7-2024

Improving pressure injury nurse awareness and decision-making in the cardiac intensive care unit: a quality improvement project.

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Improving Pressure Injury Nurse Awareness and Decision-making in the Cardiovascular Intensive Care Unit: A Quality Improvement Project

by

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Paper submitted in partial fulfillment of the
requirements for the degree of

Doctor of Nursing Practice

School of Nursing, University of Louisville

July 18, 2024

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Acknowledgements

I want to thank my husband, Brett, for supporting me through my DNP education. He was behind me every step of the way and constantly pushed me to do my best. I would like to thank my parents for their continuous encouragement and words of advice. I would like to thank Dr. Said Abusalem for giving constructive feedback to perfect my manuscript. Lastly, I would like to thank Dr. Shannon Shumaker for being the best research mentor a student could have. You have been my scholarly role model, and I am so grateful to have had your guidance.

Abstract

Background/Significance: Hospitalized patients with pressure injuries have 5 times greater death compared to a patient without a pressure injury. A needs assessment identified the problem of pressure injuries in the CVICU with the goal to improve nurse awareness and decision-making to decrease pressure injuries in the CVICU.

Purpose: The purpose of this project was to increase nurse awareness of pressure injury prevention via an education workshop and evidence-based pressure injury decision tree in the Cardiovascular ICU.

Methods: A MeSH search was conducted to identify pressure injury interventions and nurse awareness of pressure injuries which resulted in 17 publications**.** The LEGEND model appraisal tool was used to evaluate study quality. The Plan Do Study Act Model for Improvement was used to guide the process change.

Intervention: There were 20 CVICU nurses who participated in an education workshop and completed the APuP pre- and post-intervention over a 4-week duration.

Results: The Wilcoxon Signed Rank test demonstrated that an improvement in the median score difference pre- to post intervention supported PI prevention, nurse confidence, and nurse awareness of a decision- making algorithm.

Conclusion: This quality improvement project improved awareness of decision-making algorithms for pressure injury prevention interventions, increased awareness of screening for high-risk pressure injury patients, and led to 0 HAPIs occurring in the project timeframe.

Keywords: pressure injury, interventions, prevention, decision-making, nurse awareness

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Improving Pressure Injury Nurse Awareness and Decision-making in the Cardiovascular Intensive Care Unit: A Quality Improvement Project

Pressure injuries are a problem among patients in many levels of care, however critical care settings have the highest incidence rates of pressure injuries (Cox et al., 2022). In the United States alone, 2.5 million patients encounter pressure injuries yearly (Cano et al., 2015). There is a four-fold increase in severe (stage 3 or higher) pressure injuries because of an ICU admission (Cox et al., 2022). An increase in length of stay in the ICU decreases the patient's overall well-being, for worsen illness and increase the risk for more pressure injuries to occur (Cox, 2017). Although the goal is to have zero pressure injuries in hospitalized patients, pressure injuries still occur despite evolving healthcare standards and technology (Cox et al., 2022). Pressure injuries remain a problem in critical care settings and must be addressed.

Hospital associated pressure injuries (HAPI) are defined as injuries that occur to a specific location of skin or tissue while a patient is in the hospital (Rondinelli et al., 2018). They have been a problem in healthcare and continue to be a challenge to healthcare providers, patients, and healthcare systems worldwide (Joint Commission, 2022). The U.S. Centers for Medicare and Medicaid Services (CMS) is a government agency that governs four large health insurance programs in the United States that provides over 100 million people access to healthcare at a low cost (United States of America Government, 2018). CMS affirms that pressure injuries are preventable in hospitals if evidence-based protocols are in place and being followed (Joint Commission, 2022). CMS so strongly believes that pressure injuries should be preventable if cared for appropriately that in 2008, CMS stated their organization will no longer pay the costs of HAPIs (Joint Commission, 2022). The Joint Commission Hospital Association, who audits healthcare organizations in the United States related to increasing quality

improvement and patient safety, states that pressure injuries graded stage 3 or stage 4 are patient safety issues. The Joint Commission states pressures injuries can be considered a sentinel event in which immediate investigation and correction must be taken to fix the problem (Joint Commission, 2022).

The Joint Commission Hospital Association recommends following evidence-based guidelines provided by the 2019 International National Pressure Injury Advisory Panel (NPIAP) to decrease the prevalence of pressure injuries to the goal of zero HAPIs (Joint Commission, 2022). The NPIAP partners with the National Database of Nursing Quality Indicators (NDNQI) to educate and conduct surveys in hospitals on the national level in hopes of using the data collected to find solutions and diminish HAPIs (National Pressure Injury Advisory Panel, 2021). The continuous policies, recommendations, and guidelines created by these organizations aid to stop HAPI occurrence. When pressure injury evidence-based guidelines are not observed, HAPIs will continue to be prevalent among hospitalized patients.

Literature Review

A MeSH search was conducted in PubMed that included keywords of “Pressure Ulcer” “Critical Care” “Adult” and “Prevention and Control.” A Boolean string was comprised of the key terms: ((("Pressure Ulcer"[Mesh]) AND "Critical Care"[Mesh]) AND "Adult"[Mesh]) AND "prevention and control" [Subheading]. The PubMed MeSH search elicited 78 results and after limiting by publication data (2012 to 2022) and English language, 46 articles remained and after reviewing abstracts further 24 publications remained. A search in the CINAHL database was then completed with a non-MeSH Boolean string: (pressure ulcers or bed sores or pressure injury) AND (prevention or program) AND (critical care or intensive care). The search in CINAHL resulted in 893 results in which were limited by including academic journals, published within

the last 5 years, English language, and limiting subjects to 19+ years of age, leaving 193 articles remaining. Of the 193 articles, abstracts were read, which resulted in 22 articles that were applicable and chosen. However, eight studies were duplicates with PubMed articles, therefore 14 articles remained after discarding the duplicate articles. The same process done with CINAHL database was repeated in Medline and PsycINFO. Embase and Cochrane Library databases had the same process done but were limited by publications within the last 5 years, academic journals, English language, full text, RCT and systematic reviews. The search in each database yielded a total of 57 publications. Five publications were outside the five-year limit of publication related to the publications being seminal to the topic but published before 2017. The articles were narrowed again by reviewing abstracts for relevance of topic and 30 publications remained. Seven articles were excluded due to the abstract reporting that the articles' results included "low certainty of evidence." Lastly, 23 articles were read in full text and 6 studies were eliminated due to poor relevance to topic and poor quality using the LEGEND model appraisal tool. The remaining 17 studies were chosen to be evaluated.

The 17 studies chosen implemented various evidence-based interventions in critical care units of which displayed several themes. One main finding throughout was that when pressure injury prevention awareness was increased in staff members, interventions were implemented consistently which led to a lower pressure injury incidence rate (Alshahrani et al., 2021). Verbal and visual cueing feedback increases nursing staff adherence (Dave, 2020; Everett Day et al., 2022; Lee et al., 2019; Lin et al., 2020; Pickham et al., 2018; Turmell et al., 2022; Yesantharao et al., 2021). In fact, Lin et al. (2020) and Everett Day et al. (2022) found that verbal reminders by a team leader increased staff adherence when implementing a turn team which increased efficacy of the intervention. Visual reminders by pressure mapping systems increased nursing adherence

in turning patients and improved the effectiveness of redistributing pressure in patient positioning (Everett Day et al., 2022; Lin et al., 2020; Yesentharao et al., 2021). Technology such as sub-epidermal moisture (SEM) scanners and wearable patient sensors increased intervention adherence via visual reminders as well (Everett Day et al., 2022; Lee et al., 2019; Pickham et al., 2018; Turmell et al., 2022; Yesentharao et al., 2021). A key factor presented in the literature in reducing pressure injury incidence is that visual and verbal reminders help maintain consistency of implementation of interventions by nurses.

