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Reducing Pressure Injuries in the Intensive Care Setting: Nursing Knowledge and Best Practices Approach

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Reducing Pressure Injuries in the Intensive Care Setting:

Nursing Knowledge and Best Practices Approach

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By

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ABSTRACT

Background: For many health care organizations, pressure injury (PI) prevention strategies have become a priority focus to improve patient outcomes and associated costs.

Problem: A rural community hospital located in the Eastern U.S. experienced an increase in hospital acquired pressure injuries (HAPIs), predominantly in the intensive care unit (ICU). In 2018, 17.4% of HAPIs occurred in the ICU.

Approach: Implementation of a Quality Improvement project in an adult ICU, providing education and on-going learning activities to nursing staff, and applying a standardized plan of care "bundle" for prevention interventions.

Outcomes: The approach resulted in improved documentation of flotation of heels, incontinence pads, and moisturizer to skin. During the project period of 3 months, zero HAPI events occurred.

Conclusions: The implementation of a PIP program may contribute to the decrease in HAPI rates in the ICU setting. On-going monitoring is needed to evaluate sustainability of the program.

INTRODUCTION

Healthcare acquired pressure injuries (HAPIs) are a significant concern for every health care organization. The Centers for Medicaid and Medicare Services (CMS), consider HAPIs to be a "never event" and an indicator of the quality of care being provided (Agency for Healthcare Research and Quality, 2017a). The term "never event" was first introduced in 2001 and is used to describe a serious adverse event that should not occur and is typically preventable (Patient Safety Network, 2017). In 2015, the Agency for Healthcare Research and Quality (AHRQ) reported the national rate for HAPIs were 36.3 per 1,000 adult discharges, accounting for 31.6% of the total hospital acquired conditions (Agency for Healthcare Research and Quality, 2017b). HAPIs occurring in the intensive care unit (ICU) have an incidence rate of up to 49%, compared to 13.9% for patients who are admitted to a medical surgical unit (Zuo and Meng, 2015, Han et al., 2018).

Patients with pressure injuries often experience severe pain and have increased risk for infection (Institute for Healthcare Improvement, 2017). Each year approximately 2.5 million patients develop HAPIs, with over 60,000 patients dying from their complications (Health Research and Educational Trust, 2017). While there are over 200 possible risk factors and not all pressure injuries (PIs) can be prevented, certain evidence-based interventions should be in place to reduce the likelihood of their development (Kayser, VanGilder, and Lachenbruch, 2019, Zuo and Meng, 2015). With public reporting and reimbursement incentives to reduce HAPIs, health care organizations are focusing on prevention strategies (Cano et al., 2015). Various pressure injury prevention (PIP) program resources and toolkits are available by the Institute for Healthcare Improvement (IHI) and AHRQ (IHI, 2019, AHRQ, 2017). More healthcare organizations are starting to use these resources and toolkits as a guide due to their multifaceted approach and use of best practices (Englebright et al., 2018).

LOCAL PROBLEM

A 275-bed rural community hospital located in the Eastern U.S. has experienced an increase in HAPIs, predominantly in the ICU setting. In 2018, 17.4% of their HAPIs occurred in the ICU and 28.6% occurred with patients transferred to other units from the ICU. patients. Examination of potential risk factors found 965 patients were admitted or transferred to the ICU and of those, 38% required mechanical ventilation and 26% required an infusion of vasopressors, factors that increase the risk for PIs (Curry, Kutash, Chambers, Evans, Holt, and Purcell, 2012).

The nurse to patient ratio in the ICU varies from 1:1 to 1:3, depending on patient acuity. ICU nurse staffing includes 32 fulltime, part-time, or as needed, 31 float pool nurses, one unit-based educator, and seven medical evaluation nurses (responders for rapid response calls and sepsis monitoring). The ICU has encountered increased turn over the last two years. The unit has a significant amount of less experienced nurses with 37.5% having < 3 years' experience, compared to seasoned nurses with 18.8% having > 10 years' experience. Barakat-Johnson et al (2018) suggests nursing experience correlates with positive attitudes towards PIP, resulting in appropriate nursing practices.

Earlier organizational PI improvement efforts primarily focused on a provider approach, rather than a multifaceted process. Process changes were needed as the primary responsibility of prevention and treatment of PIs had been placed on the wound care nurse. Providers were educated and made accountable to document PIs and entering treatment orders. Despite these new procedures, the hospital continued to struggle to reduce PI incidence, prompting the need to identify additional improvement opportunities. A needs assessment of the hospital's current PIP practices was conducted and subsequently revealed several areas for improvement. Three areas were identified and included: inadequate nursing knowledge related to PIP, a lack of a uniform process of implementing evidence-based practice (EBP) interventions, and inconsistent nursing documentation. PI education for nursing

staff was limited to new employee orientation. Next, was the lack of a uniform process of implementing EBP interventions. A PIP policy based on EBP was in place; however, a plan of care to guide nursing and standardize prevention practices was not available. Lastly, nursing documentation was inconsistent and failed to address key elements of PI assessment, interventions and evaluation of those interventions.

LITERATURE REVIEW

PIP programs are multifaceted and involve nurse driven components that include accurate assessments, nursing knowledge, and appropriate implementation of prevention measures (Cano et al., 2015). Nurses play an integral role in prevention, directly influencing the incidence of PIs. As frontline staff, they have the unique ability to apply their knowledge and skills of evidence-based practices when delivering care to their patients. Completion of education programs provides significant increases in nursing knowledge; however, studies have shown substantial amounts of knowledge loss within the first three months and a return to baseline within five months (Cox, Roche, Van Wynen, 2011, Tweed and Tweed, 2008). However, after completing an initial PI education program, nurses were able to retain more knowledge by attending quarterly education sessions (Cox Roche, VanWyen, 2011). Literature shows PIP education programs offered on a quarterly and annual basis are an effective strategy in reducing the incidence of HAPIs (Tirgari el at., 2018, Burton, Fields, Outlaw, and Deleon, 2013, Cox, Roche, Van Wynen, 2011). Integrating nursing education into a PIP program provides nursing with ongoing support, enhancing their PI knowledge and decision-making skills (Bos et al., 2016, Miller et al., 2017).

Literature on organizational approaches to PIP strategies varies with the ability for healthcare organizations to tailor toolkits to meet their needs (Englebright et al., 2018). Evidence does suggest that HAPI prevention is more effective when using more than one strategy (Tayyib and Coyer, 2016). The use of a standardized risk assessment tool, such as the Braden Scale, is commonly used in PIP

programs, including in the ICU setting (Lin et al., 2019). The Braden Scale is a PI risk assessment tool that is utilized to conduct an assessment and is documented by the nurse. The scale has six categories (sensory perception, moisture, activity, mobility, nutrition, and friction/shear) that are scored based on the patient's condition. Braden scores range from six to 23, with lower scores indicative of higher risk in developing a PI (Bergstrom et al., 1987). Evidence supports implementing interventions to prevent PIs when a patient has a Braden score of 16 (Han et al., 2017). However, ICU patients may develop pressure injuries even when their Braden score identified them as having no risk (Han et al., 2017). Additionally, two of the six categories (sensory perception and activity) were found to not be associated with PI risk in the ICU setting (Han et al., 2017). Literature suggests a need for the development of a PI risk tool that is specific to the critical care population (Cox, 2017, Han et al., 2017).

PIP interventions can vary depending on organizational need. The AHRQ toolkit provides PIP interventions using a standardized care 'bundle' based on the Braden Scale subset score of each category (AHRQ, 2014a). The toolkit correlates with the creators of the Braden Scale recommendations of using the subset score from each category to identify specific problems with the patient that may need further investigation and to guide in the types of interventions that should be used (Braden, 2012). Providing a standardize plan of care bundle based on each subset score will reduce the incidence of potentially missing prevention opportunities if just the overall Braden score is used. Gadd and Morris (2014) found patients that were high risk for developing a PI did not have interventions tailored to their Braden subset scores 46% to 97% of the time. Patients with a Braden Scale score indicating a low risk for a PI but having a low subset score to one of the categories would indicate the need for a specific prevention intervention (Gadd and Morris, 2014). Effective prevention requires patients to have individualized plans of care based on their needs in each of the six categories, even when the overall Braden score does not indicate that the patient is at risk (Gadd and Morris,

2014). Implementing a standardized plan of care was considered due to the desire to provide staff with a consistent process for prevention implementation that would be tailored to the needs of their patients.

