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Daily alarm rounds: enhancing interdisciplinary communication and reducing perceived alarm burden in bedside nurses.

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Daily Alarm Rounds: Enhancing Interdisciplinary Communication and Reducing Perceived Alarm Burden in Bedside Nurses

by

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Doctor of Nursing Practice

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Abstract

Purpose: The Joint Commission established alarm management as a national patient safety goal in 2013 and has continued this goal through 2023 (2022). This goal mandates hospitals to prioritize alarm system management and establish evidence-based techniques to manage and reduce nuisance alarms. The purpose of this quality improvement project was to provide bedside nurses with education about excessive alarm burden and evidence-based alarm management techniques, then implement a daily bedside alarm rounding tool to enhance interdisciplinary communication and address patient alarm limits during daily rounds.

Methods: After extensive review of the literature, prompts discussing daily alarm limits were added to a cardiac intensive care unit's rounding sheeting. A pre- and post-intervention Likert-scale nursing survey was modified to address all the specific aims of this project. Descriptive statistics were used to analyze all demographic data, while differences in mean and mode were analyzed for each pre- and post-intervention question.

Results: Most of the nurses agreed that discussing patient bedside monitor alarms during daily rounds would reduce nuisance alarms in both the pre- and post-survey. Emerging themes highlighted the need for additional education regarding the benefits of discussing alarm limits and more effective communication amongst the interdisciplinary team.

Conclusion: Utilizing a daily alarm rounding tool has the potential to provide nurses with a platform to address daily alarm limits and reduce nuisance alarms.

Table of Contents

Background

The total number of bedside alarms is increasing daily with the constant advancements in healthcare technology. In the inpatient setting, bedside monitors are often utilized to track and monitor patients' vital signs including heart rate, respiratory rate, oxygen saturation, etc. These monitors have set predefined ranges for vital signs based on the programmed age of the patient that often have a high recall rate to ensure no sign of deterioration. However, one study found that predefined pediatric heart rate alarm thresholds are set near the 50th percentile for true heart rate values obtained in pediatric populations, resulting in low precision of accurate alarms (Poole et al., 2019). In fact, only 16.9% of alarms appropriately identified a problem or patient change that required an intervention by a healthcare worker (Dee et al., 2022).

The Joint Commission established alarm management as a national patient safety goal in 2013 and has continued this goal through 2023 (2022). This goal mandates hospitals to prioritize alarm system management and establish evidence-based techniques to manage and reduce nuisance alarms. The American Association of Critical Care Nurses (AACN) has also sought out to address this issue by establishing evidence-based practice guidelines for nurses and leaders. Even with national recognition and evidence-based guidelines, alarm management continues to be a growing problem with the constant advancements in technology. Evidence suggests that the customization of patient bedside alarms and enhanced interdisciplinary communication are key to managing nuisance alarms.

The purpose of this quality improvement project is to provide bedside nurses with education about excessive alarm burden, then implement a daily bedside alarm discussion tool to enhance interdisciplinary communication and address patient alarm limits during daily rounds.

Literature Review

In healthcare, clinical alarms are necessary for providing safe patient care and are meant to alert the nurses and providers of potential decline in patient status. However, in 2013, the Joint Commission found that 85% to 99% of patient alarms do not require a clinical intervention resulting in a high burden of non-actionable or clinically insignificant alarms (Lewis et al., 2019). Several evidence-based strategies have been recommended to improve alarm management including (a) enhancing interdisciplinary communication, (b) creating a multidisciplinary team to address excessive alarm burden, and (c) implementing a process to customize patient alarm settings. Similarly, the AACN published evidence-based recommendations for nursing practice to effectively manage patient alarms. Strategies recommended by the AACN include establishing a multidisciplinary team to address alarm burden, only monitoring patients for appropriate clinical indications, customizing alarm settings, and providing nursing education (Jepsen et al., 2017).

Implementing a process to customize alarm settings for each individual patient is becoming recognized as an effective tool to reducing overall alarms. The most common non-actionable alarms that can be customized to reduce alarm notifications include increasing the number of premature ventricular contractions (PVCs) needed to trigger an alarm, delaying low SpO2 alarm notifications, and arrhythmia alarms (Andrade-Mendez et al., 2020; Lewis et al., 2019; Pater et al., 2020, Poole et al., 2019; Ruppel et al., 2018). In fact, in an integrative review conducted by Ruppel et al., they found that arrhythmia alarms accounted for the highest proportion of non-actionable alarms resulting in 55% to 89% of inaccurate alarms (2018). Likewise, Pater et al. found a 52% reduction in alarm notifications after customizing patient alarms by increasing the number of PVCs needed to trigger an alarm and delaying SpO2 alarm notifications (2020).

