Prophylactic Sacral Dressings and Skin Assessments in Acute Care Emergency Surgery Patients

by

Caroline Brown

Under Supervision of

Rosemarie D. Satyshur, PhD, RN

Second Reader

Debra Bingham, DrPH, RN, FAAN

A DNP Project Manuscript
Submitted in Partial Fulfillment of the Requirements for the
Doctor of Nursing Practice

University of Maryland School of Nursing
May 2020

Abstract

Problem & Purpose Statement: Hospital acquired pressure injuries (HAPIs) are a growing issue within the healthcare system. On average, 2.5 million people in the United States develop a HAPI. Annually, approximately $26.8 billion dollars is spent on treating HAPIs in the United States alone. Consequences of HAPIs include increased length of stay, decreased quality of life, increased morbidity and mortality, and decreased hospital reimbursement. The purpose of this quality improvement (QI) project is to decreased the incidence of HAPIs, in Acute Care Emergency Surgery (ACES) patients with Braden scores less than or equal to fourteen in the Surgical Intensive Care Unit (SICU) through the implementation of a prophylactic sacral dressing and nurse practitioner (NP) and registered nurse (RN) skin assessments.

Methods: The QI project took place over a ten-week period, from September 2, 2019 to November 10, 2019 and was implemented in three phases. Phase I included identification of unit skin champions and education pertaining to the Braden Scale and preventing HAPIs. Phase II included the implementation of a prophylactic sacral dressing and NP & RN skin assessments. Phase III included data collection and analysis. In order to help with implementation, Lewin's theory of planned change was utilized.

Results: Prior to implementation, there was a total of six HAPIs, with Braden scores ranging from eight to fourteen, with an average of twelve. Post implementation, there were a total of zero HAPIs, with Braden scores ranging from ten to fourteen, with an average of thirteen. 96% (n=61) of ACES patients who met criteria had a prophylactic sacral dressing applied. 100% of ACES patients who met criteria had a skin assessment completed and documented by RNs, while 35% (n=22) of ACES patients who met criteria had a skin assessment completed and documented by ACES NPs. Data collection form compliance was 44% (n=35).

Conclusion: Compliance rates among RNs and NPs varied in respect to the documentation, and completion of the data collection form. RNs had a higher compliance rate associated with skin assessment documentation in the electronic health record compared to NPs. There was a decrease in the incidence of HAPIs after implementation of a prophylactic sacral dressing and RN/NP skin assessments.

Introduction

According to the National Pressure Ulcer Advisory Panel (2016), a pressure ulcer 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." Hospital Acquired Pressure Injuries (HAPIs) are pressure injuries that develop while a patient is in a medical facility. If a patient develops a pressure injury while in the hospital, there is an increased occurrence of poorer health outcomes such as reduced quality of life and increased costs of healthcare (Kayser, VanGilder & Lachenbruch, 2019). In the acute care setting, pressure ulcer incidence rates range from 0.4% to 38% (Health Research & Educational Trust, 2016). Critically ill patients admitted to the intensive care unit (ICU) are predisposed to developing a pressure ulcer due to lack of movement, poor nutrition, hemodynamic instability, prolonged surgical procedures and poor circulation (Byrne, Nichols, Sroczynski, Stelmaski, Stetzer, Line, & Carlin, 2016). HAPIs are an incredible burden on both patients and health care systems, therefore, it is imperative that these pressure injuries are tackled preemptively. Implementation of a prophylactic sacral dressing and nurse practitioner (NP) and registered nurse (RN) skin assessments in Acute Care Emergency Surgery (ACES) patients with Braden scores less than or equal to fourteen in the Surgical Intensive Care Unit (SICU) ensued to decrease the incidence of HAPIs. The short-term goals were: 1) 100% of RNs will comprehend and appropriately apply the Braden Scale by completing an online educational module; and 2) 100% of ACES patients with Braden Scores less than or equal to fourteen, eighteen years of age or older, and do not have a pre-existing sacral wound will have a prophylactic sacral dressing and RN/NP skin assessments completed. Long term goals for the project include a decreased incidence in HAPIs.

Literature Review

A thorough and extensive literature review was executed to unveil the most appropriate evidence based recommendations to decrease HAPIs in critically ill patients. Databases that were utilized to search for relevant studies included the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Medline. Keywords and MESH terms that were used included: pressure ulcer, sacral ulcer AND prevention, pressure ulcer AND prevention and pressure ulcer prevention AND intensive care unit. Results were reviewed and five articles were found to be relevant to the current practice problem. The Johns Hopkins Evidence Based Practice Rating Scale was used to rate the level and quality of the evidence, ranging from 1/A-III/C (Newhouse, Dearholt, Poe, Pugh, & White, 2007). For a detailed analysis of the evidence see Appendix A.

Four out of the five studies addressed inclusion and exclusion criteria within the article (Brindle & Wegelin, 2012; Byrne et al., 2016; Kalowes et al., 2016 & Santamaria et al., 2013). Throughout these four studies, the only inclusion criteria that remained constant was patients being at least eighteen years of age or older, whereas the only exclusion criteria that remained constant was the presence of a preexisting sacral ulcer.

The study by Kalowes et al. (2016) was the only article using The Braden Scale as an indicator for both inclusion and exclusion criteria, however, the randomized controlled trial (RCT) by Santamaria et al. (2013), the studies by Brindle & Wegelin (2012), Chaiken (2012), and Byrne et al (2016) all mentioned using The Braden Scale to effectively assess patients risk for developing pressure ulcers. Two studies utilized the Acute Physiologic Assessment and Chronic Health Evaluation (APACHE) II upon admission to predict mortality (Santamaria et al, 2013 & Kalowes et al., 2016). Four out of the five studies implemented a prophylactic sacral dressing along with standard preventative care for their intervention group (Chaiken, 2012; Brindle & Wegelin, 2012; Kalowes et al., 2016 & Santamaria et al., 2013). Byrne et al (2016)

was the only study that used only the application of a prophylactic sacral dressing. All of the studies, except Byrne et al (2016), used a Mepilex© Border Sacrum, a five-layered silicone foam dressing as their prophylactic sacral dressing (Chaiken, 2012; Brindle & Wegelin, 2012; Kalowes et al., 2016 & Santamaria et al., 2013). An Allevyn Sacral Gentle Border was used as the prophylactic sacral dressing in the study by Byrne et al., (2016). All of the studies implemented daily skin assessments, however, only two studies Byrne et al, (2016) and Brindle & Wegelin (2012), mentioned using a specific documentation tool to assess skin and collect data.

In the even that a hospital acquired pressure injury occurred, only two studies utilized evidence based staging criteria (Santamaria et al., 2013 & Kalowes et al., 2016). Santamaria et al., (2013) utilized the Australian Wound Management Association (AWMA) guidelines to stage and define pressure ulcers, whereas Kalowes et al., (2016) utilized the staging criteria from the National Pressure Ulcer Advisory Panel. Two out of the five studies found both a clinical and statistically significant decrease in HAPIs (Kalowes et al., 2016 & Santamaria et al., 2013). Although the remaining three studies did not find a statistical significance, a clinical significance was reported (Chaiken, 2012; Brindle & Wegelin, 2012 & Byrne et al., 2016). Based on the review of the research, there is a general consensus that implementation of a prophylactic sacral dressing and skin assessments decreased the incidence of HAPIs.

Theoretical Framework

Lewin's theory of planned change was utilized to tackle the clinical practice problem of hospital acquired pressure injuries (Appendix B, Figure 1). This theoretical framework is known as the Force Field Analysis Model (FFA) (Bozak, 2003). It was within this FFA model that he identified three critical concepts in precipitating change: driving forces, restraining forces and equilibrium (Bozak, 2003). Where driving forces move toward a positive change, restraining

forces prevent a change from occurring (Bozak, 2003). Together, these forces would detect a need for change, make changes and solidify the improved outcome. Lewin also coined the terms, unfreezing, moving and refreezing as describing the process of change (Bozak, 2003).

