

REDUCING UNIT-ACQUIRED PRESSURE INJURIES ON A CARDIAC SURGERY
PROGRESSIVE CARE UNIT

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Abstract

Title: Reducing Unit-Acquired Pressure Injuries on a Cardiac Surgery Progressive Care Unit

Background: Consequences of pressure injuries can be emotional and physical, including pain, body image distortion, increased risk for infection, increased length of stay in the hospital, and death. Pressure injuries create a significant economic burden for organizations and individuals. Organizations that have the highest incidences of pressure injuries receive less reimbursement for services.

Local Problem: Prior to project implementation, 3 pressure injuries were found on the cardiac surgery progressive care unit during a 13-week period. The cardiac surgery progressive care unit in a large academic medical center in the mid-Atlantic region was responsible for 66% of the pressure injuries. The purpose of this quality improvement project was to implement and evaluate the effectiveness of a pressure injury prevention bundle on a cardiac surgery progressive care unit over a 13-week period using the Model for Improvement as a framework for implementation.

Intervention: The pressure injury prevention bundle consisted of four steps: the Braden score, a two-nurse skin assessment on admission, a pressure-reducing surface, and a consult to the wound, ostomy, and continence nurse. Two-hundred one subjects were evaluated (n=201). The intervention was evaluated by a before-after design, comparing the number of avoidable unit-acquired pressure injuries before project implementation, to after implementation of the PUPB.

Results: Post-implementation, 4 pressure injuries were found on the cardiac surgery progressive care unit, but only 25% of the pressure injuries were determined to be the unit's responsibility, and 75% of the pressure injuries were determined to have occurred prior to admission to the unit. A nurse did not complete the two-nurse skin assessment on the one patient who developed a pressure injury during this project timeframe. The pressure injury was discovered 25.5 hours after admission to the unit, deeming it the cardiac surgery progressive care unit's responsibility.

Conclusions: The pressure injury prevention bundle should be a standard of care for all new patient admissions. When all of these factors are used together in a bundle, this project demonstrates that the unit could have zero unit-acquired pressure injuries.

Reducing Unit-Acquired Pressure Injuries on a Cardiac Surgery Progressive Care Unit

Background and Significance of Problem

A pressure injury (PI) is defined as “localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear” (Anderson et al., 2015, p. 219). Pressure injuries are both predictable and preventable. Patients are most at risk for PIs after extensive exposure to pressure from lying or sitting on a specific part of the body for prolonged periods of time (Tayyib, Boyer, & Lewis, 2015). The development of a PI while in the hospital is often viewed as evidence of failure of the nursing staff (Paul, McCutcheon, Tregarthen, Denend, & Zenios, 2014). Consequences of PIs are both emotional and physical, including pain, body image distortion, increased risk for infection, increased length of stay in the hospital, and death (Minnich, Bennett, & Mercer, 2014; Paul et al.).

PIs represent a significant economic burden for organizations and individuals. A single PI can cost between \$14,000 and \$40,000 (Beinlich & Meehan, 2014; Minnich et al, 2014.). In an effort to promote optimal care, the Center for Medicare and Medicaid Services (CMS) reduces reimbursement for hospitals that rank among the lowest quartile of comparable health care centers for certain hospital-acquired conditions, including PIs (CMS, 2014). Prevention of PIs is crucial for patient safety, satisfaction, and cost-effective care.

Approximately 250,000 hospital-acquired PIs occur in the United States each year; one out of every two of them are preventable (AHRQ, 2015). Cardiac surgery patients are at extremely high risk for developing PIs due to lack of oxygen and nutrients to the capillary beds of the skin due to cardiac medications and prolonged times on operating room tables (Morehead & Blain, 2014; Paul et al., 2014). Between July 2017 and December 2017, three patients in a

cardiac surgery progressive care unit (CSPCU) at a large academic medical center, in the Mid-Atlantic, developed avoidable hospital-acquired PIs. Two of the three unit-acquired PIs were present upon admission, but the admitting nurse did not assess and/or document the PI (Wound Nurse, Personal Communication, April 15, 2018). Even though the pressure injury did not develop on the unit, the unit assumes responsibility and the pressure injury is considered to be a hospital-acquired PI (Nurse Manager, Personal communication, April 3, 2018).

Improper assessment and documentation of skin or wounds, underutilized prevention methods, and lack of knowledge concerning pressure injury identification are barriers to PI prevention (Morehead & Blain, 2014). One of the most challenging issues is identifying stage I PIs, because there are minimal changes in color. Table 1 details PI staging (Morehead & Blain). Without proper assessment, these areas are overlooked and not documented. Without this step, patient are suffering due to a delay in implementing prevention methods (Minnich et al., 2014). Evidence shows that two-nurse skin assessments, the Braden Score, pressure-reducing surfaces (PRS), and early referral to a wound and ostomy certified nurse (WOCN) help prevent hospital-acquired PIs (Bergstrom, Braden, Laguzza, & Holman, 1987; Anderson et al, 2015; Beinlich & Meehan, 2014; Paul et al., 2014; Minnich et al.; Morehead & Blain; Tayyib et al., 2015). Appendix A is a review of the evidence that supports these interventions.

