2024

Rapid Response Education for Acute Care Registered Nurses and Certified Nursing Assistants

Christine Le
Seattle University

Rapid Response Education for Acute Care Registered Nurses and Certified Nursing Assistants

Christine Le, BSN, RN

A DNP project submitted in partial fulfillment

of the requirements for the degree of

Doctor of Nursing Practice

Seattle University

2024

Approved by: Diane K Fuller Switzer Date: June 5, 2024
DNP Faculty Mentor:
Diane Fuller Switzer, DNP, ARNP, FNP/ENP-BC, ENP-C, FAEN, FAANP, FAAN

Approved by: Date: 6/4/24
DNP Project Reader:
Natali Lagasse MSN, APRN, AGCNS-BC, CCRN

Rapid Response Education for Acute Care Registered Nurses and Certified Nursing Assistants

Abstract

Aim(s): To evaluate the effectiveness of an educational intervention for acute care registered nurses and certified nursing assistants on rapid responses and the Modified Early Warning Score.
Design: This study used a mixed method of quantitative and qualitative design, incorporating participant surveys and chart review analysis.
Keywords: *rapid response teams, rapid response systems, Modified Early Warning Score, MEWS, quality improvement, interdisciplinary collaboration, patient safety, patient monitoring, educational intervention, registered nurses, certified nursing assistants, early warning scores.*
Methods: A sample of registered nurses and certified nursing assistants in two medical-telemetry units in a 500-bed regional hospital in the Pacific Northwest.
Results: Following the education intervention, the majority of registered nurses and certified nursing assistants reported they have a clear understanding of when to call a rapid response, expected timeframes to notify the provider of a high Modified Early Warning Score, and repeat vital signs. Patient chart review revealed increased provider notification and follow up vital signs after the education intervention.
Conclusion: Findings indicated increased knowledge, confidence levels, and usefulness of the education among both registered nurses and certified nursing assistants following the education intervention. The education intervention suggested a positive correlation with increasing provider notifications and repeat vital signs for a Modified Early Warning Score of five or greater. These findings have implications for improving patient safety and clinical outcomes in acute care settings.
Implications for the profession and/or patient care: Discrepancies and inaccuracies in the institution's algorithm for collecting patient data warrants a re-evaluation of the automated parameters. Expansion to hospital-wide education for registered nurses and certified nursing assistants to ensure consistency in practice and standardization of protocols. Continued monitoring data for a longer period of time to identify trends and areas for further improvement.
Impact: The study addressed the gaps in knowledge in registered nurses, who reported they were not receiving adequate education on rapid responses in a prior Doctor of Nursing Practice Project and the need for improved patient monitoring practices. The educational intervention led to statistically significant improvements in provider notifications and repeat vital signs.
Reporting Method We followed the Standards for Quality Improvement Reporting Excellence in Education: SQUIRE-EDU guidelines.
No patient or public contribution.

Table of Contents

Introduction

In the Institute of Medicine's report, *To Err is Human: Building a Safer Health System,* it emphasized the need for the development of healthcare systems at the level of direct patient care to improve healthcare quality and prevent avoidable harm (Kohn et al., 2000; Stolldorf & Jones, 2015). Rapid response teams (RRTs) first gained attention in 2005 as a part of the Institute for Healthcare Improvement's (IHI, n.d.) 100,000 Lives Campaign as an intervention to reduce morbidity and mortality in the hospital setting. These teams provide a mechanism for timely assessment and intervention to prevent deterioration or potential cardiac or respiratory arrest at the first sign of patient decline (IHI, n.d.). In 2008, the Joint Commission (JCAHO) required hospitals to implement systems to respond to changes in a patient's condition as a part of their National Patient Safety Goals for the Hospital Program (Stolldorf & Jones, 2015). In 2015, the American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care recommended the use of RRTs and stated it can be effective in reducing the incidence of cardiac arrest (Kronick et al., 2015).

Prior to cardiac arrests in the hospital, previous studies reported that 60% of patients often have observable warning signs of physiological decline such as hypotension, tachypnea, and tachycardia (Kronick et al., 2015; Song & Lee, 2021). Consequently, in-hospital cardiac arrest is often indicative of the progression of physiological instability and a failure to promptly identify and stabilize the patient (Kronick et al., 2015). The failure to rapidly identify and treat complications is associated with increased adverse events and is labeled "failure to rescue" (Agency for Healthcare Research and Quality, 2019a; Hillman et al., 2014). The failure to rapidly identify decompensating patients is more common on the general medical units (outside of intensive care units (ICU), emergency departments, and procedural areas) where the nurse-to-patient ratios are higher and monitoring of patients happen less frequently, increasing the possibility of delayed recognition (Kronick et al., 2015).