The first step in Lewin's theory of planned change is unfreezing; this involves identifying the problem, the driving forces and the restraining forces (Shirey, 2013). The clinical practice problem was HAPIs, specifically in ACES patients with Braden scores less than or equal to fourteen. Driving forces include: positive viewpoint by staff and management, awareness of improvement needed in current practice, high level of autonomy, improved reimbursement, positive social culture, improved patient safety, improved staff morale and improved patient outcomes. Restraining forces include: negative past experiences with change, lack of time, lack of staff, lack of motivation, increased education requiring trainees and their time, lack of accommodation for education and training, low level of commitment by administration and staff and fear of change.

The second phase, known as moving or transitioning, is the implementation of a prophylactic sacral dressing and RN/NP skin assessments. During this phase, unit champions were identified and nurses were educated on the importance of preventing hospital acquired pressure injuries, along with the sacral dressing that will be utilized, how to properly apply the prophylactic sacral dressing. Once the education was complete, the implementation of the prophylactic sacral dressing and RN/NP skin assessments began.

The final phase, refreezing, was accomplished by ongoing skin care documentation audits and education. When specific nurses were identified as not being compliant with the prophylactic sacral dressing and daily skin assessments, individual education was provided.

Methods

The QI project took place in the Surgical Intensive Care Unit (SICU), a 24-bed unit within an academic tertiary care facility in Baltimore, Maryland. The patient population was ACES patients admitted to the SICU, in which there are approximately 20 patients admitted each month. Inclusion criteria for the project included all ACES patients eighteen years of age or older, SICU with an admission Braden score of less than or equal to fourteen, without a pre-existing sacral wound. Exclusion criteria included a preexisting sacral pressure ulcer, transfer out of the SICU within twenty-four hours, or patient expiration within twenty-four hours

The project was implemented in three phases, over ten weeks. Phase I took place over two weeks and included identification of unit champions, educating all RNs on how to appropriately utilize the Braden Scale, the prophylactic sacral dressing used and how to apply it, how to document skin assessments, and how to utilize the data collection form. A lesson plan was created to outline the educational objectives (Appendix C). The education was given on an online module provided through the institution and included a posttest (Appendix D).

Phase II lasted seven weeks and included the implementation of a prophylactic sacral dressing and RN/NP skin assessments. ACES Algorithms were posted in every patient room to help guide decision making by nurses (see Appendix E). When an ACES patient was admitted to the SICU, the bedside nurse completed a baseline skin assessment and completed an admission Braden score. If the Braden score was less than or equal to fourteen, and all other inclusion criteria was met, the patient was enrolled into the QI project. Patients that were enrolled in the QI project had peach reminders on the door and in the multipurpose room to alert staff that the patient was involved in this project. Once the patient was identified as an appropriate candidate for the QI project, the bedside nurse applied the prophylactic sacral dressing and notified the ACES NP through the DocHalo Application. The ACES NP was required to be at the beside

within twelve hours to complete a skin assessment with the bedside nurse. Once the skin assessment was completed, both the RN and the ACES NP documented their skin assessment findings in the EHR. The RNs documented their skin assessment findings under “Integumentary” in the “Complex Assessment” and the ACES NP documented their skin findings in a “Daily Progress Note” within the EHR.

A HAPI Prevention Data Collection Tool was utilized to track patients enrolled in the Qi project. The data collection tool consisted of measures such as: the presence of a prophylactic sacral dressing, RN/NP assessment completion, and any change in the previous sin assessment (see Appendix F). On patient admission to the SICU, and every Tuesday, Thursday, and Saturday, the ACES NP and the bedside RN completed a patient skin assessment together. The HAPI Prevention Data Collection Tool was then completed and kept in a locked safe in the multipurpose room. In the event that the patient developed a HAPI during the implementation phase of the QI project, the Wound Ostomy Care Nurse (WOCN) was notified to provide recommendations.

Phase III consisted of data collection and analysis. Audits were completed to track the compliance of both the RNs and the NPs on the utilization of the prophylactic sacral dressing, complete and correct documentation of the prophylactic sacral dressing, RN/NP skin assessment completion, and whether or not the RN and ACES NP documented their skin assessments in the EHR (Appendix G). Audits took place three days a week, on Mondays, Wednesdays, and Fridays by unit skin champions and the project leader. Descriptive statistics were then obtained including age, gender, and race.

All data was kept in a locked safe in the SICU multipurpose room. No identifying information related to patients such as name, date of birth, and medical records was collected. A

Non-Human Subjects Research approval from the University of Maryland Institutional Review Board was obtained for implementation and evaluation of this quality improvement project.

Results

In order to effectively establish change by implementing a prophylactic sacral dressing and NP/RN skin assessments, educating staff was the first priority. There is a total of 79 SICU RNs. Sixty-seven RNs competed the online educational module, yielding an 85% compliance rate (Appendix H). The 12 RNs who did not complete the online educational module received one on one education.

There was a total of eighteen ACES patients that met criteria and were enrolled in the QI project. Demographic data was also collected including age, gender, race, and baseline Braden Scores. Ages ranged from eighteen to eighty-seven, with an average age of fifty-five. Twelve of the patients were female, (67%), and six of them were male (33%). Seven of the patients were African American (39%), ten of them were Caucasian (56%), and one of them were Hispanic (6%). Braden scores ranged from ten to fourteen, with an average Braden score of thirteen.

There was a total of 63 audits performed over the seven weeks of implementation. In total, 96% (n=61) of audits indicated that patients who were enrolled in the QI project had a prophylactic sacral dressing applied (goal =100%). One hundred percent of ACES patients had a skin assessment documented by RNs, and 35% (n=22) of the audits indicated that ACES patients had a skin assessment documented by ACES NPs. The overall compliance rate of NP/RN HAPI Data Collection Form completion was 44% (n=35). When examining data as a whole, baseline data collected from January 1, 2019 to August 31, 2019 demonstrated six HAPI among ACES patients (Appendix J). Post implementation, there were zero HAPIs (goal=0) (Appendix K).

Discussion

Despite best efforts, there were challenges that occurred. The first problem encountered was with compliance. Both the RNs and ACES NPs were not consistently compliant with completing the HAPI Data Collection Form. The ACES NPs lacked consistency in seeing the patients on admission and on Tuesdays, Thursdays, and Saturdays. In order to help remind staff about the QI project, updates were given during daily safety huddles and also within the weekly updates via email.

The second problem encountered was that some of the RNs did not have the electronic DocHalo application to notify the ACES NP that an ACES patient was admitted and met criteria. In an effort to increase compliance, the DNP student was notified by the SICU charge nurse of all ACES admissions. The DNP student then contacted the bedside RN and discussed the patients Braden Score and inclusion/exclusion criteria. If the patient was deemed appropriate to enroll into the QI project, the bedside RN would apply and document the prophylactic sacral dressing, along with the skin assessment in the EHR. The DNP student would then contact the ACES NP via DocHalo. In the event that the ACES NP was unable to come to the bedside, due to lack of staffing, lack of time, or varying patient acuity, the DNP student would take pictures using the Epic Haiku application. This Health Insurance Portability and Accountability Act (HIPPA) compliant application allowed the ACES NP to visualize the patient's sacrum without having to come to the unit. The ACES NP could then document in the EHR that they were able to assess the patients skin via a photograph in the patients' medical record. These photographs also allowed for a visual paper trail of the patient's skin to better assess for changes in the patient's skin. While analyzing the data, the compliance rates of skin assessments improved from 0% to 40% after the DNP student was integrated into the QI project. This improvement, starting at week 4 may have correlated due to changing strategies.

Although compliance varied throughout the seven weeks, the intervention proved to be successful. The outcome of this QI project correlate with current evidence based literature that the implementation of a prophylactic sacral dressing and skin assessment can decrease the incidence of HAPIs (Kalowes et al., 2016; Santamaria et al., 2013; Chaiken, 2012; Brindle & Wegelin, 2012; & Byrne et al., 2016). These findings in the literature were the rationale behind launching this QI project and implementing the practice change.

Due to the varying compliance, especially among ACES NPs, it was decided that RN/NP skin assessments were not able to be sustained secondary to lack of staffing, resources, and varying priorities at this time. Given the inability to sustain NP/RN skin assessments, the WOCN, SICU leadership, and unit skin champions are looking to implement nurse/nurse skin assessments within four hours of admission to the SICU and documenting their findings in the EHR. Although the RN/NP skin assessments could not be sustained, it was decided that the implementation of a prophylactic sacral dressing was able to be continued.

