UTILIZATION OF AN EARLY WARNING SCORE TO INITIATE PROACTIVE ROUNDING BY THE RAPID RESPONSE TEAM

by

Miranda L. Lanning

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Approved by:

_____
Dr. Katherine Shue-McGuffin, DNP, MSN, APRN, FNP-C
School of Nursing

_____
Dr. Tiffany Jackson DNP, NP-C, ACHPN
School of Nursing

_____
Dr. Erika L. Setliff, DNP, CCRN-CSC, ACNS-BC, FCCM
Atrium Health

_____
Dr. Abbey Fenwick, PhD
Applied Physiology, Health, and Clinical Sciences

ABSTRACT

MIRANDA LANNING. Utilization of an early warning score to initiate proactive rounding by the rapid response team. (Under the direction of DR. KATHERINE SHUE-McGUFFIN)

Millions of adverse events occur around the world each year leading to increased hospital length of stay, increased mortality, and decreased quality of life. Several adverse events occur due to failure to rescue (FTR) situations. FTR events happen when mortality occurs following a major medical complication. With the assistance of electronic early identification of clinical deterioration, early interventions may be implemented to decrease FTR events.

This quality improvement project was guided by the PICO question: In adult medical-surgical inpatients, does proactive rounding by the critical care code team (CCCT) with utilization of an automated early warning system, compared with no proactive rounding, improve recognition of clinical deterioration, and decrease transfers to critical care? A REDCap database was built and utilized to track proactive rounding along with Modified Early Warning Scores (MEWS) by the CCCT at a tertiary medical center. The percentage of transfers to critical care from the fourth quarter of 2022 was then compared to fourth quarter of 2023 using a paired T-Test to determine statistical significance.

A proactive rounding process was developed, and 664 rounds were entered. Of these, 114 were proactive rounds with a MEWS score and 550 were non-proactive rounds. Rounding triggers were compared and analyzed which revealed that the primary reason for rounding was staff concerns. This supported the literature that collaboration was important to improve patient outcomes. There was a decrease in transfers to critical care units post-rapid response events, however it was not statistically significant.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

CCCT	Critical Care Code Team
DNP	Doctor of Nursing Practice
EMR	Electronic Medical Record
FTR	Failure to Rescue
IRB	Institutional Review Board
LOS	Length of stay
MEWS	Modified Early Warning Score
NTS	Non-technical skills
PDSA	Plan Do Study Act
REDCap	Research Electronic Data Capture

CHAPTER 1: INTRODUCTION

Approximately forty-three million adverse events occur around the world each year. Adverse events are responsible for increasing hospital length of stay, increasing mortality and decreasing quality of life (Gaughan et al., 2022). Adverse events can include failure to rescue (FTR) situations, which happen when mortality occurs following a major medical or surgical complication. FTR situations also represent a delay in recognizing or responding to in-hospital complications (Fischer et al., 2021). All clinical nurses should be prepared to recognize clinical deterioration that could lead to FTR events and activate the rapid response team to assist in early interventions (Granitto et al., 2020). Early interventions can decrease hospital stays, decrease unplanned transfers to critical care, and decrease in-hospital mortality (Na et al., 2021). However, bedside nurses are often unable to identify the signs of deterioration promptly enough to avoid complications. In a study completed by Na et al. (2021), the authors found that using automated alerts from tools, such as the Modified Early Warning Score (MEWS), improved patient outcomes.

MEWS was not utilized appropriately or in a timely manner to determine patients at high risk for clinical deterioration by bedside nursing staff at the project facility. This led to a reactive response model to adverse events rather than a proactive model. This quality improvement project was implemented to provide a proactive response model to inpatients within the hospital setting by having the rapid response team utilize MEWS to increase the awareness of clinical deterioration to decrease failure to rescue events.

Background

Clinical deterioration begins with subtle changes in physiological parameters four to six hours before a critical event. Physiological parameters include heart rate, body temperature,

blood pressure, and more. In a study by Orique et al. (2019), the authors found that nurses have poor situational awareness regarding clinical deterioration. This can lead to missed patient cues, which can lead to fewer appropriate interventions (Orique et al., 2019). Timely recognition of signs of deterioration in hospitalized patients and implementation of early interventions can improve patient outcomes (Na et al., 2021).

Rapid response teams were implemented to avoid acutely decompensating patients from further clinical deterioration and mortality (Fischer et al., 2021). At the project facility, the first emergency response team was implemented in 2004. It was called the STAT team, standing for Stabilize, Treat, Assess, & Teach. In 2009, it was rebranded as the Rapid Response Team. In 2015, The Rapid Response Team grew by hiring critical care-trained nurses into full-time positions, and in 2019 it was rebranded to become the Critical Care Code Team (CCCT). As the years have passed, the team has expanded from only having coverage a few times a week to now having coverage twenty-four hours a day seven days a week. In 2022, there were a total of 1,104 rapid response activations at the project facility. Of these activations, 309 patients transferred to critical care. The project facility's leadership has a plan to expand to have two critical care trained nurses each shift. The team is supported and employed throughout the facility.

Many practitioners support the use of evidence-based practices to support patient care. However, knowledge of evidence is not enough; it must be used and implemented into clinical practice to improve patient outcomes and care. *Proactive rounding* is defined as a nurse-driven early-patient interaction that assists with anticipating and addressing patients' needs. Proactive rounding, which is purposeful and timely rounding, is a best practice intervention and is perceived by nursing staff to be beneficial for themselves and their patients so that deterioration is detected faster (Blackburn et al., 2022). Intentional proactive rounding has been found to be

beneficial for patient satisfaction and helps to address patients' needs in a timely manner (Danaf et al., 2017; Di Massimo et al., 2022). This form of rounding helps to address the needs of the patients to ensure their safety is priority and to decrease the occurrence of patient preventable events. Proactive rounding can aid with addressing problems before they occur.

As a component of a proactive response, an automated electronic system can improve the accuracy and reliability of the detection of clinical deterioration (Na et al., 2021). With the help of automated alerts, the time of recognition can be shortened, and clinical outcomes can be improved (Na et al., 2021). When combining proactive rounding with the use of an automated detection system, clinical deterioration should decrease, and patient outcomes should improve.

Problem Statement

To address clinical deterioration in a timely manner, situational awareness of clinical deterioration must increase. Nurses should acknowledge that signs and symptoms of clinical deterioration are occurring so that they are able to implement early interventions. In 2022, the project facility had 109 code blue events and 1,104 rapid response activations. In 2023, during the first nine months, there were 86 code blue events and 838 rapid response activations.

Prior to project implementation, there was no documented intentional proactive rounding being completed at the project facility. The CCCT would intentionally check on patients who had experienced a rapid response within the previous twenty-four hours and patients who are deemed "high risk" based on nursing judgement. However, this interaction was not being tracked or documented. The MEWS built within the electronic medical record was also not being utilized. However, with the assistance of the MEWS within the EMR, the CCCT can now identify additional patients at-risk for clinical deterioration who would benefit from early interventions.

