

Hospital Acquired Pressure Ulcer Prevention
Admission Bundle

by

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Abstract

Background: The development of a pressure ulcer is detrimental to the patient, their family, providers, and hospital-based systems. Pressure ulcer development is not only costly but they are associated with an increase in morbidity and mortality. Hospital acquired pressure ulcers (HAPUs) are prevalent nationally and their incidence was on the rise in the state of Maryland as of 2015.

Local Problem: In 2017, a heart/vascular unit within a community hospital in Maryland identified the development of HAPUs among five patients, with one patient ultimately succumbing to their pressure ulcer due to sepsis from infection in their HAPU. In 2018 five HAPUs were identified prior to implementation in September 2018.

Aims/Objectives: In order to reduce rates of HAPUs on this unit and improve patient care, an evidence-based admission bundle was implemented. Specific aims for this project included an increase in compliance with aspects of the bundle, and an increase in nurse knowledge and confidence post implementation of the bundle.

Methods/Interventions: After a survey of current practice completed by staff revealed knowledge gaps and specific areas for improvement, an educational online module was developed and an evidence-based admission bundle was implemented. The admission bundle included a two-skin assessment upon admission with a turning schedule for every patient, with sacral preventative dressings and pressuring reducing mattresses recommended based upon a patient's Braden Scale scores. The Plan-Do-Study-Act model was utilized to help facilitate implementation.

Results: Prior to implementation of the bundle, there was 100% completion of education by the nursing staff. There was an overall 79.7% compliance with the two-nurse skin assessment and a 56.5% compliance rate with the use of sacral preventative dressings. In regards to the pressure reducing mattresses, 31 out of the 33 patients were either in a pressure reducing mattress at time of audit or had an order placed. This yielded a 93.9% compliance rate with this aspect of the bundle. There was a 54.5% compliance rate with the turning schedules posted in patient's rooms. During the implementation period, six pressure ulcers were identified. Based on the post-implementation survey of current practice, there was little change in knowledge and confidence levels.

Conclusions: Compliance rates with the admission bundle varied among the different aspects. There was higher compliance with the skin assessments and use of pressure reducing beds, however there were lower compliance rates with the sacral preventative dressings and turning schedules. Knowledge and confidence levels with HAPUs did not change dramatically post implementation with the HAPU admission bundle. There was an increase in HAPUs during the implementation period of this bundle which could correlate to low compliance with several aspects of the bundle as well as the low levels of change measured in nurse knowledge and confidence levels regarding pressure ulcer prevention.

Implications: The use of a nurse-driven admission bundle can promote early identification of risk and lead to early implementation of preventative measures to stop HAPUs before they start.

Overview

The development of a pressure ulcer is not only detrimental to the patient, but to their family, providers, and hospital-based system as well. According to The Wound, Ostomy and Continence Nurses Society (WOCN, 2016), “A pressure injury is defined as an area of localized injury to the skin and/or underlying soft tissue that usually occurs over a bony prominence or is related to the use of a medical or other device and is the result of pressure or pressure in combination with shear” (p. 241). Nearly 2.5 million Americans developing a hospital acquired pressure ulcer (HAPU) yearly (Agency for Healthcare Research and Quality, 2014). According to The National Pressure Ulcer Advisory Panel (NPUAP), the incidence rate of HAPUs within the United States is 2.5%, which has led to approximately 60,000 deaths annually (Padula, 2017). Analysts in the Office of Health Care Quality at the Maryland Department of Health and Mental Hygiene stated there were 76 HAPUs reported in fiscal year 2015, which increased from 63 in 2014 (Webster & Jones, 2014). HAPUs affect patients of both genders and all races and ethnicities. The development of HAPUs increases morbidity through an increase in pain, discomfort, and additional risk for sepsis and can even pose a risk for mortality (WOCN, 2016).

In addition to increases in morbidity and mortality, HAPUs are very costly. According to NPUAP, hospital acquired pressure ulcers account for approximately \$9-11 billion dollars yearly in US healthcare costs (Padula, 2017). In 2008, the Centers for Medicare and Medicaid Services (CMS) refused to reimburse payment for cost of care for stage III or IV ulcers developed during hospital stays (Jackson et al., 2011). This decision by CMS has placed added pressure on hospitals to reduce rates of pressure ulcers to improve patient care and decrease hospital costs.

Patients on a heart vascular unit (HVU) within a community hospital in Maryland are not exempt from HAPUs. A clinical educator on the HVU identified five patients with HAPUs from

January to October of 2017 (personal communication, October 26, 2017). Nurses on this unit were enforcing preventative strategies, such as limiting patient layers, but despite these efforts, five HAPUs occurred last year with one of those patients ultimately succumbing to their HAPU. This patient developed an infection due to their sacral HAPU and as a result died. This motivated the clinical educator and nursing staff to prioritize quality improvement efforts to decrease the rates of HAPUs on the HVU.

At that time polices on the HVU included skin assessments within two hours of admission, use of the Braden scale every shift to reassess risk, patient repositioning every two hours, and patient placement on supportive surfaces with a sacral preventative dressing if they had a Braden score <16 (personal communication, October 26, 2017). However, a survey of current clinical practice from Spring 2017 (see Appendix A) revealed a lack of skin assessments completed within two hours of admission, low confidence levels with the use of the Braden scale, and poor compliance with turning patients every two hours. In addition, interviews with the unit clinical educator highlighted underutilization of sacral preventative dressings and supportive bed surfaces.

The purpose of this quality improvement (QI) project was to implement and evaluate the effectiveness of a HAPU prevention admission bundle. The short-term goals of the QI project were: 1) 90% of nurses will complete and pass the online education on implementation of the bundle; 2) 75% of nurses will complete skin assessments within two hours with another nurse and 3) 75% of patients with a Braden score ≤ 16 will have a sacral preventative dressing and C2 bed during their hospitalization. Long term goals for the project were: 1) 25% reduction in new pressure ulcers compared to 2017 pressure ulcer incidence rates and 2) nurse's knowledge and

confidence levels towards HAPU prevention will improve based on a post implementation re-survey of assessment of current practice.

Literature Review

Best practices to reduce the incidence of HAPUs was the focus of the evidence in this literature review. The review began with an analysis of the Wound Ostomy Continent Nursing (WOCN) guidelines. The review then discussed the evidence regarding repositioning schedules use of prophylactic dressings and support surfaces in the reduction of pressure ulcers. Finally, the review addressed the use of pressure ulcer risk assessment tools. The research was evaluated using Melnyk and Fineout-Overholt's (2014) rating system for hierarchy of evidence and Newhouse's (2006) rating scale for the quality of evidence (Appendix B).

The 2017 WOCN guidelines for prevention and management of pressure ulcers were analyzed utilizing the AGREE II tool (Wound, Ostomy and Continence Nurses Society - Wound Guidelines Task Force, 2017). Each domain of the tool was broken down with a percentage to assess the quality of that domain. According to the AGREE II tool, domains that score >70% are considered better quality (Brouwers, Kerkvleit & Spithoff, 2016). According to the WOCN guidelines (2017), skin assessments upon admission, use of a valid/reliable risk tool and identification of at risk populations are best practices. Based on the evidence from several case studies with a least ten human subjects, there is great benefit, with little evidence of harm (WOCN, 2017). In addition, regular turning schedules, support surfaces and use of prophylactic dressings to prevent sacral pressure ulcers are also supported with evidence (WOCN, 2017). All aspects of the proposed intervention of a HAPU prevention admission bundle are recommended and show greater benefit than harm to patients and should be implemented.