RATIONALE

The Donabedian Model was used to systematically evaluate the problem and guide the project (Hickey and Brosnan, 2017). Donabedian's model was first introduced in 1966 and utilizes a systematic approach with three key aspects: structure, process, and outcomes (Donabedian, 1980). A strong organizational infrastructure comprised of a Skin Care Team and a PI Steering Committee were already in place prior to the initiation of the project. The needs assessment completed in the early stages of the project identified structural level indicators with the current PI risk assessment tool and prevention policy, ICU staff ratios, ICU nursing experience, and PI focused nurse education. Areas of opportunity were identified through a need's assessment, determining a need for practice changes. The process level indicators evaluated current plan of care interventions for PIP. Targeted interventions focused on the implementation of an evidence-based PIP program that would incorporate nursing education, EBP interventions, and provide structure for nursing documentation. The outcome measures provides a means to measure the changes made during the process of care (Donabedian, 1969). Use of the Donabedian model could provide the foundation to expand the project facility-wide after the pilot project was completed and successful.

SPECIFIC AIMS

This project had three specific aims: 1) to develop and implement evidence-based education related to PIP, 2) initiate a standardized care 'bundle' and 3) establish a documentation process that would provide consistency in nursing documentation.

METHODS

A letter of determination, deeming this a QI project, was obtained January 2019 from the Institutional Review Board (IRB) of the project site. This pilot project was conducted in the ICU. In total, there were 71 nurses who worked on the unit that were eligible to participate in the project. This included ICU staff nurses, float pool staff, medical evaluation team nurses, and the unit-based educator. Staff had 4 weeks to participate in the project by completing an online education module and completing a pre and posttest and module evaluation survey. Sixty-one nurses (86%) agreed to participate in the pilot project.

Instruments

To evaluate nursing staff PI knowledge, the original 47 question Pressure Ulcer Knowledge Test (PUKT) provided in the AHRQ toolkit was used for this project. Several studies implementing a newly created prevention education program have used the PUKT to assess staff knowledge and application (Delmore, Ayello, Smart, and Sibbald, 2018). The PUKT test was developed by Pieper and Mott (1995) and is comprised of 47 True/False/"Don't Know" questions that fall under three subset areas: risk and prevention (33 questions), PI staging (7 questions), and wound description (7 questions) (AHRQ, 2014b). The PUKT was used three times during this project (1) pre education and (2) post education module the month of May 2019, and (3) completion of project the month of August 2019. Each question of the PUKT was assigned one point for a correct answer and each incorrect or "Don't Know" answered question was assigned zero points. For this project, the scoring range set by Illesanmi et al. (2012) was used with 80% and above indicating high knowledge, 59 to 79% indicating moderate knowledge, and below 59% indicating a low knowledge level.

A chart review of nursing documentation was completed on ICU patients admitted between June and August 2019. Thirty charts were reviewed (10 charts each month). Patients who were

transferred to the ICU from another unit were excluded from review. Data collected included documenting nurses' user identification number, nursing shift (day/night), each of the six Braden Scale subset scores, cumulative Braden Scale score, medical devices in use, and interventions entered each shift. Prevention interventions included bordered foam dressing, flotation of heels, incontinence pad, moisturizer to skin, and turn schedule. Nutrition subscale interventions were not included in the chart reviews as nutrition recommendations were provided by a registered dietitian rather than the nursing staff.

Interventions

Preliminary steps included the formation of a multi-disciplinary guided team that consisted of a professional development nurse, ICU nurse, wound care nurse, and project manager. The team's role involved reviewing the hospitals PIP process, developing resources and education for staff, and assisting in the implementation of the project. Several EBP intervention resources were reviewed and resulted in the AHRQ PI toolkit being used as a guide. The toolkit included a standardized prevention care plan bundle with interventions based on a patient's subset score for each Braden Scale category (AHRQ, 2014a). To make the standardized prevention care plan bundle readily available to nursing staff, a template was created and placed under the facility favorites folder with a quick link for direct access.

A PIP education module was developed using the NDNQI Pressure Ulcer Training Module (Press Ganey, 2019). The NDNQI training module is available to the public and includes content related to pressure injury stages and descriptions, medical device related injuries, locations of pressure injuries, patient risk status and assessment, and prevention. The PI education module used for this project included the NDNQI module element, as well as a review of the standardized prevention care plan bundle template, visual imagery of the different stages of pressure injuries, and

examples of patient risk status and using the care bundle template. Nursing staff were encouraged to participate by logging in and completing the education module through their professional development course site application during the month of May 2019. Staff were instructed to allow at least an hour to complete the module due to the amount of educational content and pre and post testing. In addition, an evaluation survey of the education module was sent to staff via Survey Monkey in June 2019 with the request to complete it no later than August 2019.

Education-focused activities and unit reminders were ongoing during the implementation period (June-July 2019). PIP learning activities were held over a two week time period and included a crossword puzzle, word search, and a Braden Scale case study. Staff had additional learning opportunities during two separate nursing skills fairs with a PIP Jeopardy type activity booth. Staff were able to stop by the booth anytime during the skills fair and play for prizes. Other prize incentives (gift cards, coupons for the cafeteria) were randomly given out for completed activities to increase staff engagement and participation. A final evaluation survey was sent to staff via Survey Monkey in August 2019 and was to be completed by the end of August 2019. The survey questions focused on the staff's perception of the PI project as a whole and included a final PUKT test.

RESULTS

Education Results

Microsoft Excel (Office 2019 Version) was used to analyze and summarize the data. Nearly 86% of the eligible nurses working in the ICU completed the education and PUKT testing (61 out of 71 total nursing staff). The mean age of the participants was 37 (SD = 10.1) years and they were predominately female (90.2%). Years of service ranged from less than one year to 40 years, with the majority having one to four years of service (36.1%) (Table 1). The overall results of the PUKT results showed participants increased their knowledge in all three areas of prevention, staging, and wounds. Staging had the highest percentage of improvement from pretest to posttest with an increase

of 7%, followed by prevention with a 3% improvement, and wounds with a 2% improvement. Additionally, the percentage of participants answering “Don’t Know” decreased by 85% on the posttest (Table 2). Reviewing knowledge level (low, medium, high) based on overall score of both the pre and posttests, none of the participants had a low knowledge score. Forty-four percent of the participants scored having a medium knowledge level on the pre-test and 56% of participants scored in the high knowledge level range. Following completion of the learning module, only 18% of the participants demonstrated a medium knowledge level and 82% of participants scored in the high knowledge level range, a 46% positive increase from pretest scores.

Looking at ‘least’ and ‘most’ improved categories, two of the top most improved answers involving repositioning. Prior to the PI education, 2 to 16% of the participants correctly answered questions involving repositioning while in a chair, indicating a lack of knowledge. Following the completion of the learning module, 49 to 54% of the participants correctly answered questions involving repositioning while in a chair, indicating their knowledge improved in both areas. Overall, participants increased their knowledge in 20 of the 47 test questions. Ten questions involved prevention, five questions with wounds, and five questions with staging. Nine questions had no improvement as the participants scored 100% correctly both pretest and posttest. Interestingly, participants showed a decrease of knowledge with 18 posttest questions. Fourteen questions involved prevention, three questions involved staging and one question involved wounds. Thirteen out of the 18 questions showed a decrease of knowledge less than 4% from pretest, making it difficult to determine the reasoning for the decrease of those questions. Five of the 18 questions had more than a 5% decrease of knowledge from pretest with all questions involving prevention. The least improved question involved how often a long-term care patient should have a skin inspection, which may have been difficult for the participants to answer since they all work in the acute care setting. Less than 10% of the participants correctly answered Question #13 (heel protectors relieve pressure on the

heels). It is unknown if participants believed question #13 was a true statement or if they misidentified pressure for friction.

A test to measure the retention of knowledge was sent to all the participants during the month of August 2019, three months following the completion of the initial learning module. The return rate was under 23% (14 of 61) so retention of nursing knowledge could not be adequately assessed. Of those returning the 3-month post education survey, 36% of the 14 participants scored in the medium knowledge level range and 64% scored in the high knowledge level range. Overall, the 14 participants' scores ranged from 74% to 89%. Five of the 14 participants had a decrease of knowledge of 1 to 4% when compare to pretest scores. Two of the five with a decrease in knowledge did not participate in the project activities available during the month of June through August 2019. Seven of the participants showed improvement from their pretest scores ranging from 1% to 24% change increase. Six out of the seven with improvement in scores also participated in at least one project activity. Notably, the participant with the highest improvement of 24% was the only participant to complete all project activities. It is important to note the results of the PUKT cannot be associated with nursing competence (Delmore et al., 2018). A nurse may be competent, but this may not always translate through to their nursing practice.

Chart Audit Results

Data was collected through ICU patient charts audits between June and August 2019, sampling 10 charts each month. June had 10 total patients eligible for review, July with 11 total patients, and August with 12 total eligible patients. Patient length of stay (LOS) varied, ranging from one to five days with 20 of the patients having a one-day LOS. Data from 30 patients was extracted representing a total of 125 documentation opportunities by nursing staff on both day and night shift. All 30 patients had at least one medical device in use with 37% of the patients required mechanical

ventilation. The cumulative Braden Scale scores ranged from 8 to 22. Chart audits reviewed implementation of prevention interventions on Braden Scale subset scores of less than 4 for sensory, moisture, activity, mobility, and a score of less than 3 for friction/shear. All 30 patients required implementation of at least one intervention based on intervention requirements. Every patient had at least one incidence of nursing not documenting an intervention, occurring at the time of admission. Retrospectively, we concluded this may be a result of not having drop-down intervention list available on the history and physical nursing documentation screen. Nursing had the availability to type in interventions in the plan of care but this option was not used.