Rapid response systems typically consist of a critical care or hospitalist physician, critical care nurse, and respiratory therapist (Agency for Healthcare Research and Quality, 2019b). Bedside nurses may call a rapid response when certain criteria arise such as tachycardia, tachypnea, hypotension,

hypoxia, and acute changes in mental status (Agency for Healthcare Research and Quality, 2019b). Other circumstances that may prompt a nurse to call a rapid response include chest pain, seizures, stroke symptoms, and uncontrollable pain (Agency for Healthcare Research and Quality, 2019b). Additionally, in some hospitals, patients and families are permitted to activate the RRT when they are concerned about the patient's overall clinical deterioration (Agency for Healthcare Research and Quality, 2019b; Song & Lee, 2021). In addition to healthcare professionals, patients, and family members, early warning systems in the electronic health record play an essential role in RRTs (Lee & Hong, 2019).

Available Knowledge

When RRTs were first introduced, the system was often triggered when a patient exhibited specific predefined clinical indicators, such as a significant alteration in a vital sign or level of consciousness (Mathukia et al., 2015). As the patient's condition worsened and the body's compensatory mechanisms became ineffective, these significant vital signs approach became primarily a reactive rather than preventative measure (Mathukia et al., 2015). As a response, early warning systems were created to predict outcomes and track early signs of deterioration by monitoring five essential physiological indicators (heart rate, respiratory rate, systolic blood pressure, temperature, and level of consciousness) (Mathukia et al., 2015). By monitoring these five indicators together instead of one significant indicator, the early warning systems can detect earlier, subtle changes in the patient's condition (Mathukia et al., 2015).

The Modified Early Warning Score (MEWS) is a scoring system used to identify patients who are at risk and the degree of clinical deterioration (Alves Silva et al., 2021; Delgado-Hurtado et al., 2016; Lee & Hong, 2019). Components of the MEWS score may vary upon institution, but usually includes systolic blood pressure, heart rate, respiratory rate, temperature, and neurologic status (Delgado-Hurtado et al., 2016; Subbe, n.d.). Each vital sign has a scale corresponding with a point system ranging from zero to three points (Lagasse, 2022). Extremes in blood pressure such as hypotension of a systolic blood pressure less than 70 would earn a MEWS of three, hypertension of a systolic blood pressure above 200 would earn a MEWS of two (Lagasse, 2022). The point system is reflected with the other components of

respiratory rate, temperature, and heart rate where extremes, whether high or low, would earn a higher MEWS (Lagasse, 2022). Each parameter is scored independently, and the individual scores are then added together to calculate the overall MEWS score (Lagasse, 2022). The National Institute for Health and Clinical Excellence advised the implementation of MEWS for monitoring all adult patients in acute care settings to facilitate early detection of patient deterioration and to guarantee prompt escalation of care when needed (Mathukia et al., 2015). A patient with an individual variable of three points should be considered a higher level of care patient (Subbe et al., 2003). A total MEWS of five or greater is associated with an increased risk of mortality, ICU admission and readmission (Balshi et al., 2020; Delgado-Hurtado et al., 2016; Subbe et al., 2003). In Bhatnagar et al.'s (2021) study, patients with a MEWS above five during the first 24 hours of admission had a positive correlation with critical care requirements and a mortality rate of 59.5% (Bhatnagar et al., 2021). Additionally, 78% of all patient deaths in the emergency department had a MEWS greater than five, indicating poor outcomes (Bhatnagar et al., 2021).

Although many major healthcare organizations such as JCAHO, the American Heart Association, and IHI support the use of RRTs, there is historically inconsistent data about its effects on in-hospital mortality and patient outcomes (Hillman et al., 2014; Lyons et al., 2018). One of the largest randomized trials evaluating RRTs, the Medical Early Response and Intervention Trial (MERIT), did not find a mortality benefit or significant change in outcomes of cardiac arrest, unexpected death, or unplanned ICU admission with the initiation of a rapid response system (Hillman et al., 2005). However, a post-hoc evaluation of the MERIT study associated an increased number of RRT calls with a decreased rate of cardiac arrests and unexpected death, supporting the use of RRTs in response to acutely ill patients (Chen et al., 2009). Chen et al. (2009) suggested tracking the frequency of RRT calls as a means of assessing the effectiveness of rapid response systems because the increased number of calls is inversely related to serious adverse events.

A newer systematic review by Chan et al. (2010) associated RRTs with a 21% reduction in mortality and 38% reduction in cardiac arrests in adult hospitals. Solomon et al.'s (2016) systematic

review and meta-analysis supported Chan et al.'s findings and the IHI's recommendation for initiating RRTs. Many patients' clinical deterioration will be foreshadowed by measurable changes in vital signs hours before their cardiac arrest (Solomon et al., 2016). By identifying these patients who are at risk for clinical deterioration, the RRTs can help facilitate expedited transfers to the ICU, which is associated with decreased mortality (Liu et al., 2012; Solomon et al., 2016).