Several studies were reviewed in regards to repositioning schedules best aimed at reducing HAPUs. Frequent repositioning is recommended as a strategy to prevent HAPUs, but according to a recent Cochrane review by Gillespie et al. (2014) there was no statistical significance in the reduction of HAPUs among different turning schedules. This review analyzed data between two- and three-hour repositioning on standard mattresses and four- and six-hour repositioning on supportive surfaces. In addition, researchers found no benefit of thirty-degree tilts versus ninety-degree tilts. This Cochrane review included three randomized control studies that yielded low power and inconclusive results. In two other studies identified, researchers found that the use of team work improved repositioning among nursing staff (Harmon, Grobbel & Palleshi, 2016; Kelleher, Moorer & Makie, 2012). In a descriptive study conducted by Harmon, Grobbel and Palleshi (2016), the incidence rate of pressure ulcers decreased and repositioning of patients increased with the use of a lead nurse and verbal cues. This study was conducted on an inpatient unit and researchers observed thirty-six nurses reposition their patients. One threat to validity identified in this study was the Hawthorne effect. Researchers were not hidden, so nurses could see when they were being observed, which could have also altered the true results of the study. Kelleher, Moorer and Makie (2012) found that utilizing two-nurse champions who rounded with bedside nurses increased repositioning and decreased the prevalence of HAPUs. Their case study evaluated the effectiveness of two-nurse champions completing bedside rounds among 180 patients with their respective nurses to reduce HAPU rates. Threats to validity include a lack of control for other variables, including supportive surfaces and new moisture pads that were introduced during this study.

Six studies were accessed to evaluate the use of prophylactic dressings intended to reduce hospital acquired pressure ulcers. Padula (2017) completed a retrospective cohort study within

38 hospitals among 912 patients on the use of a prophylactic five-layer dressing on reducing HAPUs. Padula (2017) found that the dressings reduced the incidence of HAPUs ($p=.002$) and were also cost effective. In a systematic review of 21 studies, Clark et al. (2014) found reduced incidence rates of pressure ulcers when prophylactic dressings were applied. Many of the studies lacked statistical analysis, which posed a threat to the validity and all but one study lacked adequate power, which decreased their generalizability. In a non-randomized prospective study Park (2014), analyzed the effectiveness of prophylactic dressings in rates of pressure ulcers among 102 patients. Park (2014) found the silicone boarder foam dressings effective in decreasing rates of both pressure ulcers ($p<.01$) and dermatitis ($p<.03$). Two studies were conducted by the same group of researchers evaluating the effectiveness of silicone foam dressings in reducing pressure ulcer incidences, as well as their cost-effectiveness (Santamaria, Gerdtz et al., 2015; Santamaria, Liu et al., 2015). In the randomized control trial among 440 patients admitted from the emergency department to the intensive care unit, these researchers found the dressings effective in reducing incidence rates through the use of t-test statistical analysis ($p=.01$; Santamaria, Gerdtz et al., 2015). In retrospective study among the same population, researchers found the prophylactic dressings cost-beneficial after conducting a cost-analysis (Santamaria, Liu et al., 2015). Prophylactic sacral preventative dressings have overwhelming support of patient benefit and cost effectiveness in reducing HAPUs.

Two studies were highlighted in the review of supportive surfaces and their role in preventing HAPUs. In a Cochrane review, McInnes, Jammali-Blasi, Cullum, Bell-Syer, and Dumville (2013) reviewed fifty-nine studies and found that incidence rates of pressure ulcers were reduced when patients were on low-tech beds compared to standard hospital beds.

Threats to validity for this review include the lack of standardization of skin integrity, which can

alter the researcher's outcome measure and therefore alter their results. In a different review, McNichol, Watts, Mackey, Beitz and Gray (2015) reviewed seventy-two studies on support surface selection and utilized an expert panel to devise an algorithm based on skin assessments, Braden total scores, and sub-scores within the Braden scale. The developed algorithm scored high on the Content Validity Index (.95); however, when each step was evaluated individually, one step regarding the Braden scale scored greater than 18 and its use to assess/reassess need for support surfaces scored poorly. This step raised concern over the sole use of the Braden scale for reassessment in patients who scored >18 in its capability of detecting risk. This could alter the efficacy of the algorithm as a whole if one step is flawed. Supportive surfaces overall have been found to reduce incidence rates of HAPUs.

The last two studies reviewed the efficacy of the skin assessments. Moyes, Bates, Karafa, Whitman, and Albert (2017) evaluated the efficacy of the Vascular HAPI Risk Score Instrument among vascular patients through retrospective chart reviews of 800 patients admitted to a heart/vascular unit. Researchers used logistic regression to evaluate the ten items in the instrument and found all items except for gender to have significant predictive power. Among those factors with predictive power was a Braden scale <23 . This was a non-experimental study, and there was no control over the type of care patients received, so it is difficult to account for the rate of HAPU development based on risk factors. A Cochrane Review of risk assessment tools for the prevention of pressure ulcers by Moore and Cowman (2014) yielded no statistical significance between the rate of HAPU development between the use of the Waterlow, Ramstadius or Braden scales. While the overall total enrolled patients was high ($n=1,401$), there were only two studies included in the review. The first study was conducted among one hospital within different wards utilizing the Braden scale with and without training, making the

generalizability of the overall study difficult. Researches in the second study compared the Waterlow and Ramstadius scales, but did not compare the Braden scale, therefore making it difficult to determine the difference in efficacy among the three commonly used risk assessments. Currently there is no evidence to support the superiority of a skin assessment tool.

After reviewing the literature for all the topics related to pressure ulcer prevention, it became apparent that pressure ulcer prevention is multi-faceted, and a bundled approach with several interventions is the most effective approach to reduced HAPUs. When comparing the research on prophylactic dressings, they were all conducted on adult inpatient units, which is a similar setting to the target site. While some of the literature had stronger statistical significance or power, all of the studies reviewed showed a decrease in HAPUs among the patients with prophylactic dressings. In addition to the benefit of HAPU reduction, research from Santamaria, Gerdtz et al., 2015; Santamaria, Liu et al., 2015 and Padula (2017) identified them as cost-beneficial.

In regards to support surfaces, McInnes et al. (2013) found in their systematic review that low-tech beds had less incidence rates of HAPUs than standard hospital beds. McNichol et al. (2015) found high content validity for the use of multiple nurses/other staff to identify at risk patients for a support surface and found high content validity for recommending a supportive surface for patients with Braden scores <18. In the Cochrane review, Moore and Cowman (2014) found no increase in efficacy among three different scales, including the Braden scale. Moyse et al. (2017) found that the Braden scale had high predictive power.

In the Cochrane review, Gillespie et al. (2014) were unable to identify best practice for turning frequency or degree of turning. Researchers in the other two studies highlighted the use of team-work for improving repositioning of patients (Harmon, Grobbel and Palleshi, 2016 &

Kelleher, Moorer and Makie, 2012). Both were conducted on inpatient units and utilized a rounding framework with and without cues and team repositioning. The utilization of a lead/champion nurse that offered rounds or cues helped increase frequency of repositioning and led to decreases in HAPUs. Researchers also found that peer rounding allowed for sharing of clinical information and pressure ulcer prevention immediately (Kelleher, Moorer, & Makie, 2012).

Theoretical Framework

In order to help implement and evaluate the effectiveness of this DNP project, the Plan-Do-Study-Act (PDSA) quality improvement model was used. This model incorporates a four-step process that progresses in a continuous cyclic manner that allows for changes to be made to improve outcomes. The first step of the PDSA model is Plan. During this phase, data collection, objectives and a plan were developed for the implementation of the project (Institute for Healthcare Improvement, 2016). After a plan was developed, the next step was Do. Under this step, the plan was implemented and data was collected (Institute for Healthcare Improvement, 2016). Next during the Study phase, data was analyzed and compared to the anticipated results (Institute for Healthcare Improvement, 2016). In the last step of the PDSA model, Act, changes were made to the project based on interpretation and analysis of the previous steps and data (Institute for Healthcare Improvement, 2016). From this step, the cycle began again with improvements to increase results.