Out of the five Braden Scale subset categories, Sensory had the highest overall nursing documentation compliance at 74% with the combination use of 'flotation of heels' and 'turn schedule' interventions (Table 3). Turn schedule had a higher compliance of 76% and flotation of heels with 72% compliance. Turning and repositioning had the highest implementation compliance out of the interventions evaluated. However, nursing documentation of turning and repositioning every two hours was not reviewed, only the documentation of the turn schedule intervention was collected. The 'Fiction and Shear' subset category had an overall compliance of 67% with implementation of a bordered foam dressing. Compliance of this subset category was one of the lowest at 65% with staff who completed the education at the beginning of the project. Question #13, a protective dressing question on the PUKT test was also the most missed question. 'Moisture' had the lowest overall compliance at 65% with moisturizer to the skin being the most missed interventions with 57% compliance. Moisture compliance had the highest variance of 23% between staff who completed the education module at 69% compliant to staff who did not at 46% compliant. Staff who completed the education module had higher compliance with flotation of heels, incontinence pad, and moisturizer to skin. Documentation during the time of admission was identified as the most opportunity in missed interventions, accounting for 45-77% of all missed interventions.

DISCUSSION

During the project period of three months, zero HAPIs occurred in the ICU, compared to the baseline measurement of 1.8 HAPIs per 100 ICU discharged patients. The decrease in HAPIs during the pilot project period correlated to the evidence found in the literature, which suggested the use of a PIP program would decrease HAPI incidence rates (Cano et al., 2017, Englebright et al., 2018, Miller, Emeny, Freed, 2019). Results were also consistent with the literature that suggested knowledge loss occurs within first three months after staff education. Chart audits found the lowest compliance during August 2019, the last month of collecting data (Cox, Roche, Van Wynen, 2011, Tweed & Tweed, 2008). There were several opportunities for improvement with nursing documentation of moisturizer to the skin, bordered foam dressing, and flotation of heels. This project reviewed a limited number of patient charts in a three-month time period due to exclusion of patients who were admitted or transferred to other units. On-going data collection with the ability to include patients who were admitted or transferred to other units would provide a bigger picture of nursing adherence to new practices.

The use of the PUKT demonstrates improved knowledge and identification of knowledge gaps that could be an educational focus area for all nursing staff. Posttest scores indicated prevention had the lowest overall score out of the three categories: prevention, staging, and wound description. The prevention category also had the top five least improved answers from pre to posttest, suggesting the need to increase prevention education and training. The question missed most by the participants was Question #13, a protective dressing question. Implementation of a bordered foam dressing was one of the least compliant interventions by staff who completed the education. Although the participants had a short period of roughly an hour between pre and posttest using a computer-based self-learning module, the overall posttest scores improved, including a substantial reduction with using the “Don’t Know” option. Regularly scheduled education trainings provided quarterly with

various learning methods are a way to ensure staff retain knowledge of pressure injuries and improve implementation of prevention measure compliance (Delmore et al, 2018, Cox et al., 2010).

Limitations

There were some limitations to the project that deserve mentioning. The drop-down list in the electronic charting system was limited to nine prevention intervention options. The project team recommended additional interventions to be added to the drop-down list to provide staff with all the available interventions used in the standardized plan of care bundle. Unfortunately, the EHR did not allow for a customized drop-down list for a specific unit and could not be implemented during the project. It is possible that certain interventions were implemented during the time of admission; however, documentation could not be collected as a result of the H+P assessment intervention screen did not contain a drop-down list of interventions. Due to budget constraints, the education module originally intended to be delivered in face to face training had to be changed to a computer-based self-learning module. Because education sessions could not be face to face, the amount of time each participant spent reviewing the learning module is unknown and there may be a correlation in the time spent in the learning module and the difference between pre and posttest scores. Additionally, the education module and surveys were not mandatory for staff to avoid incurring additional training costs. Online learning modules can be a cost-effective strategy; however, there is limited evidence comparing the effectiveness of online versus traditional classroom settings (Cox, Roche, and Van Wyden, 2011). Classroom settings provide learners with a variety of learning methods and have been shown to be a preferred learning style (Cox et al., 2011). Several prevention education programs reviewed provided at least 3.5 hours of content (Cox et al., 2011, Bos et al., 2016). Staff engagement was identified early as a potential project challenge due to the staff not receiving reimbursement with

completion of the project's education module. The use of prize incentives was used throughout the project to help offset the lack of reimbursement and encourage engagement.

Conclusions

This QI pilot project was implemented to decrease HAPI incident rates in the ICU setting using the AHRQ toolkit as a guide. Prevention strategies require organizations to use a multifaceted approach that is customized to their organization as PI development is complex. Staff education, use of an evidence-based standardized plan of care bundle, and continuous monitoring and evaluation are necessary for sustained change (Englebright et al., 2018). Findings suggest that having a PIP education program will increase nursing knowledge, but that knowledge begins to decrease within three months of the initial training. Organizations will need to implement follow up education to help offset this knowledge loss. This can include various teaching methods provided on a regular basis. Use of the new standardized plan of care bundle takes time to incorporate into a daily process (Gallagher-Ford et al., 2019). On-going monitoring of a newly implemented PIP program will ensure continued progress is being made and that nursing knowledge has been successfully embedded into nursing practice. Supportive changes in the EHR with the addition of drop-down list of interventions in the nursing history and physical documentation screen would further enhance documentation of implemented interventions at the time of admission.

The project demonstrated that implementing a PIP program has provided the organization with EBP efforts that have improved patient outcomes. Project sustainability will include continued learning activities for nursing staff, supporting this culture change and continued monitoring to assist in on-going PIP practice improvements. Providing nursing staff with education and evidence-based PIP practices increases quality care to patients and decrease PI incident rates.

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APPENDIX A (Literature Review)