A second theme within the literature emerged that demonstrated a decrease in pressure injury incidence in critical care patients by incorporating education and training throughout the implementation process of interventions. Providing education to nurses about the interventions was found to be of utmost importance to maintain adherence among nurses (Alshahrani et al., 2021; Everett Day et al., 2022; Yilmazer & Bulut, 2019). Continuous education and training were found to be vital in reducing the risk of nurses' knowledge decline throughout implementation of the intervention (Alshahrani et al., 2021; Everett Day et al., 2022). In addition to intervention education and training, Anderson et al. (2015) found that having an expert clinician present was more beneficial to nurses as a resource compared to education solely on pressure injury reduction strategies. Expert clinicians were found to be valuable resources in reminding nurses to perform interventions, provoking questions, and increasing proactive thinking about patient care (Alshahrani et al., 2021; Anderson et al., 2015). In a study conducted by Sousa et al. (2019), education was not given to nurses while implementing fluidized positioners and authors concluded that education would have improved staff timeliness and skill of using the positioner.

A third theme identified entails organization and clarification of intervention processes implemented. Multiple interventions administered at the same time or "bundles" can be considered confusing or time consuming by some nurses (Yilmazer & Bulut, 2019). When an intervention framework is created, one must clarify how the intervention will be enrolled, who is responsible for each role, what resources are available for use, consider how the intervention will affect nursing workflow, and identify any barriers that may arise during implementation (Alshahrani et al., 2021; Lin et al., 2020; Yilmazer & Bulut, 2019). Consistency and organization can lead to sustainable practices and continual improvement in decreasing pressure injuries (Lin et al., 2020).

The evidence suggests that bundled interventions and single intervention strategies were both beneficial. Lin et al. (2020) and Dave (2020) found that multiple interventions implemented together are more effective than single interventions in reducing pressure injuries. Alshahrani et al. (2021) disputed that pressure injury prevention bundles may be effective, however not all bundles are created the same. Bundles can be composed of various intervention combinations that can be executed in different ways that may lead to discrepancies in patient outcomes (Dave, 2020; Lin et al., 2020). To decrease variances in bundled interventions, it is suggested that bundles should be based on evidence and designed with essential elements only to maintain nurse adherence (Alshahrani et al., 2021).

While multiple inventions are more effective, single interventions are also valuable. Mattress surface type was utilized in studying the effects on HAPI incidence (Bambi et al., 2022; Choi et al., 2021; Jiang et al., 2020; Yesantharao et al., 2021). The use of a foam surface mattress with 3-hour turning intervals was found to be statistically significant in decreasing pressure injury incidence (-0.001, p =0.028) compared to a 2-hour repositioning interval with an air

mattress (Choi et al., 2021). Additionally, Jiang et al. (2020) found that foam mattresses combined with a 4-hour turn interval decreased pressure injury incidence and helped reduce nursing workload (0.015, p <0.05). In contrast, a systematic review reported a significant finding stating that not one mattress type was more beneficial than another in reducing pressure injury incidence (Bambi et al., 2022). An overall theme found from the literature suggests that mattress surface type should be chosen based on patient specific characteristics (age, sex, incontinence status, laboratory values, Braden score, Body Mass Index, hospital stay, body temperature, level of consciousness, mechanical ventilation, surgery, use of inotropic support, steroids, or sedation medications) which give the patient the greatest benefit (Bambi et al., 2022; Choi et al., 2021; Jiang et al., 2020; Yesantharao et al., 2021).

Evidence suggests that decreasing pressure injury incidence with preventative silicone dressings is beneficial. The studies found that silicone protective dressings on bilateral heels and on the sacrum are effective in reducing HAPI incidence in critical care patients compared to those not using protective dressings (-0.105, p <0.001) (Hahnel et al., 2020; Lovegrove et al., 2021). The use of silicone dressings in reducing pressure injuries is shown to be effective, can be implemented with ease, and works well with the use of other pressure injury reduction interventions (Hahnel et al., 2020).

Interventions utilizing technology such as wearable patient sensors and SEM scanners are mentioned by Pickham et al. (2018) and Turmell et al. (2022). In a study conducted by Pickham et al. (2018), wearable patient sensors were used to measure optimal patient turning and data shows that the sensors increased adherence in turning patients compared to patients not wearing sensors (-0.130, p<0.001). Turmell et al. (2022) had similar findings in that visual reminders increase adherence in turning patients as the mean standard deviation increased profoundly from

55% of nurses turning patients with the visual sensor hidden compared to 89% of patients being turned with the visual sensor reminder ($p < 0.001$). Lee et al. (2019) used SEM scanning technology to identify impaired skin integrity. SEM scanning showed to be significant in aiding to reduce pressure injury incidence in that the intervention group which utilized SEM scanning had lower incidences of pressure injuries and blanching erythema versus the control group that did not utilize SEM scanning ($p=0.006$) (Lee et al., 2019). Wearable sensors and SEM scanners allow for real-time feedback increasing nurse awareness, adherence, and reduce pressure injury incidence (Lee at al., 2019; Pickham et al., 2018).

Another intervention studied was the use of Z-Flo fluidized positioners compared to standard pillows and towels when positioning patients (Barakat-Johnson et al., 2019; Sousa et al., 2019). In a study conducted by Sousa et al. (2019), Z-Flo positioners took twice as long compared to standard pillows when repositioning patients. However, Sousa et al. (2019) argued that over time, Z-Flos may be more cost effective by decreasing pressure injury incidence and minimizing potential HAPI related costs. Nurses' perceptions were measured via a Likert-Scale survey on usability and acceptability of the Z-Flo positioner and results showed that nurses believe they are easy to integrate around high-risk pressure injury areas in critically ill patients such as ears, the back of the head, and coccyx (Barakat-Johnson et al., 2019). Currently in the literature there are pressure injury prevention algorithms that exist; however, most algorithms include how to care for pressure injuries after they have occurred and are not designed specifically for prevention associated with patient- or medical device-related specific needs.

Problem

Pressure injuries continue to be a problem in today's healthcare world (Chaboyer et al., 2018). Critical care settings notably have the highest prevalence of pressure injuries among

patients in the hospital setting with prevalence being 12-32.7% (Cox et al., 2022). An international point-prevalence study conducted by Lebeau et al. (2021) showed that out of 90 countries studied, 59.2% of pressure injuries were found in the Intensive Care Unit (ICU). Healthcare technology and standards continue to evolve to decrease the incidence of pressure injuries and these changes have decreased the overall number of pressure injuries in critical care patients, however pressure injuries are still occurring (Cox et al., 2022).

Pressure injuries are a significant problem and pose various adverse effects. For each day a patient is in the ICU, the incidence for developing a HAPI increases by 2.8% and ICU patients have one pressure injury increase attributed to their length of stay by 9 days as compared to patients without a HAPI (Kim et al., 2022). Not only do pressure injuries increase a patient's mortality rate by 5 times compared to a patient without a HAPI, pressure injuries are also responsible for an increase in financial burdens (Kim et al., 2022). Based on a Markov Simulation Model created by Padula and Delarmente (2019), a HAPI is expected to cost hospitals about 10,708 US dollars per patient to care for the HAPI and the increased length of stay caused by the HAPI. Annually, HAPIs can be expected to cost the United States healthcare system about 26.8 billion dollars (Padula & Delarmente, 2019). The ultimate goal is not only to reduce pressure injuries, but to achieve a pressure injury incidence of zero (Duncan, 2007). Data supports the statement that pressure injuries are more prevalent in critical care areas and demonstrate a tremendous burden on overall patient well-being, increasing patient length of stay, increasing mortality rates, as well as creating unnecessary financial burden.