Purpose of the Project

The purpose of this quality improvement project was to assist with the detection of clinical deterioration by implementing a proactive response model prior to critical events. This project used the MEWS tool within the EMR to initiate proactive rounding by the CCCT at the project facility on adult patients in the medical, surgical, and progressive care divisions. The MEWS automatically populates based on nursing documentation of items such as heart rate, respiratory rate, blood pressure, and level of consciousness. CCCT nurses monitored MEWS scores multiple times a day and then interacted with patients with a MEWS of 5 or greater. The team addressed any needs to prevent clinical deterioration using early interventions. The goal was that these early interventions would lead to decreased transfers to critical care areas. By using technology and engaging the critical thinking skills of the CCCT, the team would proactively round and assist bedside nurses with acknowledging clinical deterioration.

Clinical Question

In adult medical-surgical inpatients, is proactive rounding by the rapid response team, with the utilization of an automated early warning system, compared with no proactive rounding, improve recognition of clinical deterioration, and decrease transfers to critical care over a three-month period?

Project Objectives

The primary focus of this study involved adult medical, surgical, and progressive care inpatient units at a 457-bed tertiary care hospital in Concord, North Carolina. The patients were in medical, surgical, and progressive care units. This project excluded patients that were already in critical care, women’s and children’s areas, operating rooms, emergency departments, and all outpatient areas. This project was implemented over three months. IRB approval was obtained

from the project facility (Appendix A) and The University of North Carolina at Charlotte (Appendix B).

There were many professional stakeholders needed for this project. High-level stakeholders included the chief nurse executive of the project facility, the assistant vice presidents of critical care and the medical, surgical, and progressive care divisions, and managers of both critical care units. Other stakeholders that were notified of this project were critical care providers, the informatics team, educators and clinical nurse specialists of the medical, surgical, and progressive care areas, and house supervisors. The direct stakeholders were the CCCT members, consisting of critical care nurses.

The objective of this quality improvement project was to develop and execute a proactive rounding process by the CCCT that utilized the MEWS. The overall goal was to increase patient safety and improve outcomes. The primary intended short-term outcome for this project was to decrease unplanned transfers to critical care. To accomplish this outcome, the CCCT first needed to develop an understanding of how the MEWS is calculated within the EMR and what the scores indicate, such as clinical deterioration. The CCCT then needed to understand what proactive rounding is and the standard work process related to it. To achieve these goals, each team member was educated about the MEWS and the process of proactive rounding.

To meet the objective of developing and implementing a proactive rounding process by the CCCT, a primary data tracking tool was developed using the REDCap database platform. To meet the objective of decreasing transfers to critical care, rapid response activations were tracked along with patient outcomes. With combined data and retrospective chart audits, all outcomes were determined.

There was a need for high-level tracking and detailed tracking within the REDCap database. Detailed data tracking included things such as the amount of rounding that occurs on each shift, the type of interactions for each round, time spent with each patient, interventions implemented, and patient outcomes. Detailed data tracking was built to be sustainable for future tracking. REDCap was accessible using a QR code and links on the desk top computer that was connected to the database where the CCCT could input data.

Conclusion

Timely detection of clinical deterioration with the assistance of early warning signs can improve patient safety and outcomes**.** Studies show that the use of early warning scores within EMRs allows nurses to make this recognition of clinical deterioration quicker than without early warning scores. This quality improvement project educated and assisted the CCCT with the utilization of the MEWS built within the EMR. The CCCT then can use the MEWS to initiate proactive rounding on patients that are at increased risk for deterioration. This may decrease or even prevent FTR events by utilizing a proactive response module instead of a reactive module.

Implementation occurred in the medical, surgical, and progressive care units. Data were collected by the CCCT via REDCap over a three-month period. The goal of this project was to increase awareness of clinical deterioration that would then allow for early interventions. These early interventions led to a decrease in transfers to critical care areas.

CHAPTER 2: LITERATURE REVIEW

A peer-reviewed literature search was performed using PubMed, CINAHL, Cochrane Library, and Google Scholar between August 2022 and March 2023. Some databases were accessed through the Atkins Library website at the University of North Carolina at Charlotte. Keywords included *proactive rounding*, *rapid response teams*, *modified early warning score*, and *clinical deterioration* using Boolean operators AND and OR. A combination of searches including any or all of the above terms was performed to find twenty-six (26) qualifying studies. Criteria for inclusion included the following: years 2017 to present, English language, inpatients, peer-reviewed, and full text.

These studies included: five systematic reviews, one randomized control trial, one controlled trial without randomization, four cohort studies or case-control studies, five systematic reviews of descriptive or qualitative studies, eight qualitative studies or descriptive studies, and two expert opinions. The collected literature offered insight into the importance of timely recognition, effective tools used for early detection of clinical deterioration, education provided to rapid response teams on clinical deterioration, collaboration with interdisciplinary teams, and relevant outcomes of the use of early warning scores.

Importance of Timely Recognition

Failure to rescue (FTR) occurs when a patient dies due to a delay in the hospital staff recognizing or responding to complications. FTR is a patient safety issue that can lead to mortality following a major complication. FTR can be measured as mortality after a treatable complication (Hall et al., 2020). Rapid response teams were employed to avoid acutely decompensating patients from additional clinical deterioration and mortality and to reduce the occurrence of failure to rescue events (Fischer et al., 2021). When signs of deterioration are

noted in a timely manner, then early interventions can be implemented quicker, leading to improved patient outcomes (Na et al., 2021). A recent study supports the use of an early warning system for the detection of declining patients, followed by escalation of care via proactive rounding, to decrease the incidence of failure to rescue (Goellner et al., 2022).

An automated electronic system can improve the accuracy and reliability of the detection of clinical deterioration (Na et al., 2021). With the help of automated alert and activation systems, such as proactive rounding by the rapid response team, the time of recognition can be shortened and clinical outcomes can be improved (Na et al., 2021). Proactive rounding is perceived by nursing staff to be beneficial for themselves and their patients so that deterioration is detected faster (Blackburn et al., 2022). Intentional proactive rounding improves patient satisfaction by addressing their needs quickly and efficiently (Danaf et al., 2017; Di Massimo et al., 2022).

Effective Tools

Two automated tools were well-represented in the literature: The Rothman Index Early Warning Score (Danesh et al., 2019; Goellner et al., 2022), and the Modified Early Warning Score (Alves Silva et al., 2021; Hermanson et al., 2020; Muralitharan et al., 2021). Both tools calculate patient scores and showed that increased scores identify patients at greater risk for catastrophic deterioration (Muralitharan et al., 2021). These early warning tools are machine-based learning programs. The review of the literature suggests that machine-based learning early warning systems can achieve greater accuracy (Hermanson et al., 2020; Miles et al., 2022; Reardon et al., 2021). The systems incorporate vital sign measurements along with nursing documentation to predict clinical deterioration (Muralitharan et al., 2021; O'Connell et al., 2020). The Modified Early Warning Score (MEWS) was developed in the United Kingdom, is one of

the first to be accepted in the United States and is based on six clinical measurements such as heart rate, body temperature, blood pressure, and more (Kramer et al., 2019).

Education

Educating the rapid response team on the prevention of clinical deterioration includes risk screening, surveillance, monitoring, and early interventions. Training can be delivered using multiple methods to the rapid response team such as direct instruction, simulations, and evidence-based teamwork programs (Winterbottom & Webre, 2021). In a study by Hermanson et al. (2020), the authors implemented a two-phase quality improvement process. The first was a rounding event with staff to identify needs and the second was a Plan Do Study Act (PDSA) model where nurses had face-to-face meetings to identify knowledge gaps. This allowed the nurses to be active participants in the process.