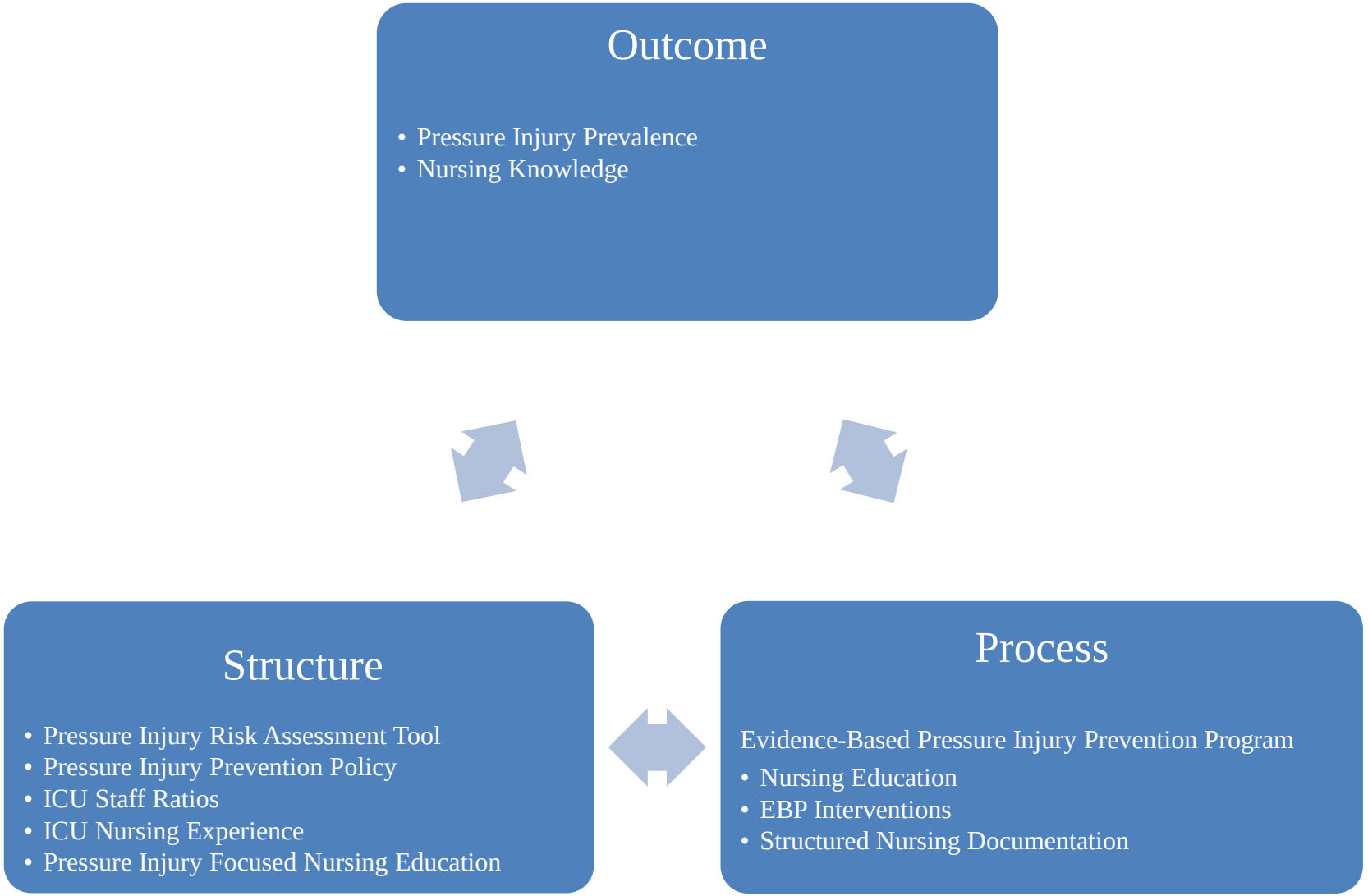
Literature Review Summary Table

TITLE OF ARTICLE	AUTHORS WITH CREDENTIALS	RESEARCH QUESTION	STUDY DESIGN	LEVEL OF EVIDENCE	DESCRIPTION OF SAMPLE	OUTCOME MEASURES	RESULTS
Translating Pressure Ulcer Prevention Into Intensive Care Nursing Practice: Overlaying a Care Bundle Approach with a Model for Research Implementation	Nahla Tayyib, MN, RN; Fiona Coyer, PhD, MScNsg, PGCEA, RN	Article discusses the development and implementation of a care bundle approach to improve patient outcomes with skin integrity.	Authors used the Ottawa Model of Research Use (OMRU). Prospective observational study. Randomized control study	Level I A	2 ICU's with review of 70 patients.	Review of ICU nurse compliance of the bundle and patient outcomes to the intervention group compared to patients in the non-intervention group	Reduction from 32.86% pressure injury incidence to 7.14%. Nurses in the ICU had a high compliance rate of the bundle with a mean score of 78.1%
Use of the Braden scale for pressure ulcer risk assessment in a community hospital setting	Molly M. Gadd, Sarah M. Morris	Determining if pressure ulcer prevention interventions are implemented based on the patients Braden Scale scare reflect the patients risk.	Retrospective chart review of patients with confirmed hospital acquired pressure injuries	Level III B	20 patients with confirmed pressure injuries	Review of intervention measures before and after the occurrence of the pressure injury. Comparing intervention occurrence between at-risk and not at risk patient days.	Indications of a need of 19% of not at risk patient days on patients with higher Braden Scale Score, but had lower subscale scores, indicating a need for an intervention.
The effectiveness of multicomponent pressure injury prevention programs in adult intensive care patients: A systematic review.	Frances Lin, Zijing Wu, Bing Song, Fiona Coyer, Wendy Chaboyer,	Reviews of programs with evaluating program components and strategies.	Systematic review	Level I A	21 paper were reviewed	To evaluate the effectiveness of pressure injury programs focused on reducing the prevalence of pressure injuries in ICU populations-	Structured and multifaceted approaches to pressure injury prevention has shown effective outcomes
Pressure ulcer prevention: where practice and education meet.	Brenda S. Bos, MS, RN; Tina M. Wangen, MS, APRN, CNS; Carl E. Elbing, MSN, RN; Debra J. Rowekamp, MS, RN; Heather A. Kruggel, MS, RN-BC; Patricia M. Conlon, MS, APRN, CNS, CNP; Leann M. Scroggins, MS, RN, CRRN, ACNS-BC; Shauna P. Schad, MS, APRN, CNS; Julie A. Neumann, MS, RN-BC; Melissa M. Barth, MS, RN, CCRN; Pamela L. Grubbs, MS, APRN, CNS; Beth A. Sievers, MS, APRN, CNS	Evaluation of nursing knowledge-affective, cognitive, and psychomotor domains of learning	Four levels of evaluation using Kirkpatrick methods to measure applied knowledge.	Level II B	Not stated	Four level evaluation on participant response, learner knowledge post 3 months education, monitoring of outcomes of avoidable pressure injuries, measure of return of investment.	Decrease in reportable pressure injuries, cost avoidance of 10.5%
Pressure injury knowledge in critical care nurses.	Donna M. Miller, DNP, MSN, Med, RN; Lisa Neelon, MSN, RN, CCRN, MICU/CICU; Kathleen Kish-Smith, BSN, RN, MICU/CICU; Laura Whitney, BS,	To identify knowledge of pressure injury prevention of critical care	Postintervention descriptive study	Level II B	32 RNs sampled	To evaluate the effectiveness of an education initiative with the use of the PZ-PUKT test.	Gaps in knowledge related to practices with prevention. Staff had higher knowledge with staging

	RN, CCM, MICU/CICU; Christopher Burant, PhD, FGSA	nurses following implementing education initiatives.					compared to prevention.
Improving outcomes by implementing a pressure ulcer prevention program (PUPP): Going beyond the basics.	Amparo Cano, Debbie Anglade, Hope Stamp, Fortunata Joaquin., Jennifer A. Lopez, Lori Lupe, Steven P. Schmidt, Daniel L. Young	To evaluate the effectiveness of a prevention program.	Review of the facilities prevalence study.	Level II B	Results of a prevalence study were used. The total patients surveyed were 305. 31 had a pressure injury, 2 had a hospital acquired pressure injury.	To evaluate care, and results after implementing initiatives to reduce hospital acquired events	Hospital acquired evens remained low at 1-2% for nine consecutive quarters.
Pressure Injury Prevention: Knowledge and Attitudes of Iranian Intensive Care Nurses	Batool Tirgari, PhD; Leili Mirshekari, MSN; and Mansooreh Azzizadeh Forouzi, MSN	Aimed to examine the knowledge and attitudes of intensive care nurses toward the prevention of pressure injury.	Data collection was done using an author-created test in English consisting of 3 parts that asked for nurses' background information and their knowledge about pressure injuries and examined their attitudes toward pressure injury prevention	Level III B	Using a census method, all of the 107 nurses working in ICUs of hospitals affiliated with Zahedan University of Medical Sciences were asked to participate in this study. The response rate was 100%, but 18 tests were not fully completed and were not included in the analysis	This was a cross-sectional, descriptive analysis study that aimed to examine the knowledge and attitudes of intensive care nurses toward the prevention of pressure injury.	The results showed that approximately 80 percent of the participants had six or less years' experience in the ICU and over 60 percent of the participants did not receive training on the prevention of pressure injuries. The authors noted that an effective way to prevent pressure injuries is to have on-going knowledge of current best practices on pressure injury prevention with having annual trainings part of the organizational process. The authors stressed that nursing attitudes correlates with nursing knowledge of pressure injuries with more favorable outcomes associated with knowledge and attitudes. Limitations to the study were the small sample size of 107 participants and the time limitation for morning staff to complete the test

The effects of various instructional methods on retention of knowledge about pressure ulcers among critical care and medical-surgical nurses	Jill Cox, PhD, RN, APN, CWOCN; Sharon Roche, DNSc, RN, APN, CCRN; Elizabeth Van Wynen, EdD, RN, NE-BC	To determine if there was a difference in retention of knowledge based on the difference of instruction.	Quasi-experimental, pretest/posttest design.	Level II A	60 nurses were randomly selected to a lecture, to computer-based instruction, or to a control group. Participants were given a knowledge test immediately after the program, 3 months post program and 6 months post program.	To determine if there was a difference in retention of knowledge based on the difference of instruction.	The most significant loss of knowledge occurred within 3 months of receiving education. Recommendations to provide education on a quarterly basis to maintain knowledge.

APPENDIX B (Theoretical Framework)
Theorical Framework of Study using Donabedian Model (Fabbruzzo-Cota et al., 2016)



APPENDIX C (MOU)

Memorandum of Understanding

Memorandum of Understanding

Between

Michelle Harvey, Doctor of Nursing Practice (DNP) student

Boise State University

and

[redacted]

This Memorandum of Understanding (MOU) outlines the terms and understanding between Michelle Harvey, a DNP student at Boise State University, and [redacted] to pilot a performance improvement project to reduce pressure injuries in the intensive care unit.

Background

Pressure injuries are considered a 'never' event by the Centers for Medicare and Medicaid and are used as a patient safety indicator in the acute care setting (Agency for Healthcare Research and Quality, 2017a). Pressure injuries acquired in the acute care setting negatively impact patients, resulting in longer lengths of stay and higher mortality rates when compared to patients without pressure injuries (Bauer, Rock, Nazzal, Jones, and Qu, 2016). Delivering quality patient care is one of the pillars of Western Maryland Health System's strategic and operational plan with the objective to improve and standardize delivery of care. As frontline staff, nurses have the unique ability to apply their knowledge and skills of evidence-based practices when delivering care to their patients. Having the appropriate knowledge of pressure injuries including characteristics that enhance the risks of acquiring pressure injuries while admitted to the hospital is vital to improving patient outcomes (Mwebaza et al., 2014). Patient outcomes can be and have been impacted by the lack of consistent nursing knowledge on pressure injuries and missed opportunities of applying evidence-based prevention practices.