Intervention

A literature review demonstrated that a quality improvement intervention aimed to improve pressure injury prevention awareness and decision-making would include: nurses

preference of visual and verbal reminders, education and training that is offered on a consistent basis, and the incorporation of an evidence-based decision-making tree (Alshahrani et al., 2021; Anderson et al., 2015; Dave, 2020; Everett Day et al., 2022; Lee et al., 2019; Lin et al., 2020; Pickham et al., 2018; Sousa et al., 2019; Turmell et al., 2022; Yesantharao et al., 2021; Yilmazer & Bulut, 2019).

Justification of Literature Implementation in Proposed Intervention

Evidence-based pressure injury interventions and management are routinely used in clinical practice yet, pressure injuries do still occur. While there are various types of interventions applicable to pressure injury reduction strategies, the analysis of the literature has shown that visual and verbal reminders, evidence-based education and training, and the incorporation of an evidence-based decision-making tree may improve awareness and decrease pressure injury incidence. Nurse participation will lead to a sustainable clinical practice improvement by increasing nurse awareness which will ultimately lead to a decrease in pressure injury incidence.

Needs Assessment

A needs assessment was conducted in the CVICU with the manager and assistant manager. The meeting resulted in identifying a need to reduce pressure injury prevalence within the unit. Data from 2020-2022 was collected on pressure injury prevalence in the unit. The National Database of Nursing Quality Indicators (NDNQI) Press Ganey survey was conducted quarterly over eight quarters from 2020 to 2022 (National Database of Nursing Quality Indicators, 2022). The NDNQI survey results showed that the percentage of patients with unit acquired pressure injuries was 20.19% (National Database of Nursing Quality Indicators, 2022). The median (50^{th} percentile) average of unit acquired pressure injuries throughout other CVICUs

in the nation was 3.38% (National Database of Nursing Quality Indicators, 2022). Thus, the unit demonstrated a greater prevalence of pressure injuries when compared to fifty percent of other CVICU's nationwide.

The NDNQI data reports that four out of the eight quarters showed that the CVICU demonstrated a greater amount of unit acquired pressure injuries than 90% of other CVICU's nationwide (National Database of Nursing Quality Indicators, 2022). The increase in acquired pressure injuries at the organization demonstrates that acquired pressure injuries are a significant problem in the CVICU.

Data collected from the wound nurse during January 2022 through December 2022 shows there were 55 hospital acquired pressure injuries in the CVICU (Butler, 2023). Of the 55 HAPIs that occurred in 2022, 22 of the pressure injuries were on sacral/coccyx area, 8 were located on heels, and 4 were medical device related pressure injuries (Butler, 2023). From January 2023 through August 2023 there were 38 hospital acquired pressure injuries (Butler, 2023). Of the 38 HAPIs that occurred up to August of 2023; 11 pressure injuries were on the sacral/coccyx region, 6 pressure injuries were on heels, and 4 were medical device related pressure injuries (Butler, 2023). The data suggest that pressure injury incidence is still happening in the CVICU, despite use of standard pressure injury prevention strategies.

Currently, the CVICU does not have a pressure injury prevention and decision-making algorithm. Nursing interventions that are in use throughout the unit include: use of Sub Epidermal Moisture (SEM) scanning, Z-Flo positioners, pillows, Mepilex products for sacrum and heels, the use of protective boots, the use of different mattresses/beds, and consults to wound nursing. However, there is no standardized decision-making process for nurses to follow when

implementing pressure reduction strategies which encourages inconsistency of the most appropriate pressure injury approach among nurses in the CVICU.

In early 2023, the Urban Academic Medical Center adapted SEM scanning technology into practice. The CVICU nurses utilized this technology once a shift on each patient as well as documenting the results. The use of the SEM scanning technology from March 2023- August 2023 has led to a decreased pressure injury incidence in the CVICU. However, pressure injuries are still evident and there is inconsistency in use of the SEM technology as well as deficient knowledge in what SEM scores mean and what interventions should be chosen in patient care by the nurses.

This DNP quality improvement project was feasible to conduct in the CVICU because there was CVICU support from the manager and other stakeholders for this project. The resources utilized throughout the project were being employed in practice in the unit, therefore this project was not a financial burden, and the resources were readily available for use.

Theoretical Framework

One relevant theoretical framework that supports this project is known as “The Power Theory” (Barrett, 2010). Elizabeth Barrett based this theory off another nursing theorist, Martha Rogers, who theorized that nurses and patients are one with the environment and both parties can participate in the process of change (Barrett, 2010). Barrett built off this theory by stating when people are aware of what they choose to do, have the freedom to make their choice, and complete the act intentionally that this creates a power that allows people to be aware they are taking part in change (Barrett, 2010). This theory applies to this project because the goal of the project is to increase nursing awareness in decision-making related to pressure injury interventions, which can challenge the individual nurse to use internal power to make changes in

their practice. The nursing staff can become more aware that they have the power to freely act as they wish. However, they must be conscious that the power of their choices can lead to change that can affect the ultimate outcome (Barrett, 2010). The nursing staff can utilize their individual power to make changes in the CVICU by increasing their awareness in choosing to freely participate in the project, understanding why they are participating, and utilize this project as a chance to make change within themselves and for patient benefit.

Purpose

This quality improvement project involved the development of a pressure injury prevention and decision-making algorithm process specific to the CVICU. The aims of the quality improvement project were to increase nurse awareness and decision-making skills of pressure injury prevention, improve screening for high-risk pressure injury, and decrease pressure injury incidence.

Quality Improvement Model

The quality improvement model of framework guiding the process of this project (see Appendix A) was the Plan, Do, Study, Act or PDSA model (Agency for Healthcare Research and Quality, 2020). The "Plan" stage was utilized in this project via needs assessment, a synthesis of evidence, creating objectives/goals, composing a GANNT chart, creating the education session, and how the project was to be implemented and evaluated (Appendix B). The "Do" stage was when the project was implemented into practice. This project spanned a duration of 4 weeks from February 13th 2024 until March 11th 2024. During the "Do" stage all the planned interventions came into action with completion of a pre-test, an education session, decision tree implementation, post-test completion, and compilation of data. The "Study" phase included analyzing the pre- and post- implementation data and assessing if the project indeed improved

the nurses' awareness of pressure injury prevention. The "Act" stage consisted of sharing the analyzed data with others and concluding if the project aims have been met and if the project is sustainable for the future or if changes need to be made for future purposes. The PDSA cycle was an appropriate framework for this quality improvement project because it is a method that will help document the development of change that is being implemented into practice; therefore, each step can be evaluated or changed to improve the project as needed (Agency for Healthcare Research and Quality, 2020).

Methods

Design

The quality improvement project aimed to increase nurse awareness of pressure injury prevention with the use of an evidence-based decision tree to aimed to increase nurse decision-making of choosing appropriate pressure injury prevention interventions in a cardiovascular intensive care unit. The project used a pre-posttest design.

Setting

The clinical setting in which this project took place was a 17-bed Cardiovascular Intensive Care Unit (CVICU) at an Urban Academic Medical Center in the Southeast United States. The patient population of this unit included high acuity patients that varied in different cardiac illnesses. This CVICU typically includes patients following open-heart cardiac surgery, lung and heart transplant, congestive heart failure, various cardiac devices (left ventricular assist devices, impella devices, and intra-aortic balloon pumps), continuous renal replacement therapy, and those on extracorporeal membrane oxygenation (ECMO) therapy.