This quality improvement model was specifically selected for this DNP project because of its cyclical ability to continue to allow change and modifications to be made to the project in order to yield the best results. This model provided structure and helped to facilitate implementation of the project in a step-by-step process. During the Plan step, literature was

reviewed, rates of compliance with each aspect of the bundle were collected from the electronic health record and surveys of current practice were completed. The Do phase incorporated education and the distribution of the turning schedule and *Skin Assessment tool* (Appendix C). During the Study phase, rates of compliance with each aspect of the bundle were collected from the electronic health record and surveys of current practice were updated and compared to pre-implementation data. After the data was analyzed, steps to improving the project were made during the Act phase. These steps included the manufacturing and distribution of a flowsheet with the steps of the admission bundle based on patients' Braden scores that could be placed on nurses' badges for easy reference. Then the cycle restarted with the modifications to improve outcomes. Barriers to implementation of this project included low response volume with the survey of current practice and the implementation of another project by another DNP student on the same unit.

Implementation Plan

This quality improvement project was implemented on a 30-bed heart-vascular unit (HVV) within a Maryland community hospital. Inclusion criteria for the nurse sample include all the Registered Nurses who worked during implementation and agreed to participate. The estimated sample size (n=60) was based on the number of staff employed during the implementation period.

The implementation of an admission bundle was aimed at early identification of at risk patients by nursing staff and the initiation of several different modalities to reduce HAPUs. This bundle included the use of a two-nurse skin assessment within two hours of a patient's admission with the use of the *Skin Assessment tool* (Appendix C). Based on a patient's Braden scale and documented wounds on the *Skin Assessment tool*, nurses implemented preventative measures,

such as sacral prevention dressings, low-air loss beds, and the implementation of a turning schedule, to help reduce HAPU incidence rates.

This project was implemented in Fall 2018 over a 14-week timeline. The first two weeks focused on staff education. Education covered the *Skin Assessment* tool and documentation within two hours of admission with an additional nurse. The turning schedule (Appendix D) and Braden scale education were also provided. Staff also received information on sacral preventative dressings and C2 beds which are beds with pressure reducing mattresses at this site, for patients whose Braden scale is ≤ 16 . The DNP student provided education through an online HealthStream module (Appendix E). All nurses completed a post-assessment quiz and were required to attain an 80% or greater in order to successfully pass the online educational module (Appendix F). Weeks three through six focused on the implementation of the admission bundle.

Week six entailed preliminary audits and analysis of usage of the bundle through the *Skin Rounds* audit tool (Appendix G). Week seven consisted of identification of any barriers and modifications to overcome any barriers were devised. Weeks eight through 12 focused on the implementation of any needed modifications to the admission bundle. These included the distribution of the badges (Appendix H) for staff to reference to remind them of compliance with certain aspects of the bundle. Lastly, weeks 13 and 14 consisted of analysis of compliance with the bundle via the *Skin Rounds* audit tool and analysis of change among the nurses with the post-implementation distribution of the *Survey of Current Practice* (Appendix I). Results were disseminated to the nurse educator on the unit.

Collection of data occurred in three stages. Prior to implementation of the HAPU prevention admission bundle, a *Survey of Current Practice* was administered. Compliance rates with aspects of the bundle were audited utilizing a *Skin Rounds* audit tool during weeks six and

13 of the implementation plan. This DNP student and/or clinical educator randomly audited charts once per week. Auditors checked for completed *Skin Assessment* tools signed off by two nurses on patients admitted to the unit. Patient's rooms were also evaluated to ensure the turning schedule was posted. Auditors also assessed for documented C2 beds and sacral preventative dressings for patients with a documented Braden score ≤ 16 . Completed *Skin Rounds* audit tools were placed in a secure binder for this DNP student to access for analysis. Incidence rates of HAPUs were also be collected from wound documentation within each patient's electronic health record in order to later assess the long-term effectiveness of this project.

Data were analyzed with two separate foci. The first analysis looked into compliance rates with the different variables of the bundle. Compliance rates with turning schedules and use of the *Skin Assessment* tool with two nurses for newly admitted patients were analyzed. As well as compliance rates of C2 beds and sacral preventative dressing for patients with a Braden score ≤ 16 . With the use of descriptive statistics, each aspect of the bundle was explored, from properly documented and completed, compared to missed opportunities to prevent HAPUs. Data collected in the *Survey of Current Practice* were compared to the same survey post implementation to see if staff's knowledge and practice has changed. In addition, HAPU incidence rates were compared pre-and post-implementation of the bundle.

Patient privacy was of utmost importance during the implementation of the HAPU admission bundle and during data collection. In order to ensure privacy, all patient identifiers were removed. A Non-Human Subjects Research determination from University of Maryland Institutional Review Board (IRB) was obtained. In addition, approval from the Nurse Research Council at the community hospital where this project was implemented was sought in July 2018

The overall purpose of this DNP project was to reduce the incidence rate of HAPUs. During the 14-week implementation plan, the short-term goals of this project were targeted, but in order to see the long-term goal achieved, this project needs to be sustainable. Buy in from key stakeholders was essential to maintain this project. Through a post-implementation presentation to the Nurse Research Council at the community hospital in March, other leaders of different areas within the hospital heard about this project leading to the potential for dissemination of this project to other units. In addition, this project relied on the support of the clinical educator who will continue to support its ongoing implementation. This project was also cost friendly with *Skin Assessment tools*, the turning schedule, and the badge reminders printing and paper accruing the only costs to implement.

Results

The overall results of this implementation project included a change in the unit's admission process regarding skin assessments and the initiation of some of the preventative methods on a fairly consistent basis. In order to facilitate that change, several concurrent steps needed to occur. Firstly, there was a 100% completion rate of the online education by staff, and they all completed the online learning module with an 80% or greater score. For the month of September (starting at 9/10/18) there were 96 completed skin assessments out of 114 admissions, which yielded an 84% compliance rate. For the month of October, assessments were filled out for 156 patients out of 193 admissions, which yielded a 77% compliance rate. For the month of November there were 123 skin assessments completed out of 163 admissions which yields a 75.4% compliance rate (see Figure 1).

Out of the 33 patients audited with a Braden score documented of ≤ 16 , 13 were found to have a sacral preventative dressing in place, a 39.4% compliance rate. Of the 20 who did not

have a dressing in place, ten patients were incontinent and were therefore not applicable due to the Hospitals Skin Care Policy which does not recommend sacral preventative dressings to be placed on patients who are incontinent. When those 20 patients were removed, the adjusted compliance rate with the use of sacral preventative dressings was 56.5%. In regards to the C2 beds, 31 out of the 33 patients were either in a C2 bed at time of audit or had an order placed for a C2 bed. This yielded a 93.9% compliance rate with this aspect of the bundle. As for the turning schedules, only 18 were posted in patient's rooms, which yielded a 54.5% compliance rate (Figure 1).

During the implementation period, six pressure ulcers were documented. Two pressure ulcers developed in September, four developed in October and there were no HAPUs in November. While October had the highest rate of pressure ulcer incidence rates, October also had the highest rate of compliance among three of the four components of the bundle (Figure 1). The two-nurse skin assessment was the only compliance rate that was not the highest for the month of October, which could reflect the need for early assessment to identify risk during admission to prevent development of pressure ulcers.

In regards to the changes in nurse knowledge assessed by comparison of the *Survey of Current Practice* pre and post implementation of the bundle, there were 20 responses out of 60 in the pre-survey (Appendix A) and only twelve responses in the post survey (Appendix I). The pre-implementation online education module about the bundle enhanced knowledge in some aspects, such as knowledge on the hospital policy and bundle requirement of a skin assessment within two-hour of admission. Pre-implementation, only 30% of staff answered correctly, while 58.3% correctly answered post implementation. Overall comparison of survey responses revealed staff knowledge/confidence levels remained the same or decreased (Table 1). Due to

only a few responses showing an improvement, the goal of increasing staff knowledge/confidence levels was not met.

In the pre and post survey there were two open-ended questions which allowed nurses to express their feelings on why they thought pressure ulcers occurred on their unit, and why it was difficult to turn patients every two hours in accordance to hospital policy. In both the pre and post survey, lack of staff was a common theme for inability to frequently turn their patients (Table 2). In addition, immobility, nutrition and incontinence were common responses pre and post implementation for causes of HAPUs according to staff (Table 2).