Purpose Statement

The purpose of this project was to implement and evaluate the effectiveness of a pressure injury prevention bundle (PIPB) in a CSPCU. The short-term goals of the project included: (1) 100% of CSPCU nurses educated on PIPB by September 24, 2018, (2) 80% compliance with PIPB by October 13, 2018, and (3) all barriers to implementation were identified and addressed by October 13, 2018. The long-term goals of the project were to be completed by November 16,

2018, and included (1) an anticipated reduction in the number of unit-acquired pressure injury incidence to zero on the CSPCU compared with three in the same quarter in 2017, (2) an anticipated complete compliance with the PIPB was to be completed on 90% of new admissions, (3) after implementing this pilot study on the CSPCU, unit barriers and facilitators were to help guide implementation efforts on a larger scale, which could result in a reduction of hospital-acquired PIs.

Theoretical Framework

The Institute for Health Care Improvement developed the Model for Improvement. This quality improvement model provides a framework to accelerate change on a small scale. The framework begins with a process improvement team working through three essential questions. The first question is, “What are we trying to accomplish?” This focuses on the specific population, the aim of the project, and specific, measurable goals. The second question is, “How will we know that a change is an improvement?” This question identifies the proper quantitative measure to determine the project’s success. The third question asks, “What change can we make that will result in an improvement?” (Institute, 2016, pp. 2). This question relies on knowledge of those who have successfully implemented the change elsewhere or those who work closely with the target population that the project aims to work with to develop ideas for change. After these questions are answered, the next step is to implement the Plan, Do, Study, Act (PDSA) Cycle.

The PDSA cycle tests the change on a small scale by planning the change, implementing the change, observing the results, and then acting on additional information gained from the cycle (Institute, 2016). The planning stage involves creating a strategy to collect data, define the objectives, anticipate outcomes, and create an implementation plan. The “Do” stage allows the team to test the change on a small scale. This is where facilitators and barriers to implementation

are discovered. The “Study” stage allows the team to analyze and learn from data. The “Act” stage allows for modification of the change to prepare for the next test. The change can be refined through several PSDA cycles (Institute). After implementing on a small scale, the team will use the information to guide implementation on a larger scale.

Utilization of Theoretical Framework

The Model for Improvement provided a meaningful framework used in the implementation of the PIPB on the CSPCU. The three leading questions helped specify, define, and measure key concepts. The questions and answers helped to engage key stakeholders and improved their comprehension of the issue. Implementing the bundle required a workload change that created a barrier of staff resistance. The cyclic nature of the PDSA model allowed for flexibility when barriers were encountered and provided guidance to modify the change to ensure success. The "Study" stage was important in analyzing PIPB compliance and the effect the PIPB had on the patients. Since the inception of the PIPB on the small scale of the CSPCU, the newfound knowledge can now be used to implement the PIPB on other units in the hospital. This will create a larger impact in preventing hospital-acquired PIs throughout the institution.

Literature Review

The focus of the evidence in this literature review was the need to reduce hospital-acquired PIs, concentrating solely on nursing-based interventions. The review begins with current evidence regarding bundles and their effect on nursing interventions. The discussion is followed by a review of interventions nurses can implement in a PIPB: the Braden Score, a consult to WOCN, ordering a specialty mattress, and two-nurse skin assessments.

Bundling Care

An effective trend in quality improvement projects is to combine several core

interventions into a care bundle. Bundles use multiple evidence-based interventions to achieve an outcome and create uniformity of care (Anderson et al., 2015; Tayyib et al., 2015). Tayyib et al. found that bundles help to increase registered nurse awareness and compliance of most care processes. When nurses do not use bundles, the variability of interventions leads to omissions of key elements of PI prevention (Tayyib et al.). In summary, the creation of a standardized process that combines several fundamental interventions has been shown to help nurses achieve a better and more consistent outcome.

Braden Score

The Braden Scale is a tool developed in 1987 to evaluate the risk of developing PIs. The nurse rates patients on a numeric scale based on sensory perception, moisture, activity, mobility, nutrition, and friction and shearing. The combined total of these criteria becomes the Braden score. The lower the Braden score, the higher the risk for developing PIs (Bergstrom et al., 1987). The reliability is 99% when used by a registered nurse (Bergstrom et al.). Scoring every patient with this risk assessment tool helps to objectively determine those who may be at risk for PIs (Paul et al., 2014). Beinlich and Meehan concluded that patients who score at 18 or less on the Braden Score are at an increased risk of hospital-associated PIs (2014). By performing a chart review, Moorehead and Blain concluded that of the patients that developed a PI, all had a Braden score at a level of 15 or less (2014). The predictive validity of a PI forming is 100% at a score of 16 (Bergstrom et al.). According to the research, a reasonably prudent nurse should order a PRS at a minimum for patients who score a 17 or less on the Braden Scale to help prevent PIs (Beinlich & Meehan; Moorehead & Blain; Bergstrom et al.).

Pressure Reducing Surface

A PRS is a specialty mattresses or mattress overlay that can relieve the pressure of the

patient's body weight from the skin (Paul et al., 2014). PRSs are especially important for patients who are unable to turn and reposition themselves to help alleviate the constant pressure their body habitus places on the most dependent aspects of the body, such as the occiput, sacrum, and heels (Beinlich & Meehan, 2014). The nurse should utilize PRSs when there is a risk indicated by the Braden score or presence of current skin breakdown. Skin breakdown should also initiate a prompt nursing referral to WOCN.