Similarly, Bradford et al. found that introducing SpO2 alarm delays could reduce non-actionable alarms by 25-67% (2017). On the other hand, Poole et al. (2019) and Srinivasa et al. (2017) found that by simply adjusting the patient's heart rate range to the patient's expected activity level yields a significant reduction in nuisance alarms. Numerous studies have concluded that creating a process for nurses to customize patient alarms for their patient's specific needs would reduce clinically irrelevant alarms.

Numerous studies identified that changing default parameter settings to appropriately address the patient's specific needs is an effective way to reduce overall alarm burden. However, changes in alarm parameters must be adjusted with caution as actionable alarms could be eliminated if the alarm parameters are set too wide or turned off, resulting in a potential patient safety event. The AACN has found that establishing a multidisciplinary team to address nuisance alarms is key in safely managing alarms. The team should frequently assess patient alarms and gather data from all aspects of patient care to determine which alarms are most problematic or inappropriate for the unit (Jepsen et al., 2017; Jubic, 2017). Then, the team can then use that data to appropriately customize the patient's alarm settings and safely reduce the total number of alarms (Jepsen et al., 2017; Jubic, 2017). Likewise, Lewis et al. (2017) and Bosma et al. (2023) both concluded that addressing inappropriate alarm parameters during daily interdisciplinary rounds helps identify when alarm customization is required and safely reduces overall alarm burden.

Lastly, communication is a vital component to reducing the overall alarm burden. In fact, the AACN recognizes communication as the top contributing factor for managing alarms. Effective communication within the interdisciplinary team helps to identify patient-specific goals, when certain alarms should be discontinued or modified, and when certain patient-care activities may induce non-actionable alarms (AACN, 2023). One study found that effective communication

within an interdisciplinary team that manages alarm settings appropriately can significantly reduce nuisance alarms, enhance patient safety, and heighten both nursing and patient satisfaction (Lewis et al., 2019).

In conclusion, research shows that the most effective ways to reduce manage alarms is by providing beside nurses with education about excessive alarm burden, implementing a process to customize patient alarm settings, forming a multidisciplinary team to safely address excessive alarms, and enhancing interdisciplinary communication.

Significance of the Problem

For the past 10 years, the Joint Commission has established alarm management as a national patient safety goal. This goal requires all accredited hospitals to make alarm management a top priority within their system. Literature has shown that there are numerous evidence-based strategies to improve alarm management practices. Though evidence-based alarm management standards are available in the literature, there is still a significant gap in translating these standards into clinical practice.

A recent retrospective study was conducted in a cardiac intensive care unit (CICU) at a children's hospital in Louisville, KY to assess the severity of alarm burden. The study looked at all bedside monitor alarms (respiratory rate, heart rate, blood pressure, oxygen saturations, etc.) for 25 patient beds from August 2019 to October 2019 and found that the CICU experiences on average 1590 total alarms each day, which is approximately 64 alarms per patient bed per day (Metcalfe et al., 2021). The study also found that alarms sounded on average for 15 minutes until the alarm was addressed by suspending the alarm or silencing the alarm which resulted in over 1,000 total hours of alarms sounding over the study's period (Metcalfe et al., 2021). Included in

the findings, the authors concluded the total number of alarms per day shows the significance of alarm burden and a need for improved alarm management tools in this CICU.

The literature was scarce on what defines excessive alarm burden however, Metcalfe et al. defined excessive alarms as greater than 20 alarms per patient bed per day (2021). For this QI project, excessive alarm burden was also defined as greater than 20 alarms per patient bed per day.

QI Model

The Iowa Model was used to help facilitate the implementation of this project. The Iowa Model is a framework used mostly in the healthcare setting to endorse evidence-based practice and promote excellence within the healthcare system (Iowa, 2017). The first step in the Iowa Model is to identify any issue noticed within the healthcare system. The second step is to determine whether this issue is a priority or not. If the issue is recognized as a priority, then the third step is to form a team that will assemble, critique, and synthesize all available research published about the issue. Once there is sufficient research about the issue, the team will then form a proposal with evidence-based practice guidelines and outcomes to pilot within the healthcare system. If the change is appropriate, then the team should institute the change into practice and monitor the process. Lastly, all information and results should be disseminated.