Unintended problems for this project did occur despite best efforts during the planning and implementation periods. The first problem presented itself during the first week of audits. The audit tool did not account for incontinent patients, who, per the skin policy, were not permitted to utilize a sacral preventative dressing regardless of their Braden scale score. Due to the lack of accountability from the beginning, compliance rates with the use of the sacral preventative dressings could be underscored. Limitations for this project included low nurse response levels with the pre and post *Survey of Current Practice*. The data collected were based on pre/post implementation data.

Discussion

This quality improvement project provides initial support in establishing a HAPU admission bundle to identify at risk patients and implement preventative methods to stop HAPU development from the start. Results showed high compliance in several aspects of the bundle, but also showed areas for improvement. Strengths of this project included high compliance with the two-nurse skin assessments and the use of C2 beds. Two nurse skin assessments utilizing the *Skin Assessment* tool met the short-term goal of 75% compliance. This high compliance shows

that assessments with two nurses can be done during admission to put more eyes on the patient to assess risk, which is essential for implementation of preventative measures during the rest of a patient's hospitalization. The utilization of C2 beds for patients with a Braden scale score of ≤ 16 also met the short-term goal of 75% compliance. The turning schedules in patient's rooms and the use of sacral preventative dressings on patients with a Braden scale score of ≤ 16 did not meet the short-term goal of 75% compliance. In addition, post surveys reveal areas for change in knowledge that can later improve HAPU prevention. The low compliance with turning schedules and sacral preventative dressings as well as lack of knowledge change could all correlate with the increase in HAPUs developed during the implementation of this QI project.

Bundled approaches are often used for pressure ulcer prevention because of their ability to incorporate multiple interventions (Anderson et. al, 2015). This approach was used for this project; however, with the implementation of multiple interventions comes more staff responsibility and risk for burnout. Halfway through the implementation period, staff laminated badges with a flow chart with the multiple aspects of the bundle based on a patient's Braden scale score were dispersed. According to Anderson et. al, when interventions are clear and concise, they are more readily adopted by staff (2015). The badges gave staff clear and concise reminders to help improve compliance rates with aspects of the bundle. Despite the badge dissemination, the rates of compliance did not change. This might indicate that it was not a matter of remembering, but rather a burden of responsibility or continued lack of education that staff felt in regards to completing all aspects of the bundle. The burden of responsibility could have been addressed through more efficient documentation measures for staff.

Anderson et. al (2015) focused on the importance of staff education and engagement for successful implementation of quality improvement projects. The lack of knowledge change pre

and post implementation, could also correlate to the low compliance rate with aspects of the bundle. The HealthStream education module did have 100% completion prior to implementation, but education and engagement activities were not continued throughout the implementation period.

In a similar study, researchers utilized a universal bundled approach along with semi-weekly wound-ostomy continent (WOC) nurse rounds to reduce HAPUs among intensive care unit patients. In this study researchers did not have statistically significant improvements in compliance rates with their bundled interventions, but unlike this quality improvement project they did have an overall reduction in HAPU incidence rates. This is in part due to the semi-weekly rounds with the WOC nurse which provided staff opportunities for coaching, education and allowed for communication (Anderson et. al, 2015)

The Braden scale was utilized in this quality improvement project to assess risk of HAPU development. There is currently a lack of sufficient research to support the superiority of an assessment tool and patients with vascular disease pose a risk for pressure ulcers that may not be fully captured by Braden scale scores (Moyes et. al, 2017). The use of Braden scales among this population can lead to poor risk stratification and missed opportunities to initiate preventative measures which could account for the occurrence of pressure ulcers during implementation of this project.

The sacral preventative dressings also did not meet the short-term goal of >75% compliance. The staff reported in both the pre and post *Survey of Current Practice* that incontinence was a major contributor HAPUs on the HVU. The sacral preventative dressings are not permitted on incontinence patients per the Hospital's Skin Care Policy. As mentioned above, incontinence was not taken into account for the first audits, which therefore could have altered

the rate of compliance and limit the outcomes of this quality improvement project. Efforts were made to overcome this in the sequential audits, by noting incontinence within the *Skin Rounds Audit Tool*.

In both the pre and post implementation *Survey of Current Practice*, staff reported lack of staff and high patient acuity as barriers to turning their patients every-two hours. The use of the turning schedule was aimed at cueing staff to turn their patients, but if there is a lack of staff this cue would not overcome that barrier and staff may have felt the turning schedule unnecessary and therefore underutilized, which may have led to increase rate in HAPUs. The use of a lead RN or PCT for team-turning can be utilized for future aims at improving turning in the HVU as described by Harmon, Grobble and Palleschi (2016). Use of a lead nurse could maximize the staff that is available for turning to promote an increase in compliance.

During the first two months of implementation there were six documented HAPUs, which is a dramatic increase from the five HAPUs in the previous eight months of pre-implementation planning. High patient acuity and low staffing as described by the nurses' responses in the *Survey of Current Practice* can attribute to the incidence rates of HAPUs. In addition, low compliance with turning and use of sacral preventative dressings could attribute to the increase in HAPUs. Staff burden with documentation and lack of reinforced education and engagement could have also affected the rates of HAPUs. Lastly the low staff participation with the *Survey of Current Practice* pre-implementation could have yielded areas of need that do not truly reflect the majority need of the unit.

Limitations for this project included the short implementation period. This project was implemented over a 12-week period and could only assess for short-term goals. In reviewing the literature, many studies used for reference in this quality improvement project were implemented

over a minimum of six-month timeframe. In addition, other interventions that relate to pressure ulcer prevention, such as nutrition, wound ostomy nurse consults and heel protectors, among others were not accounted for. This project is not generalizable to other adult inpatient units.

Conclusions

The development of HAPUs is a major concern for the healthcare system and for patients as well. This QI project highlighted a multi-faceted approach to the prevention of HAPUs. This bundle promoted identifying at risk patients from admission to help implement preventative measures based on Braden scale scores. While compliance was not high with all aspects of the bundle, there was good compliance with the two-nurse skin assessment at admission, which is essential to early identification of at risk patients.

Leadership recognized a problem within the HVU and specifically asked for help reducing the problem. Given the continued need for HAPU prevention with modifications, this project is anticipated to be sustainable with the commitment of leadership on this unit. HAPUs are prevalent within other units of this community hospital and this low-cost quality improvement project may be implemented in other adult inpatient settings with similar preventative measures (low-air loss beds and sacral preventative measures), or this project can be tailored with the different preventative measures based on the needs of the proposed implementation unit.

Further implications of this study highlight the need for alternative measures to improve compliance with all aspects of the bundle in order to further reduce risk of HAPU development that engage staff. Next steps might include WOC rounds and HAPU preventative measures specialized for the incontinent patient population. In addition, the use of turning devices such as lifts to help promote turning compliance when staffing is low or patient acuity is high.