Consulting the Certified Wound, Ostomy, and Continence Nurse

Patients should be referred to WOCNs for specialty skin care (Anderson et al., 2015). The WOCN accurately assesses, stages, and formulates a plan to treat PIs (Minnich et al., 2014; Anderson et al.). Better outcomes occur when referrals are made proactively on admission in a standardized process, rather than basing the level of preventative care on individual nurse discretion (Anderson et al.). WOCNs serve as a coach to educate nurses while implementing specialized PI prevention methods (Anderson et al.). In order to determine the necessity of engaging the WOCN, the nurse should be sure to do a comprehensive, judicious assessment.

Two Nurse Skin Assessments

Nurses should perform a comprehensive visual skin assessment on admission to evaluate for the presence of PIs and wounds (Anderson et al., 2015). Two nurses should perform the initial skin assessment in order to change the unit culture into proactively preventing PIs instead of reacting to PIs (Anderson et al.). Evidence suggests that by mentoring newer nurses, experienced nurses place a greater focus and emphasis on preventing PIs themselves. In addition, it allows for ongoing mentoring and learning opportunities that are essential for program success (Paul et al., 2014; Beinlich & Meehan, 2014). This bottom-up process engages, encourages, and supports nursing staff to help find solutions to a unit problem. Ongoing coaching of PI

prevention has the strongest effect on learning, while fostering teamwork and encouraging collaboration (Anderson et al.; Beinlich & Meehan). Minnich et al. noted that at first staff resisted or forgot to complete the two nurse skin assessments but overtime, it became integrated into daily practice (2014). Requiring a two-nurse skin assessment takes the burden from one nurse and allows nurses to work as a team to reposition the patient in order to ensure every area of skin is assessed (Paul et al.). Accurate documentation upon initial skin assessment ensures that nurses will follow best practice protocols (Minnich et al.). Early, accurate skin assessment and proactive management leads to a reduction in PIs (Paul et al.).

Implementation Plan

Description of Project

A quality improvement (QI) project focused on nurse-centered admission PIPB was implemented with a sample of patients and nurses on a CSPCU of a large academic medical center. Inclusion criteria for the patient population included any patient newly admitted within the 12-hour nurse shift to the CSPCU (n=201). Inclusion criteria for the nurse sample included the current CSPCU registered nurses (n=51).

Procedures and Timeline Plan

The QI project took place over a 13-week period. During the first week the DNP project leader recruited and trained eight nurses to serve as project champions (early adopters). The team champions attended a 15-minute training session led by the project leader on the PIPB. Information on complete skin assessments, signs of PIs, Braden Scores, using PRS, and consulting WOCN was part of champion education (See Appendix B). Information on proper documentation of the two-nurse skin assessment, Braden score, PRS, and WOCN was also included. Champions demonstrated competency through verbal teach back. Throughout the first

week, the project leader signed off champions as competent for the PIPB. At the end of the first week, the project leader introduced the PIPB to RNs during daily shift huddles.

During weeks two through four, the project leader educated RNs on the PIPB components. Training occurred during pre-shift huddles and in-services. See Appendix C for the handout tool was posted for reference throughout the unit. The signed competency log was given to the unit manager once all RNs were signed off for her records.

During weeks five through twelve, the PIPB was used for all new admissions onto the CSPCU. At week eight, the implementation process was modified to overcome barriers and emphasize facilitators based on PIPB compliance data and themes in anecdotal interviews. The champions aided staff in properly completing the bundle. During this time, the project leader conducted weekly rounds to support nurses and champions and conducted audits to evaluate PIPB utilization. During weeks thirteen through fourteen, data was compiled to evaluate the effectiveness of PIPB in preventing unit-acquired PIs. The project leader identified any necessary modifications and updated the implementation plan.

Data Collection Plan to Evaluate Project

After the nurse education sessions on how to use the PIPB were completed, data on utilization of the PIPB was collected by the project leader. All aspects of the PIPB were documented by the RN in the electronic health record (EHR). A documentation audit tool was used to determine PIPB utilization. Data for each aspect of the bundle was collected, including completion of the Braden score, two nurse skin assessment, WOCN consult, PRS utilization, and presence of skin breakdown. Refer to Appendix D to see audit tool. The project leader utilized random observations every week to observe the two-nurse skin and to hear anecdotal comments from RNs to determine facilitators and barriers.

Data Analysis Plan

A data report was generated by the project leader for data coding (Appendix C). Compliance with the PIPB will be determined by the total number of correct PIPB utilization divided by the number of patients audited. A run chart was used to track the percentage of new admissions where the PIPB was properly completed. Analysis of individual aspects of the bundle were also compiled to determine compliance and areas for improvement. Anecdotal interviews and observations were compiled to assess for common themes and patterns in responses. The total number of unit-acquired PIs for this time period was reported in the hospital's Nosocomial Hospital Acquired Pressure Injury Report.

Human Subjects Protection/Approval

To minimize risk of sharing protected patient information, data was collected on the unit, with no patient identifiers, and stored in a password-protected computer stored in the project leader's home. A project description was submitted to the University of Maryland Baltimore (UMB) Institutional Review Board (IRB) for a Non Human Subjects Research (NHSR) determination. Approval to implement the DNP project was obtained from the organization.