The available literature suggests that nurses hold RRTs in high regard and consider it a valuable resource for managing unstable patients (Astroth et al., 2017). However, there is an observed phenomenon where nurses may refrain from initiating the RRT services, even in instances where patients manifest overt indicators of clinical deterioration (Astroth et al., 2017). This failure to appropriately engage the RRT could lead to unfavorable patient outcomes and increased healthcare costs (Beckett et al., 2013). The specific factors contributing to this underutilization are not fully comprehended, prompting the development of the Rapid Response Team Facilitators and Barriers Survey to evaluate the obstacles nurses face when initiating a rapid response (Astroth et al., 2017). The survey included barriers related to nursing unit culture, team member characteristics, and RRT knowledge (Beckett et al., 2013).

Rationale

Healthcare systems that utilized the Rapid Response Team Facilitators and Barriers Survey had varying results across institutions (Astroth et al., 2017). Common themes include seasoned nurses utilizing RRTs more than less experienced nurses, associate degree nurses needed more prompting to activate RRT than baccalaureate nurses, and unit culture and team characteristics positively correlated with RRT knowledge (Astroth et al., 2017; Tilley & Spencer, 2020). Education remains a pivotal element to minimize barriers to RRT activation (Tilley & Spencer, 2020). A lack of knowledge of RRTs were negatively correlated with barrier subscales (Astroth et al., 2017; Tilley & Spencer, 2020).

In March 2023, a Rapid Response Team Facilitator and Barriers Survey was collected by a Seattle University alumni for a Doctor of Nursing Practice (DNP) project at a local regional hospital in the Pacific Northwest (Torchilo, 2023). The survey was administered to nurses working on acute care units and revealed that unit culture and knowledge were the main facilitators and barriers to activating

RRTs (Torchilo, 2023). A significant majority of nurses perceived a sense of support from both their unit leaders and peers when initiating a rapid response (Torchilo, 2023). Additionally, they found their colleagues were readily available to offer insights on whether and when to activate RRTs and to aid with the care of other patients (Torchilo, 2023). The most robust barrier to activating RRTs was identified as education, regardless of their shift worked and educational background (Torchilo, 2023). Eighty percent of the nurses surveyed agreed that they do not receive adequate RRT education, 95% say they do not receive continuing education, and 100% say that the education that was provided, was not offered at a convenient time (Torchilo, 2023). Recommendations from this DNP project suggested prioritizing ongoing education and training for nurses on RRT activation protocols to enhance their knowledge and confidence in recognizing critical situations and initiating timely RRT calls (Torchilo, 2023).

A potential gap in practice specific to this implementation site is the initiation of the Co-Caring Model in August 2023. At this institution, previously, the nurse is responsible for obtaining vital signs, unless the nurse specifically asked the nursing assistant for help. The Co-Caring Model was put into effect where one nursing assistant is assigned to one nurse to care for six patients together. The expectation now is the nursing assistant will take all vital signs so the nurse can have a higher ratio of patients. With this new model in place, it is possible the nursing assistant is not reporting a MEWS above five because it is not listed in their parameters to report to the nurse. The institution policy dictates that the nurse must notify the provider and call a rapid response if a patient has a MEWS equal to or above five.

Theoretical Framework

The Donabedian Model for Quality of Care was applied to this DNP project. This model consists of three components, structure, process, and outcome (Donabedian, 1988). Structure focuses on the organizational and physical aspects of healthcare delivery (Donabedian, 1988; Moore et al., 2015). It encompasses the facilities, resources, staffing levels, equipment, and infrastructure available in a healthcare setting (Donabedian, 1988; Moore et al., 2015). Process evaluates the delivery of healthcare services, which includes adherence to clinical guidelines and the appropriateness of diagnoses and

treatments (Donabedian, 1988; Moore et al., 2015). Outcome focuses on the ultimate effects of healthcare on the health status of patients, including recovery, quality of life, morbidity, and mortality (Donabedian, 1988; Moore et al., 2015).

This DNP project incorporated all aspects of the Donabedian Model of structure, process, and outcomes. The DNP project provided an educational intervention to increase the awareness and understanding of RRTs, which correlates with the organizational aspects of healthcare delivery with education and training programs (Howell & Stevens, 2020). The aims to improve the proficiency in implementing MEWS to identify early warning signs of clinical deterioration and trigger timely inventions aligns with the process component, which evaluates the delivery of the performance of care (Howell & Stevens, 2020). The institution has a rapid response policy which outlines the circumstances where initiating a rapid response is recommended, the expected timeframe to notify provider and repeat vital signs (Lagasse, 2022). Ensuring this policy and recommendations are followed fall under the process measure (Howell & Stevens, 2020). Lastly, the outcome goals of increasing provider notification, repeat vital signs within the hour, and number of rapid response activations trigger timely assessment and interventions and therefore, improve patient outcomes. In summary, this DNP project aligns with the Donabedian Model by encompassing improvements in education and training (structure), enhancements in the delivery of care processes (process), and the achievement of positive patient-related outcomes (outcome) (Howell & Stevens, 2020).