Conclusion

Hospital acquired pressure injuries are a major concern for today's healthcare system and effect various patients and populations, without regards to sex, race, and age. This QI project introduced an evidence based approach to preventing HAPIs by implementing a prophylactic sacral dressing and NP/RN skin assessments in high risk ACES patients identified via the Braden Scale. ACES NPs identified a problem with HAPIs among their patient population and asked for assistance to reduce the problem. In an effort to decrease the incidence of HAPIs, implementation of a prophylactic sacral dressing and RN/NP skin assessments were deployed.

Despite varying compliance rate among ACES NPs and RNs, the implementation of a prophylactic sacral dressing and RN/NP skin assessments decreased the incidence of HAPIs

among high risk ACES patients in the SICU. Continued positive effects related to decreased HAPIs include improved patient outcomes and decreased cost of care; highlighting the importance of sustaining the use of a prophylactic sacral dressing. Continuing to educate staff on the importance of preventing HAPIs, as well as ways to prevent HAPIs remains a crucial factor in improving patient outcomes

References

Agency for Healthcare Quality and Research. (2014). Preventing pressure ulcers in hospitals. *U.S. Department of Health and Human Services*. Retrieved from: https://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool7b.html

Allevyn Gentle Border Multisite Foam Dressing. (n.d.). Retrieved from: https://www.healthproductsforyou.com/p-smith-nephew-allevyn-gentle-border-multisite-silicone-gel-adhesive-hydrocellular-foam-dressing.html?gclid=EAIaIQobChMIyq_P9pGA4QIVj0wNCh1C5QvwEAQYBSABEgIzKvD_BwE

Chaiken, N. (2012). Reduction of sacral pressure ulcers in the intensive care unit using a silicone border foam dressing. *Wound, Ostomy and Continence Nurses Society*. 39(2), 143-145.

Bozak, M.G. (2003). Using lewin's force field analysis in implanting a nursing information system. *Computers, Informatics, Nursing*. 21(2), 80-85.

Brindle, T.C. & Wegelin, J.A. (2012). Prophylactic dressing application to reduce pressure ulcer formation in cardiac surgery patients. *Wound, Ostomy and Continence Nurses Society*. 39(2), 133-142.

Byrne, J., Nichols, P., Sroczynski, M., Stelmaski, L., Stetzer, M., Line, C. & Carlin. (2016). Prophylactic sacral dressing for pressure ulcer prevention in high-risk patients. *American Journal of Critical Care Nursing.* 25(3), 228-234.

Health Research & Educational Trust (2016). Hospital acquired pressure ulcers (HAPU) change package: 2016 Update. *Health Research & Educational Trust.* Retrieved from: www.hret-hen.org

Kalowes, P., Messina, V. & Li, M. (2016). Five-layered soft silicone foam dressing to prevent

pressure ulcers in the intensive care unit. *American Journal of Critical Care*. 25(6), 108-119.

Kayser, S.A., VanGilder, C.A. & Lachenbruch, C. (2019). Predictors of superficial and severe hospital-acquired pressure injuries: a cross-sectional study using the International Pressure Ulcer Prevalence survey. *International Journal of Nursing Studies.* 89, 46-52.

Mitchell, G. (2013). Selecting the best theory to implement planned change. *Art & Science Nursing Management.* 20(1), 32-37.

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. (2016). *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide.* Cambridge Media: Osborne Park, Australia.

Newhouse, R.P., Dearholt, S.L., Poe, S.S., Pugh L.C., & White, K.M. (2007). *Johns Hopkins nursing evidence-based practice model and guidelines*. Indianapolis, IN: Sigma Theta Tau International Honor Society of Nursing.

Padula, W. V. (207). Effectiveness and value of prophylactic 5-layer foam sacral dressings to prevent hospital-acquired pressure injuries in acute care hospitals. *Journal of Wound Ostomy & Continence Nursing*. 44(5), 413-419.

Padula, W.V. & Delarmente, B.A. (2019). The national cost of hospital-acquired pressure injuries in the United States. *International Wound Journal*. 1-7.

Santamaria, N., Gerdtz, M., Sage, S., McCann, J., Freeman, A., Vassilioi, T., De Vincentis, S., Wei Ng, A., Manias, E., Liu, W. & Knott, J. (2015). A randomized controlled trial of the effectiveness of soft silicon multi-layered foam dressings in the prevention of sacral and heel pressure ulcers in trauma and critically ill patients: the border trial. *International Wound Journal.* 12(3), 302- 308

Shirey, M.R. (2013). Lewin's theory of planned change as a strategic resource. *Journal of Nursing Administration.* 43(2), 69-72.

Sullivan, N. & Schoelles, K.M. (2013). Preventing in-facility pressure ulcers as a patient safety strategy: a systematic review. *Annals of Internal Medicine.* 158, 410-416.

Appendix A

Review of the Evidence

Study Citation: Brindle, T.C. & Wegelin, J.A. (2012). Prophylactic dressing application to reduce pressure ulcer formation in cardiac surgery patients. *Wound, Ostomy and Continence Nurses Society*. 39(2), 133-142					
Study Objective: Determine if application of a self-adherent silicone border foam dressing would reduce pressure ulcer incidence when compared to standard preventative interventions.					
Design & Method	**Sample & Setting**	**Major Variables Studied**	**Outcomes Measures & Data Analysis**	**Findings**	**Appraisal/Level and Quality/Conclusions** **Level**: III/C
Design: Quasi- experimental **Method:** Patients admitted to the CSICU were screened for inclusion based off of risk factors. Patients were then assigned to either the standard treatment group or the intervention group. Rooms on the unit were preselected (7 intervention rooms/7standard practice rooms).	*N*= 100 (however, 15 patients were excluded due to incomplete data or discharge from CSICU). **Intervention group:** *n*= 56 **Control group:** *n*=39 **Setting:** CSICU in Virginia between July 2010 and September 2010.	**Independent variable:** Patients receiving intervention of a prophylactic sacral dressing, along with standard care. **Dependent variable:** Reduction in sacral pressure ulcers.	-Cox proportional hazards regression model -Kaplan-Meier estimate	-8 pressure ulcers developed in 4/35 patients in standard care group. -1 pressure ulcer developed in the intervention group. -Unadjusted HR from Cox regression model was 4.4 (95% CI: 0.49 to 39.4, *P*=.19). -After adjustment by propensity score, the HR was 3.6 (95% CI: 0.32 to 40.7, *P*=.30), therefore patients who received standard care alone (control group), were 3.6 times more likely to develop a pressure ulcer compared to	**Strengths:** -Quasi-experimental study is practical, feasible and can be generalized. -Ethically safe. -Tables and results clearly presented. -Inclusion/ exclusion criteria were clearly defined. **Limitations:** -Small sample size/single setting -Convenience sample. -Possibility of selection bias. -No power analysis. -Other skin prevention strategies were already being instituted therefore it is hard to distinguish whether or not the prophylactic sacral border decreased the incidence of PU rates, possibility of confounding factors. -IRB delay which led to changes in sample size and design (originally a multicenter trial comprising three academic medical centers, however IRB delay led to two sites withdrawing decreasing the sample size and power of the study to detect differences between groups.) -Overall incidence of pressure ulcers were less than anticipated.

				the intervention group.	**Conclusions:** -Timely assessment for inclusion and implementation of sacral dressing. -Inspect skin daily. -Implement Mepilex, a five-layer silicone foam dressing. -Change sacral dressing every 3 days or PRN. -Reassess risk using Braden Scale. -Integrate standard preventative practices along with prophylactic dressing.

Abbreviations: CSICU, cardiac intensive care unit; CI, confidence interval; HR, hazard ratio; IRB, institutional review board; PRN, as needed.

Study Citation: Kalowes, P., Messina, V. & Li, M. (2016). Five-layered soft silicone foam dressing to prevent pressure ulcers in the intensive care unit. *American Journal of Critical Care*. 25(6) 108-119.

Study Objective: To compare the difference in incidence rates of HAPUs in critically ill patients, with the use of a 5-layered soft silicone foam dressing.