Purpose

This is a pilot performance improvement project to be conducted in the intensive care unit to reduce the rate of hospital acquired pressure injuries by providing education to nursing staff. The education component will include best practices of the pressure injury prevention process as well as the specific documentation standards required. In the planning phase of the project (November 2018-April 2019), two guided teams will focus on the pressure injury prevention bundle and standards for nursing documentation in the EHR. During the implementation phase (May 2019-

August 2019), education sessions will be conducted with ICU nursing staff with a pre and post questionnaire designed to evaluate their baseline and post-education knowledge of pressure injuries, processes for pressure injury prevention and documentation standards. The long-term outcomes of the project are to reduce the rate of pressure injuries by utilizing evidence-based practices for pressure injury prevention, develop consistency with documentation in the nursing intervention screens, implement prevention activities based on identified patient risk, and to initiate an electronic tracking tool to monitor prevention practices and pressure injuries.

Intended Project Outcomes

- Improved nursing knowledge on pressure injuries and risk awareness
- Improved nursing knowledge on the pressure injury prevention bundle
- Increased consistency and accuracy of the pressure injury prevention bundle and nursing intervention documentation screens
- Reduction in pressure injury rates of patients admitted in ICU

Duration

The DNP Scholarly Project will begin November 2018 with the inception of guided teams who will review current evidence-based practices on the prevention of pressure injuries and current documentation fields in the nursing intervention screen. Any changes to current practice and/or nursing intervention screens will be completed by April 2019. Education materials and auditing tools will be completed by April 2019. The implementation of the DNP Scholarly Project will begin May 2019 and will include education sessions for the ICU nursing staff. Auditing for the appropriate use of the prevention bundle and nursing intervention screens will begin June 2019. The DNP Scholarly Project will be completed by February 2020.

Reporting

The DNP Scholarly Project will include a final report, an abstract, an oral presentation of the report and potential publication. The DNP student will present the Final Project Report to organizational stakeholders February 2020 as well as presenting bimonthly interim reports to the Pressure Injury Steering Committee, starting June 2019 through February 2020. The DNP student will submit a Final Project Report for publication in ScholarWorks as part of the requirements of the DNP program. ScholarWorks is a collection of services designed to capture and showcase all scholarly output by the Boise State University community, including doctoral dissertations and doctoral project reports.

Complete the section below:
Agency preferences for referral within the student's work: By Region

In the student's Final Report? Yes
In an abstract? Yes
In professional presentations? Yes
In professional publications? Yes
Any restrictions in the discussion of project details? No

Student Contact Information

APPENDIX D (Logic Model)
Student: Michelle Harvey
Scholarly Project Title: A Pilot Performance Improvement Project to Reduce Pressure Injuries in the Intensive Care Unit

Resources/Inputs	Activities	Outputs		Outcomes: Short term	Outcomes: Intermediate	Outcomes: Long term
-Guided team members: • ICU nursing staff • Skin care team member for the ICU • Education Department -Network drive for education slide materials -Electronic medical record program -HealthStream program for education credits -Microsoft Outlook for emailing intensive care staff -Evidence based bundle -Policy and protocols for bundle	-Development of education materials (pdf handouts and power point presentation) on updated process for the pressure injury prevention bundle -Email intensive care staff to complete the education module in HealthStream -Online education module for intensive care nursing staff available throughout the month of May 2019	-Education for the intensive care nursing staff -Education materials for new nurse orientation and annual competencies	-Nursing staff in the intensive care units. -Skin care team member for the intensive care unit.	1. 80% of all nursing staff in the intensive care unit completed the education module on pressure injury prevention bundle and nursing documentation by May 31, 2019 (PO).	7. 80% of all nursing staff, hospital-wide, complete annual education training on the pressure injury prevention bundle and nursing documentation fields for Education Year 2020 (PO). 8. 100% of all new nursing staff hired during Education Year 2020 complete education training during orientation on the pressure injury prevention bundle and nursing documentation fields (PO).	
-Guided team members:	-Development of education materials (pdf handouts and	-Pre-post education evaluation on	-Nursing staff in the intensive care unit	2. After completing the education module in May 2019, results from	9. By December 2020, after completing the annual education, all	14. By December 2022, after completing the annual education,

• ICU nursing staff • Skin care team member for the ICU • Education department -Network drive for education slide materials -Electronic medical record program -HealthStream program for education credits -Microsoft Outlook for emailing intensive care staff - Evidence based bundle -Policy and protocols for bundle -Test tool -Funds for prize incentives	power point presentation) on updated process for the pressure injury prevention bundle and nursing documentation fields -Development of a test that will be used for pre-implementation and post-implementation of education sessions -Email intensive care staff to register for an education session in HealthStream -Pre-implementation test of education session administered to ICU nursing staff -Online education module for intensive care nursing staff available throughout the month of May 2019 -Post-implementation test of education session administered to ICU nursing staff	nursing staff knowledge of pressure injuries, and the facility process on the prevention bundle and nursing documentation -Education of the intensive care nursing staff -Education materials for new nurse orientation and annual competencies		the post implementation test showed an overall 20% improvement change with nursing answering questions from the Pressure Ulcer Knowledge Test (PUKT). (including stages and the facility prevention process with the bundle and documentation) correctly, compared to pre-implementation of education test (PO).	nursing staff, hospital-wide, with a change increase of 10% with improved knowledge of pressure injuries, compared to initial post implementation test results (PO).	nursing knowledge of pressure injuries was maintained with no decrease in knowledge when compared to the previous year test results (PO).

	-Biweekly activities (Crossword Puzzle, Word Search, Case Study) available for staff to complete -Booth at nursing skills fair with questions on prevention interventions based on Braden subcategory scores.					
-Guided team members: • ICU nursing staff • Education Department • Quality • Wound Care -Patient Safety and Medical Review Committee and Pressure Injury Steering Committee for reporting project status reports -Skin care team member for the intensive care unit -Printed materials for handouts in committee meetings -Electronic medical record program	-Development of an audit tool used by the skin care team that is completed monthly to assess for appropriate use of bundle, starting June 2019 -Implementation started June 2019 for appropriate use of the pressure injury prevention bundle by the ICU nursing staff -Prevention bundle cheat sheets developed and available to the nursing staff -Dedicated super user available on the intensive care unit during project implementation	-Quality care provided by the intensive care nursing staff that is current evidence-based practice -Provided prevention practices that are based on current best practices -Reduction of pressure injuries acquired in the intensive care unit - (Identify super users) available to help others during the	-Patients in the intensive care unit -Nursing staff in the intensive care unit -Skin care team member for the intensive care unit -Patient Safety and Medical Review Committee and Pressure Injury Steering Committee	3. 80% consistency of the pressure injury prevention bundle by the nursing staff in the intensive care unit by August 2019 (PO).	10. 80% consistency of the pressure injury prevention bundle by all nursing unit staff by December 2020 (PO).	15. 90% consistency of the pressure injury prevention bundle by all nursing unit staff by December 2022 (PO).

-Funds for staff time in guided team meetings, education sessions, and printed materials -Evidence based bundle -Policy and protocols for bundle -Entry of audits	-Skin care team member audits (10 patients) monthly for appropriate use of the pressure injury prevention bundle, starting June 2019 -Opportunities from skin care audits discussed monthly by the guided teams -Post implementation status reports presented to the Pressure Injury Steering Committee	implementation stage -Create monthly audit tools -Monthly project status report for upper level directors				
-Guided team members: • ICU nursing staff • Education Department • Quality • Wound Care -Skin care team member for the intensive care unit -Patient Safety and Medical Review Committee and Pressure Injury Steering Committee for reporting project status reports	-Development of an audit tool used by the skin care team that is completed monthly to assess for appropriate use nursing documentation fields, starting June 2019 -Implementation started June 2019 for appropriate use of the pressure injury prevention nursing documentation fields by the ICU nursing staff -Dedicated super user available on the	-Quality care provided by the intensive care nursing staff that is current evidence-based practice -Provided prevention practices that are based on current best practices -Reduction of pressure injuries acquired in the intensive care unit	-Patients in the intensive care unit -Nursing staff in the intensive care units -Skin care team member for the intensive care unit -Patient Safety and Medical Review Committee and Pressure Injury Steering Committee	4. 80% consistency of the pressure injury prevention nursing documentation field screens by the nursing staff in the intensive care unit by August 2019 (PO).	11. 80% consistency of the pressure injury prevention nursing documentation field screens by the nursing staff on all by December 2020 (PO).	16. 90% consistency of the pressure injury prevention nursing documentation field screens by the nursing staff on all by December 2022 (PO).

