizational goals and advance patient care (Chaghari, Saffari, Ebadi, & Ameryoun, 2017). MEWS staff education will promote positive change in the organization by increasing RNs' knowledge and confidence. Comparison and analysis of data collected in this project clearly showed that MEWS education improved posttest scores, indicating the RNs' more significant understanding of MEWS assessments and better patient outcomes.

The dissemination plan is to first present the project's results in the organization's Nursing Quality Forum. The audience will be the chief nursing officer, nursing directors, nurse managers, nurse educators, and the performance improvement team. Also, I will present my findings during the staff meeting of the pilot unit. Upon implementing the project throughout the organization, I am planning to collect a six months' postimplementation data on the number of RRTs, Code Blues, ICU transfers, and sepsis identifications and compare to the pre-implementation data. I plan to publish my findings in the *Journal of Nursing Care Quality*. I want to compare the paper MEWS documentation versus electronic MEWS documentation compliance upon MEWS assessment integration into the electronic health records. Again, I will compare the data on RRTs, Code Blues, ICU transfers, and sepsis identification with the paper and

electronic documentation process, which I will submit for publication to the *American Nursing Informatics Journal*.

Analysis of Self

I gained insight, knowledge, and leadership skills through the DNP program and implemented many projects during the practicum experience. I learned and executed various strategies, including strengths-weaknesses-opportunities-and threats analysis, policy writing, project implementation, and data analysis. The opportunity to lead the implementation of the project and risk mitigation strategies empowered me with confidence to overcome the challenges in leadership roles. I learned about analytical methods and evidence-based practice to meet the organization's needs and generate evidence through data analysis. Furthermore, I sharpened my project management skills, including planning, designing, implementing the evidence-based practice, and evaluating the project while overcoming challenges both expected and unexpected.

Collaboration with the interprofessional team assisted me in various stages of the project. I realized the significance of interprofessional association as a nurse leader in project management and the project's life cycle. As a nurse informaticist, taking a leadership role in educating nurses on an evidence-based practice required me to expand nursing knowledge to promote better patient outcomes. Obtaining buy-in from the leadership was an initial challenge due to a significant change in the leadership positions. The new leaders took longer to settle into their roles and to accept my project proposal and implementation. The other challenge proved to be time management, which required me to learn and utilize different techniques to complete the project on time.

The practicum project allowed me to identify the current practice gap that compromises patient safety and, subsequently, to find an evidence-based practice to bridge the gap. The evidence from MEWS staff education had proven that training and practice could improve the nursing staff's knowledge and competence. Additionally, I functioned as a change agent to influence the current organizational practice, using evidence to modify the nursing approach and meet the organization's goals. I am confident that the DNP program and the project have prepared me to advance my professional role at the leadership level.

Summary

Early identification of patient deterioration will prevent patient decline, reduce the number of Code Blues, ICU transfers, and RRTs, and assist in sepsis recognition. With MEWS, nurses evaluate patients more frequently, take vital signs and other assessments, and recognize patient decline. The purpose of the DNP staff education project was to assess RNs' knowledge in identifying the early warning signs of patient deterioration and escalation using the MEWS algorithm. The project took place in one medical unit of a community hospital in the Northeast United States. Twenty-six RNs attended the MEWS education classroom training, including a pretest, PowerPoint presentation, MEWS flow sheet practice, and posttest. Comparison and analysis of the pre- and posttest scores showed that the RNs' knowledge about MEWS had significantly increased after attending the educational session. Based on the posttest scores, the RNs had an understanding of the MEWS algorithm and flow sheet completion, taking action based on the MEWS score. Future opportunities aligned with the project include monitoring the

quality improvement data related to staff compliance in documenting and taking action based on the MEWS algorithm. A further project opportunity could involve tracking data on Code Blues, RRTs, sepsis, and ICU transfers to measure the MEWS's benefit in early recognition of patient deterioration. The project will lead to positive social change by improving patient outcomes, reducing complications, and decreasing healthcare costs nationwide.