Design & Method	**Sample & Setting**	**Major Variables Studied**	**Outcomes Measures & Data Analysis**	**Findings**	**Appraisal/Level and Quality/Conclusions** **Level**: I/A
Design: Prospective randomized controlled trial **Method:** Patients were screened upon admission for eligibility and then randomized to either the control group or intervention group.	*N*= 366 **Intervention group:** *n*= 184 **Control group:** *n*=182 **Setting:** Cardiac, medical and trauma ICUs in a 569- bed, level II trauma hospital between November 2011 and December 2012	**Independent variable:** Patients receiving intervention of a prophylactic sacral dressing, along with standard care SKIN Bundle **Dependent variable:** Reduction in sacral pressure ulcers.	-Cox proportional hazards regression	-A total of 370 patients would be required to detect a 5% decrease in pressure ulcers. -Patients in the intervention group had a HR of 0.12 (95% CI, 0.02-0.98; *P*=.01) -Patients treated with dressings had an 88% reduced risk of HAPUs developing. -The cumulative incidence of HAPUs was significantly lower in the intervention group (0.7% vs. 5.9%, *P*=0.01)	**Strengths:** -Randomized -Power analysis used. -Large sample size. -Used multiple units within a level 2 trauma institution. -Cost effectiveness tracked. -Intention-to-treat analysis was used. -Tables and results clearly presented. -Inclusion/ exclusion criteria were clearly defined. -Ethically safe. -Power analysis performed. **Limitations:** -Single institution. -Impossible to blind data collectors due to nature of the treatment intervention. -Other skin prevention strategies were already being done on the units therefore it is hard to distinguish whether or not the prophylactic sacral border decreased the incidence of PU rates, possibility of confounding factors. **Conclusions:** -Timely assessment of inclusion and implementation of sacral dressing. -Inspect skin daily.

					-Implement Mepilex, a five-layer silicone foam dressing. -Change sacral dressing every 3 days and PRN. -Reassess risk using the Braden Scale. -Integrate standard preventative strategies along with a prophylactic sacral dressing.

Abbreviations: HAPU, hospital acquired pressure ulcer; ICU, intensive care unit; HR, hazard ratio; CI, confidence interval; PRN, as needed.

Study Citation: Byrne, J., Nichols, P., Sroczynski, M., Stelmaski, L., Stetzer, M., Line, C. & Carlin, K. (2016). Prophylactic sacral dressing for pressure ulcer prevention in high-risk patients. *American Journal of Critical Care Nursing.* 25(3), 228-234.					
Study Objective: To assess whether treating high-risk patients with a prophylactic sacral dressing decreases the incidence of unit-acquired pressure ulcers.					
Design & Method	**Sample & Setting**	**Major Variables Studied**	**Outcomes Measures & Data Analysis**	**Findings**	**Appraisal/Level and Quality/Conclusions** **Level**: II/B
Design: Prospective, nonrandomized, quasi-experimental observational study (no control) **Method:** All patients were screened upon admission to one of the three ICUs. Based off of their risk factors, a sacral dressing was applied. A data collection sheet was used to track pressure ulcers.	*N*= 243, (however, only 200 of them had completed data). **Setting:** 3 ICUs: SCCU, MCCU and the MICU at an urban tertiary academic medical center between October 2011 and November 2012.	**Independent variable (IV):** High risk patients receiving intervention of a prophylactic sacral dressing. **Dependent variable (DV):** Reduction in sacral pressure ulcers.	-Incidence rate ratios -Confidence intervals	-The number of unit acquired sacral pressure ulcers decreased by 3.4 to 7.6 per 1000 patient days - SCCU had an IR of 0.41 (95% CI, 0.16-1.09; *P*=.08) -MCCU had an IR of 0.54 (95% CI, 0.16-1.78, *P*=.31 -MICU had an IR of 0.49 (95% CI, 0.14-1.73, *P*=.27) -Throughout all 3 ICUs, the use of a prophylactic sacral dressing led to a decrease in the incidence of HAPIs.	**Strengths:** -Quasi-experimental, observational study. -Large sample size. -Used more than one ICU within the institution. -Tables and results clearly presented. -Inclusion/exclusion criteria clearly defined. - Other skin prevention strategies were not being done on the units. -Dermal defense champions used. -Although not statistically significant, it was clinically significant. -Ethically safe. **Limitations:** -Demographic information not collected. -Convenience sample. -Single institution. -Poor/incomplete documentation on 43 patients who had the dressing, therefore excluding them from the study. -Interrater reliability could not be used. **Conclusions:** -Timely assessment of inclusion and implementation of sacral dressing.

					-Inspect skin daily. -Implement Allevyn, a silicone foam dressing. -Change sacral dressing every 3 days and PRN. -Education and reminders to staff regarding application and prevention of pressure ulcers (Dermal Champions).

Abbreviations: ICU, intensive care unit; SCCU, surgical coronary care unit; MCCU, medical coronary care unit; MICU, medical intensive care unit; IR, incidence ratio; CI, confidence interval; PRN, as needed.

Study Citation: Santamaria, N., Gerdtz, M., Sage, S., McCann, J., Freeman, A., Vassilioi, T., De Vincentis, S., Wei Ng, A., Manias, E., Liu, W. & Knott, J. (2015). A randomized controlled trial of the effectiveness of soft silicon multi-layered foam dressings in the prevention of sacral and heel pressure ulcers in trauma and critically ill patients: the border trial. *International Wound Journal.* 12(3), 302- 308.

Study Objective: Determine the effectiveness of multi-layered soft silicone foam dressings in preventing ICU pressure ulcers when applied in the ED to trauma and critically ill patients.

Design & Method	**Sample & Setting**	**Major Variables Studied**	**Outcomes Measures & Data Analysis**	**Findings**	**Appraisal/Level and Quality/Conclusions** **Level**: I/A
Design: Prospective, open-label, randomized controlled trial **Method**: Patients who met inclusion criteria were randomly assigned to either the control group or the intervention group.	*N*= 440 **Intervention group:** *n*=219 **Control group:** *n*=221 **Setting:** A large academic teaching hospital in Australia between April 2011 and December 2012.	**Independent variable**: Patients receiving a sacral dressing plus standard prevention strategies. **Dependent variable:** Reduction in sacral pressure ulcers.	-Power analysis -ARR -Cox regression analysis	- A total of 220 patients would be required to detect a 3.5% decrease in pressure ulcers. -The EER was 3.1%, whereas the CER was 13.1%, therefore the ARR was 10%, which provides the NNT value of 10. -HR for developing a pressure ulcer in the intervention group of 0.198 (95% CI 0.065-0.555, *P*=0.002) -Intervention group had significantly less patients who developed a pressure ulcer in the ICU (5 vs. 20, *P*=0.001).	**Strengths:** -Randomized control trial. -Large sample size. -Power analysis used. -Tables and results clearly presented. -Inclusion/ exclusion criteria were clearly defined. -Ethically safe. **Limitations:** -Single institution -Not possible to blind data collectors to the nature of the treatment intervention. -Results can only be viewed in the context of the critically ill patient in the ED and ICU setting. -Other skin prevention strategies were already being done on the units, therefore it is hard to distinguish whether or not the prophylactic sacral border decreased the incidence of PU rates, possibility of confounding factors. **Conclusions:** -Timely assessment of inclusion -Implement prophylactic dressing upon admission to ED for patients being admitted to the ICU. -Inspect skin daily.

				-There were significant reductions in both sacral (2 vs. 8, *P*=0.05) and heel pressure ulcerations (5 vs. 10, *P*=0.002) compared to the control group.	-Implement Mepilex, a five-layer silicone foam dressing. -Change sacral dressing every 3 days and PRN. -Reassess risk using the Braden Scale. -Integrate standard preventative strategies along with a prophylactic sacral dressing.

Abbreviations: ICU, intensive care unit; ED, emergency department; ARR, absolute risk reduction; EER, experimental event rate; CER, control event rate; NNT, number needed to treat; HR, hazard ratio; CI, confidence interval; PRN, as needed.