-Printed materials for handouts in committee meetings -Electronic medical record program -Funds for staff time in guided team meetings, education sessions, and printed materials -Evidence based bundle -Policy and protocols for bundle -Entry of audits	intensive care unit during implementation -Skin care team member audits (10 patients) monthly for appropriate use of the nursing documentation fields, starting June 2019 -Opportunities from skin care audits discussed monthly by the guided teams -Post implementation status reports presented to the Pressure Injury Steering Committee	- (Identify super users) available to help others during the implementation stage -Create monthly audit tools -Monthly project status report for upper level directors				
Guided team members: • ICU nursing staff • Education Department • Quality • Wound Care -Skin care team member for the ICU -Conference rooms to conduct meetings with each guided team and education sessions	-Assemble multi-disciplinary team to develop bundle and nursing documentation fields Guided Team Members: • ICU nursing staff • Education Department • Quality • Wound Care -Guided team completed literature reviews of best	-Pressure injury prevention bundle -Auditing tool for the skin care team to evaluate appropriate use of the pressure injury prevention bundle and nursing documentation fields	-Patients in the intensive care unit -Nursing staff in the intensive care unit -Skin care team auditor for the intensive care unit - Patient Safety and Medical Review Committee and	5. Between June 2019 and August 2019, pressure injuries (Stage 1-4, DTI's) acquired by patients admitted to the ICU were reduced by 25% from baseline rate 2.67 pressure injuries per 100 ICU patients (June 2018 - December 2018) (CO).	12. For CY2020, pressure injuries in the ICU were reduced by 50% from baseline (June 2018 -December 2018 (CO). 13. For CY2020, pressure injuries hospital-wide were reduced by 50% from baseline (June 2018 - December 2018 (CO).	17. For CY2022, pressure injuries in the ICU were reduced by 90% from baseline (June 2018 -December 2018 (CO). 18. For CY2022, pressure injuries hospital-wide were reduced by 70% from baseline (June 2018 - December 2018 (CO).

-Projector for overhead viewing during guided team meetings and education sessions -Printed materials for handouts provided at each guided team meeting and education sessions -Network drive for all materials provided during guided team meetings and for use of collaboration with team members with updates/changes and education session slides -Internet usage for literature searches on best practices for pressure injury prevention bundles -Electronic medical record program -HealthStream program for education credits -Patient Safety and Medical Review Committee and Pressure Injury Steering Committee for	practices for pressure injury prevention bundles and nursing documentation and updated current practice -Prevention bundle cheat sheets developed and available online to the nursing staff -Additional education to skin care team auditors on developed audit tool used monthly -Implementation started June 2019 for appropriate use of the pressure injury prevention bundle by the ICU nursing staff -Dedicated super user available on the intensive care unit during project implementation -Audits (10 patients) for appropriate use of the bundle and documentation fields monthly, starting June 2019	-Reviewing and evaluating the usability of the nursing documentation screens and assess for any opportunities for improvement -Develop education materials for new nurse orientation and annual competencies -Identify super users available to help others during the implementation stage -Monthly audit tools -Monthly project status report for upper level directors	Pressure Injury Steering Committee			

reporting project status reports -Funds for staff time in guided team meetings, education sessions, and printed materials -Evidence based bundle -Policy and protocols for bundle	-Opportunities from skin care audits discussed monthly by the guided teams -Post implementation status reports presented to the Pressure Injury Steering Committee					

APPENDIX E (Timeline)

	Project: A Pilot Performance Improvement Project to Reduce Pressure Injuries in the Intensive Care Unit																	
	Month/Year																	
Activity	Aug 2017	Jan 2018	May 2018	Jun 2018	Jul 2018	Aug 2018	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Feb 2020
PLANNING																		
Mission, Vision, and Problem Statement Development																		
Literature Reviews																		
Project Timeline																		
Project Logic Model Development																		
Information Gathering- Nursing Staff, Skin Care Team																		
Met with Leadership- Pressure Injury Steering Committee																		
Formation of Guided Teams (Two Teams)- Prevention Bundle and Nursing Documentation																		
Project Charter																		
MOU Completed																		
Cost Analysis																		
Guided Team Meetings																		
DMAIC Development- Guided Teams																		
Prevention Bundle Team- Literature Reviews on Best Practice with Comparison of Current Practice																		
Prevention Bundle Team- Development of Current Best Practices to Prevention Bundle and Prevention Policy																		
Prevention Bundle Team- Prevention Bundle and Policy to Med Exec Committee for Approval																		
Nursing Documentation Team- Review Nursing Documentation Screens for Opportunities																		
Nursing Documentation Team- Evaluate Usability of Nursing Documentation Fields																		

Nursing Documentation Team- Development of Documentation Fields in Testing Mode																		
Nursing Documentation Team- Nursing Documentation Fields to Meditech Committee for Approval																		
Development of Skin Care Team Auditing Tool for Bundle and Nursing Documentation Fields																		
Development of Education Materials for ICU Nurses that Includes the Pressure Injury Prevention Bundle Process and Screen Shots of the Nursing Documentation Fields																		
Develop Test that will be used for Pre-Implementation and Post-Implementation of Education Sessions																		
Education Packets Printed Off for the Intensive Care Nursing Staff on Pressure Injury Prevention Bundle and Nursing Documentation Screen Changes with Visual Aids of Updated Screens																		
Annual Education Packet and Test Questions Put into HealthStream																		
Education PowerPoint Slides Saved on the U drive for Access Availability to the Guided Team Members																		
Project Proposal																		
IRB Approval																		
IMPLEMENTATION																		
Email Intensive Care Staff to Register for an Education Session in HealthStream																		
Prior to Education Session, Administer Pretest to Nursing Staff in the Intensive Care Unit to Evaluate Knowledge and Attitudes on Pressure Injuries																		
One Hour Education Sessions to ICU Nurses and Skin Care Team Auditor for ICU																		
Education Cheat Sheets to Print Shop for Lamination																		
Education Presentation Added to New Nurse Orientation Schedule.																		
Super Users Selected																		

Go-Live for Prevention Bundle and Nursing Documentation Field Compliance																	
Opportunities from Skin Care Audits Discussed Monthly by the Guided Teams																	
Post Implementation Status Reports Presented to the Pressure Injury Steering Committee																	
DATA COLLECTION																	
Baseline Data (June 2018- December 2018) Collected																	
Skin Care Team Monthly Audit Implemented (10 charts)																	
Pre-Implementation Test to ICU Nursing Staff																	
Post-Implementation Test to ICU Nursing Staff																	
Performance Data (June 2019-August 2019) Collected																	
DATA ANALYSIS																	
Baseline Date (June 2018 - December 2018) Analysis																	
Pre-Implementation Test to ICU Nursing Staff Analysis																	
Post-Implementation Test to ICU Nursing Staff Analysis																	
Performance Data (June 2019-August 2019) Analysis																	
DISSEMINATION																	
DNP Student in Collaboration with the Pressure Injury Steering Committee- Setup, Administer, and Monitor																	
Project Status Reports to Patient Safety and Review Committee and Pressure Injury Steering Committee Bimonthly																	
Skin Care Team Audit Results and Opportunities Reported to Patient Safety and Review Committee and Pressure Injury Steering Committee Bimonthly																	
Final Report																	

APPENDIX F (Outcome Evaluation Table)

Outcome	Data Collection Instrument / Data	Analysis Goal	Analytic Technique
80% of all nursing staff in the intensive care unit completed education module on pressure injury prevention bundle and nursing documentation by May 31, 2019 (PO).	**Instrument:** Nursing staff in the ICU setting to complete education module in HealthStream, a professional development application used by the health care organization. **Data:** Pull list of registration sign in sheets for each education session out of HealthStream and compare with the total number staffed ICU, float, and Sepsis nurses (fulltime, part-time, and PRN).	To evaluate for competition of education module by all nursing staff who work in the ICU setting.	Total count of staff completing an education session out of all nursing staff in the ICU setting (FT, PT,PRN)
After completing the education session in May 2019, results from the post implementation test showed an overall 20% improvement compared to pre-implementation of education test (PO).	**Instrument:** Nursing staff in the ICU setting to complete education module in HealthStream, a professional development application used by the health care organization. After they have registered for an education session, staff will be required to complete a pre-education test in HealthStream prior to the education session. Staff will not be able to complete the education module until they have completed the pre-education session test. For all staff that completed the education module, a post-education test would be sent for completion by the staff member during the last month of the implementation phase of the Scholarly Project. Staff will have until the completion of the implementation phase of the project to complete the test. A reminder email will be sent during the last month until the staff member has completed and/or until the completion of the project. **Data:** Pull pre and post education tests from HealthStream. The tests will review pressure injuries, patient risks, Braden Scale (with patient case scenarios), prevention measures, documentation requirements, and nursing role and process with pressure injury prevention. Use of the Pressure Ulcer/Injury Knowledge (PUKT) test.	To evaluate for an increase in nursing staff knowledge with pressure injuries and identify patient risk factors To evaluate nursing knowledge on pressure injury prevention measures, nursing documentation requirements, and nursing role and process with pressure injury prevention.	True/False/"I don't know" answers Descriptive Statistics will be used to measure the mean, median, and standard deviations of the scores from both pre and post-tests and comparison between the two to evaluate for improvement from the pre to the post-tests.
80% consistency of the pressure injury prevention bundle by the nursing staff in the intensive care unit by August 2019 (PO).	**Instrument:**10 chart audits to be completed monthly. The audits are pulled into a report monthly and reviewed for any additional education opportunities with the use of descriptive statistics.	To evaluate for process breakdown with the pressure injury prevention bundle	Utilizing explanatory techniques with a manual and electronic audit, will increase the ability to monitor