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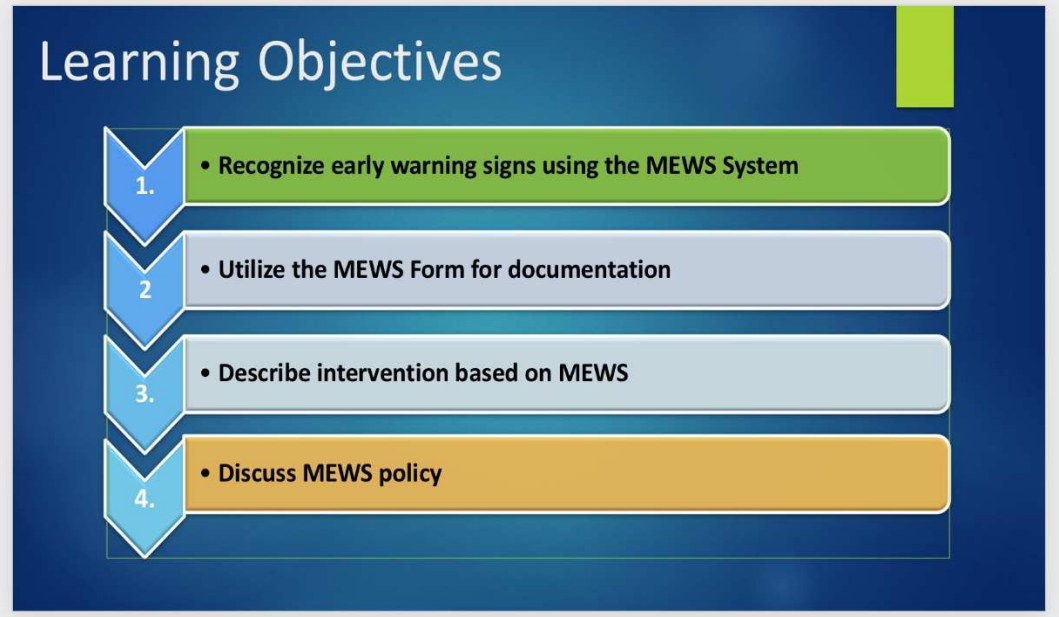
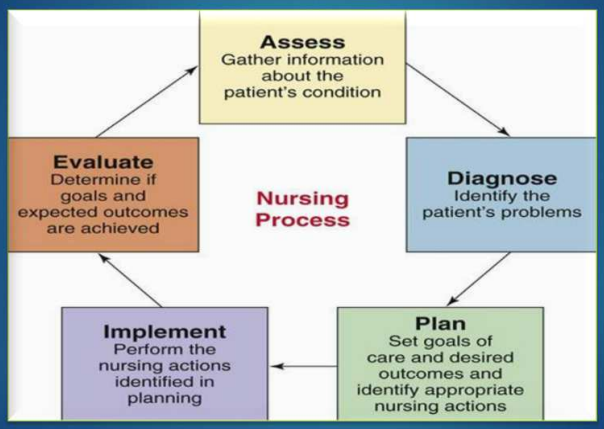
Appendix A: MEWS Educational PowerPoint Presentation



The Nursing Process



Change in Condition

- **A clinically important deviation from baseline in physical, cognitive, behavioral or functional status.**

Nursing Assessments: Initial

- Baseline information
- Important to note on admission what is the "new normal"
- Know what to delegate and what not to delegate
- SBAR

Red Flags

A warning of trouble or danger ahead:

- Can be obvious
- Can be subtle
- Can be "intuition"
- Can be "gut feeling"

Red Flags –Can You See Them?

- Patients whose condition deteriorates acutely while hospitalized often exhibit warning signs (such as abnormal vital signs) in the hours before experiencing adverse clinical outcomes.

Do we see the red flag?

Nursing Assessments: Ongoing and Focused

- Based on patient condition
- Can be challenging
- Surveillance and trending ongoing
- Ask:
  - What am I most worried about?
  - What can I do for this patient?

Red Flags - Take Home

- Patients present with a "warning" sign or symptom 6-8 hours prior to an actual decline or arrest.
- Subtle signs can be identified by monitoring basic vital signs.
- Rapid response teams were developed to assist with emergency response in hopes of decreasing in hospital cardiac arrests.

Early Warning System

Risk Based Scoring

- Physiologic scoring system before patients experience catastrophic event.
- Scores are placed in algorithms and nurses take action based on the scores.