Plans for Project Sustainability

There is a clear need for this practice change to occur within the whole organization to aide in CMS reimbursement and to improve patient outcomes. The CSPCU PIPB can be used in all units in the organization. The PDSA cycle is cyclic in nature in that the CSPCU will serve as the pilot unit. Information gained from pilot will then be used to strengthen the QI project in order to successfully implement the PIPB on other units. The detailed implementation plan will be disseminated to other units in the Senior Clinical Nurse meeting.

Results

Implementation of the PIPB required several key changes on the CSPCU. First, 52 nurses were trained on using the PIPB for all new admissions to the unit. All staff nurses were trained within the first four weeks of implementation and expected to follow the bundle. Prior to implementation, nurses were already consistently performing the Braden score once a shift and notifying WOCN to evaluate for skin breakdown. Nurses were inconsistently placing at risk patients on PRSs, but now had to follow an algorithm according to the Braden score to standardize the process. The newest step was for nurses to complete two nurse skin assessments on admission instead of completing a skin assessment individually. A run chart was used to track PIPB compliance over the implementation timeline, which can be seen in Figure 1. The lowest rate of compliance was during the second week of required PIPB utilization at 37%. The highest rate of compliance occurred during week ten, the last week of data collection at 94.4%. The mean rate of compliance was 69.4%.

During the implementation timeline, four PIs were identified by RNs on the CSPCU. Seventy-five percent of the PIs (3 of the 4) were discovered on admission; the nursing care on the unit was not responsible for these occurrences. One of the PIs was a stage II sacral PI, which was discovered by a nurse 25.5 hours after admission. Since the assessment done on admission did not identify this occurrence, the unit was held accountable for it. The admitting nurse did not follow the PIPB for this patient due to perceived lack of time (CSPCU Nurse, personal communication, November 10, 2018).

Discussion

Prior to implementation of the bundle, the Braden score was already performed on all patients and WOCN consults were consistently being placed for skin concerns. The PRS

algorithm helped the unit utilize more of the pressure-reducing mattress overlays, instead of immediately using a specialty mattress, which decreases costs for the unit. The most important change that the PIPB brought to the unit was the two-nurse skin assessment. Nurses were able to catch skin issues prior to the 24-hour mark that would place the unit at blame.

The results are consistent with study findings. Similar to observations in Minnich et al. (2014), it was a challenge for the nurses to remember to perform the skin assessment at the start of the project and nurses were worried it would delay their work process. The new work flow slowly integrated into daily practice and most concerns dissipated after the implementation period. In accordance with Beinlich and Meehan's (2014) findings, post-implementation, nurses independently initiated prevention strategies earlier in the patient stay and more consistently recognized patients at risk for hospital-acquired PI development. The unit champions and buy-in from staff was critical to the success of the PIPB. It was vital to have a focused nursing team that was willing to deal with the challenges of implementing the bundle on the unit (Paul, McCutcheon, Tregarthen, Denend, & Zenios, 2014). Barriers and facilitators to the PIPB were assessed through anecdotal interviews with nurses and can be found in Figure 2. Perceived barriers included lack of time and forgetting. Perceived facilitators were having a resource nurse available, patient safety, and patient/family involvement. A resource nurse is a nurse who functions solely to help other nurses. He/she does not have a patient assignment.

The observed outcomes were consistent with the anticipated outcomes. The single avoidable PI for which the CSPCU was held responsible was discovered 25.5 hours after the patient arrived on the unit from an intensive care unit. The admitting nurse did not complete a two-nurse skin assessment and missed this stage II PI over the sacrum. Per the WOCN it would be impossible for a person to develop such a wound in 25.5 hours and was most likely present

before being admitted to the CSPCU (WOCN, Personal Communication, November 10, 2018).

This further emphasized the importance of two-nurse skin assessments in increasing accountability and improving quality of skin assessments on admission.

The strengths of this project resulted mostly from buy-in from the majority of the staff. Seventeen percent of the staff were champions, which helped to propel the bundle into a fundamental task for the unit. Manager buy-in was vital in ensuring staff were held accountable for completing the bundle and for frequent reminders of the expectation to complete two-nurse skin assessments. The unintended positive consequence of the PIPB was patient and family satisfaction. Several families and patients expressed appreciation for making their skin a priority. The patients and families either had a previous experience with a PI or had knowledge of PIs and appreciated the extra measures put in place to prevent PIs and identify PIs with early intervention.

Limitations to the generalizability of the project include hospital availability of PRS similar to the types used in the implementing institution. Also, the availability of nurses to complete a two-nurse skin assessment or the availability of a WOCN affect whether or not this project's intervention could be applied in other units or institutions. It should be noted that the PIPB did not include a nutritional assessment or referral to dietician for nutrition needs. This was not included because it was required in the admission bundle for the implementing institution before implementation. For places that are not required to complete a nutritional assessment, one should be integrated into the bundle.

A bias that could have occurred to the project was that the project leader worked as a staff nurse on the unit. The staff may have had more buy-in because they already had a relationship with the project leader. In order to minimize the bias and ensure the longevity of the

project, after the project leader finished the implementation phase, the project leader encouraged unit champions to head the bundle with her support.