Alarm management has been nationally recognized as a patient safety issue that all accredited hospital systems must address. A needs assessment was conducted in the setting for this project that showed a significant burden of alarms and a need for improvement in alarm management. Since this issue is considered a priority, a project team was formed including a DNP student, a DNP chair and co-chair committee, the unit's nurse manager, and the unit's nurse

educator. A literature review was conducted to assemble, critique, and synthesize all available research published on managing alarm burden. Evidence concluded that the most effective method for managing alarms is to enhance interdisciplinary communication and improve alarm customization techniques. Nursing education and an alarm rounding tool was piloted in the unit for 4 weeks. The DNP student will then disseminate the results by presenting at conferences and authoring a scholarly article.

Purpose and Specific Aims

Short-term outcomes include increasing awareness of excessive alarm burden and alarm management through education. Intermediate outcomes include implementing a new daily rounding sheet with a section for bedside monitor alarms to help facilitate a discussion amongst the interdisciplinary team to determine whether the patient's alarms are appropriate. Long-term outcomes include reducing the overall burden of bedside alarms in the CICU and enhance customization of alarm limit practices amongst the interdisciplinary team.

Specific aims of this project include (1) increasing nurse awareness of alarm burden, (2) enhancing bedside nurse awareness about alarm management, (3) increasing nurse advocacy for alarm management, and (4) enhancing bedside nurse perceptions of interdisciplinary communication related to alarms.

Methods

A systematic literature search was conducted using Google Scholar and PubMed. The keywords and phrases searched were (alarm burden OR excessive alarms OR nuisance alarms) AND (interdisciplinary communication OR team communication) AND (daily rounds OR

interdisciplinary rounds) AND implementation. This initially produced 247 scholarly articles. Criteria to include only full text articles published in English within the last five years from January 1, 2017, to August 31, 2017, was applied, which further eliminated 124 articles. Abstracts and titles from the remaining articles were then thoroughly reviewed and included if they addressed excessive alarm burden or were part of a quality improvement process. Articles were excluded based on the level of evidence which produced eleven high quality, relevant, and recently published articles for this literature review.

Design

This is a pre- and post-test QI project that took place in a pediatric cardiac intensive care unit. The sample for this project included bedside nurses working in the pediatric cardiac intensive care unit and all data was collected via an online survey through Microsoft Teams.

Setting

The setting for this project was a 17-bed state-of-the-art medical/surgical intensive care unit (ICU) at an accredited Magnet-designated free-standing pediatric hospital serving Kentucky. This unit specializes in critically ill patients with congenital heart disease, arrhythmias, or cardiac dysfunction. Each patient room is equipped with continuous 5-lead electrocardiography (ECG) telemetry, pulse oximetry, and respiratory rate monitors.

Population

Approximately 114 bedside nurses are staffed in this CICU and 39 of those nurses were surveyed. The population was chosen by convenience sample. Any nurse who worked on the unit

during the time of the implementation was asked to participate. Exclusion criteria included any nurse that did not work on the unit during the time of implementation. The nurse-to-patient ratio is typically 1:1 or 1:2 depending on the level of patient acuity.

Context

Alarm burden in this intensive care unit was identified through research. It was concluded that a substantial number of nuisance alarms existed on this unit and improved alarm management tools were needed. A needs assessment was conducted in this cardiac intensive care unit, and it was identified that no evidence-based alarm management tools were being utilized, which further proved the need for implementation of an alarm management tool.

The CICU nurse manager and assistant nurse managers were involved in the project. The DNP student investigator planned to be in communication with the nurse manager and assistant nurse managers during the period of the project and helped them provide education to the nurses about the project. Human resources and the institutions' IRB team were involved to ensure the legal and personal safety of all participants in the project.

Potential barriers for successfully implementing this project included a lack of communication or education about the project leading to inappropriate use of the rounding tool by the bedside nurses. The CICU can be a high stress environment and sometimes the bedside nurses are not always available to round with the interdisciplinary team which may pose a barrier for implementation of the project. Lack of acceptance or understanding of the need for the rounding tool can also pose a potential barrier and lead to inappropriate use of the rounding tool by the bedside nurses.

This quality improvement project aligns with the healthcare systems' mission, vision, and values by providing high quality health care and enhancing patient safety through the individualization of patient monitors to better recognize true signs of patient deterioration from false alarms. This project aims to apply research into practice and establish evidence-based methods to reduce alarm burden. This quality improvement project also aspires to provide an enhanced work culture by improving interdisciplinary communication.

Intervention

A pre- and post-intervention Likert-scale nursing survey was created via Microsoft Forms and was sent to all CICU nursing emails via a shared direct link created for this QI project.