Modified Early Warning System (MEWS)

Scoring is based on:

- Respiratory rate
- Heart rate
- Systolic blood pressure
- Conscious level
- Temperature
- SpO2

Policies

Policies:

- Vital Signs
- MEWS

MEWS Flow Sheet

Pt. Label

Date	Time	Respirations		Heart Rate		Systolic BP		LOC	Temp.		SpO2		MEWS	Intervention		RN
		Rate	Score	Rate	Score	BP	Score	Score	Temp	Score	Amount	Score	Total	✓YES	✓NO	Initial

Scoring Key	3	2	1	0	1	2	3
Resp. Rate		<8		9 - 17	18 - 20	21 - 29	30 or more
Heart Rate		<40	40 - 50	51 - 100	101 -110	111 - 129	130 or more
Systolic BP	<70	71 - 80	81-100	101 - 159	160-199	200 - 220	221 or more
LOC	Unresponsive	Responds to pain	Responds to voice	Alert	Agitation or confusion	New agitation or confusion	
Temperature		95 or less	95.1 – 96.8	96.9 - 100.4	100.5 – 101.3	>101.3	
SpO2	90%	90%-92%	93%-95%	96%-100%			

Scores	0 – 2 GREEN	3 YELLOW	4 Orange	≥ 5 RED
Nursing Actions	Continue to monitor per unit standard	Monitor vital signs frequently (every two hours) X 3. If MEWS score is "3", Notify the PA/NP	Take action! RN will notify PA/NP to evaluate the patient	CODE RRT

RN Initial	RN Signature	RN Initial	RN Signature	RN Initial	RN Signature

Modified Early Warning System

Mr. H.

Admission: Subdural hematoma

Day 2 on the unit

MEWS

Respiratory rate = 24

Heart rate = 110

Systolic blood pressure = 104

Conscious level = Responds to voice

Temperature = 98.7

Spo2 – 98%

What do you do?

Modified Early Warning System

Mr. L.
Admission: GI Bleed
Day 2 on unit

MEWS
Respiratory rate = 16
Heart rate = 130
Systolic blood pressure = 104
Conscious level = Alert
Temperature = 98.7

What do you do?

Standardized Communication

Skilled Communication when it matters most.

- Concise
- Assertive
- Confident
- Intuitive and analytical
- Understanding the bigger picture
- What do you want done?

S	SITUATION A concise statement of the problem *What is going on*
B	BACKGROUND Pertinent and brief information related to the situation *What has happened*
A	ASSESSMENT Analysis and considerations of options *What you found / think is going on*
R	RECOMMENDATION Request / recommend action *What you want done*

Escalation Policy

Calling a Rapid Response

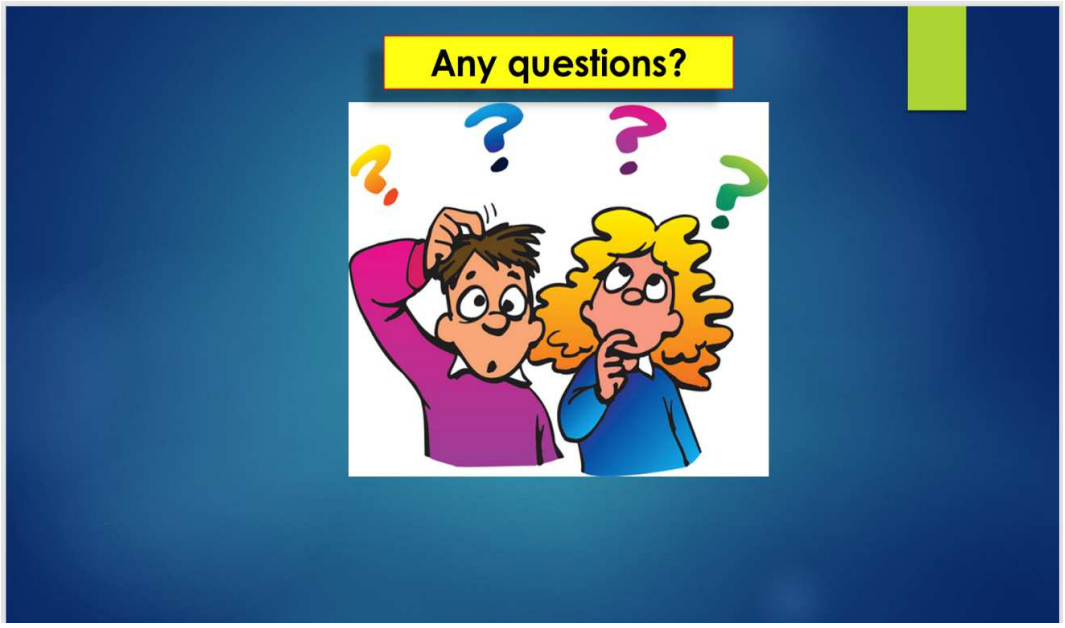
Patient has signs and symptoms of increasing acuity