Study Citation: Chaiken, N. (2012). Reduction of sacral pressure ulcers in the intensive care unit using a silicone border foam dressing. *Wound, Ostomy and Continence Nurses Society*. 39(2), 143-145.					
Study Objective: To determine if a silicone border foam dressing could decrease the incidence of sacral pressure ulcers in the ICU.					
Design & Method	**Sample & Setting**	**Major Variables Studied**	**Outcomes Measures & Data Analysis**	**Findings**	**Appraisal/Level and Quality/Conclusions** **Level**: III/B
Design: Non-experimental prospective design **Method:** A 35-month observation of the prevalence of sacral HAPUs was conducted as baseline data. Sacral HAPU incidence was measured during a 6-month prospective data collection period.	*N*= 564 **Intervention group:** *n*=273 **Control group:** *n*=291 **Setting:** Community-based, level 2 trauma hospital in Chicago, Illinois.	**Independent variable:** Patients receiving a sacral dressing plus standard prevention strategies. **Dependent variable:** Reduction in sacral pressure ulcers.	None mentioned.	-Sacral HAPU prevalence over 35 months was 12.3%. Over the 6- month intervention period, 5 HAPUs occurred. Sacral HAPU incidence rate over the 6 months was 1.8%. -These findings suggest the routine application of the sacral dressing may have reduced the incidence of HAPUs in the ICU.	**Strengths:** -Large sample size -Ethically safe. -Cost tracked. **Limitations:** -Nonexperimental. -Because the WOCN visited daily, that may have influenced more turning therefore decreasing HAPUs. -Non-randomized. -Single institution. -Single setting. -Convenience sample. -Other skin prevention strategies were already being done on the units therefore it is hard to distinguish whether or not the prophylactic sacral border decreased the incidence of PU rates, possibility of confounding factors. -No power analysis reported. -Inclusion/exclusion criteria not reported. **Conclusions:** -Timely assessment of inclusion and implementation of sacral dressing. -Inspect skin daily. -Implement Mepilex, a five-layer silicone foam dressing.

					-Change sacral dressing every 3 days and PRN. -Reassess risk using the Braden Scale. -Integrate standard preventative strategies along with a prophylactic sacral dressing.

Abbreviations: ICU, intensive care unit; HAPU, hospital acquired pressure ulcers; WOCN, wound, ostomy care nurse; PRN, as needed.

Appendix B

Theoretical Framework

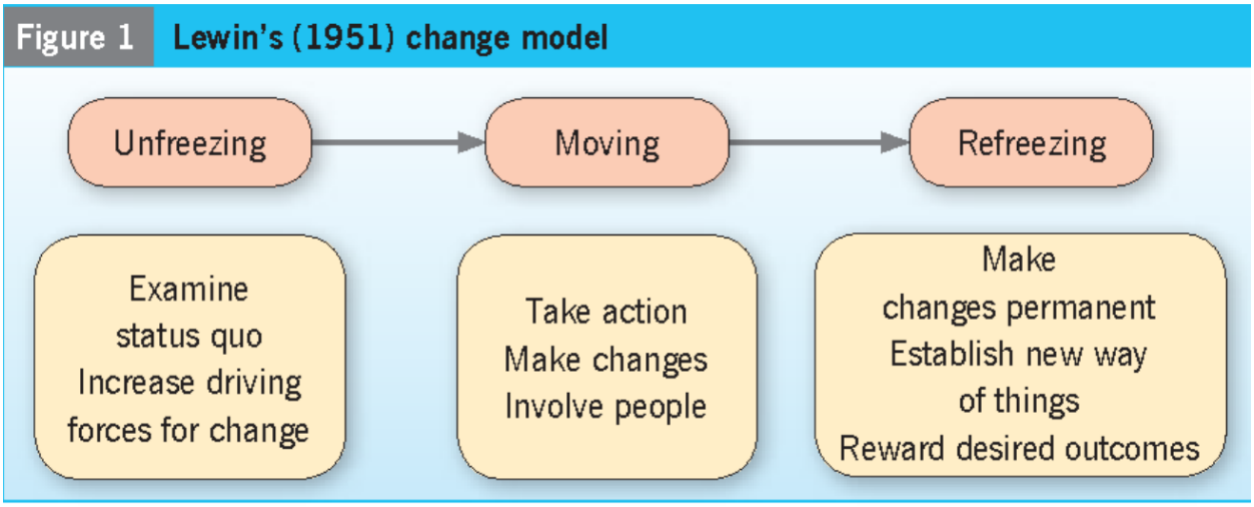


Figure 1. Conceptual framework for Lewin's theory of planned change (Mitchell, 2013).

Appendix C

Lesson Plan for Education

Objective

The purpose of this formal education is to inform Surgical Intensive Care Unit (SICU) nurses about the significance of hospital acquired pressure injuries (HAPIs), reinforce understanding and application of the Braden Scale, discuss patient factors associated with an increased risk for HAPIs, discuss appropriate placement and utilization of the Allevyn Gentle Border Multisite prophylactic sacral dressing, utilization of the Acute Care Emergency Surgery (ACES) Algorithm, and how the registered nurse (RN) and nurse practitioner (NP) skin assessments are conducted and documented.

Content Outline

1. Significance of the problem
    a. If a patient develops a pressure injury while in the hospital, there is an increased occurrence of poorer health outcomes such as reduced quality of life and increased costs of healthcare (Kayser, VanGilder & Lachenbruch, 2019).
    b. On the SICU, the prevalence rates of HAPIs increased by between fiscal year 2015 and fiscal year 2016, with a total of fourteen HAPIs in fiscal year 2015, and twenty-five HAPIs in fiscal year 2016.
    c. A majority of the patients who developed HAPI were ACES patients.
    d. HAPIs lead to poor patient outcomes, increased hospital length of stay, and decreased quality of life.
2. Braden Scale

   a. The Braden Scale is a validated and recommended tool that consists of six subscales that contribute to the development of a pressure ulcer (Agency for Healthcare Research and Quality, AHRQ, 2014).
   b. These six subscales include: sensory perception, moisture, activity, mobility, nutrition, and friction & shear (AHRQ, 2014).
   c. Total score ranges from 6-23, with any score 18 or less indicating a high risk for developing a pressure injury (AHRQ, 2014).
   d. The lower the Braden score, the higher the risk of developing a HAPI.
   e. Allotting patient's the appropriate Braden score is crucial to identify those at low, moderate, and high risk.
   f. For the implementation of this quality improvement (QI) project, a Braden score less than or equal to fourteen is considered high risk.

3. Patient Factors
   a. Critically ill patients admitted to the intensive care unit (ICU) are predisposed to developing a pressure ulcer due to lack of movement, poor nutrition, hemodynamic instability, prolonged surgical procedures and poor circulation (Byrne, Nichols, Sroczynski, Stelmaski, Stetzer, Line, & Carlin, 2016).
   b. Other patient factors include: obesity, diabetes mellitus, corticosteroids, and prolonged immobility.
4. Allevyn Gentle Border Multisite Dressing
   a. The prophylactic sacral dressing that will be utilized is a triple layer, soft silicone gel adhesive that uses a highly absorbent hydrocellular foam pad to maintain optimal wound moisture and facilitate wound healing.

b. Correct placement of the prophylactic sacral dressing is vital to ensure effectiveness
    i. Ensure sacral skin is clean and dry, spread gluteal cleft and locate coccyx, peel off films from dressing, place the distal end of the dressing at the patient's coccyx, and adhere to skin.
c. Every shift, the dressing should be peeled back and the skin should be assessed.
d. Dressings should be changed every 72 hours or when soiled

5. ACES Algorithm
    a. Step by step algorithm constructed to provide direction regarding decision making for project.
        i. Admit patient
        ii. If the admission is an ACES patient, the RN will complete the Braden Scale and a preliminary skin assessment.
        iii. If the Braden score is less than or equal to fourteen, implement prophylactic sacral dressing and document placement under the "Daily Care" Flowsheet in the electronic health record (EHR).
        iv. Next, the bedside RN must notify the ACES NP that a patient meets inclusion criteria and is enrolled in the QI project.
            1. Nurses will text the NP on the DocHalo Application, a secure, private, and confidential communication tool.
            2. Nurses will open the application, click on 'Teams' and scroll down to 'UMMC- Acute Care Emergency Surgery ACES'
            3. Once the nurse chooses the appropriate team, the nurse will send the ACES team a notification about the patient.

v. ACES NP have twelve hours to come and do a bedside skin assessment with the RN.