Specific Aims

The purpose of this DNP project was to educate nurses and nursing assistants on rapid response systems and the use of the Modified Early Warning Score with an educational intervention. The project aims were to: 1) enhance awareness and understanding of rapid response systems and 2) improve proficiency in MEWS implementation to identify early warning signs of clinical deterioration and trigger timely interventions. The population, intervention, comparison, and outcome (PICO) statement is: “For registered nurses and nursing assistants on an acute care unit, does education on rapid response systems

and the use of the Modified Early Warning Score increase the level of understanding of rapid response systems, the number of provider notifications, follow-up vital signs, and rapid response calls?"

Methods

This DNP project to educate nurses and nursing assistants on RRTs is a quality improvement project. Quality improvement projects aim to identify areas where healthcare delivery can be improved and implement changes to achieve better patient outcomes (American Academy of Family Physicians, n.d.). Quality improvement processes are advantageous by promoting a culture of quality in the practice, determining areas for improvement, committing to ongoing evaluation, and enhancing efficient and effective delivery of care for both healthcare providers and patients (American Academy of Family Physicians, n.d.).

Context

This DNP project took place in a large 500-bed regional hospital in the Pacific Northwest. There are 17 acute care units, but the project focused on the two medical-telemetry units that have the Co-Caring Model in place. Inclusion criteria included registered nurses and certified nursing assistants on these two units. This also included traveler or agency assignments that were designated to these units because they should have received an orientation on the Co-Caring Model and expectations. Exclusion criteria included float registered nurses, nursing assistants, and licensed practical nurses as they may not be familiar with the Co-Caring Model. The goal participation rate was 30% of staff meeting inclusion criteria.

Intervention

The intervention consisted of an online education that encompassed a comprehensive selection of topics aimed at enhancing healthcare providers' knowledge and proficiency. The education highlighted the use and importance of RRTs for promptly addressing patients' deteriorating conditions. The education covered the MEWS Score, equipping healthcare professionals with a valuable tool for early detection of clinical decline. The presentation outlined notification parameters, delineating the specific criteria for alerting registered nurses from certified nursing assistants, as well as from nurses to providers. Following

the educational session, a post-education survey was administered to gauge nurses' confidence and comprehension in initiating a rapid response, ensuring that the educational content is effective and beneficial. The survey assessed any barriers faced by nursing assistants in reporting notification parameters to enlighten on potential areas for improvement in the reporting process. This comprehensive educational initiative served as a pivotal step towards strengthening the quality of care provided to patients in clinical settings.

Measures

Data collection consisted of chart review of one month prior to education intervention, during, and one month post-education intervention. The clinical nurse specialist shared the "MEWS Alert Summary" dashboard with the DNP student. This dashboard contains each unit's percentage of provider notifications and follow-up vital signs when a patient has a MEWS of five or more. The dashboard lists each patient whose MEWS is above five and the student analyzed individual charts to assess if the vital signs were taken by a registered nurse or nursing assistant. This helped differentiate if the barrier to initiating rapid responses is due to the nursing assistant not notifying the nurse of the vital signs due to the new Co-Caring Model or if the barrier is the nurse is not aware of the purpose of RRTs. These percentages and numbers were compared one month prior to intervention and one month after. A chi-square test was used for data analysis to check whether the education and notifications, repeat vital signs, and number of RRTs are dependent or by chance.

Analysis

A post-education survey completed through Microsoft Forms asked the participants of their healthcare role (registered nurse versus certified nursing assistant), years of experience, years worked at the institution, shift worked (morning, evening, or night), and level of education (associate degree in nursing or baccalaureate). The survey also contained quantitative data based on a Likert Scale. Registered nurses and nursing assistants ranked their perceived understanding of the rapid response system, notification parameters, their comfort level in calling a rapid response, and if they value the education provided. These will be done on a scale of one to five, with one being the participant strongly disagreeing

with the statement and five strongly agreeing. Lastly, there was a qualitative section where participants provided feedback on the education, additional information they would like to express regarding the new Co-Caring Model, and the nursing assistants' barriers to reporting parameters to the nurses. Since the qualitative section was short answer, analysis was manually using thematic analysis without software programs. This survey is not a validated survey as it was specific to this institution and its new Co-Caring Model, rapid response policy, and notification parameters. The data analysis of the chart review of one month prior and after education was done with Microsoft Excel using the Chi-square test formula.

Ethical Considerations

The project was approved by the faculty mentor. Seattle University and the clinical site's Institutional Review Board (IRB) determined the project to be exempt from IRB review in accordance with federal regulation criteria. The DNP student personally funded two lunches as incentives, one for day shift and one for night shift, to the unit that had the most survey participants. The lunches were kept under $50 per person as a federal stipulation that was noted by Seattle University's IRB. There were no ethical considerations. The survey was implemented January 26, 2024, to February 26, 2024. The DNP student collected the data regarding number of rapid responses, provider notification, and follow-up vitals for December 26, 2023, to March 26, 2024.