Conclusion

The PIPB is useful in preventing unit-acquired PIs when performed on all admissions to an inpatient unit. It is a completely nurse-driven bundle that requires no monetary cost. The bundle prevents the unnecessary repercussions caused by PIs that are identified too late after a patient is admitted. Having fewer PIs helps staff morale, decreases time spent on dressing changes, and can improve reimbursement to the hospital.

After running through two PDSA cycles, it became evident that once the PIPB was integrated into the standard admission requirements, the bundle was very sustainable. It became a standard, rather than an extra task that nursing had to do. The CSPCU, now has a dedicated resource nurse. The role description includes completing the two-nurse skin assessment with the admitting nurse. Now that there is a designated person to perform the assessment with, the task will be easier to perform.

There is a high potential for the PIPB intervention to spread to other units in the hospital. It is avidly supported by leadership and the WOCN, who are spreading the success of the PIPB to other areas of the hospital. The PIPB is currently being spread to the Cardiac Surgery Intensive Care Unit (CSICU) with the help of the project leader and CSICU champions.

The implication for future nursing practice is that the PIPB should be a standard of care for all new patient admissions. When all of these factors are used together in a bundle, this project demonstrates that the unit could potentially have zero unit-acquired PIs. A future quality improvement project can focus on limiting PIs associated related to medical devices such as nasal cannula usage. Many of the skin concerns discovered during the implementation timeframe

were post-auricular blanchable erythema due to improperly fitting or prolonged nasal cannula usage. An evidence review should be performed on proper prevention techniques and weaning schedules for nasal cannulas. Morehead & Blain (2014) suggest yearly education competencies on identifying PIs in order to keep identification and prevention a nursing priority.

The suggested next step for this project is to start spreading the PIPB to other units in the hospital. Once more PDSA cycles run and adjustments are made, the PIPB should become a hospital-wide requirement for all admitted patients.

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Table 1

Staging PIs

Pressure Injury Stage	Characteristics
Stage 1	“Non-blanchable erythema of intact skin. Skin may be more pigmented, have change in sensation, temperature, or firmness” (NPAUP, 2016, pp.5)
Stage 2	“Partial thickness loss with exposed dermis. The wound bed is viable, pink or red, moist, and may also present as a blister” (NPAUP, 2016, pp.6)
Stage 3	Full-thickness loss of skin, in which adipose is visible in the injury and granulation tissue is often present” (NPAUP, 2016, pp. 7)
Stage 4	“Full-thickness skin and tissue loss with exposed...fascia, muscle, tendon, ligament, cartilage, or bone in the injury” (NPAUP, 2016, pp.8)
Unstageable	“Full-thickness skin and tissue loss in which the extend of tissue damage...cannot be confirmed because it is obscured by slough or eschar” (NPAUP, 2016, pp.9)
Deep Tissue Injury	“Persistent non-blanchable deep red, maroon, or purple discoloration” (NPAUP, 2016, pp.10)

NPUAP Pressure Injury Stages. (2016). *National Pressure Injury Advisory Panel*. Retrieved from <http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-injury-stages/>

Table 2

Nurse Perceptions of Barriers and Facilitators to Pressure Injury Prevention Bundle Compliance

Themes	Comments
<i>Barriers</i>	
Time	-Uncomfortable asking another nurse to spend their time doing a 2-nurse skin assessment -Unable to find time to coordinate an assessment with another busy nurse
Forgot	-It is a new process that is not prioritized -Nurse forgot to perform two nurse skin assessment at change of shift after not having time to complete the assessment during course of the shift
<i>Facilitators</i>	
Resource Nurse Available	-When a nurse is available who is not taking patients, it is easier to complete all bundle steps as soon as patient arrives -Resource nurse is able to actively engage admitting nurse to facilitate compliance -Interventions initiated on patient arrival to unit
Patient Safety	-Having another nurse in the room makes it less awkward to check sensitive skin areas -Able to tell patient this is a standard process that is required
Patient/Family Involvement	-Patient/families feel included -knowledgeable patients express appreciation of making skin a priority -patients hear nurses explain the common areas where pressure injuries develop and prevention methods