- Acute change in heart rate <40 or >130 bpm
- Acute change in systolic BP <90 mmHg
- Respiratory Distress
- Acute change in RR <8 or >28 per min
- Acute change in saturation <90% despite increasing FIO2 requirements
- Vital sign change 20% from baseline

Calling a Rapid Response

Patient has signs and symptoms of increasing acuity cont'd.

- Acute change in level of consciousness
- Acute change in urine output to <50 ml in 4 hours
- Chest pain unrelieved by NTG
- Sudden loss of movement or weakness of face, arm, or leg
- Unexplained agitation lasting more than 10 minutes
- New, repeated or prolonged seizures
- Uncontrolled pain


Any questions?

Appendix B: MEWS Flow Sheet

MEWS Flow Sheet

Pt. Label

Date	Time	Respirations		Heart Rate		Systolic BP		LOC	Temp.		SpO2		MEWS	Intervention		RN
		Rate	Score	Rate	Score	BP	Score	Score	Temp	Score	Amount	Score	Total	✓YES	✓NO	Initial
Scoring Key		3		2		1		0		1		2		3		
Resp. Rate				<8				9 - 17		18 - 20		21 - 29		30 or more		
Heart Rate				<40		40 - 50		51 - 100		101 -110		111 - 129		130 or more		
Systolic BP		<70		71 - 80		81-100		101 - 159		160-199		200 - 220		221 or more		
LOC		Unresponsive		Responds to pain		Responds to voice		Alert		Agitation or confusion		New agitation or confusion				
Temperature				95 or less		95.1 – 96.8		96.9 - 100.4		100.5 – 101.3		>101.3				
SpO2		90%		90%-92%		93%-95%		96%-100%								
Scores		0 – 2 GREEN				3 YELLOW				4 Orange				≥5 RED		
Nursing Actions		Continue to monitor per unit standard				Monitor vital signs frequently (every two hours) X 3. If MEWS score is "3", Notify the PA/NP				Take action! RN will notify PA/NP to evaluate the patient				CODE RRT		

RN Initial	RN Signature	RN Initial	RN Signature	RN Initial	RN Signature

Appendix C: Pretest/Posttest

1. **What is MEWS?**

   a) Mental Evaluation Warning Signs

   b) Modified Early Warning Signs

   c) Modern Electricity Work Safety

2. **What are the parameters of MEWS? Check all that apply**

   a) Systolic Blood Pressure

   b) Temperature

   c) Heart Rate

   d) Urine Output

   e) Respiration

   f) Oxygen Saturation

   g) Level of consciousness

   h) Hemoglobin level

3. **How often do you do MEWS?**

   a) Every hour

   b) Every 2 hours

   c) Every 4 hours

   d) Every shift

   e) Daily

4. **Where do you document MEWS score?**

   In the MEWS Flowsheet

5. **If score is 0-2 what is your action?**

   Continue to monitor

6. **If score is 3-4 what is your action?**

   Monitor frequently – every 2 hours

7. **If score is 4 what do you do?**

   Call the PA/NP to assess the patient

8. **If score is greater than 5, what do you do?**

   Call Rapid Response

9. **How frequent you monitor the patient if the score is between 3-4?**

   a) Every hour

   b) Every 2 hours X 3 times

   c) Every 3 hours

   d) Every shift

   e) Every 4 hours

10. Does the MEWS score stop you calling the rapid response? Yes or No

11. Where do you access the MEWS policy? – Policy Tech

12. What would you do when there is a delay in PA/NP in assessing the patient with elevated MEWS score?

Escalate – Call Nurse Manager or Supervisor

13. How soon you will document MEWS score after the vital signs are checked?

Within one hour from the time of checking

14. Who is responsible in calculating MEWS score?

Registered Nurses

15. Who is responsible in checking the vital signs?

Registered Nurses or Nursing Assistants