This project was appropriate for this unit because the patient population has many co-morbidities and factors that affect perfusion to various parts of the body, which is a large risk factor of pressure injuries.

The unit employed 72 registered nurses, 6 Advanced Practice Nurse Practitioners, 5 Intensivists, 5 Cardiac Surgeons, certified nursing assistants, a Manager and Assistant manager.

Sample

The target population included the registered nurses who were employed in this unit. There were 50 permanent staff nurses and approximately 20 travel nurses who worked in the CVICU with varying 12-hour shift schedules. The nurses in the unit varied from new graduate nurses to nurses with 30 plus years of work experience. Nurses were selected through a convenience sample with a goal of 24 registered nurses as determined by 95% confidence level and a 5% margin of error (Qualtrics, 2023).

Inclusion criteria were registered nurses who work in the CVICU as full-time employees on both day and night shift. Exclusion criteria included nurses who worked PRN or as needed workers who worked less than 2 shifts per week and nurses who did not complete both the pre and posttest.

Context

Pressure injuries are a problem in the CVICU. A main reason why pressure injury incidence was a problem in the CVICU is because there was no pressure injury prevention protocol in place. There were many different resources supplied to the RNs in the unit to implement pressure injury prevention, but there was no organized process to guide RNs on appropriate intervention implementation. Patients in the CVICU were receiving inconsistent pressure injury prevention interventions. In this project, existing pressure injuries did not count

as “new” pressure injury incidence. New pressure injury incidences were based on pressure injuries that developed during the 4-week period.

Stakeholders

The stakeholders identified for the project included a variation in levels of staff. The CNO at the Urban Academic Medical Center is one stakeholder identified because she takes into consideration and approves processes that aid in decreasing cost for the hospital and longs to have better patient care for the facility. The CVICU manager and assistant manager are stakeholders because they work to constantly improve the processes in the CVICU and reaffirm the staff that interventions are important for the benefit of the patients. The Intensivists, APRNS, and Cardiothoracic surgeons are stakeholders because they strive for the best outcomes of patients. The registered nurses are stakeholders because this project can ease the burden of decision-making for pressure injury prevention and increase their awareness of pressure injuries.

Culture of the Environment for Change

Current Protocol

The CVICU has a positive culture that is always looking to increase safety and patient outcomes. Before project implementation, the nurses in the CVICU would document a Braden Score for each patient as well as bilateral heel and sacral SEM scores each 12-hour shift. Other interventions such as turn every 2 hours, bed type, use of Z-Flo pillows, sacral and heel Mepilex’s, and Molnlycke Z-flex heel boots were put into place via nurse judgement or if reminded by the nurse managers, nurse practitioners, or intensivists. There is a “Wound Wednesday” protocol, stating that pictures and measurements of existing wounds are to be done every Wednesday and uploaded to the electronic medical record (EMR). Additionally, anytime nurses visualize a pressure injury they are to document the pressure injury in the EMR, take a

picture of the wound so it will be uploaded to the EMR, and consult the wound nurse for further treatment instructions.

Facilitators to Project Implementation

The manager and assistant manager were large facilitators for the implementation of this project. During the needs assessment meeting, both managers showed enthusiasm towards the idea of the project. In the past, they have encouraged the implementation of multiple new ideas to better the CVICU unit as a whole and for the care of the patients. The support from the managerial staff helped this project flourish.

Barriers to Project Implementation

While there was a large amount of support for this project, there were potential barriers that may have affected the implementation and outcomes. Every nurse is different, allowing for different perceptions or choices to be made while choosing interventions for patients. To reduce this barrier, the decision-tree education allowed opportunity for real-time feedback to confirm reliability of the training which made it an interactive learning setting.

Another potential barrier was patient hemodynamic instability. Hemodynamic instability could have been a barrier because many interventions implemented to reduce HAPIs utilize repositioning patients to redistribute pressure (Cano et al., 2015). If patient acuity was of concern, use of the pressure injury decision-making algorithm may have been delayed or may not have taken place (Cano et al., 2015). Some researchers suggest that certain HAPIs are regarded as unavoidable because of patient acuity risk factors (Pittman et al., 2019). Unfortunately, patient acuity in the CVICU can be unpredictable at times. To alleviate this barrier, nurses had the opportunity to note rationale if the decision tree was not utilized.

A third barrier was a perceived increase in workload among nurses. Indeed, adherence to consistency of evidence-based interventions is essential in decreasing pressure injuries (Alshahrani et al., 2021). Implementation of the project may have interrupted the current standard workflow and to reduce this potential barrier the DNP student educated the nurses that the algorithm being implemented did not add new interventions into practice, however it can aid in nurse awareness of appropriate interventions, so less time may be spent on decision-making thus interventions may occur earlier in patient care and more consistently.

Intervention Implementation Procedure

The DNP student informed management and charge nurses in late Fall of 2023/early Spring of 2024 of the quality improvement project steps and intervention phases. In the early Spring staff meeting, the DNP student and managers introduced the project to staff. The DNP student posted flyers around the unit and e-mailed the same flyer to all nurses 2 weeks before the start of the project that indicated when the project and education workshop session would take place. The 2 education sessions were scheduled so both day and night shift nurses could attend. In early Spring, the “daily huddle points” that are stated before each shift by the charge nurses included information about the project and asked for willing nurses to participate in the project.

The project implementation began February 13, 2024. At the education sessions the nurses took the modified APuP. The nurses were then informed of the pressure injury incidence in the unit from August 2022- September 2023 to make the problem known. There were 3-points of education during the sessions. The first education point was information regarding the Braden Scale supported with evidence by the NPIAP and AHRQ. The Braden Scale was described with the goal to understand what the Braden Scale is, how to use the scale, and why the scale is important to pressure injuries. The education workshop included information to notify the charge

nurse if their patient has a Braden score of 12 or less indicating a high risk for developing a pressure injury (Agency for Healthcare Research and Quality, 2014).

The second education point was on key points of pressure injury prevention from the NPIAP guidelines. The DNP student introduced the RNs to the NPIAP organization and the goals of the guidelines for patient care. Next, the DNP student shared the NPIAP guidelines: pressure injury risk assessment, preventative skin care guidelines, assessing for nutrition status, appropriate pressure redistribution, heel care/positioning, and pressure injury prevention with devices. The RNs were also educated that pressure injuries upon arrival to the unit will not be counted as part of the pressure injury incidence in the 4-week period.

The third education topic included the introduction of the decision tree. The decision tree showed what specific interventions to implement within the algorithm. Visual reminders of the decision tree were posted in each patient room. Verbal reminders were also incorporated into the project. The daily team huddle verbally reminded participating nurses to use the decision tree.

The education presented was consistent throughout the project with weekly unit emails sent by the DNP student which contained reminders of the project, pressure injury education points, and offered an opportunity for any questions. Continuous education and training are found to be vital in reducing the risk of nurses' adherence to a pressure injury prevention program decline throughout implementation of the intervention (Alshahrani et al., 2021; Everett Day et al., 2022).

The DNP student asked the charge nurse every Monday for a rate count of Braden Scale scores of 12 or less that were reported each week. After the 4-week period, the same nurses who took the pre-test modified APuP took the modified APuP again.