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Table 1 *Comparison of Survey of Current Practice*

Questions	Pre-Survey %of correct responses (n=20)	Post -Survey %of correct responses (n=12)
1. When a patient is admitted to the unit, a skin assessment should be performed within	30	58.3
2. On a scale of 1 -10, how confident are you in using the Braden scale to accurately capture your patient's risk for skin breakdown?	70	64
3. I identify a patient as high risk for skin breakdown when Braden \leq 16	40	41.7
4. I place a preventative sacral dressing on my patients when Braden \leq 16	50	41.7
5. Sacral Preventative dressings should be changed	60	83.3
6. I place my patient on a C2 bed when	40	41.7
7. I know how to independently order a C2 bed	95	91.7
8. I can honestly say that I turn my patients every two hours >75% of time	45	41.7
9. When I get my patients out of bed to the chair, it is unsafe for them to stay in the chair for longer than 2 hours if they cannot offload their weight	75	75
10. I understand the term "off-loading" weight, and know strategies to implement with my patients while they are in the chair	90	100
11. Which of the following patient's nutritional status does not put them at a high risk for a pressure ulcer	63	72.7
12. I feel confident in understanding how my patient's nutritional status affects their risk of skin breakdown and feel confident in addressing at risk patients to the multidisciplinary team during rounds	90	100

Table 2
Comparison of Nurse Perceptions of Skin Breakdown Pre and Post Implementation

Themes	Comments
Pre-Survey	
Barriers to turning every-two hours	-“Patient Acuity” -“Patient Refusal” -“Low staff & Lack of PCT’s” -“Need more than 1-2 staff for turns”
Patients develop HAPUs because	-“Poor/lack of nutrition” -“Incontinence, C.diff patients especially” -“Lack of turning” -“Patient refusal to turn”
Post-Survey	
Barriers to turning every-two hours	-“Lack of time” -“Lack of staffing” -“Not enough PCTs”
Patients develop HAPUs because	-“Immobility” -“Incontinence” -“Poor nutrition prior to arrival and continued poor nutrition”

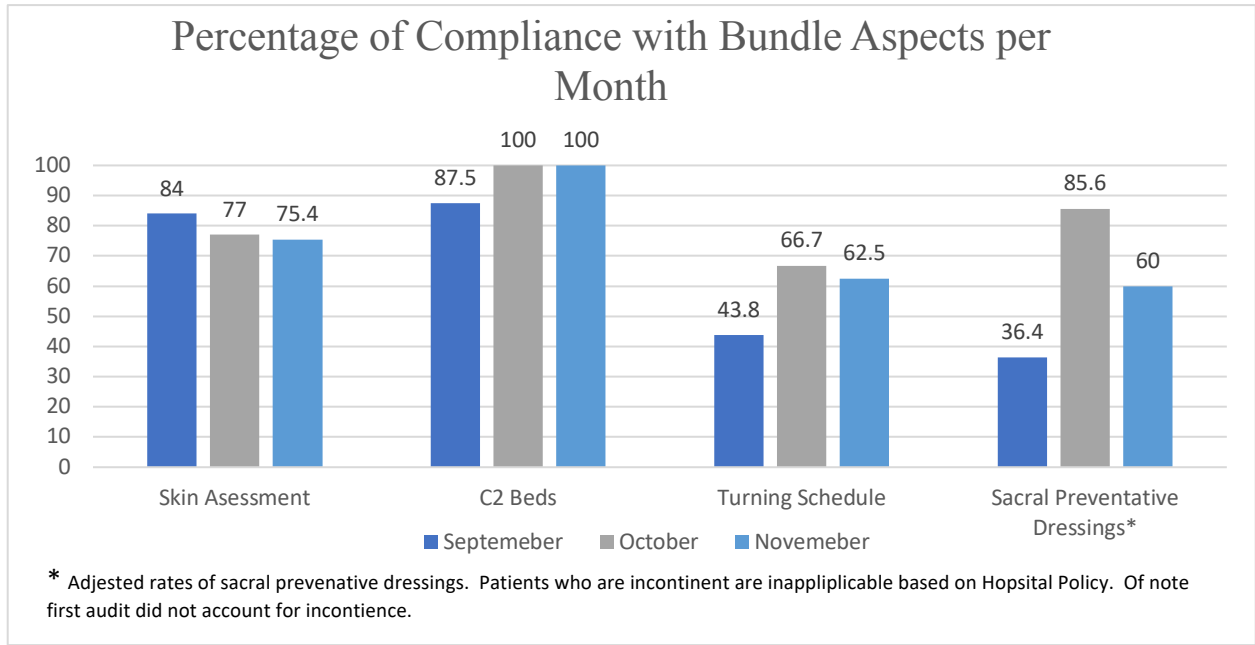
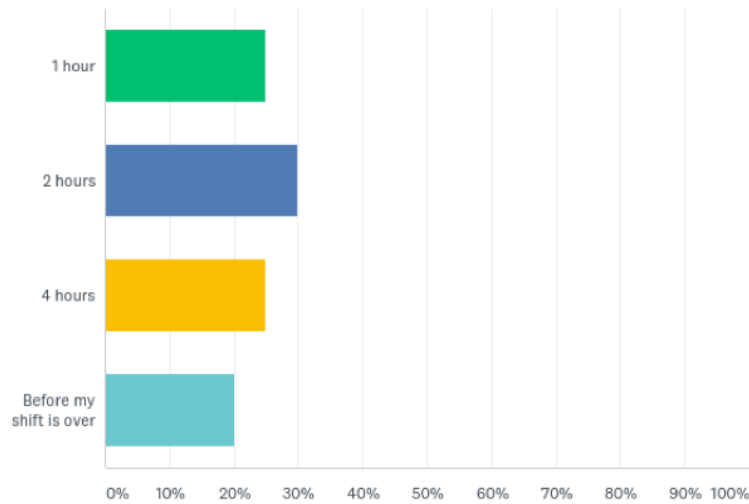


Figure 1. Compliance Rate

Appendix A: Survey of Current Practice

Q1: When a patient is admitted to the unit, a skin assessment should be performed within

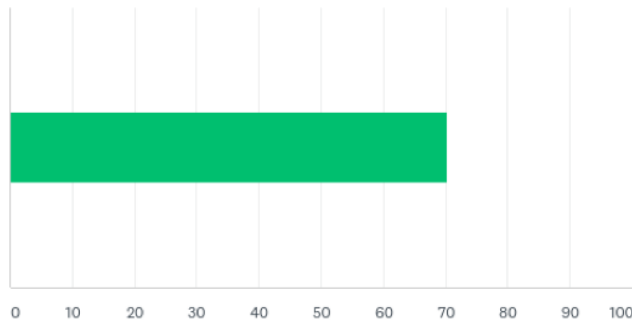
Answered: 20 Skipped: 0



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Q2: On a scale of 1 -10, how confident are you in using the Braden scale to accurately capture your patient's risk for skin breakdown?

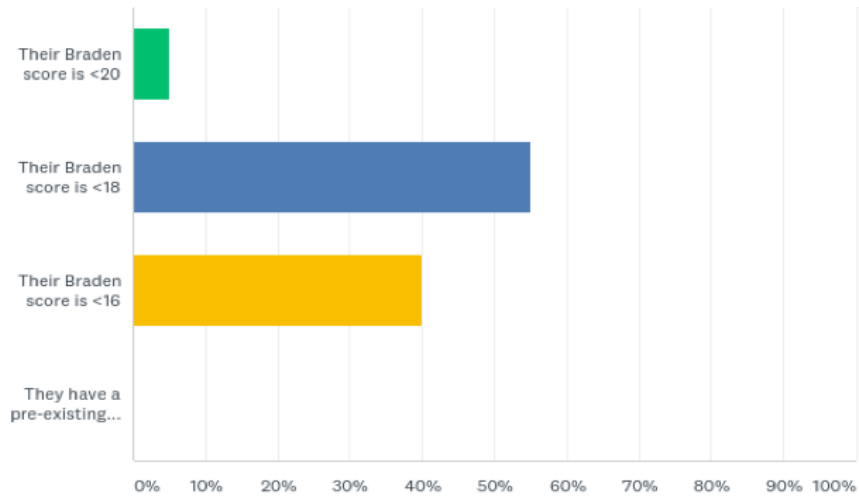
Answered: 20 Skipped: 0



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Q3: I identify a patient as high risk for skin breakdown when