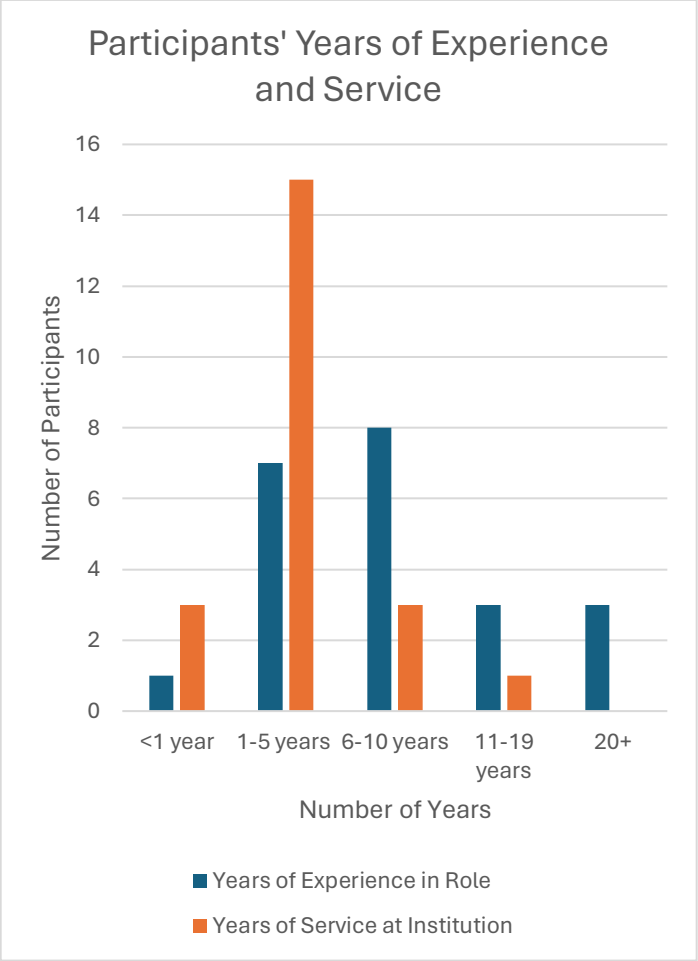
Results

Participant Survey Results

The education module and participant survey flyers were distributed throughout the two units on January 26, 2024, and taken down on February 26, 2024. The DNP student sent two emails during that period to encourage participation. The two units had a total of 145 RNs and CNAs in the month of February. The survey elicited 24 responses (17% participation rate), where 17 participants identified as CNAs and seven as RNs. The participants' years of experience is shown in Figure 1. In terms of shifts, 52% worked nights and 47% worked days.

FIGURE 1

Combined RNs and CNAs' years of experience in their role and years of service at the institution (n = 22)



The survey consisted of eight questions using the Likert scale assessing the participants' perception of knowledge and confidence level regarding rapid responses and notification parameters. When RNs were asked if they had a clear understanding of when to call a rapid response, the expected times to notify provider and repeat vital signs, and if they felt confident in initiating a rapid response when necessary, 71% answered "agree" or "strongly agree". All RNs said they were very likely or extremely likely to initiate a rapid response when they recognize signs of deterioration in a patient.

When CNAs were asked if they had a clear understanding of parameters that needed to be reported to the RN, including a MEWS equal to or above five, 65% responded "agree" or "strongly agree". With RNs and CNAs combined, 57% "agree" or "strongly agree" this education will positively

impact patient outcomes and 75% said this education provided new knowledge for them (true or false option). In the open-ended questionnaire, three CNAs stated they would call the charge nurse if they were unable to call the primary nurse to notify them of vital sign abnormalities.

Chart Review Results

Chart review was conducted between December 26, 2023, to March 26, 2024. Data analysis included information between December 26, 2023, to January 26, 2024 (pre-education period) and March 1, 2024, to March 26, 2024 (post-education period) (Table 1). Data obtained in February was not included in the analysis as education throughout the two units were still ongoing. During the pre-education period, there were 14 instances of a MEWS alert of five or greater. Among these 14 instances, providers were notified nine times, and follow-up vital signs conducted within two hours were conducted nine times. However, the institution's protocol was to retake a complete set of vital signs within 15 minutes, yet there was only one instance of adherence to this protocol. Similarly, the protocol also requires calling a rapid response within 15 minutes, but there were only three instances of compliance. When considering rapid responses called within the hour, the count increases to four instances.

In the post-education period, there were 40 instances of a MEWS alert of five or greater, with providers notified 24 times ($p=0.004$). Follow-up vital signs within two hours were conducted 24 times ($p=0.009$). Only two instances adhered to the institution's protocol of retaking a complete set of vital signs within 15 minutes. Regarding rapid responses, there were four instances of compliance with the protocol of calling within 15 minutes. This count increases to eight instances when considering rapid responses called within the hour. Although not initially in the initial measures, it was notable during the chart review process that in the pre-education period, four of the patients who had a MEWS of five or greater transferred to a higher level of care (step-down unit or intensive care unit). In the post-education period, this increased to nine patients.