	Data: Data that will be pulled from the patient record. The data confidentiality/protection plan will be discussed in the proposal. Braden score for each category, interventions implemented.	To evaluate consistency of the pressure injury prevention bundle To identify opportunities of improvement early for increased patient outcomes	patients with high risks for developing a pressure injury due to causal factors, and identify process breakdown early to lead to patient outcomes improvement.
80% consistency the pressure injury prevention nursing documentation field screens by the nursing staff in the intensive care unit by August 2019 (PO).	**Instrument:**10 chart audits to be completed monthly. The audits are pulled into a report monthly and reviewed for any additional education opportunities. **Data:** Data that will be pulled from the patient record. The data confidentiality/protection plan will be discussed in the proposal. Braden score for each category, interventions implemented.	To evaluate for process breakdown with the documentation field screens To evaluate consistency the pressure injury prevention nursing documentation field screens To identify opportunities of improvement early for increased patient outcomes	Utilizing explanatory techniques with a manual and electronic audit, will increase the ability to monitor patients with high risks for developing a pressure injury due to causal factors, and identify process breakdown early to lead to patient outcomes improvement.
Between June 2019 and August 2019, pressure injuries (Stage 1-4, DTI's) acquired by patients admitted to the ICU were reduced by 25% from baseline 2.67 pressure injuries per 100 ICU patients (June 2018 - December 2018) (CO).	**Instrument:** Dimensional Insight, a business intelligence program, will be used to pull ICD-10 pressure injury codes that are indicated as not present on admission. Manual chart review of patients who have an ICD-10 code for pressure injuries to validate the patient acquired the pressure injury while admitted in the intensive care unit. **Data:** Pressure injury prevalence for patients in the ICU who are over the age of 18 and were not transferred from another intensive care hospital that acquired a pressure injury (any stage) while admitted in the ICU. Stakeholder group will be determining the reduction goal of the outcome.	To evaluate for pressure injury prevalence during implementation of the pressure injury prevention bundle.	For quantitative data, descriptive statistics will be used to measure the prevalence rate, including the mean and median.

APPENDIX G (3 Year Budget Plan)

Pressure Injury Prevention Program				
Revenues	**Budget Year 1**	**Budget Year 2**	**Budget Year 3**	**Rationale**
Potential Grant Funding	$16,630.00			In-Kind Donations
Total	***$16,630.00***			
Meeting Room Expenses				
Conference Rooms for Meetings	$300.00	$0.00	$0.00	$100.00 per month for usage
Guided Team Salary Expenses				
Guided Team Member Salaries (1st year) Project Leader $40.00/hour Wound Care Nurse $30.00/hour Professional Development Coordinator $50.00/hour ICU Nursing Staff – Nurse Champion/Super User $40.00/hour	$1,240.00	$0.00	$0.00	1-hour meeting x 10 meetings
Education Expenses				
Education Training Preparation Team Salaries (1st year)	$360.00	$0.00	$0.00	Project Leader $40.00/hour Wound Care Nurse $30.00/hour Professional Development Coordinator $50.00/hour (3 1-hour meetings)
Education Training Skin Care Team Auditor Salary (1st year)	$40.00	$0.00	$0.00	$40.00/hour 1st year ICU nurse auditor only.
Project Leader Salary for Education Sessions (1st year)	$400.00	$0.00	$0.00	$40.00/hour (10 1-hour sessions) 1st year with 10 sessions. 2nd and 3rd year provide education sessions to new RN's (12 sessions/year) $50.00-hour x 12 1-hour sessions annually (with an estimated 2% annual merit increase)
Professional Development Staff Salary for Education Sessions	$500.00	$612.00	$624.24	
ICU Nurse Champion/Super User Salary (1st year)	$6,720.0	$0.00	$0.00	$40.00/hour x 12 hours/day for 2 weeks
Reporting and Analysis Expenses				
Skin Care Audit Salary (1st year)	$1,440.00	$0.00	$0.00	Chart audits- $40.00/hour x 6 hours/month for 6 months

Pressure Injury Steering Team Meetings- Salaries of Members Project Leader $40.00/hour Director of Wound Care $60.00/hour Wound Care Nurse $30.00/hour Director of Critical Care $60.00/hour Director of Clinical Services $60.00/hour Information Technology (Meditech Coordinator) $50.00/hour Performance Improvement Analyst $40.00/hour Professional Development Coordinator $50.00/hour ICU Nursing Staff – Nurse Champion/Super User $40.00/hour ICU Skin Care Team Auditor $40.00/hour	$1,410.00	$0.00	$0.00	Reporting and Analysis:1-hour meeting x 3 months
Reporting and Analysis: Project Leader	$3,200.00	$2,448.00	$2,496.96	$40.00/hour x 80 hours 1st year. Estimated 2% annual merit increase. 2nd and 3rd year 5 hours per month
Office Supply Expenses				
Education Printing Materials for Handouts. Includes copier toner and boxes of paper	$300.00	$900.00	$900.00	$50.00/per cartridge (3 cartridges for year 1, 9 cartridges for year 2 and 3.) $50.00/box (3 boxes for year 1, 9 boxes for year 2 and 3.)
Tech Support Expenses				
IT Support	$720.00	$1,440.00	$1,440.00	$60.00/hour for up to 2 hours a month
Total Expenses	***$16,630.00***	***$5,400.00***	***$5,461.20***	

APPENDIX H (Expense Report)

Source of Expense	Expense Description	Dollar Value	Type of Cost	Description of Cost	Estimated Volume	Expense Per Unit
Guided Meetings		Cost $	Fixed or Variable			
Materials and Supplies	Printer Supplies-copier toner	$150.00	Fixed	Office supplies for	3	$50.00/per cartridge
	Paper for meeting documents, test	$150.00	Fixed	meetings	3	$50.00/box (10 reams)
Meeting Rooms/ Guided Team meetings	Use of conference rooms and projectors	$600.00	Fixed	Conference Room Usage	6 meetings/ month	$100.00/month
Guided Team Member Salaries	Approximate Hourly Salaries x 10 1-hour meetings			Guided Team Member		
	Project Leader	$400.00	Variable	Salaries	10 hours	$40.00/hour
	Wound Care Nurse	$300.00	Variable		10 hours	$30.00/hour
	Professional Development Coordinator	$400.00	Variable		10 hours	$40.00/hour
	ICU Nursing Staff – Nurse Champion/Super User	$400.00	Variable		10 hours	$40.00/hour
	Total Requested	***$2,400.00***				
Education Training		Cost $	Fixed or Variable			
Meeting Rooms	Use of conference rooms and projectors	$100.00	Fixed	Conference Room Usage	3 meetings/ month	$100.00/month
Education Training Preparation Team Salaries	Project Leader- $40.00/hour x 3 1-hour meetings	$120.00	Fixed	Project Leader Salary	3 hours	$40.00/hour
	Inpatient Wound Care Nurse- $30.00/hour x 3 1-hour meetings	$90.00	Fixed	Wound Care Nurse Salary	3 hours	$30.00/hour
	Professional Development Staff (1 RN)- $50.00/hour x 3 1-hour meetings	$150.00	Fixed	Professional Development Staff Salary	3 hours	$50.00/hour
	Total Requested	***$460.00***				