Decision Tree Algorithm

This quality improvement project consisted of a pressure injury prevention decision tree algorithm created specifically for the CVICU patient population supported with evidence-based literature (see Appendix C). The decision-tree was designed to increase nurse awareness of how to prevent pressure injuries in CVICU patients. The algorithm was organized with 3 main branches of pressure injury prevention interventions. One branch of the tree stemmed into two categories, the patient either had a medical device (LVAD, Impella, IABP, ECMO, CRRT) or did not have a medical device. If the nurse had a patient without a device, he/she followed the algorithm for stable post-op cardiac patient or followed the algorithm for lung/heart transplant or an aortic dissection patient. This allowed the nurses to follow the algorithm and see what interventions were indicated for their specific patient's needs.

A second branch of the decision tree was based on SEM scores. The nurses used the SEM technology to scan heels and sacrum every shift according to the algorithm. The SEM score branch of the tree was designed to help nurses become aware of what interventions are needed for their patient based on the SEM scores recorded on heels and sacrum.

The third part of the decision tree was designed to increase nurse awareness of interventions needed in patients with existing pressure injuries. This branch was intended to help prevent existing pressure injuries from progressing to further stages. This branch included the interventions needed for pressure injuries stage 1-4, unstageable and deep tissue injuries. This branch also included part of the unit's "Wound Wednesday" protocol, stating that pictures and measurements of existing wounds were to be done every Wednesday and uploaded to the EMR. Lastly, this branch included information of what to do if the nurse believed their patient was a candidate for a specialty "Sand bed" for the current stage of their patient's pressure injury.

Overall, the pressure injury prevention decision tree was created to increase awareness of pressure injury prevention techniques for specific patient needs of SEM scores, patients with devices versus patient without devices, and appropriate actions to take to prevent existing pressure injuries from worsening. The interventions included in the decision tree are resources that were available in the CVICU unit or could be retrieved from the hospital's central supply. The interventions included in the decision tree included regular pillows, heel and sacral mepilex, Z-Flo positioners, Braden Scale, SEM scanners, pressure redistribution mattresses, Centrella beds (low-air loss/alternating pressure mattresses), Sand beds (specialty sand bed), and off-loading boots. Based on patient specific needs, the SEM score, device or no device, and existing pressure injury, the nurses used the algorithm to implement the appropriate interventions to prevent pressure injuries in their patients.

The literature supports the implementation of an evidence-based pressure injury decision tree. A decision-tree was created that incorporates a flow-chart approach to pressure injury prevention. It included a guideline-driven detailed algorithm for ICU nurses to use in the management of pressure injury prevention and management (Alshahrani et al., 2021; Lin et al., 2020; Yilmazer & Bulut, 2019). Consistency and organization will lead to sustainable practices and continual improvement in decreasing pressure injuries (Lin et al., 2020). The interventions implemented in this project were based on best evidence in literature to aid in the measurable outcomes for this project.

Permissions

Permission was approved to modify and use the Attitude towards Pressure Ulcer Prevention instrument in this quality improvement project by Dr. Beeckman, the original creator of the instrument (Beeckman et al., 2010). The DNP project was submitted to the University of

Louisville International Review Board and approved on January 8th 2024 to proceed with implementation.

Measures

Demographics

Data were collected to examine nurse years of experience, type of degree held, and shift type (day or night).

Attitudes, Awareness and Decision-making

The Attitudes towards Pressure Ulcer Prevention (APuP) instrument (see Appendix D) was chosen to test RN attitudes of pressure injury prevention in belief that attitudes may aid in foreseeing clinical performance (Beeckman et al., 2010). The APuP instrument was created by Beeckman et al (2010) to measure how attitudes towards pressure injury prevention can affect preventive care.

Beeckman et al. (2010) believes that a barrier in performing pressure injury prevention guidelines in clinical practice is when nurses have a negative attitude towards pressure injury prevention. The instrument is composed of 13 questions with 5 subscales defined as attitude categories. The first subscale category consists of 3 questions on personal competency in preventing pressure injuries. The second subscale category consists of 3 questions on nurse thoughts about the priority of pressure injury prevention in patient care. The third subscale consists of 3 questions on the RNs thought of the amount of patient and financial impact pressure injuries can endure. The fourth subscale consists of 2 questions on thoughts of nurse responsibility in pressure injury prevention. The final subscale is composed of 2 questions on the confidence the nurse has in the effectiveness of pressure injury prevention. All positively worded questions are answered with a Likert Scale with options of strongly agree (4), agree (3), disagree

(2), and strongly disagree (1) and all negatively worded questions were reverse coded (Beeckman et al., 2010). The maximum score that can be achieved is 52 points, the higher the score is reflective of a more positive attitude towards pressure injury prevention (Beeckman et al., 2010).

To determine validity of the instrument, Cronbach's alpha coefficients were calculated for the instrument in totality and the 5 subscales. The instrument and subscales calculated Cronbach's alpha ranged from 0.75 to 0.82 demonstrating admirable internal consistency (Beeckman et al., 2010). The APuP instrument is a valid and reliable instrument with ease of use and clinical usefulness with exploring attitudes towards pressure injury prevention (Beeckman et al., 2010).

The APuP was modified with the addition of 2 questions added that will measure RN awareness of decision-making algorithms and if they find decision-making algorithms helpful. The modifications of this instrument were approved by the author. The APuP instrument was an appropriate instrument to measure attitudes and awareness in the target population.

Pressure Injury Braden Assessment Scale

The Braden Scale is a pressure injury risk prediction tool created in 1988 by Barbara Braden and Nancy Bergstrom (Bergstrom et al., 1987). This tool has 6 subscales each with their own scoring system (see Appendix E). The first subscale is sensory perception and is rated from 1- completely limited, 2- very limited, 3- slightly limited, and 4- no impairment. The second subscale is Moisture and is scored 1- skin is constantly moist, 2- very moist, 3- occasionally most, and 4- rarely moist. The third subscale is activity and is scored 1- bedfast, 2- chairfast, 3- walk occasionally, and 4- walks frequently. The fourth subscale is mobility and is scored 1- completely immobile, 2- very limited, 3- slightly limited, and 4- no limitations. The fifth

subscale is nutrition and is scored 1- very poor appetite, 2- probably inadequate, 3- adequate, and 4- excellent. The last subscale is friction and shear which is scored 1- problem, 2- potential problem, and 3- no apparent problem (Bergstrom et al., 1987).

Each subscale is scored a number based on the healthcare provider's observation. The score range is 6-23. The lower the patient scores on the Braden Scale indicates that the patient has a higher risk of developing a pressure injury. Higher patient scores indicate a lower risk of pressure injury development. According to Agency for Healthcare Research and Quality (2014), a score of 12 or less on the Braden Scale indicates a patient is at high risk for developing a pressure injury.

The reliability of the Braden Scale is excellent (r=0.99) when used by registered nurses and sensitivity was 100% in both studies done in original testing (Bergstrom et al., 1987). The Braden scale is an excellent indicator of patients at risk for pressure injuries. This quality improvement project measured Braden Scale rates weekly by having the charge nurse collect the number of patients that had a Braden score of 12 or less for the 4-week period.

Pressure Injury Incidence

Another goal that was measured is the pressure injury incidence pre- and post-implementation. Pressure injury rates were collected by wound care nurses in the hospital and analyzed by quality improvement specialists. This information was requested by the DNP student pre- and post- intervention. Pressure injuries were identified by pressure injury staging guidelines by the NPIAP (Edsberg et al., 2016).

Data Analysis

SPSS

IBM SPSS Statistics 29 software was used.

Demographics

Descriptive Statistics were used to analyze demographic data.