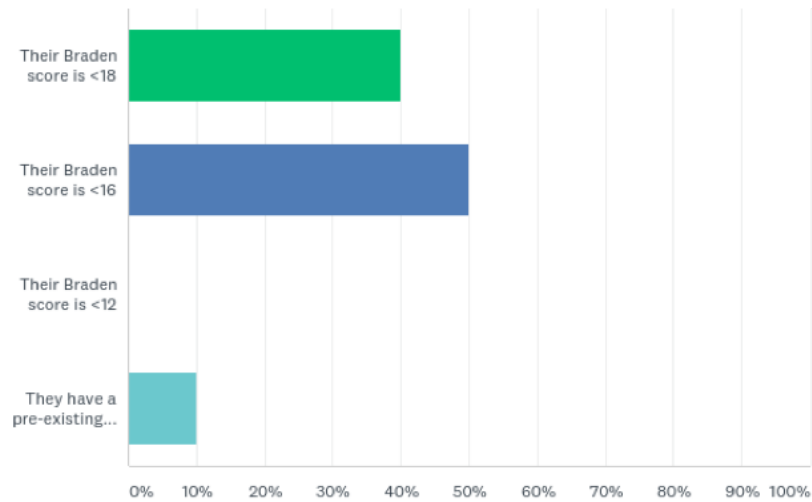
Answered: 20 Skipped: 0



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Q4: I place a preventative sacral dressing on my patients when

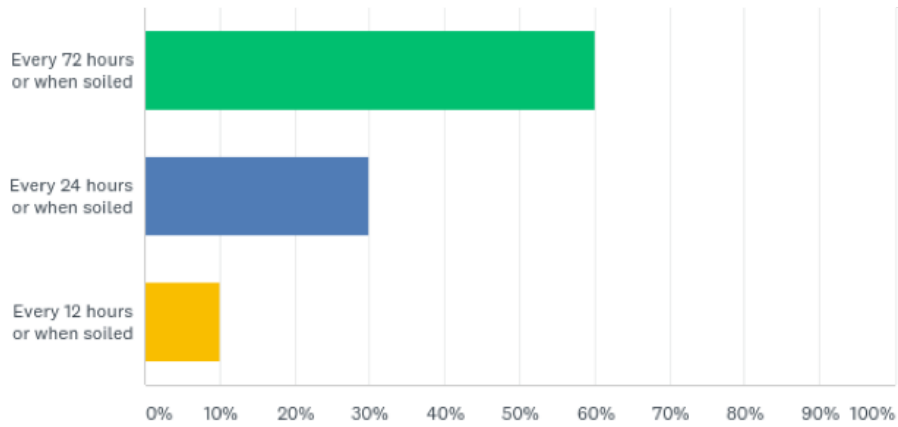
Answered: 20 Skipped: 0



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Q5: Sacral Preventative dressings should be changed

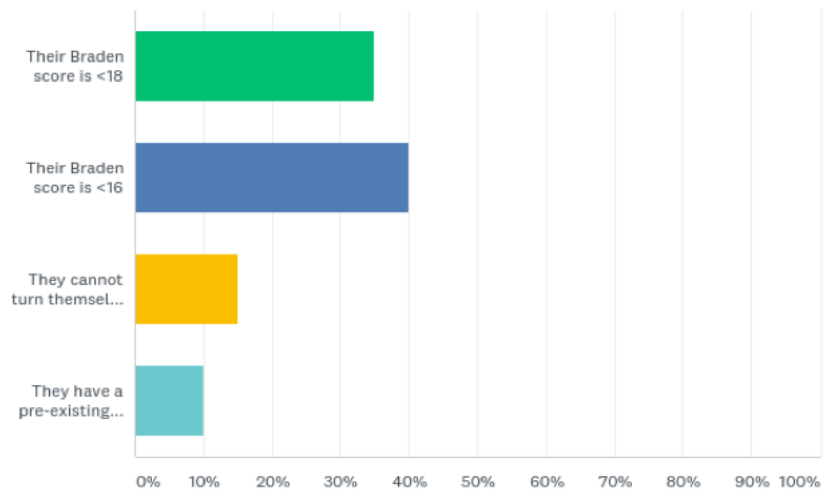
Answered: 20 Skipped: 0



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Q6: I place my patient on a C2 bed when

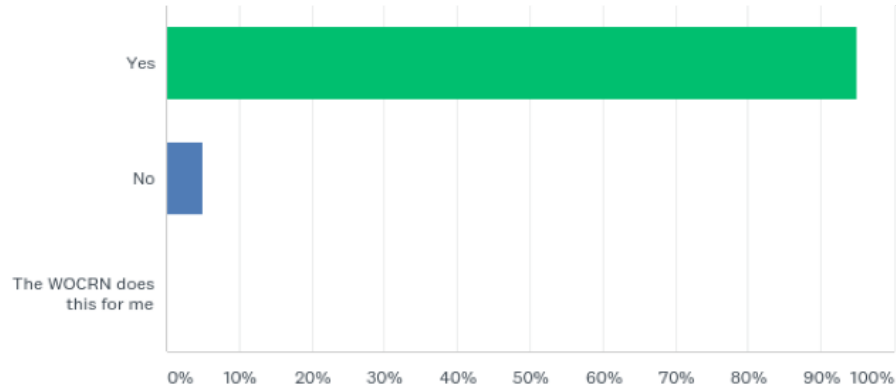
Answered: 20 Skipped: 0



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Q7: I know how to independently order a C2 bed

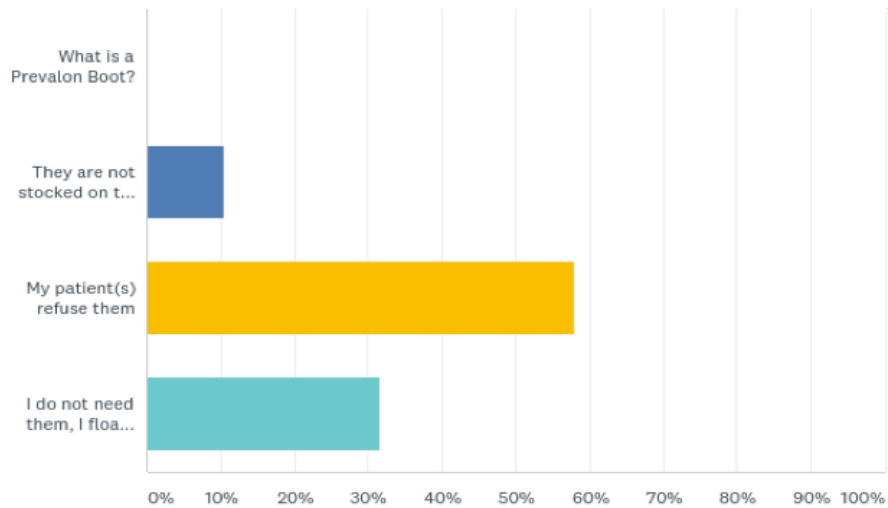
Answered: 20 Skipped: 0



Powered by  SurveyMonkey

Q8: Prevalon Boots for heel protection are not utilized frequently on the unit because