Collaboration

With proactive rounding comes a collaboration with bedside nursing staff. Nurses feel empowered to notify rapid response team members sooner when reviewing the MEWS and noticing a change in patient condition (Ashbeck et al., 2020). With this collaboration, interventions were implemented earlier, which led to a decrease in deterioration and mortality. Non-technical skills (NTS) training has demonstrated improved communication and cooperation. Badge tags, a hand-off process, and regular meetings have been found to improve collaboration and the NTS (Chalwin et al., 2020). A study by Shiell et al. (2022) found that collaboration among providers, nurses, and rapid response teams led to a focus on patient safety, optimizing early detection, and management of patient deterioration.

Relevant Outcomes

The literature review revealed multiple outcomes made possible by using proactive rounding and automated early warning systems. These outcomes include a decrease in unplanned ICU transfers (Danesh et al., 2019), a decrease in hospital length of stay (Hermanson et al., 2020), reduced cardiac arrest outside of the ICU (Jung et al., 2022; Ko et al., 2020; Tirkkonen et al., 2020; Winterbottom & Webre, 2021), and a decrease in in-hospital mortality (Na et al., 2021). These outcomes led to improved quality indicators. In a study done by Silva et al. (2021), the authors found a significant decrease in in-hospital mortality with the use of MEWS$\geq$4.

Overall, timely recognition of early warning signs can improve patient safety and satisfaction. Multiple studies provided reliable evidence to show that with the implementation of early interventions, patient outcomes would be improved. These outcomes include unplanned ICU transfers, decreased hospital length of stay, reduced cardiac arrest outside of the ICU, and decreased in-hospital mortality. However, there is a lack of studies that show the importance of proactive rounding by the rapid response team. Many studies describe bedside nurses calling the rapid response team once being alerted of an elevated early warning score, but only one study discussed proactive rounding by the rapid response team. Through this DNP project, this knowledge gap was narrowed.

Conceptual/Theoretical Framework

For this quality improvement project, Kurt Lewin's Three-Step Change Theory was used. Lewin developed a well-accepted approach to changing human behavior. Lewin's model proposes that there are forces to promote change while restricting forces oppose it (Burnes, 2020). To enact change within these forces, Lewin's three-step process includes unfreezing, moving, and refreezing.

The first step, unfreezing, is a challenging process of re-education (Burnes, 2020). At times, individuals are hesitant and resistant to learn new processes. This project involved educating the CCCT about a proactive rounding model. This model included utilizing the MEWS, which has not been used in the past. With this education and awareness, the team may be more open to the necessity for change.

The second step, moving, is action-based research. Moving is the change that takes place to be able to obtain new information and new processes. This step was the implementation step. The CCCT was encouraged to view rounding from a fresh perspective and implement the MEWS to prioritize patients. Patients with increased MEWS were rounded on first. This step also encompassed data tracking using REDCap. This was a new process for the team that allowed for electronic tracking of rounding and patient interactions.

The third step, refreezing, encompasses the new behavior and reinforces it. This project included processes for sustainability. Sustainability will be obtained by implementing and continuing the usage of a standard of work process. Using a group approach with the CCCT helps to ensure the integration and continued use of the new process of proactive rounding.

CHAPTER 3: METHODS

The purpose of this quality improvement project was to implement the use of the modified early warning score, as a proactive response model prior to critical events. This then would allow the team lead to assess the effectiveness of proactive rounding on recognition of clinical deterioration in a timelier manner. To accomplish this purpose, the project lead used a methodological approach that included attention to the design, sample, setting, intervention style, data collection, and ethical considerations related to the project.

Project Design

Quality Improvement projects involve processes designed to improve clinical care, patient safety, and patient outcomes. This project was designed to implement the use of an early warning electronic score to determine patients at high risk for clinical deterioration. These patient interactions would then be tracked using a REDCap database. Outcome measures would include the percentages of transfers to critical care after a rapid response. Data were collected pre- and post-intervention to assess for changes in outcomes.

Sample

The inclusion criteria for this quality improvement project were the surgical, medical, and progressive care units. This project excluded patients that were already in critical care areas, women's and children's areas, operating rooms, emergency departments, and all outpatient areas. The critical care areas were excluded due to the inability to progress their care to a higher level. The CCCT are available for the outpatient areas as needed but were not included in proactive rounding. CCCT had an inclusion criteria list for proactive rounding that included the following patients: MEWS 5 or greater, rapid response calls within the last 24 hours, and high-risk patients

due to nursing and/or provider concerns. This list of patients was kept in an Excel spreadsheet that was only accessed by members of the CCCT.

Setting

The setting for this quality improvement project was the adult medical, surgical, and progressive care inpatient units at a 457-bed tertiary care center. It has a 40-bed medical/surgical critical care unit and a 14-bed cardiovascular critical care unit. The CCCT is staffed 24/7 with a minimum of one critical care trained nurse each shift. The CCCT is available for the entire hospital at any time. The population of this project is the same as the current coverage by the CCCT; therefore, this would not be a change in coverage for the team.

Intervention and Data Collection

To implement this quality improvement project, implementation was separated into steps. The first step was education and awareness for the CCCT about the Modified Early Warning Score (MEWS) tool within the EMR. This education included what the MEWS tool indicates, what alters the score, and how to react to the score. This education was provided as in-person, hands-on training. Staff were able to set up their specific views within the electronic medical records and practice viewing the MEWS for all the included patient populations. This education session also included training on follow-up interventions based on the current MEWS score. Education also included how to access REDCap and how to document in the REDCap database.

The second step was implementing a process that allows the CCCT to see and retrieve the MEWS scores on all patients in the medical-surgical divisions as a standard of work. High-risk patients were ranked by their scores. Currently, all nurses have access to the MEWS tool using a patient list view in the EMR. With education on how to find and rank these scores, the CCCT

utilized these scores at consistent intervals for proactive rounding. A standardized workflow (Figure 1) was developed to keep the proactive rounding process consistent and sustainable.