TABLE 1

Data comparison pre-education versus post-education

	Pre-Education Dec 26-Jan 26	Post-Education March 1-26	Percent Increase	Significance
MEWS Count	14	40	186%	
Provider Notification	9	24	167%	Yes, p = 0.004
Follow up vitals in 2 hours	9	24	167%	Yes, p = 0.009
Complete follow up vitals in 15 minutes	1	2	100%	No
RRT in 15 mins	3	4	33%	No
RRT in 1 hour	4	8	100%	No
Transfer to higher level of care in 24 hours	4	9	125%	No

Discussion

This project yielded valuable insights into the effectiveness of an education intervention on improving patient monitoring and response within the acute care units. The participant survey results highlighted positive perceptions among both RNs and CNAs regarding their knowledge and confidence levels related to rapid responses and notification parameters. Notably, the majority of RNs expressed clear understanding and confidence in initiating rapid responses when necessary, which is crucial for timely interventions. The open-ended responses provided additional context, revealing the importance of clear communication pathways, such as contacting the charge nurse in case of difficulty reaching the primary nurse.

Chart review results further emphasized the impact of the education intervention. The education intervention led to statistically significant improvements in provider notification and follow-up vital signs. Although the other measures did not reach statistical significance, it may still be clinically noteworthy in the increase from pre- to post-education in the number of rapid responses called.

Additionally, the increase in patient transfers to higher levels of care post-education underscores the potential positive impact on patient outcomes.

The institution employs Microsoft Power Business Intelligence (BI) for patient data aggregation and utilizes an automated dashboard to track MEWS alerts, provider notifications, and repeat vital signs. However, the parameters set by the BI dashboard differ from the institution's protocol. For instance, the BI dashboard has a wider window, 30 to 120 minutes, for repeat vital signs to mark it as being done, compared to the institution's protocol of reassessment within 15 minutes. Consequently, adherence to the institution's protocol may not be accurately reflected in the BI dashboard data, which is crucial for leadership analysis. Furthermore, data inaccuracies may arise from typographical errors made by RNs or CNAs during vital sign entry. Errors in numerical input can inadvertently inflate the MEWS, misrepresenting the patient's clinical condition. Even if these errors are promptly corrected in the patient's chart, the initial MEWS value persist in the BI dashboard. Thus, the MEWS is marked as a high number, the provider was not notified, and repeat vital signs were not done, even if the patient's condition did not warrant it.

Interpretation

The fundamental goal of healthcare interventions and quality improvement projects is to enhance patient outcomes, and the observed increase in provider notifications and repeat vital signs following the education program features its significance in achieving this objective. By promoting a culture of vigilance and prompt intervention among healthcare workers, the project contributes to improved patient safety and clinical outcomes. Timely notification and reassessment of the patient enable early identification of deteriorating patients, facilitating timely interventions, and reducing the risk of adverse events (Vincent et al., 2018; Xie et al., 2022).

The impact of the education program extends beyond individual learners. Tailored to address gaps in knowledge and practice among RNs and CNAs, the education exemplifies the importance of educational interventions and fosters a collaboration among members of the healthcare team. Including CNAs in the importance of timely provider notifications and vital sign reassessment empowers them to

actively contribute to patient monitoring and safety. This inclusive approach not only enhances communication and coordination among team members, but also strengthens mutual respect and appreciation for each other's roles and contributions (Campbell & Scott, 2021).

Future steps include re-evaluating the BI dashboard and its parameters to rectify the issue of inaccurate MEWS. This involves aligning the dashboard's parameters more closely with institutional protocols, to ensure consistency and accuracy in data recording. Other studies have examined combining early warning scores with other data such as laboratory results, the patient's comorbid conditions, and patient age to create a personalized risk score for deterioration, but further research is needed in this area (Vincent et al., 2018). Optimizing this institution's algorithm and its parameters can be the foundation for more personalized risk data in this population. Additionally, measures such as enhanced training for RNs and CNAs responsible for data entry can mitigate the impact of data entry errors on the dashboard accuracy.

This quality improvement project presents an opportunity for potential expansion throughout the steps, with future steps aimed at monitoring data over a longer period of time. Expanding this education hospital-wide offers benefits such as ensuring consistency in practice and standardization of protocols across all units and maximizing the reach of the educational intervention, ensuring that all healthcare staff have access to the necessary training and resources to enhance patient safety. Monitoring the data over a longer period of time would allow for the identification of trends, patterns, and areas for further improvement.

Limitations

The project's short timeframe for data collection, spanning just one month before and after the education intervention, presents a significant limitation. Ideally, data collection would extend beyond this narrow window to allow for a more comprehensive assessment of the intervention's long-term impact. A longer observation period would provide a clearer picture of sustained changes in practice and patient outcomes over time. This limitation underscores the need for future studies to consider extended follow-up periods to capture more robust and reliable results regarding the intervention's effectiveness.

Another potential limitation was the presence of a confounding factor when the two units' manager set a personal goal for all RNs to increase provider notifications in 2024. The DNP student was not aware of this goal prior to initiating this project. Therefore, the observed increase in provider notifications during the post-education period may not solely reflect the impact of education but could also be influenced by managerial directives.