After a review of the literature, there was not one survey that addressed all the specific aims of this project, so a modified survey was created to address and include all outcome measures. The modified survey was created after reviewing the literature and pulling validated questions from other surveys that address these specific aims. The pre- and post-survey consists of three demographic questions, five 5-point Likert scale questions, and one true or false question.

Education was provided to all CICU nurses via a 10-15 slide voice-over PowerPoint on excessive alarm burden, bedside alarm limit ranges in the pediatric population, importance on addressing excessive alarms as an interdisciplinary team, and an example of how to effectively utilize the alarm rounding tool. The CICU's nurse educator placed the PowerPoint into the healthcare systems nurse portal, which was accessible to all nursing staff. The nurse educator assigned all the CICU nursing staff to view the PowerPoint prior to the Go-Live date for the

alarm rounding tool. The nurse portal helped track participation rates by showing who had or had not viewed the PowerPoint.

The intervention consisted of altering the CICU's daily rounding sheet to include three new questions that specifically addressed the patient's bedside alarms. The questions were: (1) did the patient have excessive alarms (>20 alarms per patient bed per day) over the past 24 hours (as defined by Metcalfe et al., 2021), (2) which alarm: heart rate, respiratory rate, oxygen saturation, or other, and (3) should we as a team discuss customizing beside alarms for this patient: Y or N. The CICU prints their daily rounding sheets on regular white printer paper. To ensure the beside nurses were using the correct rounding sheet during the invention period, the modified version of the daily rounding sheet with the daily alarm rounding tool was printed on blue printer paper. The DNP student was present during rounds once a week throughout the intervention phase to audit compliance with the rounding sheet. The expected time for the intervention was four weeks from the end of January 2024 to the end of February 2024.

Ethical Considerations

Implementation of the project followed a successful defense of the project to the DNP team, in addition to the leadership within the School of Nursing. To mitigate any unforeseen harm, participants were notified that the investigator did not intend on collecting any identifying data responses and clarified that the survey was anonymous. This QI project proposes minimal risk for participants. Statements for IRB were acquired from the University associated with the children's hospital as well as the healthcare institution itself. Permissions from IRB were acquired prior to proposal defense. In addition, permission from the CICU nurse manager was received prior to creating this project.

Completion of this survey served as consent for participation in this project. The survey was voluntary and did not include any identifying information. Survey data was collected in Microsoft Forms, a secure platform that is linked to a shared Microsoft Teams Folder which is password protected and available only to the DNP student and DNP team members. Data was transferred to Microsoft Excel and IBS SPSS Statistics for analysis. All data was stored on a password protected laptop and available only to the DNP student and DNP team members.

Measures

The first measure in this QI project was nurse awareness of excessive alarm burden. The pre- and post-survey addressed this by asking nurses if nurses recognize that alarm management is a national patient safety goal. The next measure was nurse perceptions of alarm management to reduce excessive alarms. The pre- and post-survey addressed this second measure by asking the nurses if discussing patient bedside alarms during daily rounds will reduce nuisance alarms. The third measure was perceptions of nurse advocacy for alarm management. The pre- and post-survey asked the nurses two questions: Do they routinely advocate to customize their patient's bedside alarms and have they considered discussing their patient's bedside alarm limits during daily rounds. Lastly, to measure nurse perceptions on interdisciplinary communication, the survey asked if nursing input regarding patient alarms is encouraged during interdisciplinary rounds.

Data Analysis

Survey data was collected in Microsoft Form and transferred to Microsoft Excel and IBS SPSS Statistics for analysis. Descriptive statistics were used to analyze all demographic data and

compare pre-intervention to post-intervention survey data. The descriptive data was analyzed using central tendencies based on data normality and distribution to determine whether there was a change from pre- and post-survey data. The mean and mode of each individual question was analyzed to determine if there is an increase in the total mean and mode between pre-intervention and post-intervention survey data.

Results

Demographic Data for CICU Nurses

A total of 39 CICU bedside nurses completed the pre-survey, whereas only 11 CICU bedside nurses completed the post-survey (Table 1). In the pre-survey, 1 (3%) of the respondents was PRN, 11 (28%) were part time, and 27 (69%) were full time, compared to the post-survey where 11 (100%) of the respondents were full time. The mean years of experience was similar between pre-survey respondents at 1.51 years ± 0.506 and post-survey respondents at 1.55 years ± 0.522. There was a total of 19 (49%) dayshift nurses and 20 (50%) nightshift nurses that completed the pre-survey, compared to the post survey, where 5 (45%) dayshift nurses and 6 (55%) nightshift nurses responded.