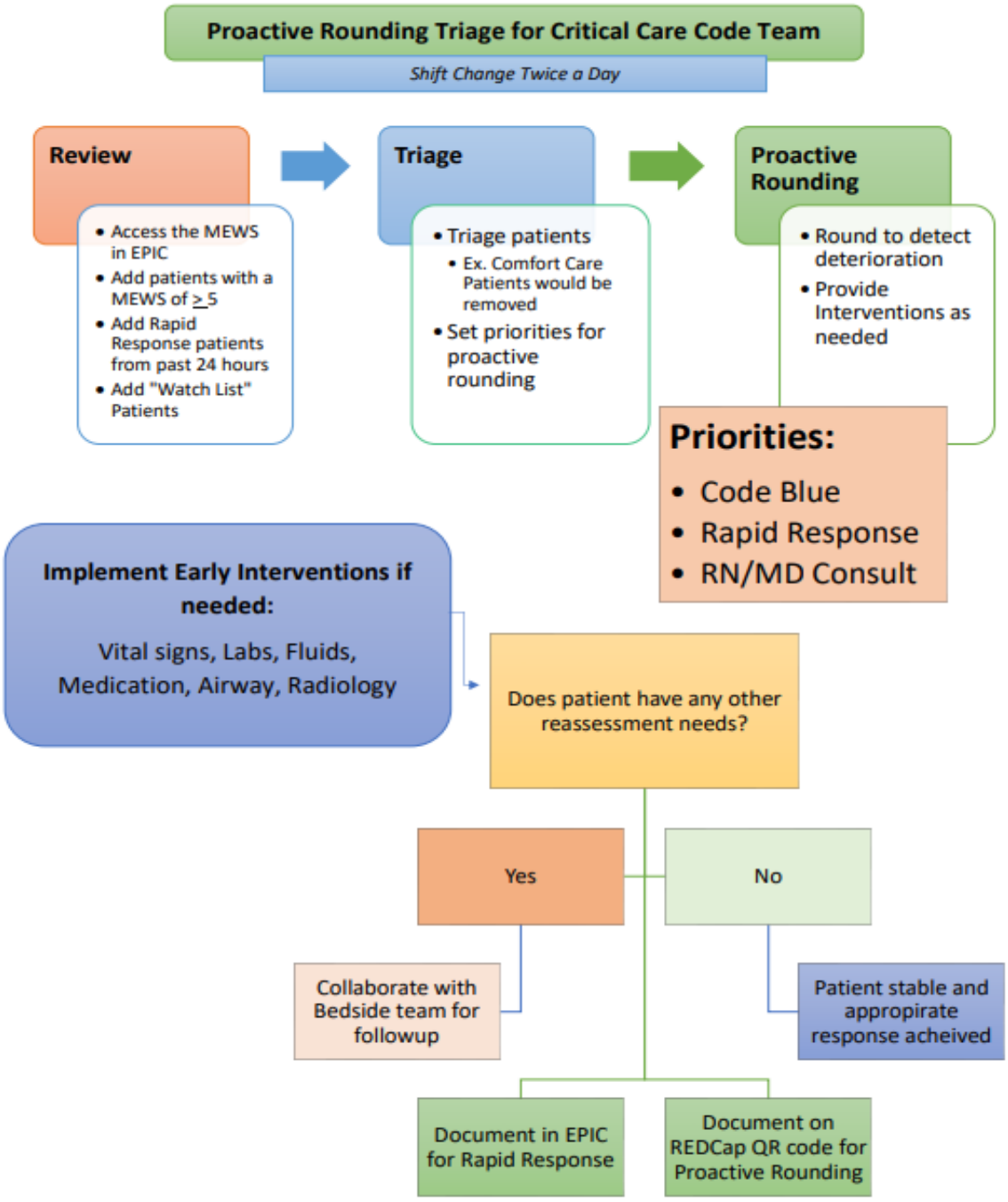

Figure 1

Data Collection Procedures

The third step was to teach the CCCT how to use the MEWS tool to determine the need for rounding and the implementation of early interventions. The CCCT was able to utilize the MEWS and the standard of work to proactively round on patients to help prevent clinical deterioration and improve patient outcomes. Using critical thinking skills, they applied standing orders to implement early interventions. After proactive rounding and implementation of early interventions, the CCCT inputted the data into the REDCap database. This database tracks patient information, the type of interaction with the patient, the current MEWS, interventions implemented, and outcomes.

Measurement Tools

The measurement tool that was used for the data collection for this project was REDCap. REDCap is a business tool that is utilized by the project facility. It is a secure web platform that allows project managers to design and manage databases and surveys. REDCap data can be exported with seamless downloads into Excel and other statistical packages such as SPSS for data analysis. The REDCap data is entered by the CCCT during each shift.

Activated rapid responses and code blue calls were also tracked using an Excel sheet. This form of tracking did not include patient information. It included the type of event, the time and date of the event, and the location of the event. This was manually tracked using Rover and the overhead paging system. This information was then compared to rapid response documentation within the EMR. Tracking this information and comparing it to rapid response tools and narrator documentation allowed for consistency and accuracy.

Data Collection Procedure

Institutional Review Board (IRB) approval from both University of North Carolina Charlotte and the project facility was obtained prior to data collection. Data collection took place

over three months, from October 2023 to December 2023. The data collected during this time were compared to the data that were formerly obtained manually from the CCCT in the fourth quarter of 2022. The data collection expanded from the current state, as represented in Figure 2, to include proactive rounding and not just rapid response or code blue information. All individuals were educated on the standard of work, the inclusion criteria, and how to utilize REDCap before the go-live of this project. The education was performed in person and was shared through email with the team. The project leader ensured that all data was being tracked promptly. With the success of proactive rounding tracking, the data tracking using REDCap will be continued after project completion and shared at a system level.

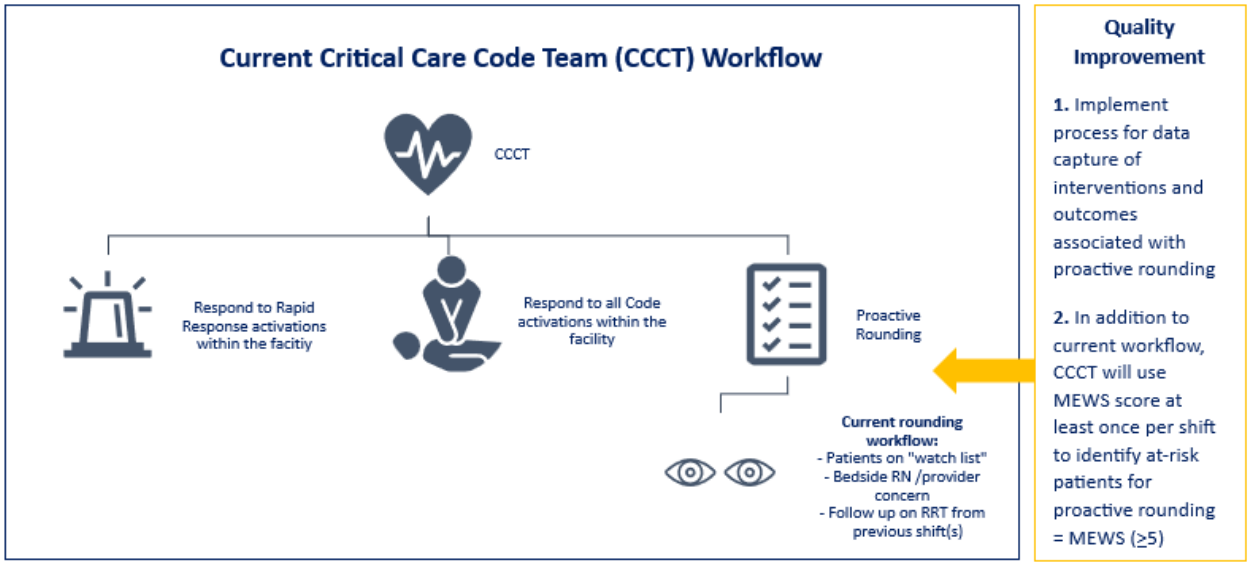

Figure 2

Current Critical Care Code Team (CCCT) Workflow with Project Aims

The CCCT accessed the REDCap survey, where they entered their data via a link or a QR code. This access was on a secure and protected website. The CCCT promptly entered data into the database. The team accessed one record at a time, which ensured the confidentiality of the other records. The team was unable to review prior patient information or entries. The link for

the survey was available via multiple formats. The link was available for the CCCTs on their office desktop computer, in their emails, and a shared Excel spreadsheet. A QR code was printed and placed in the office which they could easily scan with a cell phone or other electronic device to allow access to the survey. Many members of the team saved the link on their electronic device for convenient access.