Attitudes, Awareness and Decision-making

To maintain anonymity of the pre- and post- APuP tests and to determine that the pre- and post-test were completed by the same person, participants labeled their pre- and post- test with their mother's initials and year of birth. A Wilcoxon Signed Rank Test was used to evaluate the median score differences from pre- and post-modified APUP. The Wilcoxon Signed Rank Test utilizes nonparametric statistical analysis. This test is appropriate for a sample size of 20 and for ordinal data. The significance level was set at $p = 0.05$.

Pressure Injury Braden Assessment

The number of Braden Scale Assessment scores of 12 or less were collected each week throughout the project and analyzed with descriptive statistics.

Pressure Injury Incidence

Patient pressure injury incidence was measured using incidence rates pre- and post-project implementation analyzed with descriptive statistics.

Evaluation of Process

The process of this project was evaluated after all data had been collected and analyzed. The results will be shared with the CVICU managers, intensivists, nursing staff, wound nurses, and quality improvement educators at the facility. There will be a poster presentation in August of 2024 in which the final manuscript will be disseminated. The final manuscript will be submitted for publication.

Results

Demographics

There were 20 nurses who participated in this project of which 55% worked day shift and 45% worked night shift. Of the 20 nurses, the highest degree held included 80% with a Baccalaureate degree, 15% with an Associate degree, and 5% with a Master's degree. There were 5% who have practiced as a nurse for less than one year; 60% for 1-5 years; and 10% for more than 5 years but less than 10 years. There were 10% who have practiced for 10 years but less than 15 years; 5% for 15 years but less than 20 years; and 10 % for 20 years or more (see Appendix F).

Attitudes, Awareness and Decision-making

Attitudes, awareness, and decision-making towards pressure injury prevention were measured pre- and post- intervention with a Wilcoxon Signed Rank Test. The pre- and post-Modified APuP demonstrated a 100% response rate with completion of both the pre- and post-surveys (see Appendix G). Wilcoxon Signed Rank Test indicated that the majority median post-test scores were statistically significantly higher than the median pre-test score for questions 1, 3, 6, 14, and 15 indicating improvement post intervention. The question regarding the nurses' thought of pressure ulcer prevention being too difficult and that others are better at prevention measures demonstrated a statistically significant increase in post-test score ($z = -2.121$, $p = 0.034$), indicating that the education session and decision-making tree algorithm improved the nurses' pressure injury prevention ease and capability. The question related to the nurses' confidence in ability to prevent pressure injuries demonstrated a statistically significant increase in post-test score ($z = -2.333$, $p = 0.020$), indicating that the nurses' confidence in preventing pressure injuries increased after the education session and implementation of the decision-making algorithm in practice. The question regarding nurses' thoughts on pressure ulcer prevention being a priority in patient care demonstrated a statistically significant increase in

post-test score (z = -2.236, p = 0.025), indicating an increase in the nurses' beliefs that pressure ulcer prevention is more of a priority in patient care. The question regarding the nurses' awareness of a decision-making algorithm for pressure injury prevention interventions demonstrated a statistically significant increase in post- test score (z =-3.500, p = <0.001), indicating that this project increased nurse awareness of a decision-making algorithm for pressure injury prevention interventions. Lastly, the question regarding if decision making algorithms are helpful in practice demonstrated a statistically significant post-test score (z =-2.449, p =0.014), indicating an improvement that decision making algorithms are helpful in practice. The remaining 10 questions did not have post- test scores indicating statistical significance.

Braden Scale Assessment Rates

The number of Braden Scale Assessment scores of 12 or less were collected weekly by the charge nurse and incidence rates were analyzed. The first week (February 13-19) there were 6 scores of 12 or less. The second week (February 20-26) there were 14 scores of 12 or less. The third week (February 27-March 4) there were 13 scores of 12 or less. Lastly, the fourth week (March 5-11) had 18 scores of 21 or less. In total throughout the 4 weeks there were 51 scores of 12 or less on the Braden Scale reported to the charge nurse demonstrating high level of risk for pressure injury.

Pressure Injury Incidence

The number of pressure injuries that occurred during the 4-week period of this project were analyzed with descriptive statistics. During the 4-week period existing pressure injuries were not counted toward pressure injury incidence. From February 13th to March 11th there were 0 hospital acquired pressure injuries.

Discussion

This DNP quality improvement project demonstrates that a nursing intervention to improve pressure injury prevention in the CVICU increased nurse awareness and decision-making. In addition, it shows that screening for high- risk pressure injury and implementation of an evidence-based decision-tree can improve pressure injury prevention. Thus, all three specific aims of this project were met.

The results showed that 80% of nurses in this project have baccalaureate degrees which is consistent with the bureau of Labor statistics who reported that the highest level of nursing education in 2023 was indeed a baccalaureate degree (Bureau of Labor Statistics, 2023). According to Ayello et al. (2017), a survey regarding wound care education in undergraduate baccalaureate nursing programs conducted in all 50 states of the U.S. showed there were several curriculum deficiencies about pressure injury management. Some of the curriculum deficiencies included an inconsistency of education on validated pressure ulcer risk assessment tools, of pressure injury incidence, and how to use pressure redistribution techniques (Ayello et al., 2017). Thus, evidence suggests that baccalaureate prepared nurses will benefit from unit specific pressure injury prevention education. Baccalaureate nurses are an ideal population to continue to work with during the sustainability of this project.

There was increased confidence in nurse ability to prevent pressure injuries, increased nurse awareness that pressure prevention is not too difficult to implement into practice, increased nurse thoughts that pressure injury prevention should be a priority in patient care, increased nurse awareness of a decision-making algorithm for pressure injury prevention interventions, and increased nurse perception that decision making algorithms are helpful in practice. A long-term goal of this project was that 95% of nurse participants showed an improvement in their

awareness and decision-making regarding pressure injury prevention interventions post-intervention. This goal was met due to statistically significant results on questions 14 and 15 post-test which demonstrates this quality improvement project improved these measures and ultimately improved pressure injury prevention processes

The CVICU typically has a patient population with high acuity indicating that more patients are at a higher risk for developing pressure injuries (Cox et al., 2022). Collecting Braden Scale scores was helpful in gaining insight into the high-risk nature of acquiring pressure injury in the. McEvoy et al. (2024) supports the conclusion that the majority of critical care patients are at high risk for developing a pressure injury. It is suggested that spending time assessing patient risk is imperative, however, implementing preventative measures is the more important step in pressure injury prevention (McEvoy et al., 2024). An intermediate goal was that the Braden Scale score will identify 100% of patients who are high-risk for pressure injury. This goal was met because the Braden Scale was used to screen and those patients who were at high risk were identified.

The pressure injury incidence was 0 throughout the 4-week period. This finding is surprising due to the high-risk patient population. However, studies show that pressure injury incidence can vary at times in critical care settings due to the patient census, length of stay and differences in patient acuity at the time (Alshahrani et al., 2024). An additional long-term goal was to decrease pressure injury incidence by 10% by the end of the 4-week period. The outcome of this goal was that there was no decrease in pressure injury prevalence. However, the week prior to the project start there were 0 HAPIs on the unit and throughout the project there were still 0 HAPIs. Thus, having 0 HAPIs throughout the 4-week period is considered a success.