Pre- and Post-implementation Survey Results

There was a total of 39 nurses (34% response rate) that responded to the pre-survey and 11 nurses (9% response rate) that responded to the post-survey (Table 2). Majority of the bedside nurses responded as neutral when responding if they had considered discussing their patient's bedside monitor alarm limits during daily rounds in both the pre- and post-survey. Most of the nurses agreed that discussing patient bedside monitor alarms during daily rounds would reduce nuisance alarms in both the pre- and post-survey. Most of the nurses also agreed that they

routinely advocate to customize their patient's bedside alarms in both the pre- and post-survey. Interestingly, majority of respondents agreed that having a daily rounding tool would promote interdisciplinary discussions about patient bedside monitor alarms in the pre-survey but responded with either neutral or agreed in the post-survey. Respondents remained neutral when considering if discussion related to patient alarms was encouraged during interdisciplinary rounds.

Effectiveness of Nursing Education

Response rates to the educational module were determined by the number of pre-intervention survey responses (34% response rate). Effectiveness of education was determined based on how many participants correctly answered that alarm management is recognized as a national patient safety goal in both the pre- and post-survey (Table 3). In the pre-survey, 38 nurses (97%) correctly answered that alarm management is recognized as a national patient safety goal, whereas only one nurse (3%) answered this question wrong. However, in the post-survey, 10 nurses (91%) correctly answered that alarm management is recognized as a national patient safety goal in both the pre- and post-survey compared to one nurse (9%) answered this question wrong.

Discussion

While the post-survey response rate was less than desirable, the data did show interesting trends worth discussing. The first trend noted was the need for additional education regarding the benefits of discussing alarm limits. Though most nurses correctly responded that alarm management is recognized as a national patient safety goal, there was one respondent in both the pre- and post-survey that responded incorrectly stating that alarm management is not recognized

as a patient safety goal. Furthermore, the nurses responded neutral in both the pre- and post-survey on if they had considered discussing their patient's bedside monitor alarm limits, yet majority of respondents did agree that it would be beneficial to discuss patient bedside monitor alarms. This further proves that increasing education about the negative impacts of predefined alarm limits and how they can be a nuisance to both the nurse and the patient is needed.

The second trend noted throughout this project was the need to further encourage nurses to discuss alarms. Though this study did not address the unit's culture regarding bedside rounds, it may be beneficial for future studies to include this as a measure. Majority of respondents were neutral regarding whether they had considered discussing their patient's alarms during daily rounds but agreed that they routinely advocated to customize their patient's bedside alarms. One could conclude that the nurses may have responded as neutral to not feeling empowered enough to speak up during the larger bedside rounds. Instead, they may feel more comfortable voicing their concerns during secondary rounds where the group is much smaller or with an individual rather than in a group setting. It may be feasible that providing the nurses with a designated time during daily rounds would allow them the platform needed to feel empowered to report concerns regarding alarms.

The last trend noted throughout this project was the need for enhanced interdisciplinary communication. Interestingly, majority of the nurses agreed in the pre-survey that having a daily alarm rounding tool would promote interdisciplinary discussion about customizing patient alarms yet were neutral in the post-survey. Again, one could conclude that the nurses do not feel that their input is being considered during the current process of rounding. Perhaps providing the unit with a different approach to daily rounding would enhance interdisciplinary communication, increase nursing advocacy, and empower nurses to discuss alarms. Additionally, the nurses

remained neutral when considering if discussion related to patient alarms was encouraged during interdisciplinary rounds in both the pre- and post-survey. Furthermore, the nurses responded neutral in both the pre- and post-survey on if they had considered discussing their patient's bedside monitor alarm limits during daily rounds. This underscores the need for better communication amongst the interdisciplinary team to ensure the nurses are voicing their concerns and addressing nuisance alarms.

Limitations

There were several limitations noted with this project. The first limitation was the low response rates for both the pre- and post-surveys. Multiple strategies to increase both pre- and post-survey response rates were included throughout this project. The first strategy was to include a QR code on the education module that reminded the CICU bedside nurses to complete the pre-survey prior to starting the education module. The second strategy was to place a reminder to complete the pre- and post-surveys on the CICU nurses' safety huddle board. The third strategy was to have the CICU nurse educators send email reminders and GroupMe messages to the bedside nurses to complete both the pre- and post-survey.

Another limitation was the short duration of data collection and implementation of the CICU daily rounding sheet. 31% of participants responded in the pre-intervention survey as being either PRN or part-time for their work status, however there were 0% that responded either PRN or part-time in the post-intervention survey. Since the implementation phase only lasted 4 weeks, it may not have allowed enough time for PRN or part-time staff to have sufficient exposure to the daily alarm rounding tool. This could explain the lower response rates for the post-survey compared to the pre-survey.