REDCap can be customized and changed at any time. It uses field validation and branching logic to improve data quality. There are mandatory fields to ensure all information is collected correctly. REDCap allows the collection of data into a survey tool even when there is no Wi-Fi or cellular connection; it will sync data to the server at a later time. REDCap administrators are then able to review the data.

Data Analysis

REDCap is a supported business tool of the project facility. The database allows for easy viewing of reports and can inspect plots and give descriptive statistics of the data. Data is easily exported into Excel or SPSS using two forms of reports based on the information being reviewed. The rapid response and code blue calls that were manually tracked were compared to the code blue and rapid response documentation stored within the EMR to ensure consistency and comprehensiveness. The project leader created custom reports that allow for trends to be identified easily. Data collected was compared to prior manually tracked rapid response information and then analyzed via SPSS. A t-test was used to compare the percentage of transfers from the fourth quarter of 2022 to the fourth quarter of 2023.

Ethical Considerations

Confidentiality was the utmost priority of this project due to patient information being collected. REDCap is a secure web platform that provides HIPPA protection. The platform

secures files using secure logins from any device. There is no other software needed for security. Each survey was entered individually to ensure each patient's information is secured. REDCap project administrators were the only people able to access all the information within the database. Collaboration with the quality improvement department ensured all information stayed protected.

CHAPTER 4: RESULTS

A total of 664 rounds were entered for the medical-surgical areas at the project facility. Entries were divided into two categories, proactive rounding, and non-proactive rounding. There was a total of 114 proactive rounds entered and a total of 550 non-proactive rounds entered. Data were paired down to allow only one trigger to better understand the reasoning for rounding.

This project also looked at rapid response and code blue activations. Pre data from the fourth quarter of 2022 and post implementation data from the fourth quarter of 2023 were analyzed. There was a total of 333 rapid response and 12 code blue activations pre-implementation compared to a total of 309 rapid response and 29 code blue activations post implementation. Rapid response documentation was then analyzed to determine the number of patients that transferred to critical care. During the fourth quarter of 2022, 29.1% of rapid response patients transferred to critical care. There was a decrease to 22% of patients transferring to critical care post implementation.

Proactive Rounding Results

A total of 664 REDCap rounds were entered during the project implementation period. Of these, 114 (17%) were identified as proactive rounding which included a MEWS score ranging from 0 to 10. Of the 114 entries, 35% had a qualifying MEWS score of 5 or greater. The average MEWS score was found to be 3.71. The average score for patients with a MEWS of 5 or greater was 6.48. Figure 3 represents the total number of MEWS scores for proactive rounding.

Patients were proactively rounded on due to being on the watch list (37.7%), CCCT rounding on unit (20.2%), staff concerns (18.4%), two or more criteria being met (14%), MEWS of 5 or greater (5.3%), or rapid response within the last 24 hours (4.4%). During these proactive rounds, the CCCT was able to coach the nurse 85 times, planned a follow up round 55 times,

assisted with notification to the provider 25 times, and encouraged the bedside nurse to increase monitoring 15 times. Of all the proactive rounding, only 7 patients had to be transferred to a higher level of care. For the 114 patients with proactive rounding, a total of 78 interventions were implemented. These interventions included: airway/breathing, circulation, medication, and laboratory/test.

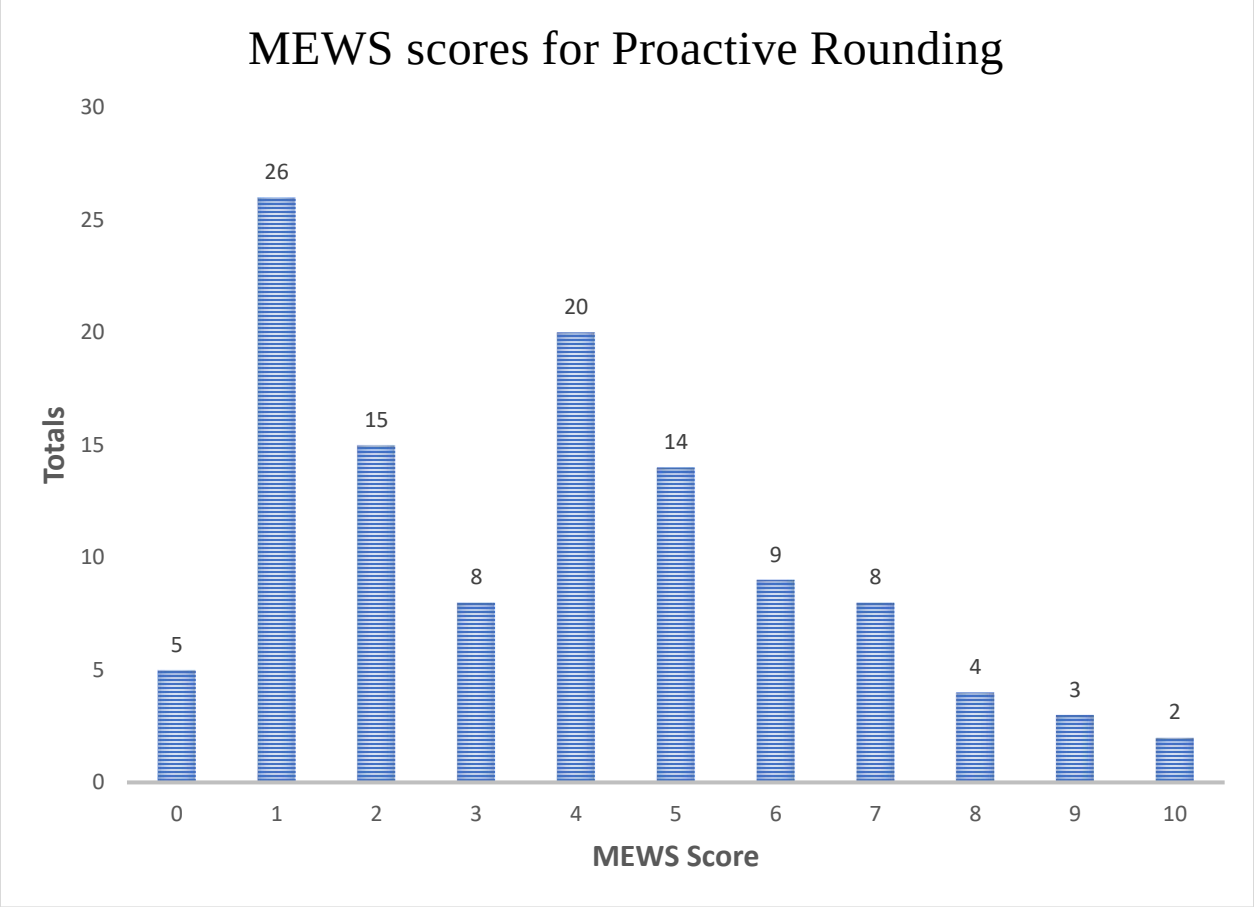

Figure 3

MEWS Scores for Proactive Rounding

Non-Proactive Rounding Results

Of the 664 REDCap entries, 550 (83%) were entered as other rounds. Other rounds or non-proactive rounds were not triggered by the MEWS score but were initiated by other triggers that preceded FTR event such as rapid responses and code blues. Non-proactive rounds included

staff concerns, arrhythmias, altered mental status, intravenous insertion, equipment, bleeding, patient care, agitation, temperature changes, unresponsive, nutrition, allergic reactions, and syncopal episodes (Figure 4). Staff concerns were the largest trigger for rapid response interactions at 30.5%. The CCCT then coached the nurse (29%) or provided early intervention (31%).