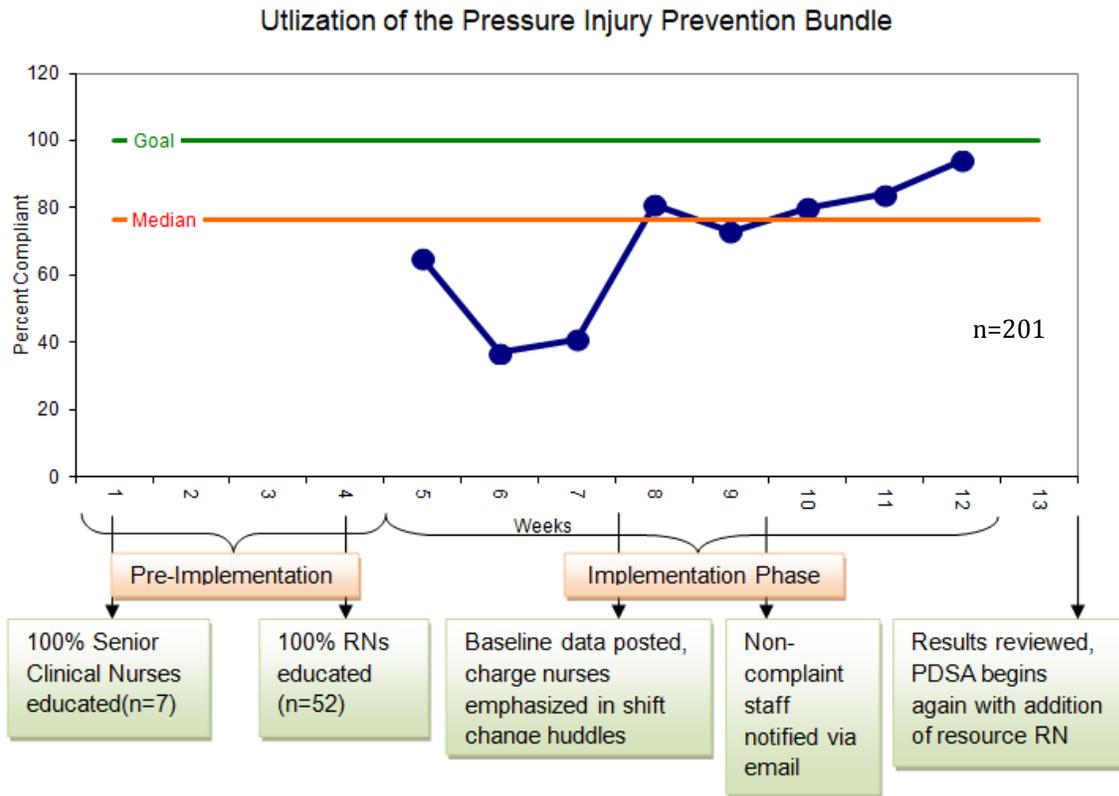


Figure 1. Utilization of the Pressure Injury Prevention Bundle

Appendix A
Evidence Review Table

Author, Year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcome Studies (How measured)	Results	Level and Quality Rating
Anderson et al., 2015	<p>To examine the effectiveness of a pressure injury prevention bundle.</p> <p>Used an expert in pressure injury prevention to serve as a coach during nursing rounds to implement a standard universal pressure injury prevention bundle.</p> <p>Bundle includes: use of pressure redistributing support surfaces, patient turning and repositioning, and a structured regimen for sacral skin care.</p>	Quasi-experimental pre- and post-intervention design	<p>Subjects in three different intensive care units located at the same medical center.</p> <p>Pre-intervention n=181; post-intervention n=146</p> <p>Controlled for Braden scale score, body mass index, ICU length of stay, unit placement, and transfer/admit status.</p>	Admission/discharge skin assessments were reviewed for incidence of PIs, via chart audits.	<p>Significant reduction of unit acquired PIs (P<0.001).</p> <p>Wound, Ostomy, and Continence Nurse (WOCN) standardized the process for which emollient to use to reduce RN confusion.</p> <p>Expert nurse assessments are more effective than peer-to-peer skin assessments.</p> <p>Having WOCN regularly on unit for education, stimulation of questions, and prompt referral to WOCN was a core implementation component.</p>	III A
Beinlich & Meehan, 2014	To use staff nurses to serve as unit-based resource nurses to help colleagues in assessing, treating, and preventing PIs.	Quasi-experimental pre- and post-intervention design	511 bed hospital, with 6 units serving as the pilot units. Actual number of patients not reported, but includes every patient in hospital over a 5-year period.	Hospital-acquired pressure injury prevalence pre- and post-implementation. Data retrieved from Nursing Quality Indicator survey tool.	<p>Significant reduction of unit acquired PIs (P<0.01).</p> <p>Learned that nurse and patient care technicians were layering specialty mattresses with multiple linens, lowering the efficacy of the specialty mattresses in preventing PIs.</p>	III B

					<p>Patients who developed PIs tended to be older and immobile for greater than 3 hours.</p> <p>Offering education at the unit level promotes nurses to embrace evidence-based practices and improves patient outcomes.</p> <p>Post-implementation nurses were independently initiating prevention strategies earlier in the patient stay and more consistently recognized patients at risk for hospital acquired pressure injury development.</p>	
Minnich, Bennett, Mercer, 2014	<p>Early identification and intervention of PIs after surgery.</p> <p>Intervention: 2 nurses provide skin assessment together. The article states this was critical to program success.</p> <p>If a pressure injury was identified, nurses were expected to accurately measure, document, and photograph the injury, and consult the WOCN to properly stage and order interventions for the patient.</p>	Quasi-experimental pre and post intervention design	N=3,035 patients over 2 years	Incidence of PIs pre-intervention and post-intervention, via chart audits	<p>Significant reduction of unit acquired PIs (P<0.001). over a 24-month period.</p> <p>Unit-based pressure injury prevention council members were key educators and resources for front line staff members.</p> <p>In the beginning, it was a challenge for the nurses to remember to perform the skin assessment. Staff were worried it</p>	III B