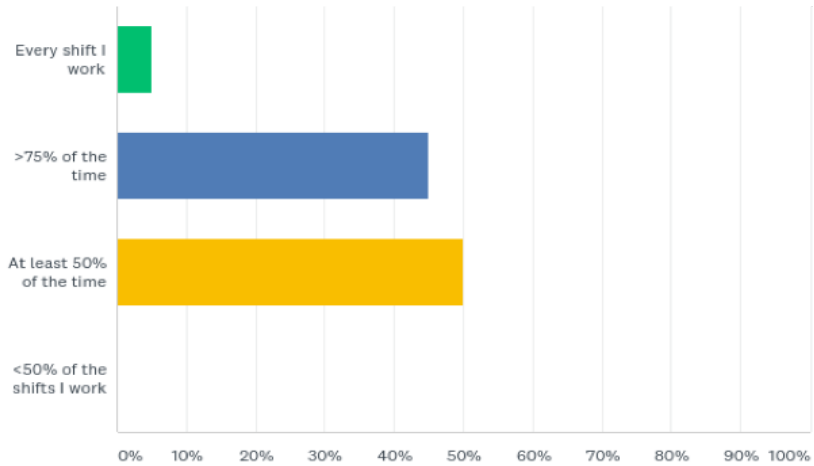
Answered: 19 Skipped: 1



Powered by  SurveyMonkey

Q9: I can honestly say that I turn my patients every two hours

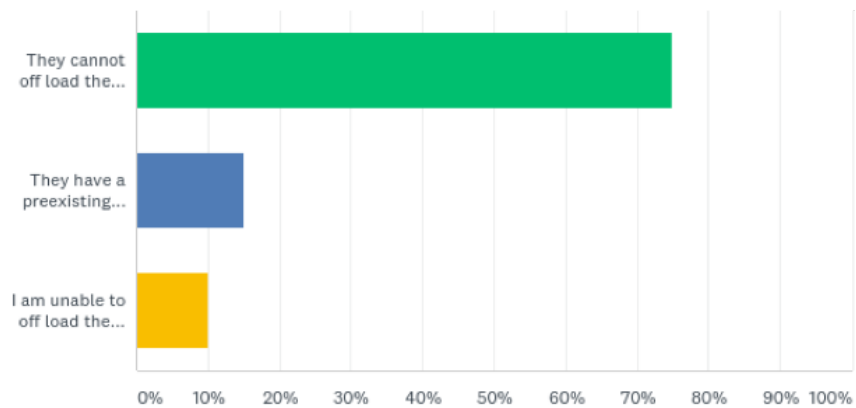
Answered: 20 Skipped: 0



Powered by  SurveyMonkey

Q10: When I get my patients out of bed to the chair, it is unsafe for them to stay in the chair for longer than 2 hours if

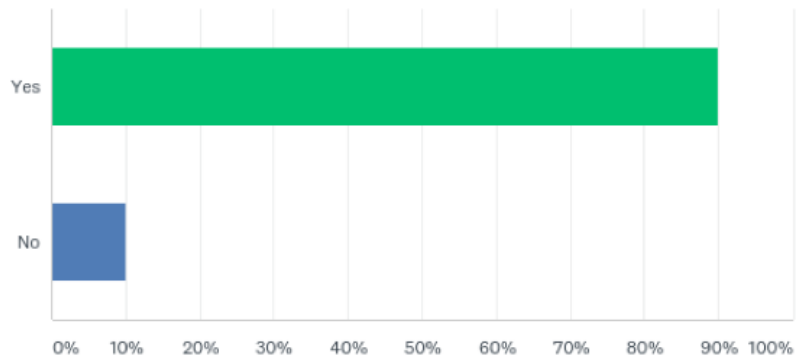
Answered: 20 Skipped: 0



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Q11: I understand the term "off-loading" weight, and know strategies to implement with my patients while they are in the chair

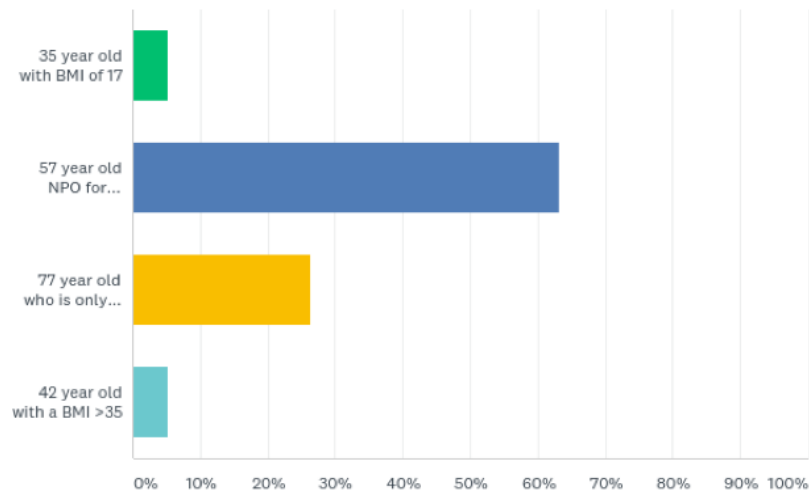
Answered: 20 Skipped: 0



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Q12: Which of the following patient's nutritional status does not put them at a high risk for a pressure ulcer

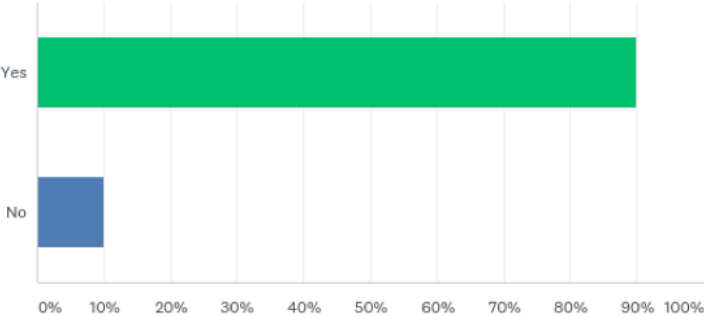
Answered: 19 Skipped: 1



Powered by SurveyMonkey

Q13: I feel confident in understanding how my patient's nutritional status affects their risk of skin breakdown and feel confident in addressing at risk patients to the multidisciplinary team during rounds

Answered: 20 Skipped: 0



Evidence Review Table -Crane-Hicks

Appendix B

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
WOCN, 2017	Updated WOCN guidelines on assessment, prevention, and treatment of HAPUs	Practice guideline	N=131 articles reviewed	Expert panel of 6 Strength of evidence and classification of recommendations benefit v. harm	-Perform skin assessment on admission Level C/Class I -Use reliable/valid tool in conjunction with identifiable risk factors Level C/Class I -Place individuals at risk on redistribution surfaces LevelC/Class I -Use prophylactic dressings to prevent sacral and heel ulcers in patients at risk Level A/Class I	Level I Grade A
Brindle & Wegelin (2012)	Compare rates of pressure ulcers with the application of silicone boarder foam dressing compared to standards of care. Re: prophylactic dressings	Retrospective cohort study	N=100 56-intervention - application of silicone border foam dressing 39-control- unit standards of care Inclusion criteria: admitted in CSICU for >48h.	Participants underwent daily skin assessments. If breakdown of skin suspected the principle investigator, a WOCRN notified and treatment plan developed.	8 pressure ulcers developed in 4/35 patients in control group. 1 pressure ulcer developed in 1/50 patient in intervention group. P>.058. Not statically significant	Level IV Grade B
Clark et al. 2014	Examine the use of prophylactic dressings for the prevention of pressure ulcers Re: prophylactic dressings	Systematic Review	N=21 3-randomized control trials (1998-2013) 7 – cohort (2006-2012) 11-case studies (2004-2012)	Four studies measured incidence of pressure ulcers on scrums, two studies measured incidence on heels, and three on nose. Two studies compared types of dressings, ten compared incidence of pressure ulcers with dressings to no dressings.	Of the three RTCs only one had adequate power & statistically significant data to prove dressings reduced incidences of pressure ulcers. Of the 18 non-RCTs they reported low incidences of pressure ulcers on nose, sacrum and heel with use of dressing, however they were weak. Threats to validity include a majority of the studies did not provide adequate statistical analysis and a majority of the studies included lacked randomization.	Level I Grade C