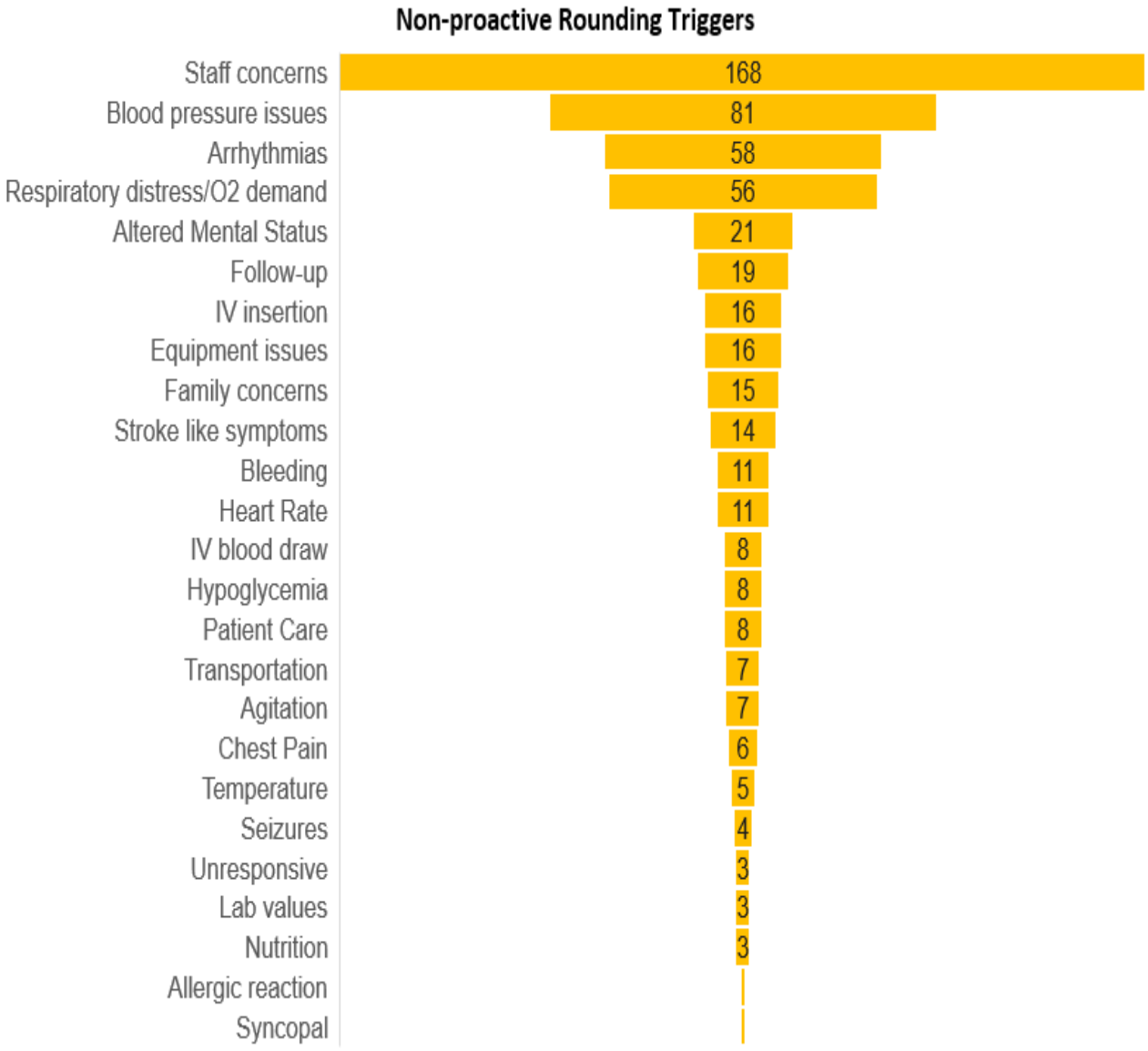

Figure 4

Non-Proactive Rounding Triggers

Rapid Response Transfers to Critical Care

For this quality improvement project, one objective was to determine if proactive rounding utilizing MEWS scores out of the EMR by the critical care code team would lead to a decrease in transfers to critical care. Data were collected from the fourth quarter of 2022, which included 333 rapid response activations and 12 code blue activations. Of these, 22% transferred to critical care. Pre-implementation data were also collected for July 2023 to September 2023. During this time, there were 289 rapid response activations and 31 code blues. Of these, 23.3% transferred to critical care. During implementation of the quality improvement project, there were 309 rapid response activations and 29 code blues. Of these patients, 22% transferred to critical care. There was a continuous decline in the percentage of transfers to critical care.

Using SPSS, a paired T-test was run to compare the percentage of transfers to critical care in the fourth quarter of 2022 with the fourth quarter of 2023. This comparison between the 3 months of transfer percentage in quarter 4 of 2022 ($M = 29.5$, $SD = 3.72$) compared to the 3 months of transfer percentage in quarter 4 of 2023 ($M = 22.05$, $SD = 6.27$) did not demonstrate statistical significance, $t(2) = 1.419$, $p = .292$ with a 95% CI [-15.10, 29.96].