6. Skin Assessments
    a. On admission, and three days a week, (Tuesday, Thursday, and Saturday) the ACES NP and bedside RN will conduct a skin assessment.
    b. RNs will document their findings under the “Integumentary” category in the “Complex Assessment” Flowsheet.
    c. ACES NP will document their findings in the “Daily Progress Note” in the EHR.
    d. Bedside RN and ACES NP will then complete the data collection tool.
    e. In the event a patient develops a HAPI during the implementation phase, the wound care nurse (WOCN) will be consulted.
        i. Treatment recommendations by the WOCN will be implemented.

Appendix D

HAPI Prevention Post-Test

1. **When should patient skin assessments be completed?**
    a. Admission to the unit
    b. Every shift
    c. Change in previous wound status
    d. All of the above

2. **Which of the following are components of the Braden Scale? (check all that apply)**
    a. Moisture
    b. Nutrition
    c. Skin temperature
    d. Mobility

3. **When applying an Allevyn Gentle Border Multisite Sacral Dressing, which of following explains the correct placement?**
    a. Ensure skin is clean and moist, spread gluteal cleft and locate coccyx, peel off films from dressing, place the distal end of the dressing at the patient's coccyx, and adhere to skin.
    b. Ensure sacral skin is clean and dry, peel off films from dressing, place dressing above the gluteal cleft and adhere to skin.
    c. Ensure sacral skin is clean and dry, peel off films from dressing, use skin protectant to sacral area, spread gluteal cleft, place dressing with the distal end of the dressing at the top of gluteal cleft, and adhere to skin.
    d. Ensure sacral skin is clean and dry, spread gluteal cleft and locate coccyx, peel off films from dressing, place the distal end of the dressing at the patient's coccyx, and adhere to skin.

4. **How many categories comprise the Braden Scale?**
    a. 5
    b. 6
    c. 4
    d. 7

5. **Which of the following increases the patients risk for developing a HAPI?**
    a. Diabetes Mellitus
    b. Obesity
    c. Corticosteroid use
    d. Prolonged immobility
    e. All of the above

6. **True or False: The higher the Braden score the higher risk of developing a pressure ulcer.**

a. True
b. False

7. Which intervention associated with the Allevyn Gentle Border Multisite dressing is correct?
a. Change the dressing every 72 hours or when soiled
b. Peel back dressing and assess underlying skin every 72 hours
c. Use dressing on patients with uncontrolled fecal and/or urinary incontinence to protect patients skin
d. Apply the dressing even if a patient has an allergy to silicone

8. If a patient has a Braden score of 14, what category does this patient fall into?
a. Mild risk
b. Moderate risk
c. High risk
d. Very high risk

9. Mr. S requires the ceiling lift for getting out of bed. He slides down in the bed and requires frequent repositioning with maximum assistance. What friction and shear score would you assign to Mr. S?
a. 1
b. 2
c. 3
d. 4

10. Mrs. Smith is a 74-year-old female who was admitted to the SICU after a small bowel resection. Mrs. Smith only responds to painful stimuli and is currently on bedrest. She can only make slight changes in her body position and requires moderate to maximum assistance in moving. For 5 days prior to her surgery, she rarely ate a complete meal, and she is currently on trickle tube feeds. Mrs. Smith's skin is currently dry, without any moisture. What is Mrs. Smith's Braden score?
a. 12
b. 14
c. 15
d. 13

11. How should you notify the ACES advanced practice providers that a patient has been admitted and meets qualification for enrollment in the QI project?
a. Email
b. DocHalo
c. Text message
d. Phone call

12. Where should RNs document their skin assessment?
a. Daily Care Flowsheet
b. Wounds, Drains, and Airways Flowsheet

c. Integumentary category under Complex Assessment Flowsheet
d. None of the above

13. What are inclusion criteria for the QI project?

a. Older than 18 years of age
b. ACES patient
c. Braden score less than or equal to 14
d. All of the above

14. Once a patient has been admitted and enrolled in the QI project, on what days do RN/APP skin assessments occur?

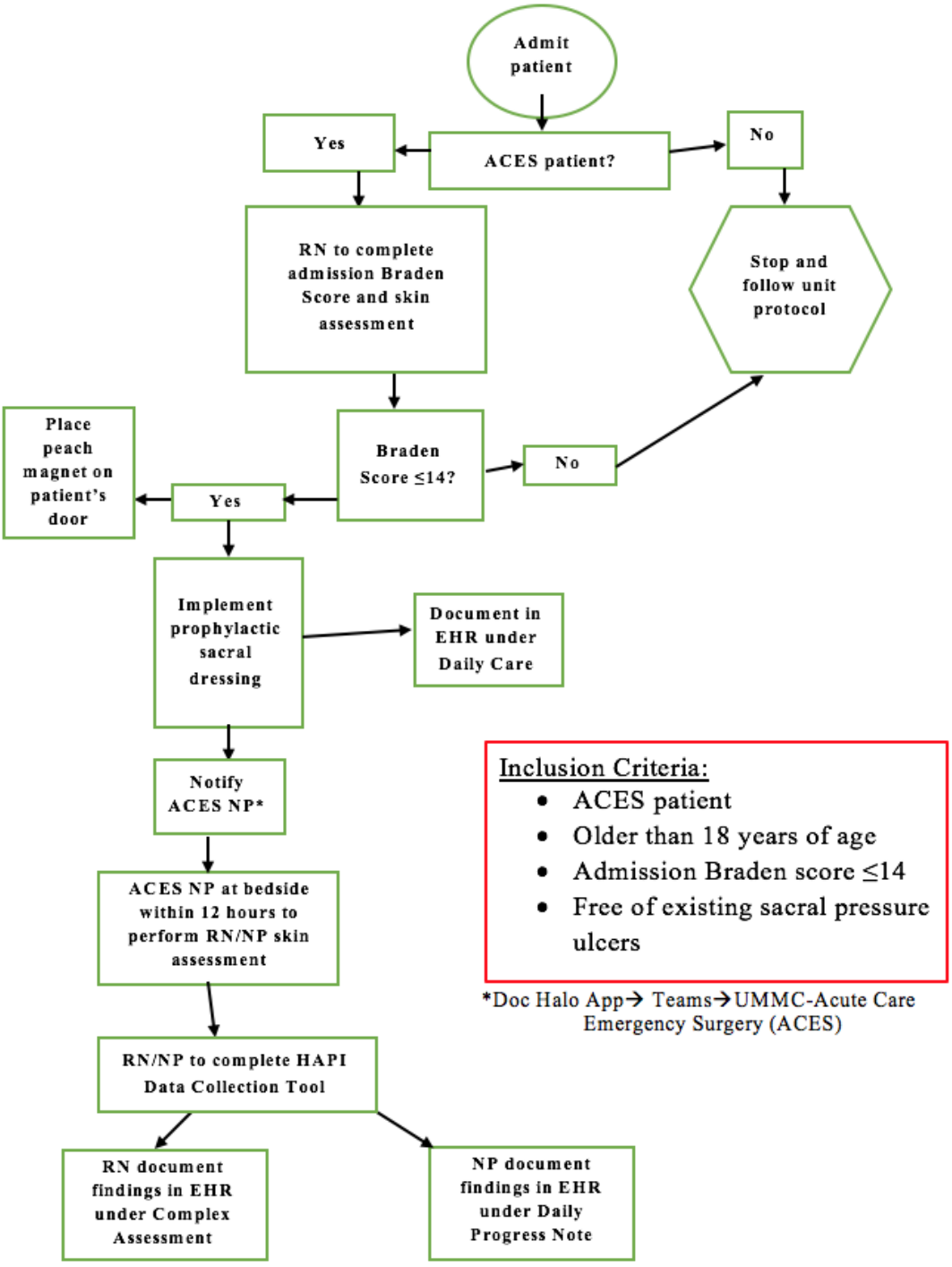
a. Monday, Wednesday, Friday
b. Monday-Friday
c. Tuesday, Thursday, Saturday
d. Saturday and Sunday