					would delay their work process. The new work flow slowly integrated into daily practice and all concerns dissipated after 6 months.	
Morehead & Blain, 2014	<p>The goal of this study was to educate staff, improve turning of patients, and accurate documentation.</p> <p>Yearly competencies on PIs are mandatory to ensure staff identification and prevention of PIs.</p>	Quasi-experimental pre and post intervention design	<p>Actual sample number not reported, but includes every ICU patient on that unit over a 3-year period.</p> <p>Data from a single ICU over a 3-year period in time.</p>	National Database for Nursing Quality Indicators (NDNQI) incidence of PIs for the unit, pre and post implementation.	<p>Significant reduction of unit acquired PIs (P<0.01).</p> <p>Able to maintain 0% pressure injury level for 3.5 years after initiation of intervention, except during one quarter, where it was identified that there was an abundance of new staff that needed better wound identification education.</p> <p>One of the most challenging aspects of pressure injury prevention is accurate identification of stage I development. Deep tissue injuries are frequently dismissed as a bruise.</p>	III B
Paul, McCutcheon, Tregarthen, Denend, & Zenios, 2014	<p>The ultimate goal was to reduce hospital acquired PIs in a busy cardiac surgery specialty hospital.</p> <p>Interventions included raising awareness that PIs are undesirable and preventable.</p>	Quasi-experimental, pre-and post-intervention design	<p>Cardiac surgery patients, adult and pediatric.</p> <p>No sample size reported, however it was stated that this is one of the world's largest and busiest cardiac surgery hospitals and the</p>	Incidence of PIs pre-and post-implementation, via a chart audit.	<p>Significant reduction of unit acquired PIs (P<0.01).</p> <p>Cardiac surgery patients are among the most at risk for skin breakdown.</p> <p>Experienced nurses became more focused</p>	III B

	<p>Education to identify the earliest stage of a pressure injury & how to differentiate between PIs and other skin injuries.</p> <p>Floor nurse performs skin assessment while charge nurse watches and critiques assessment if necessary.</p> <p>If pressure injury identified, a photograph is taken, careful documentation is performed, and WOCN consulted to initiate prompt treatment.</p>		<p>sample size included every patient.</p>		<p>on preventing PIs by mentoring new nurses and taking training courses.</p> <p>Vital to have a focused nursing team that is willing to help deal with the challenges of implementing the initiative on the unit.</p>	
<p>Tayyib, Coyer, & Lewis, 2015</p>	<p>Test the effectiveness of a pressure injury prevention bundle in reducing the incidence of PIs in intensive care units.</p> <p>Pressure injury prevention bundle includes: risk assessment, skin assessment, skin care, nutrition, repositioning, support surface, education, and training, and care of medical devices</p>	<p>Two-arm cluster randomized control trial</p>	<p>N=140: 70 control participants and 70 intervention participants. In Saudi Arabian ICU</p>	<p>Total number of PIs experienced.</p>	<p>Significant reduction of PIs among experimental group. Stage I p=0.002, Stage II p=0.026</p> <p>A standardized skin assessment tool was used.</p> <p>Braden Risk Assessment Tool used to predict PIs. 6 elements: sensory perception, moisture, activity, mobility, nutrition, and friction and shear.</p> <p>Bundle approach is more efficient than a single intervention in changing practice. Standardization improves bundle compliance among</p>	<p>II A</p>

					staff. Important to standardize nurse language in skin assessment.	
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Rating System for Hierarchy of Evidence

Level of the Evidence

Type of the Evidence

- I (1) Evidence from systematic review, meta-analysis of randomized controlled trails (RCTs), or practice-guidelines based on systematic review of RCTs.
- II (2) Evidence obtained from well-designed RCT
- III (3) Evidence obtained from well-designed controlled trials without randomization
- IV (4) Evidence from well-designed case-control and cohort studies
- V (5) Evidence from systematic reviews of descriptive and qualitative studies
- VI (6) Evidence from a single descriptive or qualitative study
- VII (7) Evidence from the opinion of authorities and/or reports of expert committees

Melnik, B.M. & Fineout-Overholt, E. (2014). *Evidence-based practice in nursing & healthcare: A guide to best practice* (3rd ed.). New York: Lippincott, Williams & Wilkins.

Rating Scale for Quality of Evidence

- A: High – consistent results with sufficient sample, adequate control, and definitive conclusions; consistent recommendations based on extensive literature review that includes thoughtful reference to scientific literature
- B: Good – reasonably consistent results; sufficient sample, some control, with fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence
- C: Low/major flaw – Little evidence with inconsistent results; insufficient sample size; conclusions cannot be drawn

Newhouse, R.P. (2006). Examining the support for evidence-based nursing practice. *Journal of Nursing Administration*, 36(7-8), 337-40.

Appendix B Lesson Plan

Objectives:

After completion of the lesson, the nurse will:

1. Be able to list 3 reasons why unit acquired PIs are a problem.
2. State the 4 components of the Pressure Injury Prevention Bundle (PIPB).
3. Summarize 3 ways the PIPB will be beneficial to the nurses or patients.

Topics Covered:

Pressure Injury Problem

- PIs can be seen as evidence of failure of nursing staff (Paul, et al., 2014)
- Consequences of PIs can be both emotional and physical, including pain, body image distortion, increased risk for infection, increased length of stay in the hospital, and in rare cases, death (Minnich et al., 2014; Paul et al., 2014).
- A single pressure injury costs between \$14,000 and \$40,000 (Beinlich & Meehan, 2014; Minnich et al.).
- The Center for Medicare and Medicaid Services (CMS) reduces reimbursement for hospitals that rank among the lowest quartile of comparable health care centers for certain hospital-acquired conditions, including PIs (CMS, 2014).
- In the final quarter of 2017, the CSPCU developed three avoidable PIs, two of which were present on admission, but not documented properly on admission. The unit had to assume fault for those PIs (Personal communication, Nurse Manager, April 3, 2018).