Conclusion

This quality improvement project offered several insightful highlights of an educational intervention aimed at improving patient monitoring and response within acute care settings. Analysis of participant survey responses revealed positive trends, indicating enhanced knowledge, confidence levels, and usefulness of the education among both RNs and CNAs following the intervention. Particularly, the education was correlated with an increased number of provider notifications and follow-up vital signs, suggesting an encouraging impact on patient care delivery.

It is important to acknowledge limitations such as the short timeframe for data collection and potential confounding factors. Moving forward, efforts should be made to reexamine the institution's algorithm for collecting patient data, collect data for a longer period of time, and expand educational initiatives across the institution are crucial for sustaining and maximizing the project's impact. Future quality improvement or doctoral projects may analyze if this education intervention improves patient outcomes such as decreased length of stay and decreased cardiac or respiratory arrests.

References

Agency for Healthcare Research and Quality. (2019a). *Failure to rescue.* Retrieved from: https://psnet.ahrq.gov/primers/primer/38/failure-to-rescue

Agency for Healthcare Research and Quality. (2019b). *Rapid response systems.* Retrieved from: https://psnet.ahrq.gov/primer/rapid-response-systems

Alves Silva, L. M., Moroço, D. M., Pintya, J. P., & Miranda, C. H. (2021). Clinical impact of implementing a rapid-response team based on the Modified Early Warning Score in wards that offer emergency department support. *PLoS One*, *16*(11), e0259577. https://doi-org.proxy.seattleu.edu/10.1371/journal.pone.0259577

American Academy of Family Physicians. (n.d.). *Basics of quality improvement. https://www.aafp.org/family-physician/practice-and-career/managing-your-practice/quality-improvement-basics.html*

Astroth, K. S., Woith, W. M., Jenkins, S. H., & Hesson-McInnis, M. S. (2017). A measure of facilitators and barriers to rapid response team activation. *Applied Nursing Research*, *33*, 175–179. https://doi-org.proxy.seattleu.edu/10.1016/j.apnr.2016.12.003

Balshi, A. N., Huwait, B. M., Noor, A. S. N., Alharthy, A. M., Madi, A. F., Ramadan, O. E., Balahmar, A., Mhawish, H. A., Marasigan, B. R., Alcazar, A. M., Rana, M. A., & Aletreby, W. T. (2020). Modified Early Warning Score as a predictor of intensive care unit readmission within 48 hours: A retrospective observational study. *Revista Brasileira de Terapia Intensiva*, *32*(2), 301–307. https://doi.org/10.5935/0103-507x.20200047

Beckett, D. J., Inglis, M., Oswald, S., Thomson, E., Harley, W., Wilson, J., Lloyd, R. C., & Rooney, K. D. (2013). Reducing cardiac arrests in the acute admissions unit: A quality improvement journey. *BMJ Quality & Safety*, *22*(12), 1025–1031. https://doi-org.proxy.seattleu.edu/10.1136/bmjqs-2012-001404

Bhatnagar, M., Sirohi, N., & Dubey, A. B. (2021). Prediction of hospital outcome in emergency medical admissions using modified early warning score (MEWS): Indian experience. *Journal of Family Medicine and Primary Care*, *10*(1), 192–198. https://doi.org/10.4103/jfmpc.jfmpc_1426_20

Campbell, A., Layne, D., & Scott, E. (2021). Relational quality of registered nurses and nursing assistants: influence on patient safety culture. *Healthcare*, *9*(2), 189. https://doi-org.proxy.seattleu.edu/10.3390/healthcare9020189

Chen, J., Bellomo, R., Flabouris, A.,Hillman, K., & Finfer, S. (2009). The relationship between early emergency team calls and serious adverse events. *Critical Care Medicine*, *37*(1), 148–153. https://doi-org.proxy.seattleu.edu/10.1097/CCM.0b013e3181928ce3

Delgado-Hurtado, J. J., Berger, A., & Bansal, A. B. (2016). Emergency department Modified Early Warning Score association with admission, admission disposition, mortality, and length of stay. *Journal of Community Hospital Internal Medicine Perspectives*, *6*(2), 31456. https://doi.org/10.3402/jchimp.v6.31456

Donabedian A. (1988). The quality of care. How can it be assessed? JAMA, *260*(12), 1743–1748. https://doi.org/10.1001/jama.260.12.1743

Hillman, K., Chen, J., Cretikos, M., Bellomo, R., Brown, D., Doig, G., Finfer, S., Flabouris, A., & MERIT study investigators (2005). Introduction of the medical emergency team (MET) system: A cluster-randomised controlled trial. *Lancet*, *365*(9477), 2091–2097. https://doi-org.proxy.seattleu.edu/10.1016/S0140-6736(05)66733-5

Hillman, K., Chen, J., & Jones, D. (2014). Rapid response systems. *The Medical Journal of Australia*, *201*(9), 519-521. https://doi-org.proxy.seattleu.edu/10.5694/mja14.01088

Howell, M.D., & Stevens, J.P. (2020). *Understanding healthcare delivery science*. McGraw Hill.