The last limitation noted with this study was the small sample size. Only one hospital unit participated in this study, which comprised of about 114 bedside nurses. This study did not look at the effects of alarm burden or the use of a daily alarm rounding tool in any other unit within this hospital or in other hospitals. A multi-institutional study with a larger sample size would be beneficial for future studies on the effects of alarm burden and the use of a daily alarm rounding tool.

Implications

In 2013, the Joint Commission found that 85% to 99% of patient alarms do not require a clinical intervention resulting in a high burden of non-actionable or clinically insignificant alarms (Lewis et al., 2019). Due to the high burden of nuisance alarms, the Joint Commission established alarm management as a national patient safety goal in 2013 and has continued this goal through 2023 (2022). This goal mandates hospitals to prioritize alarm system management and establish evidence-based techniques to manage and reduce nuisance alarms. Evidence suggests that the customization of patient bedside alarms and enhanced interdisciplinary communication are key to managing nuisance alarms.

The use of a daily alarm rounding tool has the potential to enhance nurse awareness of excessive alarm burden, increase nurse advocacy to reduce excessive alarms, and encourage nurses to manage alarm limits. This project showed that nurses can be great advocates for their patients with the right platform, especially within a large group setting. This also underscored the importance of interdisciplinary communication and the need for more robust education to empower nurses to advocate and voice their concerns regarding nuisance alarms.

Sustainability

The majority of CICU nurses agreed that discussing their patient's bedside monitor alarms during daily rounds would reduce nuisance alarms in both the pre- and post-survey. Even though the data did not show a significant improvement in nursing perception of alarm burden pre- and post-implementation, it is still recommended by the Joint Commission to have alarm management techniques set in place to combat nuisance alarms.

Conclusion

This QI project showed that bedside nurses agree that it would be beneficial to discuss patient bedside monitor alarms to reduce those that are a nuisance and non-actionable. While it is encouraging that the nurses understand the problem of alarm burden, providing more robust education about the negative impacts of predefined alarm limits would further encourage nurses to utilize a daily alarm rounding tool to voice their concerns regarding nuisance alarms. The results showed that majority of respondents were neutral regarding whether they had considered discussing their patient's alarms during daily rounds but agreed that they routinely advocated to customize their patient's bedside alarms. Though this project did not measure the unit's culture around daily rounds, this shows that the nurses may not have the best platform to feel they are being heard. Empowering nurses to advocate for their patients and voice their concerns are key to reducing nuisance alarms. Lastly, this project proved that there is a need for better communication amongst the interdisciplinary team to ensure the nurses feel comfortable voicing their concerns and addressing nuisance alarms in a larger group setting.

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Table 1

Demographics of CICU Nurses

Variables	Pre-Implementation N = 39 (%)	Post-Implementation N = 11 (%)
Employment status		
PRN	1 (3)	0 (0)
Part Time	11 (28)	0 (0)
Full Time	27 (69)	11 (100)
Years of Experience		
<1 year	4 (10)	3 (28)
1-5 years	21 (54)	4 (36)
>5 years	14 (36)	4 (36)
Work Shift		
Dayshift	19 (49)	5 (45)
Nightshift	20 (50)	6 (55)

Table 2

Survey Responses Before and After Daily Bedside Alarm Tool in the CICU

Survey Questions	Pre-implementation		Post-implementation		
	Mean N = 39	Mode N = 39	Mean N = 11	Mode N = 11	Mean Change
I have considered discussing my patient bedside monitor alarm limits during daily rounds	3.26	3.00	3.18	3.00	-0.08
Discussing patient bedside monitor alarms during daily rounds will reduce nuisance alarms	3.95	4.00	3.82	4.00	-0.13
I routinely advocate to customize my patient bedside alarms	3.62	4.00	3.64	4.00	+0.02
Having a daily alarm rounding tool promotes an interdisciplinary discussion about customizing my patient bedside monitor alarm limits.	3.90	4.00	3.40	3.50	-0.50
Nursing input regarding patient alarms is encouraged during interdisciplinary rounds	3.05	3.00	3.00	3.00	-0.05

Table 3

Effectiveness of Education

Variables	Frequency N = 39	Percent
Pre-implementation		
True	38	97.0
False	1	3.0
Post-implementation		
True	10	91.0
False	1	9.0