Summary

This quality improvement project focused on increasing nurse awareness of pressure injury prevention interventions and decision-making skills in the Cardiovascular Intensive Care Unit. The project site had a high prevalence of pressure injuries dictated by the NDNQI data from 2020-2022 and data collected on pressure injury incidence in the unit by the wound nurse in 2022 up to August of 2023. Key literature findings showed that nurses preferred visual and verbal reminders of interventions, education and training that is offered on a consistent basis, nursing adherence to interventions is important to decreasing pressure injuries, and that organized and clear interventions are easier for nurses to follow. The specific aims of this quality improvement project were to: (a) increase nurse awareness and decision-making skills of pressure injury prevention; (b) improve screening for high-risk pressure injury; (c) decrease pressure injury incidence. HAPIs were a problem in the CVICU and the key findings from the literature were used to develop a decision- making algorithm intervention to stop the problem from continuing.

Interpretation

The outcome of the project was that there were 0 HAPIs at the conclusion of the project. The pressure injury decision-making tree utilized best evidence from the literature review conducted. Technology such as SEM scanners were included in the tree which aimed to increase awareness and adherence of the nurses to reduce pressure injuries (Everett Day et al., 2022; Lee et al., 2019; Pickham et al., 2018; Turmell et al., 2022; Yesentharao et al., 2021). Different beds were utilized based on patient specific circumstances as mentioned by multiple studies to decrease pressure injury incidence (Bambi et al., 2022; Choi et al., 2021; Jiang et al., 2020; Yesantharao et al., 2021). The decision-making tree was created in a clear and concise manner to help maintain adherence and ease of use (Lin et al., 2020). Education sessions were done to

increase the nurses' knowledge base of pressure injury prevention to help increase awareness and decrease pressure injury incidence (Alshahrani et al., 2021; Everett Day et al., 2022; Yilmazer & Bulut, 2019). The literature helped the anticipated outcome of 0 HAPIs become a reality for the 4-week period of this project.

The impact of this project affected the nurses by increasing the awareness of the problem that the CVICU had with pressure injury incidence. This project also helped nurses decide what interventions are appropriate for specific patients ultimately increasing the ease of decision-making. Lastly, this project impacted the patients as the patients during this time did not acquire a pressure injury.

Limitations

Some limitations that were present during this project include the variability in patient acuity. Some nurses may not have been able to take pressure injury intervention into practice due to patient hemodynamic instability. Another limitation is the time of the education sessions. The educations session occurred before the nurses started their 12 hours shift. This is a limitation because the nurses may have been anxious to start their shift. However, steps were taken to prepare for this, and time spent on the education sessions were proactively clearly communicated. Efforts were made to minimize and adjust for these limitations by keeping the education session informative, yet brief and allowing for the nurses to come forward if they could not utilize the decision tree due to hemodynamic instability.

Conclusion

This project's findings show an increase in nurse awareness of pressure injury prevention interventions and decision-making algorithms for pressure injury interventions. Post intervention shows that 0 HAPIs were prevalent during the project. The creation of the pressure

injury prevention intervention decision tree can be useful to the CVICU because it aids in nurse decision-making and increases consistency in interventions chosen to ultimately decrease pressure injury incidence in the unit.

The unit Manager asked to keep the decision-trees hung up in each patient room after project completion. The manager would like to keep the algorithm posted as well as present it to other units to decrease pressure injury incidence in other critical care areas with similar patient devices. This project has high sustainability. In future studies this type of decision-tree algorithm could be modified to fit other unit-based specific patient characteristics. As research and technology continues to develop, modifications can be made based on new evidence.

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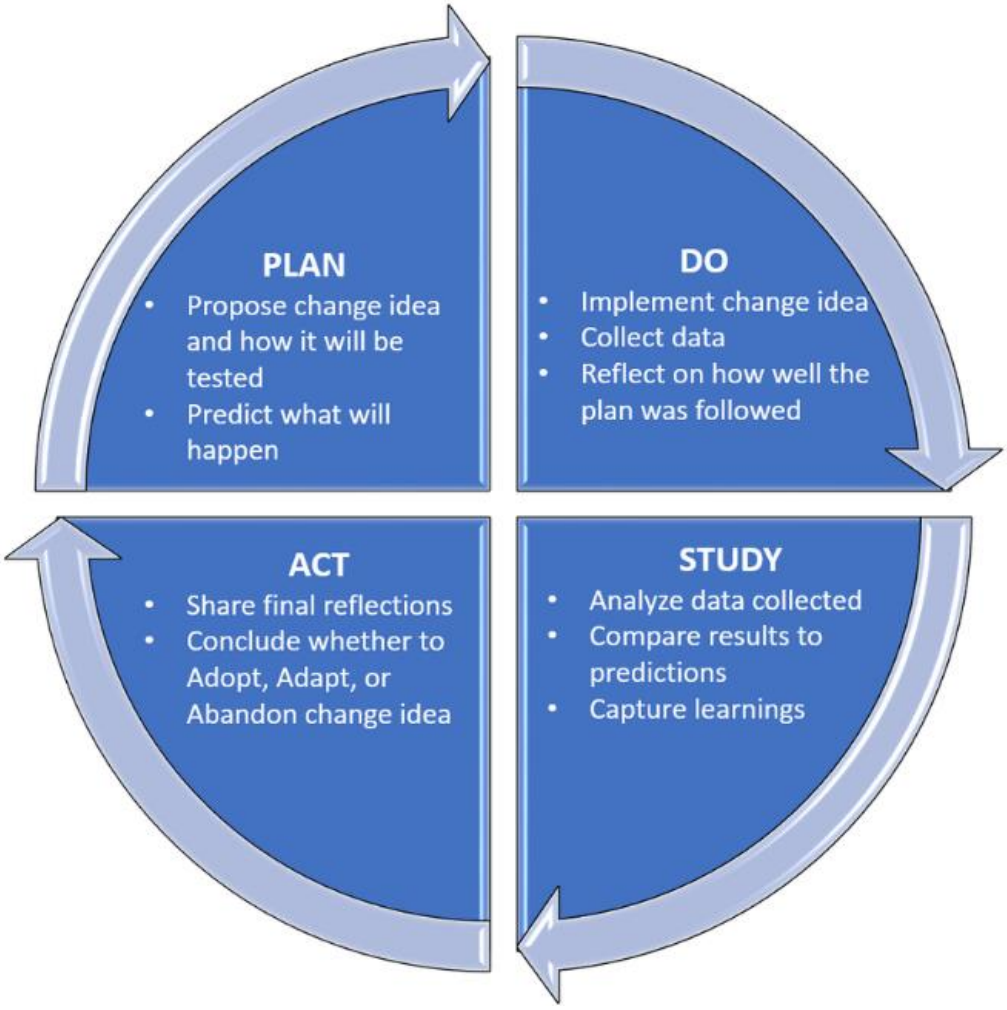
Appendix A

Plan Do Study Act Cycle



(Barron et al., 2023)