Pressure Injury Prevention Bundle Components

- Braden Score
 1. Document in electronic health record every shift, as normal.
 2. Used as an objective tool to determine those at risk for PIs.
- Two nurse Skin Assessment
 1. During the admitting nurse's shift, a second nurse must assess the skin with the admitting nurse ; and cosign the skin documentation in EPIC.
 2. Nurses must do a complete head to toe skin assessment checking all areas of the body for any evidence of skin breakdown.
- Wound, Ostomy, and Continence Nurse (WOCN) Consult
 1. Consult WOCN for any skin breakdown or suspected pressure injury.
 2. WOCN assesses patient and makes appropriate prevention or treatment recommendations.
- Pressure Reducing Surface
 1. Use bed decision tree (Appendix D) to place patient on optimal pressure reducing surface.
 2. Place order in the computer if using a PRS₇ and ask secretary to order specialty mattress if needed.
 3. Document PRS in electronic health record.

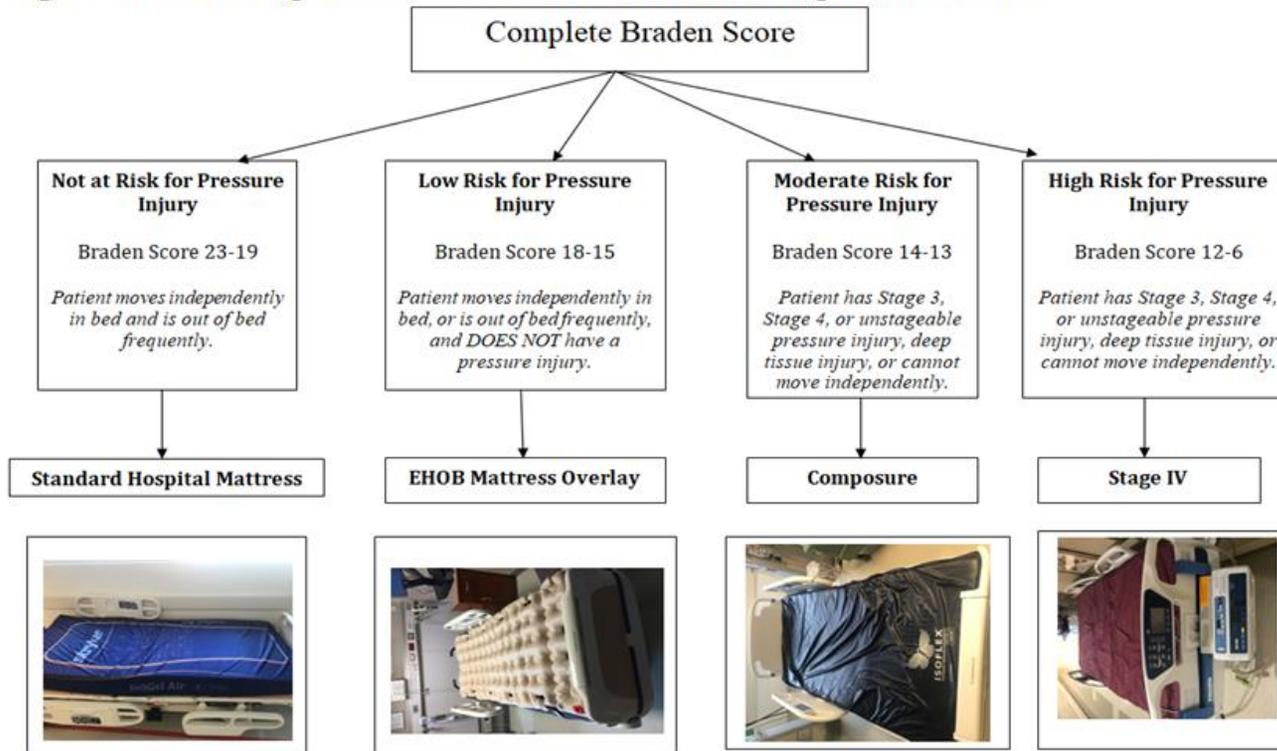
Benefits of Completing the Bundle

- Places an emphasis on skin.
- Utilizes teamwork to prevent hospital acquired PIs.
- Avoids penalties our unit and hospital will receive from misidentified hospital acquired PIs.

Appendix C
Pressure Injury Prevention Bundle Tool

Admission Pressure Injury Prevention Bundle Steps

1. Complete the Braden Score.
2. Complete 2 nurse skin assessment. Document as comment "*Dual nurse skin assessment performed with nurse initials*" in WDA section of chart.
3. Place order in chart for wound ostomy and continence nurse for skin breakdown/concerns.
4. Order pressure reducing surface based on Braden Score algorithm below.



Appendix D
Pressure Injury Prevention Bundle Audit Tool

Date of Admission	De-identified Patient ID	Code for Admitting RN	Braden Score Performed	2 Nurse Skin Assessment Documented	Skin Breakdown Found	WOC N Consult Placed	Specialty Mattresses Ordered	PIPB Performed Correctly

Key:

Yes=1

No=2

Not applicable=3