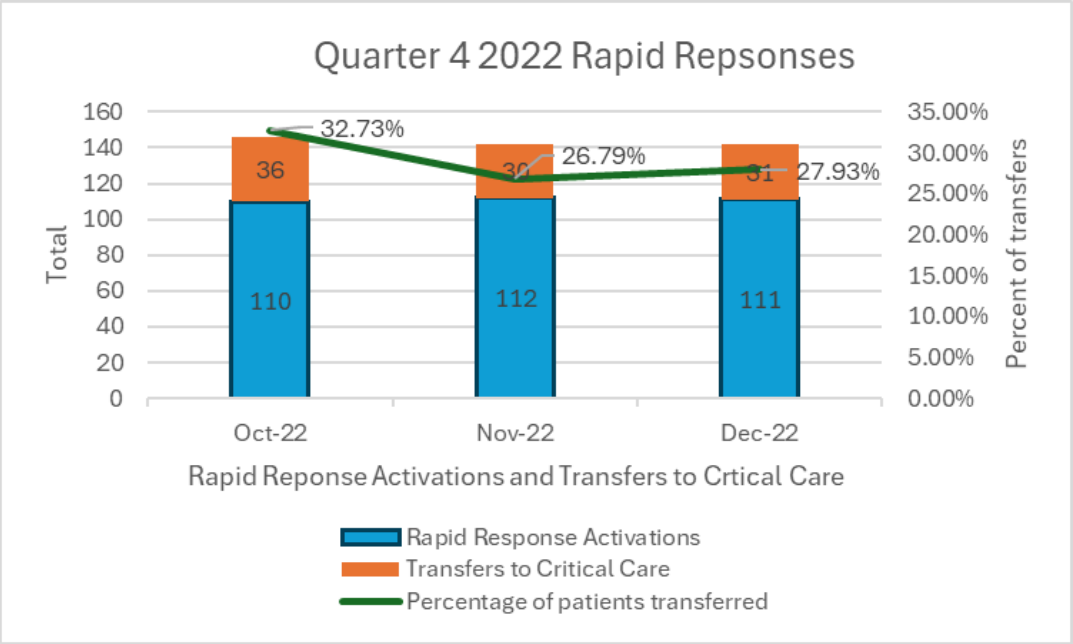

Figure 5

Percentage of Patients Transferred to Critical Care Quarter 4 of 2022

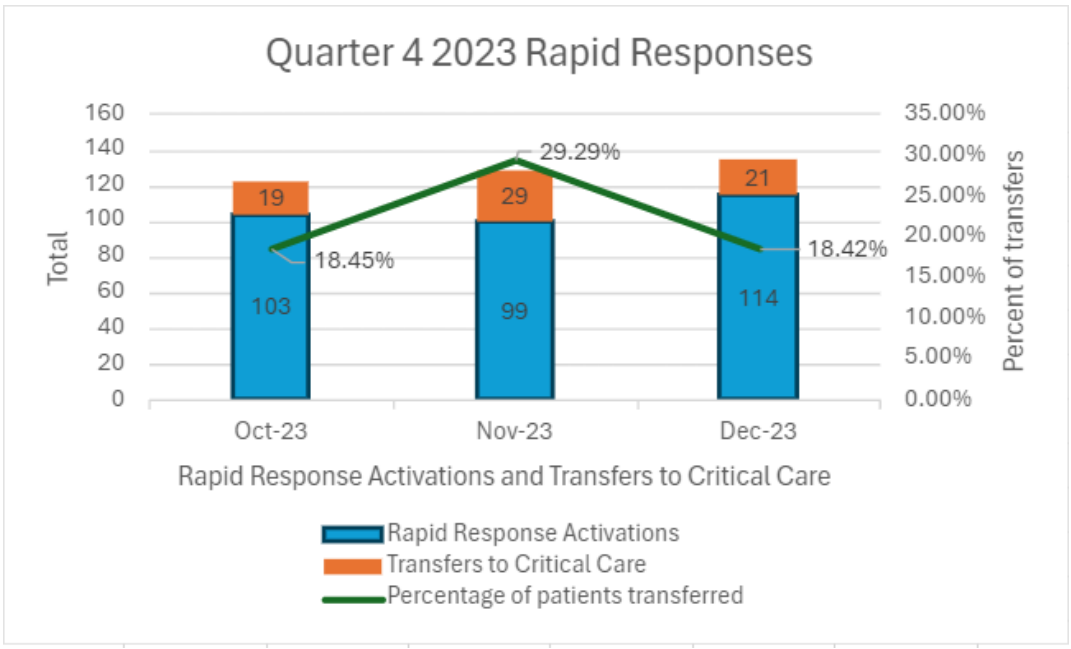

Figure 6

Percentage of Patients Transferred to Critical Care Quarter 4 of 2023

CHAPTER 5: DISCUSSION

Proactive rounding is a nurse-driven, early-patient interaction that assists with anticipating and addressing patients' needs. This rounding helps address the care of patients to ensure they are safe and decrease the occurrence of preventable adverse events. Proactive rounding can aid in addressing problems before they occur. The purpose of this project was to decrease FTR events and to improve patient outcomes.

Discussion of Results

When patients' clinical deterioration can be detected in a timely manner, interventions can be implemented earlier, which then improves patient outcomes. Through an extensive literature review, the project lead found significant research suggesting that proactive rounding was beneficial and shown to decrease transfers to critical care (Danesh et al., 2019). The REDCap database was used successfully to quantify the importance of the CCCT, and the number of patients supported outside of rapid response and code blue activations. The CCCT was able to track data within the REDCap database over a three-month implementation period from October 1 to December 31, 2023, in the medical, surgical, and progressive care units.

A total of 664 rounds were completed on patients in the project setting. These rounds included proactive rounding and non-proactive rounding. The project objectives were that the CCCT would assess MEWS within the EMR and determine patients at high risk for clinical deterioration based on a MEWS of 5 or greater, then, they would proactively round on these patients to determine if patient interventions could be implemented if patient condition required interventions. The results of this project provided insight into the MEWS score and its limitations. The project lead found that the CCCT often would round on patients, and afterwards, would look at the MEWS score within the EMR. They would then document the rounding and

the MEWS, but the proactive rounding was not triggered by the score itself. The proactive rounding tracking gave insight into the rationale of the subsequent rounding.

Non-proactive rounding also increased understanding of why CCCT rounds on patients. Many patients that were captured in the non-proactive rounding should have been tracked on the proactive rounds because they had a rapid response within the last 24 hours, were placed on the watch list, or had been transferred out of critical care within the last 24 hours. However, CCCT that rounded on these patients, did not utilize the implemented workflow, that included the MEWS, to determine who to round on first.

A part of the REDCap database allowed for tracking of implemented interventions. Thirty percent of the non-proactive rounds were due to staff concerns. This suggests that the bedside nursing staff was worried about the patient and was confident in the CCCT's ability to assess the patient and assist with patient care. This supports the literature that nurses should feel empowered to notify the rapid response team when noticing a change in patient conditions (Ashbeck et al., 2020). This collaboration between bedside nursing and the CCCT enhances patient care and allows for early interventions.

Rapid response activations along with transfers to critical care were also tracked and analyzed for this quality improvement project. The percentage of patients that were transferred to critical care post rapid response was not statistically significant. Due to the winter surge in daily patient census, the fourth quarter of 2022 was compared with fourth quarter of 2023. However, the fourth quarter of 2023 was at record high census levels. This led to multiple locations to be opened to care for overflow patients. Due to this, CCCT had more areas to cover and more patients to monitor, causing an increase in workload.

When comparing fourth quarter 2022 to fourth quarter 2023 there still was a decrease in percentage of transfers to critical care based on overall percentage. Although not statistically significant, this information is clinically significant. This decrease in percentage shows that proactive rounding is useful and does assist with improving patient outcomes. However, this decrease was not achieved using the MEWS in most cases, this does show that recognizing clinical deterioration can improve patient outcomes.

Limitations

Multiple limitations were identified after reviewing the quality improvement project results. These limitations included the workflow of the CCCT, the MEWS score, and the collection of rapid response data. When adding the MEWS on as a trigger for proactive rounding for the CCCT, it altered their workflow. During busy times and when only one code team member was available, there was limited time to look at MEWS scores within the EMR. Once they started their rounding process, they were unable to get to a computer to determine more patients to be rounded on. Often the CCCT was out rounding and would visit a patient and then look up the MEWS score afterwards.

The number of staff varied on each shift. Due to staffing limitations, sometimes only one team member was available. To fill some of these staffing gaps, critical care nurses were used as relief code team members when staffing ratios were permitted. Some of the relief code team members understood the MEWS score and how it should be used while others did not. Therefore, buy-in was varied. During this time of the project implementation period, the project facility had a record number of daily census of greater than 500 per day. This put an increased amount of stress on the CCCT as they had an increased number of patients and locations to round on.