15. **True or False: In the event that a patient develops a hospital acquired pressure injury while enrolled in the QI project, the WOCN should be notified.**

a. True
b. False

Appendix E

ACES Algorithm



Appendix F

HAPI Prevention Data Collection Tool

Room Number: _____ SICU Admission Date:_____

Admission Braden Score:_____ SICU Discharge Date:_____

Date	**Prophylactic Sacral Dressing (Y/N)**	**RN/NP Skin Assessment (Code #)**	**Change in Previous Skin Assessment? (Y/N) If Yes, Explain**

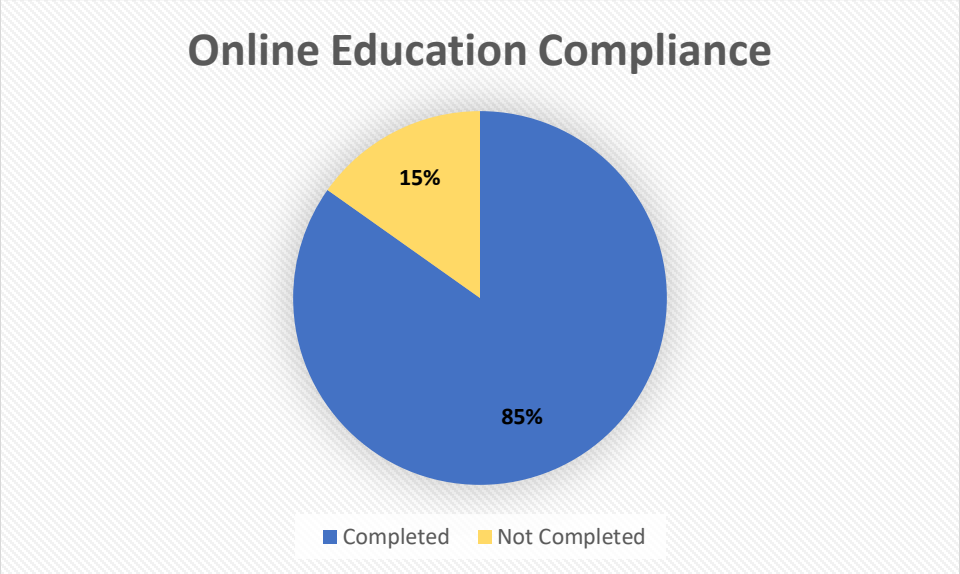
Appendix G

HAPI Prevention Audit Tool

Date	Prophylactic Sacral Dressing in Place? (Y/N)	Prophylactic Sacral Dressing Documented in EHR (Y/N)	RN/NP Skin Assessment Completed in EHR (Y/N)	RN Skin Assessment Documented in EHR (Y/N)	ACES NP Skin Assessment Documented in EHR (Y/N)