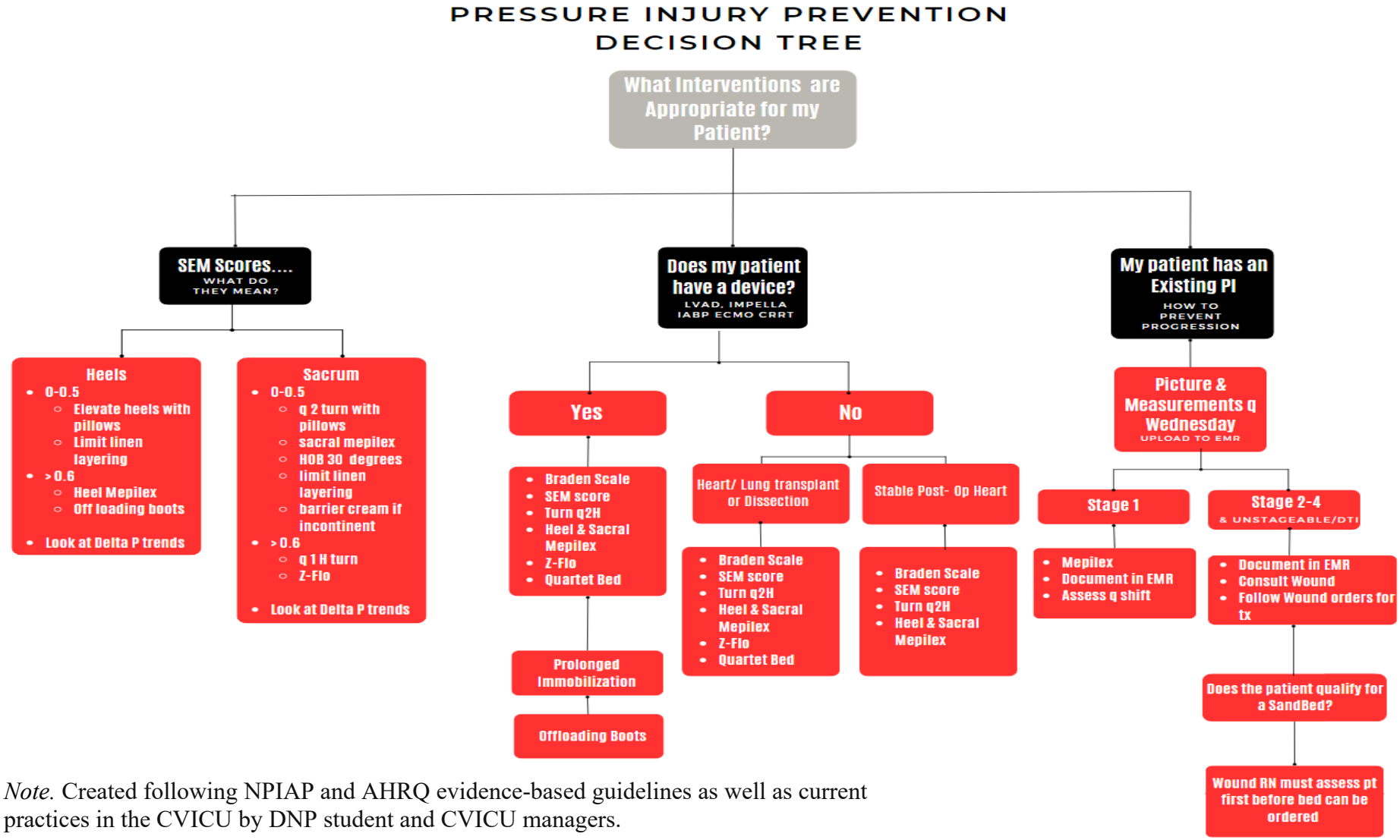
Appendix B

Project Timeline

Project Activity	Aug 2023	Sep 2023	Oct 2023	Nov 2023	Dec 2023	Jan 2024	Feb 2024	Mar 2024	Apr 2024	May 2024	Jun 2024	Jul 2024	Aug 2024
Proposal development													
Final proposal submission													
DNP Project committee meeting/proposal approval													
DNP Project proposal defense													
IRB submission and Approval													
Advertise project to nursing staff													
Implement project													
Analyze data													
Prepare final report													
Develop final poster													
Disseminate poster session													

Appendix C

Pressure Injury Prevention Decision Tree



Note. Created following NPIAP and AHRQ evidence-based guidelines as well as current practices in the CVICU by DNP student and CVICU managers.

Appendix D

Demographics and Modified Attitude Towards Pressure Ulcer Prevention Instrument

Demographics

1. Number of years in practice:

   □< 1 year □ 1 year - 5 years □> 5 years - <10 years

   □ 10 years - < 15 years □ 15 years - < 20 years □ 20 years or more

2. Highest degree held:

   □ Diploma □ Associate □ Baccalaureate □ Masters □ Doctorate □MD/DO

3. Shift:

   □ Day □ Night

Modified Attitudes towards Pressure Ulcer Prevention (APuP) Instrument

1. I feel confident in my ability to prevent pressure ulcers.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

2. I am well trained to prevent pressure ulcers.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

3. Pressure ulcer prevention is too difficult. Others are better than I am.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

4. Too much attention goes to the prevention of pressure ulcers.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

5. Pressure ulcer prevention is not that important.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

6. Pressure ulcer prevention should be a priority.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

7. A pressure ulcer almost never causes discomfort for a patient.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

8. The impact of pressure ulcers on a patient should not be exaggerated.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

9. The financial impact of pressure ulcers on society is high.
   Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

10. I am not responsible if a pressure ulcer develops in my patient.
    Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

11. I have an important task in pressure ulcer prevention.
    Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

12. Pressure ulcers are preventable in high-risk patients.
    Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

13. Pressure ulcers are almost never preventable.
    Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

14. I am aware of a decision-making algorithm for pressure injury prevention interventions.
    Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

15. Decision-making algorithms are helpful.
    Strongly agree (4) ___ Agree (3) ___ Disagree (2) ___ Strongly disagree (1)___

Appendix E

Braden Scale

Sensory Perception	**Moisture**	**Activity**	**Mobility**	**Nutrition**	**Friction and Shear**
No Impairment (4)	Rarely Moist (4)	Walks Frequently (4)	No Limitations (4)	Excellent (4)	
Slightly Limited (3)	Occasionally Moist (3)	Walks Occasionally (3)	Slightly Limited (3)	Adequate (3)	No Apparent Problem (3)
Very Limited (2)	Very Moist (2)	Chair bound (2)	Very Limited (2)	Probably Inadequate (2)	Potential Problem (2)
Completely Limited (1)	Constantly Moist (1)	Bed bound (1)	Completely Limited (1)	Very Poor (1)	Problem (1)

(Bergstrom et al., 1987)

Appendix F

Demographics of Nursing Participants, N=20

Variable	n	%
Shift		
Day	11	55.0
Night	9	45.0
Years in practice		
<1 year	1	5.0
1-5 years	12	60.0
>5- <10 years	2	10.0
10- <15 years	2	10.0
15- <20 years	1	5.0
20 years or >	2	10.0
Highest degree held		
Associate	3	15.0
Baccalaureate	16	80.0
Masters	1	5.0

Appendix G

Pre- and Post- Intervention Modified APuP Survey Answers, N=20

Question	Z	*p*
1. I feel confident in my ability to prevent pressure ulcers	-2.333	.020*
2. I am well trained to prevent pressure ulcers	-1.633	.102
3. Pressure ulcers prevention is too difficult. Others are better than I am	-2.121	.034*
4. Too much attention goes to the prevention of pressure ulcers	-1.667	.096
5. Pressure ulcer prevention is not that important	-1.732	.083
6. Pressure ulcer prevention should be a priority	-2.236	.025*
7. A pressure ulcer almost never causes discomfort for a patient	-1.342	.180
8. The impact of pressure ulcers on a patient should not be exaggerated	-.318	.751
9. The financial impact of pressure ulcers on society is high	-.707	.480
10. I am not responsible if a pressure ulcer develops in my patient	-.447	.665
11. I have an important task in pressure ulcer prevention	-1.134	.257
12. Pressure ulcers are preventable in high-risk patients	-.302	.763
13. Pressure ulcers are almost never preventable	-.832	.405
14. I am awake of a decision-making algorithm for pressure injury prevention interventions	-3.500	<.001*
15. Decision-making algorithms are helpful	-2.449	.014*

Note. * Reflects statistically significant data $p < .05$