When using the MEWS, multiple patients were identified whose score in the computer did not match their clinical presentation. The patient was either better or worse than the score represented. The MEWS is a real time score and is based on nursing documentation. If documentation is not completed fully nor entered in a timely manner, then the scores will be altered. There is also no way to determine what a prior score was because the scores are not saved anywhere within the EMR. This makes it difficult for a nurse to gauge if a patient is worsening or improving. The floor nurses also did not fully understand the use of MEWS. There was a competing score within the EMR called the sepsis score. Often the CCCT would look at both scores simultaneously and determine the severity of clinical deterioration of the patient.

This project provided data showing that the project facility varied in its way of tracking rapid responses and patient outcomes. For years, there has been a manual process based on paper tool rapid documentation. However, in 2023, the rapid response narrator, along with the code blue narrator built within the EMR, was adopted by the CCCT and other critical care teammates. The transition to the narrator within the EMR has altered the way rapid responses are tracked. Not all rapid activations are true rapid events and not all rapid documentation was triggered by a rapid activation. Some rapid documentation was due to proactive rounding by the CCCT when a patient required an increased number of interventions. This gap shows that there is an increased need for improved rapid response tracking.

Implications for Nursing Practice

Based on the project findings, intentional proactive rounding was found to be beneficial for patient care and outcomes. There was a decrease in the percentage of patients needing to transfer to critical care after a rapid response. One of the greatest findings in this project was that bedside nursing staff were able to raise concerns for their patients and notify the CCCT nurses to

assist with patient care to improve the patients' outcomes. Thirty percent of the non-proactive rounding and 18% of the proactive rounding was due to staff concerns. This supports the importance of positive collaboration between bedside staff and the code team in improving patient outcomes (Shiell et al.,2022).

This project provided additional insight on the need for CCCT nurses and their ability to improve patient outcomes with early interventions. CCCT nurses are able to bring critical care knowledge to patients rather than having the patient transfer to critical care. Increasing the number of CCCT nurses would allow for more patients to be proactively rounded to decrease FTR events.

Recommendations for Practice

Recommendations for future practice include exploring staff knowledge of the MEWS score and its ability to determine clinical deterioration of a patient. The MEWS is a real time score in the EMR; and there is currently no way to track changes in the score and the time between changes. The MEWS was determined to be beneficial for patient care; however, more research is needed regarding the MEWS tool and its significance in clinical deterioration. More research would also be needed to determine how the sepsis score correlates and/or supports the MEWS score.

This quality improvement project also supports the need for an increased number of CCCT nurses. By increasing the number of staff available for the CCCT, more patients can be assessed to determine if clinical deterioration could be addressed earlier. The code team nurses bring an enhanced set of skills that support patients in a variety of settings. They play a crucial role in providing timely interventions for deteriorating patients. They can identify and address issues before they escalate, improving patient outcomes and reducing the need for transferring to

critical care. They facilitate communication among healthcare teams, promoting a collaborative approach to patient care.

Conclusion

The goal of the CCCT is to improve patient outcomes and prevent failure to rescue events. With the implementation of proactive rounding, which is defined as a nurse-driven early-patient interaction that assists with anticipating and addressing patients' needs, the CCCT can assist bedside nursing staff with implementing early interventions. Through this quality improvement project, the lead implemented a proactive rounding system and was able to learn more about electronic early warning scores calculated within the electronic medical record. Proactive rounding helps to assist bedside nursing staff with patient care needs to ensure the patient is safe while decreasing the occurrence of patient preventable events proactively before problems can occur.

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APPENDIX A

WAKE FOREST UNIVERSITY
HEALTH SCIENCES

Office of Research
INSTITUTIONAL REVIEW BOARD

MEMORANDUM

To: Erika Setliff
Atrium Medical

From: Jeannie Sekits, Senior Protocol Analyst
Institutional Review Board

Date: 9/25/2023

Subject: Not Human Subjects Research: IRB00100800
Utilization of an Early Warning Score in Proactive Rounding by the Critical Care Code Team

The Wake Forest University School of Medicine Institutional Review Board has reviewed your protocol and determined that it does not meet the federal definition of research involving human subject research as outlined in the federal regulations 45 CFR 46. 45 CFR 46.102(f) defines human subjects as "a living individual about whom an investigator (whether professional or student) conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information."

The information you are receiving is not individually identifiable. In recent guidance published by the Office of Human Research Protections (OHRP) on the Guidance on Research Involving Coded Private Information or Biological Specimens, OHRP emphasizes the importance on what is being obtained by the investigator and states "if investigators are not obtaining either data through intervention or interaction with living individuals, or identifiable private information, then the research activity does not involve human subjects."

Exemption Category 4 - Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Medical Center Boulevard, Winston-Salem, NC 27157-1023 (336) 716-4542 / fax (336) 716-4480

Note that only the Wake Forest University School of Medicine IRB can make the determination for its investigators that a research study does not meet the federal definition of human subject research. Investigators do not have the authority to make an independent determination that a study does not meet the federal requirements for human subject research. Each project requires a separate review and determination by the Board. The Board must be informed of any changes to this project, so that the Board can determine whether it continues to not meet the federal requirements for human subject research. If you have any questions or concerns about this information, please feel free to contact our office at 716-4542.

APPENDIX B

CHARLOTTE
DIVISION OF RESEARCH

To:	Miranda Lanning University of North Carolina at Charlotte
From:	Office of Research Protections and Integrity
Approval Date:	22-Aug-2023
RE:	Notice of Determination of Exemption
Exemption Category:	4
Study #:	IRB-23-1077
Study Title:	Utilization of an Early Warning Score in Proactive Rounding by the Critical Care Code Team

This submission has been reviewed by the Office of Research Protections and Integrity (ORPI) and was determined to meet the Exempt category cited above under 45 CFR 46.104(d). This determination has no expiration or end date and is not subject to an annual continuing review. However, you are required to obtain approval for all changes to any aspect of this study before they can be implemented and to comply with the Investigator Responsibilities detailed below.

Your approved consent forms (if applicable) and other documents are available online at Submission Page.

Investigator's Responsibilities:

1. Amendments **must** be submitted for review and the amendment approved before implementing the amendment. This includes changes to study procedures, study materials, personnel, etc.
2. Researchers must adhere to all site-specific requirements mandated by the study site (e.g., face mask, access requirements and/or restrictions, etc.).
3. Data security procedures must follow procedures as described in the protocol and in accordance with OneIT Guidelines for Data Handling.
4. Promptly notify the IRB office (uncc-irb@charlotte.edu) of any adverse events or unanticipated risks to participants or others.
5. Five years (5) following this approval/determination, you must complete the Admin-Check In form via Niner Research to provide a study status update.
6. Be aware that this study is included in the Office of Research Protections and Integrity (ORPI) Post-Approval Monitoring program and may be selected for post-review monitoring at some point in the future.
7. Reply to the ORPI post-review monitoring and administrative check-ins that will be conducted periodically to update ORPI as to the status of the study.
8. Complete the Closure eform via Niner Research once the study is complete.

Please be aware that approval may still be required from other relevant authorities or "gatekeepers" (e.g., school principals, facility directors, custodians of records).