Institute for Healthcare Improvement. (n.d.). *Rapid response teams.* https://www.ihi.org/Topics/RapidResponseTeams/Pages/default.aspx

Kohn, L.T., Corrigan, J. M., & Donaldson, M.S. (Eds.). (2000). *To Err is Human: Building a Safer Health System*. National Academies Press (US).

Kronick, S. L., Kurz, M. C., Lin, S., Edelson, D. P., Berg, R. A., Billi, J. E., Cabanas, J. G., Cone, D. C., Diercks, D. B., Foster, J. J., Meeks, R. A., Travers, A. H., & Welsford, M. (2015). Part 4: Systems of care and continuous quality improvement: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation*, *132*(18 Suppl 2), S397–S413. https://doi-org.proxy.seattleu.edu/10.1161/CIR.0000000000000258

Lagasse, N. (2022). *Rapid response team: Policy & RRT nurse initiated orders (NIOs).* Providence Regional Medical Center Everett. https://phs-waprmce.policystat.com/policy/9483965/latest

Lee, B. Y., & Hong, S. B. (2019). Rapid response systems in Korea. *Acute and Critical Care*, *34*(2), 108–116. https://doi-org.proxy.seattleu.edu/10.4266/acc.2019.00535

Liu, V., Kipnis, P., Rizk, N. W., & Escobar, G. J. (2012). Adverse outcomes associated with delayed intensive care unit transfers in an integrated healthcare system. *Journal of Hospital Medicine*, *7*(3), 224–230. https://doi-org.proxy.seattleu.edu/10.1002/jhm.964

Lyons, P. G., Edelson, D. P., & Churpek, M. M. (2018). Rapid response systems. *Resuscitation*, *128*, 191–197. https://doi-org.proxy.seattleu.edu/10.1016/j.resuscitation.2018.05.013

Mathukia, C., Fan, W., Vadyak, K., Biege, C., & Krishnamurthy, M. (2015). Modified Early Warning System improves patient safety and clinical outcomes in an academic community hospital. *Journal of Community Hospital Internal Medicine Perspectives*, *5*(2), 26716. https://doi-org.proxy.seattleu.edu/10.3402/jchimp.v5.26716

Moore, Lynne PhD; Lavoie, André PhD; Bourgeois, Gilles MD; Lapointe, Jean MD. Donabedian's structure-process-outcome quality of care model: Validation in an integrated trauma system. *Journal of Trauma and Acute Care Surgery 78*(6):p 1168-1175, June 2015. DOI: 10.1097/TA.0000000000000663

Solomon, R. S., Corwin, G. S., Barclay, D. C., Quddusi, S. F., & Dannenberg, M. D. (2016). Effectiveness of rapid response teams on rates of in-hospital cardiopulmonary arrest and

mortality: A systematic review and meta-analysis. *Journal of Hospital Medicine*, *11*(6), 438–445. https://doi-org.proxy.seattleu.edu/10.1002/jhm.2554

Song, M. J., & Lee, Y. J. (2021). Strategies for successful implementation and permanent maintenance of a rapid response system. *The Korean Journal of Internal Medicine*, *36*(5), 1031–1039. https://doi-org.proxy.seattleu.edu/10.3904/kjim.2020.693

Stolldorf, D.P., & Jones, C.B. (2015). Deployment of rapid response teams by 31 hospitals in a statewide collaborative. *Joint Commission Journal on Quality and Patient Safety*, *41*(4), 186–191. https://doi-org.proxy.seattleu.edu/10.1016/s1553-7250(15)41024-4

Subbe, C. (n.d.). *Modified Early Warning Score (MEWS) for clinical deterioration.* MDCalc. https://www.mdcalc.com/calc/1875/modified-early-warning-score-mews-clinical-deterioration

Tilley, M., & Spencer, K. (2020). Perceived barriers to rapid response team activation among nurses. *The American Journal of Nursing*, *120*(7), 52–60. https://doi-org.proxy.seattleu.edu/10.1097/01.NAJ.0000688220.05900.7c

Torchilo, F. (2023). "Identifying Nurse-Reported Barriers and Facilitators to Timely Rapid Response Team Activation." *Doctor of Nursing Practice Projects.*

Vincent, J. L., Einav, S., Pearse, R., Jaber, S., Kranke, P., Overdyk, F. J., Whitaker, D. K., Gordo, F., Dahan, A., & Hoeft, A. (2018). Improving detection of patient deterioration in the general hospital ward environment. *European Journal of Anaesthesiology*, *35*(5), 325–333. https://doi-org.proxy.seattleu.edu/10.1097/EJA.0000000000000798

Xie, J., Wang, Z., Yu, Z., & Guo, B. (2022). Enabling timely medical intervention by exploring health-related multivariate time series with a hybrid attentive model. *Sensors*, *22*(16), 6104. https://doi-org.proxy.seattleu.edu/10.3390/s22166104