Appendix A

University of Louisville IRB Approval letter

University of Louisville

Human Subjects Protection Program Office
300 East Market Street, Suite 380
Louisville, Ky 40202
P: 502. 852.5188 E: hsppofc@louisville.edu

DATE:	January 09, 2024
TO:	Emily Mountjoy McRae
FROM:	The University of Louisville Institutional Review Board
IRB NUMBER:	23.0919
STUDY TITLE:	**Daily Alarm Rounds: Enhancing Interdisciplinary Communication and Reducing Perceived Alarm Burden in Bedside Nurses**
REFERENCE #:	775976
DATE OF REVIEW:	12/18/2023 The changes were reviewed and approved by HSPPO staff on 01/09/2024
CONTACT FOR QUESTIONS:	Sherry Block 852-2163 slbloc04@louisville.edu

The IRB Chair/Vice-Chair (or An IRB member) has reviewed your submission. The project described does not meet the "Common Rule" definition of human subjects' research. The IRB has classified this project as Non-Human Subjects Research (NHSR). The project can proceed.

This submission has been determined to be quality improvement, and not human subjects research, based on the goal(s) stated in the protocol.

Institutional policies and guidelines on participant privacy must be followed. If you are using protected health information, the HIPAA Privacy rules still apply.

Any changes to this project or the focus of the investigation must be submitted to the IRB to ensure that the IRB determination above still applies.

Amendments for personnel changes or study closures are not required.

Sincerely,

Paula Radmacher, Ph.D., Vice Chair,
Biomedical Institutional Review Board
PR/slb

We value your feedback; let us know how we are doing: https://www.surveymonkey.com/r/CCLHXRP

Appendix B

Norton Healthcare IRB Approval Letter

NORTON RESEARCH INSTITUTE

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January 11, 2024

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231 East Chestnut Street
Louisville, KY 40202

RO# 23-N0391 / IRB# 23.0919 / Title: Daily Alarm Rounds: Enhancing Interdisciplinary Communication and Reducing Perceived Alarm Burden in Bedside Nurses

Dear Researcher:

The Norton Research Institute (NRI) is pleased to notify you that your application to conduct the research project referenced above in the following Norton Healthcare (NHC) facility has been approved.

- **Norton Children's Hospital**

Your project does not meet the "Common Rule" definition for human subjects' research (NHSR). Therefore, IRB review is not needed prior to conducting the project. Norton Research Institute should be notified if the status of your project changes.

Please note: Additional institutional approvals, such as from practice managers, HR, and/or Norton Medical Group, may be necessary based upon the type of project you are conducting. It is your responsibility to work with your advisors to ensure that all institutional permissions have been obtained prior to initiating your research project.

We look forward to the successful completion of your project. If you have any further questions or need assistance, please contact the NRI at 502-629-3501.

Please let us know how we are doing. Follow the link https://www.surveymonkey.com/s/NHORAsatisfaction to complete the NRI Satisfaction Survey in less than two minutes. Your feedback helps the NRI improve the services we provide and meet the needs of the research community.