Project Implementation		Cost $	Fixed or Variable			
Meeting Rooms	Use of conference rooms and projectors $100.00/month x 3 months	$300.00	Fixed	Conference room usage	1 meeting/ month	$100.00/month
Pressure Injury Team Member Salaries	Approximate hourly salaries x 3 1-hour meetings	$120.00	Variable	Pressure Injury Team member salaries	3 hours	$40.00/hour
	Project Leader	$90.00	Variable		3 hours	$30.00/hour
	Wound Care Nurse	$120.00	Variable		3 hours	$40.00/hour
	Professional Development Coordinator	$120.00	Variable		3 hours	$40.00/hour
	ICU Nursing Staff – Nurse Champion/Super User					
	Total Requested	***$750.00***				
Reports		Cost $	Fixed or Variable			
Project Leader	$40.00/hour x 80 hours	$3200.00	Variable	Time spent creating, running, and analyzing reports	80 hours	$40.00/hour
ICU Skin Care Team Auditor	$40.00/hour x 6 hours/month	$1,440.00	Fixed	Time spent auditing 10 charts	36 hours	$40.00/hour
IT Support	$60.00/hour, up to 2 hours month	$720.00	Variable	IT support with Verge, DI, and Health Stream programs	12 hours	$60.00/hour
	Total Requested	***$5,360.00***				
	Grand Total Requested	***$8,970.00***				

APPENDIX I (Statement of Operations)

Statement of Operations		
Revenues		
In-Kind Donations		
Team Member Salaries		
Conference Rooms		
Office Supplies		
	Total	***$8,970.00***
Expenses		
Conference/Meeting Room		
Usage Expenses		$1,000.00
Salaries		
Team Member Salary Expenses		$1,670.00
Project Leader Salary Expenses		$3,840.00
Auditor Salary Expenses		$1,440.00
Office Supply Expenses		$300.00
Tech Support Expenses		$720.00
	Total	**$8,970.00**
Operating Income		***($0.00)***

APPENDIX J (Pieper Pressure Ulcer Knowledge Test)

For each question, mark the box for True, False, or Don't Know.

	True	False	Don't Know
1. Stage I pressure ulcers are defined as intact skin with nonblanchable erythema in lightly pigmented persons.			
2. Risk factors for development of pressure ulcers are immobility, incontinence, impaired nutrition, and altered level of consciousness.			
3. All hospitalized individuals at risk for pressure ulcers should have a systematic skin inspection at least daily and those in long-term care at least once a week.			
4. Hot water and soap may dry the skin and increase the risk for pressure ulcers.			
5. It is important to massage bony prominences.			
6. A Stage III pressure ulcer is a partial thickness skin loss involving the epidermis and/or dermis.			
7. All individuals should be assessed on admission to a hospital for risk of pressure ulcer development.			
8. Cornstarch, creams, transparent dressings (e.g., Tegaderm, Opsite), and hydrocolloid dressings (e.g., DuoDerm, Restore) do not protect against the effects of friction.			
9. A Stage IV pressure ulcer is a full thickness skin loss with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structure.			
10. An adequate dietary intake of protein and calories should be maintained during illness.			
11. Persons confined to bed should be repositioned every 3 hours.			
12. A turning schedule should be written and placed at the bedside.			
13. Heel protectors relieve pressure on the heels.			
14. Donut devices/ring cushions help to prevent pressure ulcers.			
15. In a side lying position, a person should be at a 30-degree angle with the bed unless inconsistent with the patient's condition and other care needs that take priority.			
16. The head of the bed should be maintained at the lowest degree of elevation (hopefully, no higher than a 30-degree angle) consistent with medical conditions.			
17. A person who cannot move him or herself should be repositioned every 2 hours while sitting in a chair.			
18. Persons who can be taught should shift their weight every 30 minutes while sitting in a chair.			
19. Chair-bound persons should be fitted for a chair cushion.			
20. Stage II pressure ulcers are a full thickness skin loss.			

	True	False	Don't Know
21. The epidermis should remain clean and dry.			
22. The incidence of pressure ulcers is so high that the government has appointed a panel to study risk, prevention, and treatment.			
23. A low-humidity environment may predispose a person to pressure ulcers.			
24. To minimize the skin's exposure to moisture on incontinence, underpads should be used to absorb moisture.			
25. Rehabilitation should be instituted if consistent with the patient's overall goals of therapy.			
26. Slough is yellow or creamy necrotic tissue on a wound bed.			
27. Eschar is good for wound healing.			
28. Bony prominences should not have direct contact with one another.			
29. Every person assessed to be at risk for developing pressure ulcers should be placed on a pressure-redistribution bed surface.			
30. Undermining is the destruction that occurs under the skin.			
31. Eschar is healthy tissue.			
32. Blanching refers to whiteness when pressure is applied to a reddened area.			
33. A pressure redistribution surface reduces tissue interface pressure below capillary closing pressure.			
34. Skin macerated from moisture tears more easily.			
35. Pressure ulcers are sterile wounds.			
36. A pressure ulcer scar will break down faster than unwounded skin.			
37. A blister on the heel is nothing to worry about.			
38. A good way to decrease pressure on the heels is to elevate them off the bed.			
39. All care given to prevent or treat pressure ulcers must be documented.			
40. Devices that suspend the heels protect the heels from pressure.			
41. Shear is the force that occurs when the skin sticks to a surface and the body slides.			
42. Friction may occur when moving a person up in bed.			
43. A low Braden score is associated with increased pressure ulcer risk.			
44. The skin is the largest organ of the body.			

	True	False	Don't Know
45. Stage II pressure ulcers may be extremely painful due to exposure of nerve endings.			
46. For persons who have incontinence, skin cleaning should occur at the time of soiling and at routine intervals.			
47. Educational programs may reduce the incidence of pressure ulcers.			

APPENDIX K (NDNQI Module Permission for use)

RE: use of NDNQI Module

LL [redacted]

To Harvey, Michelle E

Reply

You forwarded this message on 3/20/2019 9:16 AM.

Phish Alert

Hello,
That type of use would be fine. The course is publically available for education purposes at this time.

[redacted]
Education Programming Manager
[redacted]

From: Harvey, Michelle E [redacted]
Sent: Tuesday, March 19, 2019 4:54 PM
[redacted]
Subject: RE: use of NDNQI Module

CAUTION: This email originated from outside of the organization.

Yes, my project will be a pilot project in the ICU with pressure injury prevention education to nursing staff. My advisor informed me that education should be from a reliable source that uses slides/pictures from sources such as the NPUAP.

[redacted]
Sent: Tuesday, March 19, 2019 4:59 PM
To: Harvey, Michelle E [redacted]
[redacted]
Subject: use of NDNQI Module

Greetings,
I received your request for permission for use of the NDNQI module. Can you expound on how you plan to utilize it?

I am workingon my DNP and trying to find an appropriate learning module for pressure injuries. I found the modules developed by NDNQI, but not sure if I need to have approval to use the module. If someone could direct me in who I need to speak with, I would greatly appreciate it.

[redacted]
Education Programming Manager
[redacted]

APPENDIX L (Project Data Tables)

Table 1

Demographics of Participants (n=61)		
Age, y Mean (SD)	37 (10.1)	
	n	%
Sex		
Female	55	90.2
Male	6	9.8
Service Years		
<1	4	6.6
1-4	22	36.1
5-9	16	26.2
10-14	8	13.1
15-19	6	9.8
≥20	5	8.2
Department		
ICU	27	44.3
Float	28	45.9
Medical Evaluation	6	9.8

Table 2

Average Percentage of Correct Scores and Total Percentage Correct by Pre and Post Tests (n=61)			
	Pretest	Posttest	% Change
Prevention	79.7%	82.4%	3%
Staging	79.9%	85.7%	7%
Wounds	88.3%	90.4%	2%
Average Total Score	79.0%	84.0%	6%
Average Total "Don't Know"	2.7%	0.4%	-85%

Table 3

	Nursing Documentation Compliance with Prevention Interventions by Braden Scale Subset Score					
	n = documentation opportunity	Bordered Foam Dressing	Flotation of Heels	Incontinence Pad	Moisturizer to Skin	Turn Schedule
Overall	Sensory score < 4 (n = 92)		71.7% (66/92)			76.1% (70/92)
	Moisture score < 4 (n = 67)			73.1% (49/67)	56.7% (38/67)	
	Activity < 4 (n = 122)		65.6% (80/122)			67.2% (82/122)
	Mobility < 4 (n = 114)		68.4% (78/114)			71.9% (82/114)
	Friction/Shear < 3 (n = 106)	67.0% (71/106)				
Staff who <u>did not</u> complete education module	Sensory score < 4 (n = 23)		65.2% (15/23)			82.6% (19/23)
	Moisture score < 4 (n = 13)			61.5% (8/13)	30.8% (4/13)	
	Activity < 4 (n = 28)		60.7% (17/28)			75.0% (21/28)
	Mobility < 4 (n = 27)		59.3% (16/27)			77.8% (21/27)
	Friction/Shear < 3 (n = 25)	72.0% (18/25)				
Staff who <u>did</u> complete education module	Sensory score < 4 (n = 69)		73.9% (51/69)			73.9% (51/69)
	Moisture score < 4 (n = 54)			75.9% (41/54)	63.0% (34/54)	
	Activity < 4 (n = 94)		67.0% (63/94)			64.9% (61/94)
	Mobility < 4 (n = 87)		71.3% (62/87)			70.1% (61/87)
	Friction/Shear < 3 (n = 81)	65.4% (53/81)				