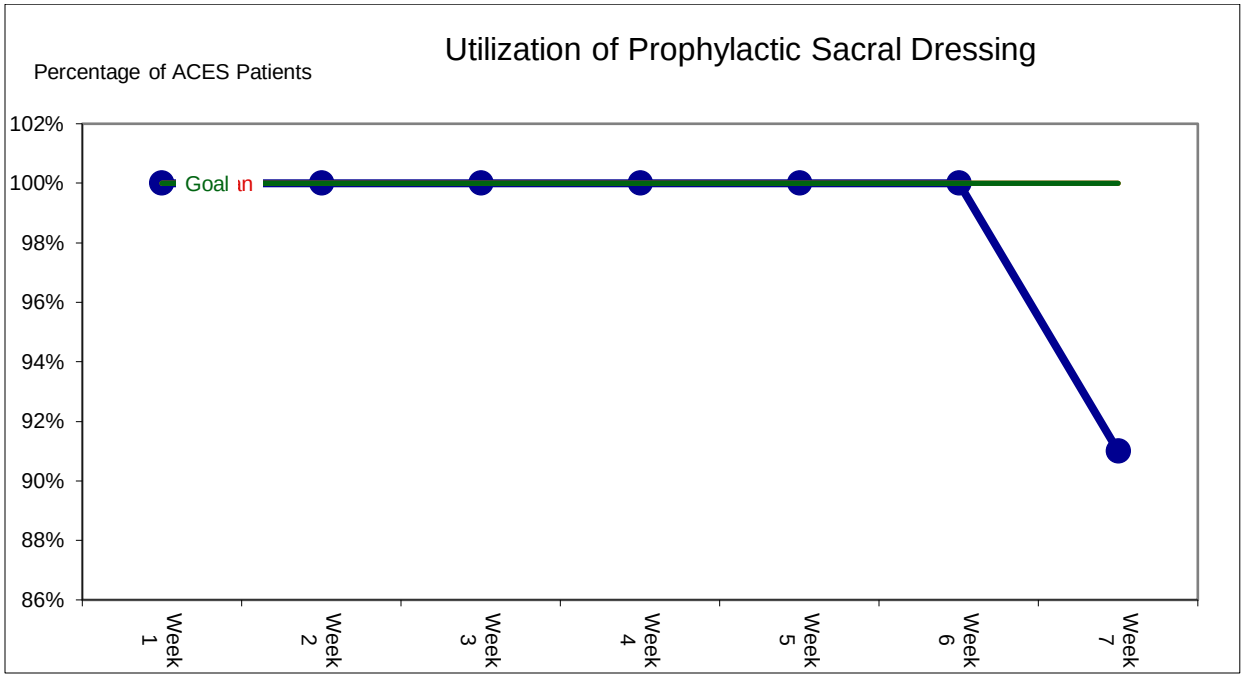
Appendix H

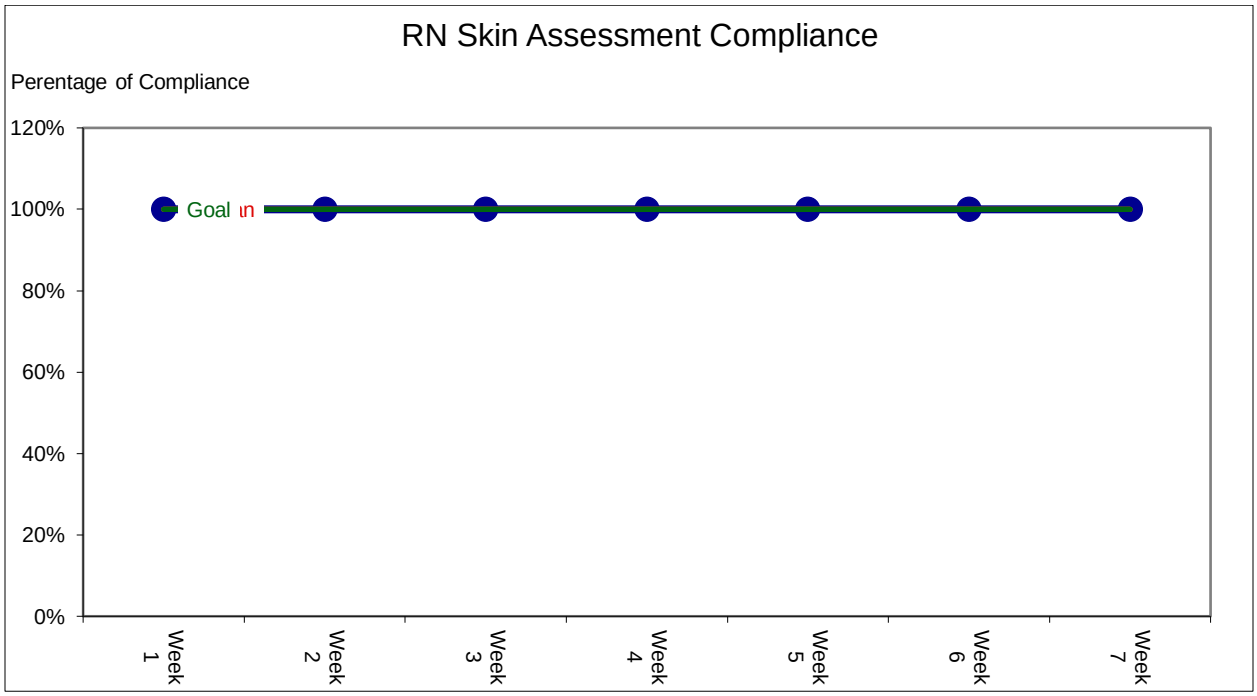
RN Education Compliance

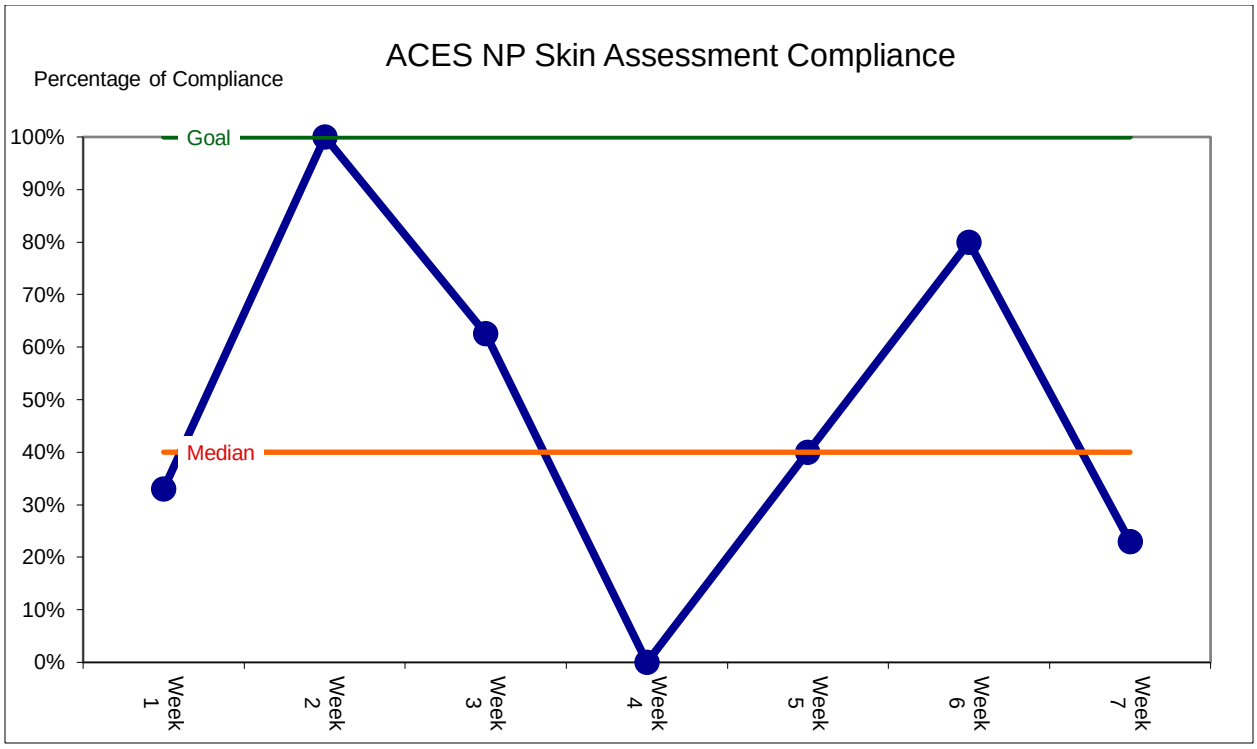


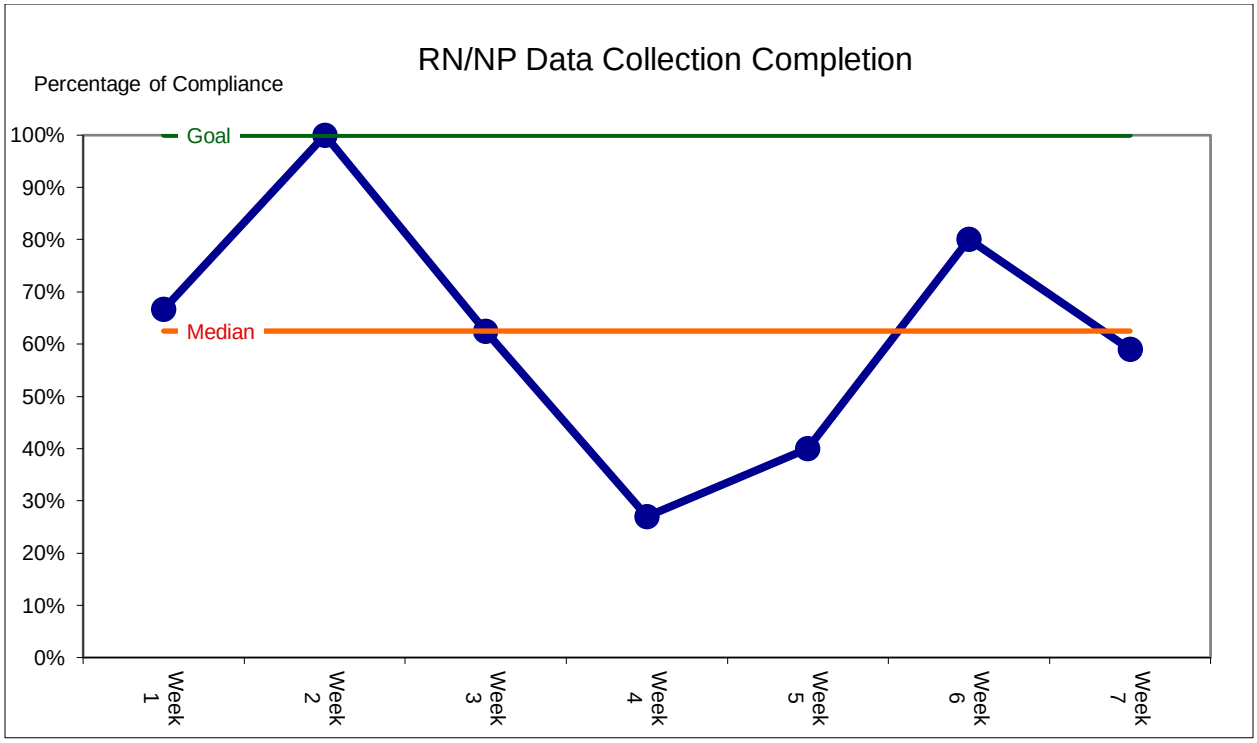
Appendix I

Compliance Run Charts



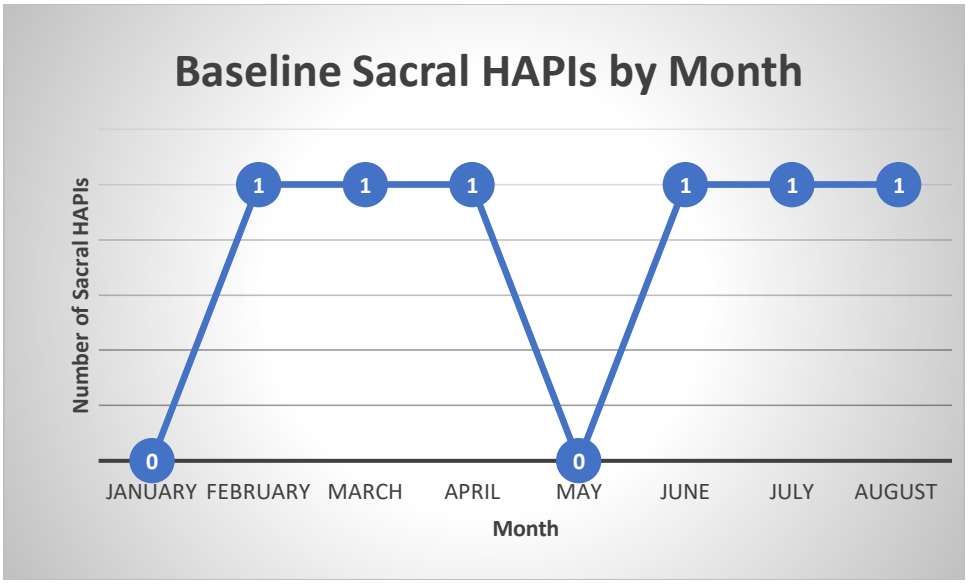



ACES NP Skin Assessment Compliance
Percentage of Compliance
Goal
Median
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7


RN/NP Data Collection Completion
Percentage of Compliance
Goal
Median
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Week 7

Appendix J

Pre-Implementation Sacral HAPIs



Appendix K

Post-Implementation Sacral HAPIs