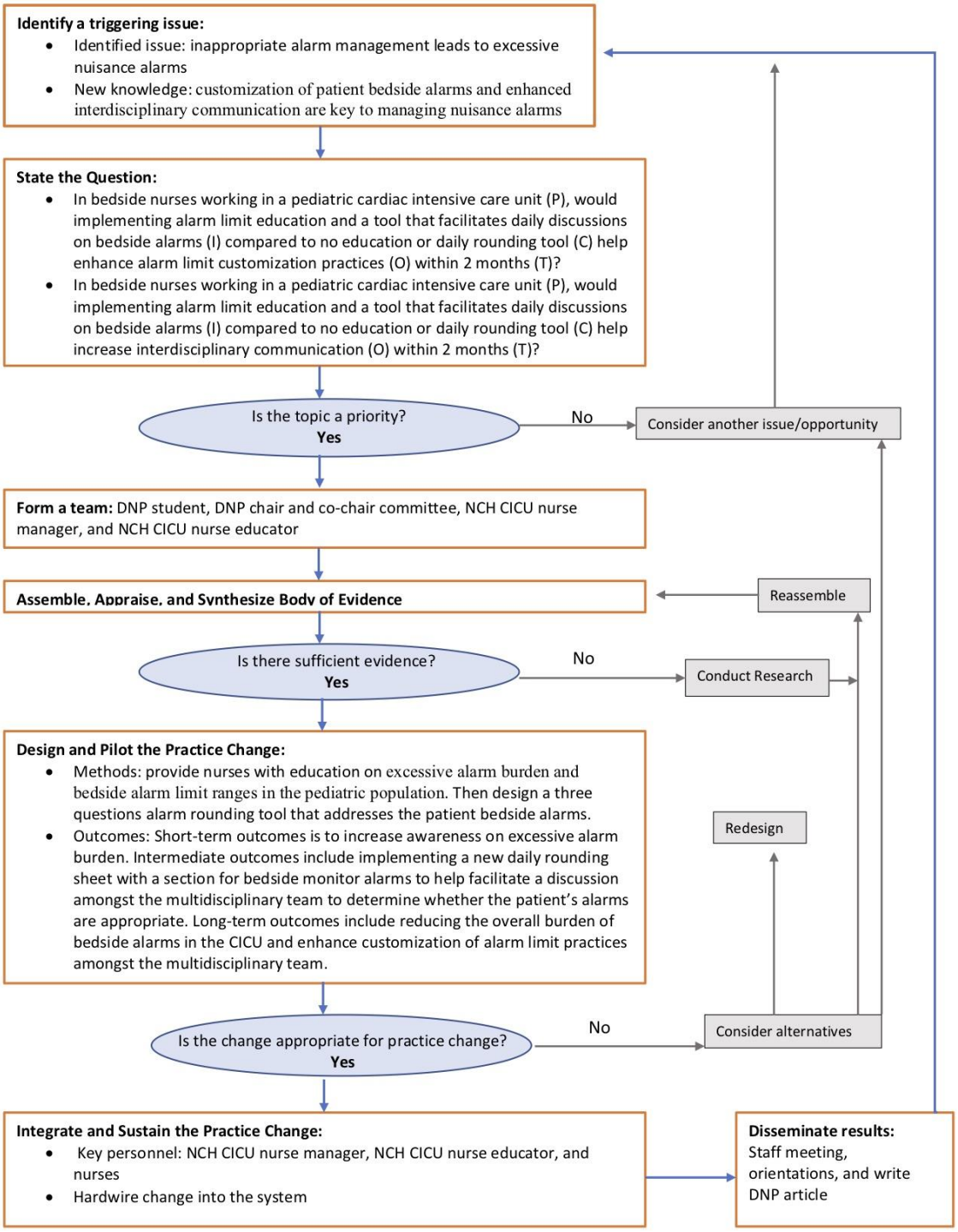
Sincerely,

Stephen W. Wyatt

Stephen W. Wyatt, DMD, MPH
Chief Research Executive
Norton Research Institute

Appendix C

Iowa Model



Appendix D

Pre- and Post-Survey for CICU Nurses

Nursing Survey:

1. Employment status (PRN, Part-Time, or Full-Time)
2. Years of experience in the CICU (<1 year, 1-5 years, or >5 years)
3. Regular work shift (Dayshift 7AM-7PM or Nightshift 7PM-7AM)

4. I have considered discussing my patient's bedside alarm limits during daily rounds (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

5. Discussing patient bedside alarms during daily rounds will reduce nuisance alarms (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

6. I routinely advocate to customize my patient's bedside alarms (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

7. Nursing input regarding patient alarms is encouraged during interdisciplinary rounds (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

8. Alarm management has been recognized as a national patient safety goal (Yes or No)

9. Having a daily alarm rounding tool promotes an interdisciplinary discussion about customizing my patient's alarm limits.
   (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree)

Appendix E

CICU Nurse Lesson Plan

Alarm Burden Lesson Plan

Learning Objectives:
1. Review the significant of alarm burden on a national and local level
2. Understand common alarm management techniques and strategies
3. Review the QI project intervention and outcomes

Teaching Aids: A voiceover PowerPoint that will be uploaded to the units online nursing portal.

Development of Lesson:
Introduction: I will provide 2-3 slides reviewing the background and significance of alarm burden. Next, I will provide 2-3 slides reviewing the retrospective study performed in the CICU showing the significance of alarm burden within the unit.

Alarm management: 3 slides will be provided discussing evidence-based techniques for combating nuisance alarms including customizing bedside alarm limits, forming an interdisciplinary team to manage alarms, and enhancing interdisciplinary communication.

Summary: 1 slide will be provided summarizing the learning objectives

Assessment/Evaluation of Lesson Plan: A pre- and post-nursing survey will be provided to all CICU nursing emails prior to release of education module to evaluate effectiveness of education. Response rates to the education module will be determined by number of responses to the pre-survey.

Appendix F

Daily Alarm Rounding Tool

(1) Excessive alarms (>20) over the past 24 hours? Y or N

(2) Which alarm: HR, RR, SpO2, or other

(3) Team discussion to customize beside alarms for this patient: Y or N