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
Padula, 2017	Measure the effectiveness of prophylactic 5-layer foam sacral dressings to prevent hospital-acquired pressure injury rates Re: prophylactic dressings	Retrospective observational cohort	N: 912 Sample from 38 acute care hospitals. 5 year period Patients >18yrs, Admitted for >5 days.	AHRQ Patient Safety Indicator #3 (PSI-03) Defines HAPIs as stage 3, 4, or unstageable pressure injuries	There were reductions in PSI-03 between 2010-2015 with the adoption of prophylactic 5-layer foam sacral dressings 1.0 cases/quarter; P=.002 Also noted cost effectiveness: Average cost of dressing \$7 and average cost of PSI3 treatment \$70,000.	Level IV Grade B
Park, 2014	Measure the effect of silicone boarder foam dressing on development pressure ulcers (PU) and/or incontinence dermatitis (IAD) Re: prophylactic dressings	Non-randomized prospective cohort study	N=102 52- experimental 50-control Patients >40yr, Braden <16, admitted to ICU	Skin assessments performed on patients every 3 days by 2 primary wound nurses. IADs measured via IADS instrument. Pressure ulcers determined by 2009 guidelines from National Pressure Ulcer Advisory Panel	23/50 in control group developed a pressure ulcer, and 3/52 in the experimental group developed a pressure ulcer. P<.001. In addition, experimental group had decrease in IAD P<.033	Level III Grade B
Santamaria, Gerdtz et al, 2015	Effectiveness of multi-layered soft silicone foam dressings in preventing intensive care unit (ICU) pressure ulcers when applied in the ED. Re: prophylactic dressings	Randomized control trial	N=440 Experimental =219 Control = 221 Inclusion criteria: ED and ICU admission. Patients >18yrs.	Pressure ulcers that were suspected were identified and staged via the Australian Wound Management Association four-point staging system.	The control group developed 20 pressure ulcers, v. the experimental group, which only developed 5. This was statistically significant with P = 0.001	Level II Grade A
Santamaria, Liu et. al, 2015	To examine the cost-benefit of soft silicone foam dressings in pressure ulcer (PU) prevention Re: prophylactic dressings	Retrospective non-experimental	N=440 Experimental Cases =219 Control = 221	A cost analysis was conducted as well as univariate sensitivity analysis to ensure accurate costs comparing costs of dressing application, and cost of care for treatment of PU.	Dressings were found to be cost effective. The cost of the intervention was estimated at AU\$36.61 per person. The associated cost of PU treatment was estimated at (AU\$1103.52).	Level IV Grade A

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
<p>McInnes, E., Jammali-Blasi, A., Cullum, N., Bell-Syer, S., & Dumville, 2013</p>	<p>Identify surfaces that reduce the incidence of pressure ulcers.</p> <p>Re: supportive surface</p>	<p>Systematic Review</p>	<p>N=59 trials (1982-2013) Only RCT's and quasi-randomized trials included 31 trials included patients with intact skin. 10 included patients with ulcers grade 1 < at baseline 4 included patients with pressure ulcers, but did not stage ulcers 1 included only grade 4 pressure ulcers. 13 trials not specify skin integrity at baseline 12- compared cushions 5- evaluated sheepskin 4-turntables/beds 19-overlays 28-mattresses 3-foam surfaces 2-waffle surfaces 1-heel suspension</p>	<p>Incidences of ulcer defined by stage 1 or greater Stages of pressure ulcers were defined by EPUAP-NPUAP classification system Standard mattress – not clearly defined Low Tech support surface: gel, water, air, bed, sheep skin overlay or mattress) High Tech support surface: air loss, alternating-pressure</p>	<p>Incidences of pressure ulcers were significantly reduced among at risk patients when utilizing a low-tech bed compared to a standard hospital mattress. 95% CI ranged from (.09-.85) amongst the different surface types. Trials that compared high-tech beds to standard mattresses showed decrease in pressure ulcer incidences among the high-tech beds, however there were high risk of bias in trials Trials that compared high-tech and low-tech beds had inconclusive results.</p>	<p>Level I Grade C</p>
<p>McNichol, Watts, Mackey, Beitz, & Gray 2015</p>	<p>Provide clinical guidance for selecting a support surface based on patient needs utilizing an evidence-based algorithm.</p> <p>Re: supportive surface</p>	<p>Non-experimental – Expert opinion</p> <p>Expert panel of 20.</p>	<p>Literature reviewed and yielded 72 publications (1992-2014). Expert task force then drafted an algorithm for -specific selection of types of supportive surfaces -target audience: nurses, physicians, physician assistants -Adult patients (>16yrs) in acute care, long term care and home care settings -Admitted >24 hours</p>	<p>Algorithm is entered after initial skin assessment, and pressure ulcer risk assessment. The Braden Score is utilized with a score <18 or presence of pressure ulcer. Pathways populate for user to guide through based on Braden sub-scales such as moisture and mobility.</p>	<p>Content validity was assessed using a Content Validity Index CVI which was powerful, .95. When the algorithm was broken down into 29 steps, ratings for each were done by a panel and a mean score was calculated. Only one statement (#6) scored poorly “For intact/closed skin not at risk for development of pressure ulcers (Braden >18) reassess need.” Currently the Braden Scale is the exclusive tool for risk assessment, and there is concern over its sole use.</p>	<p>Level VI Grade B</p>

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
Anderson et. al, 2015	<p>Examine the effectiveness of a universal pressure ulcer prevention bundle (UPUPB) with semiweekly wound care nurse rounds to adherence of interventions and incidence rates of pressure ulcers</p> <p>Re: bundle</p>	Quasi-experimental pre/post intervention	<p>Pre: N = 181 Post: N = 146 (Subjects were different in groups) Inclusion: >18 yrs. and admitted >24 hours to ICU Exclusion: pre-existing pressure ulcer <18yrs, lack of consent Among 3 ICU'S in a level I trauma center pre and post phase each lasted 6 months</p>	<p>Chart reviews for interventions and WOC nurse rounding logs. Intventions included skin emollients, assessment head-to-toe, floating heels off bed, early identification and use of pressure redistribution surfaces, and repositioning.</p>	<p>Samples were compared for BMI, mean Braden scale score, age, and LOS between groups. The post phase group has lower admission and Braden scale scores.</p> <p>Rates of PU decreased in post-intervention phase = 15% - 2.1%</p> <p>There was statistical significance for complaisance with repositioning p=.015 and elevation of heels p<.001 in post implementation group.</p>	Level III Grade B
Gillespie Chaboyer, McInnes, Kent, Whitty, Thalib, 2014	<p>Evaluate the effects of repositioning on the prevention of HAPUs in adults, and identify the most effective repositioning schedules</p> <p>Re: turning schedule</p>	Systematic Review	<p>N= 3 RTCs & 1 economic study which yielded 502 participants from long-term and acute settings. 2 RTC's compared 30 and 90-degree tilts 1 RTC compared repositioning frequencies on different support surfaces</p>	<p>In the trials that compared tilt degrees, results were combined using random effects model and the difference in risk of HAPU in both groups was insignificant.</p> <p>In the third trial, participants were randomly clustered in 2 and 3-hour repositioning on standard mattresses, and 4 or 6 hour repositioning on viscoelastic foam mattresses</p>	<p>There was low power among these groups and the data did not prove a difference among tilt degree for reduction of HAPUs.</p> <p>The frequency of repositioning study was also underpowered and proved no difference among turning frequencies in either group among the same mattress type.</p>	Level I Grade C

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
Harmon, Grobbel, & Palleschi, 2016	Evaluate the effectiveness of a team-turning intervention to reduce rates of HAPUs Re: Turning schedule	Descriptive correlational study	N=36 RNs observed 12 bed SICU unit over 14-day observation period Lead RN offered verbal cues to promote turning.	Data collected regarding turns made by 3 independent observational investigators and staff were unaware of times of observations.	During the observations, lead RN provided verbal cues 63% of time, which lead to turning response of 56% of staff. Without cues, 21% of staff completed turns. Positive correlation noted between cueing and turning $r=0.815$, with $P<.05$. Rates of PI reduced from 24.9% to 16.8%. Staff perceptions were also measures and 78.6% agreed that the cues were helpful	Level VI Grade B
Kelleher, Moorer, & Makic, 2012	Evaluate the effectiveness of nurse-to-nurse rounding to reduce HAPUs Re: Turning schedule	Case study 2 champions 180 patients	2 skin champions identified on a 17-bed SICU. 2 champions-initiated PU rounds to assess risk via Braden scale, and application of nursing care.	NDNQI standards were used to assess HAPU prevalence and this was done on a quarterly basis. PU staging via the NPUAP definitions. PU staging	Pressure ulcer prevalence down trended in quarters after the implementation of the PU rounds, but were not incidence rates or statistically significant. Prevention interventions increased i.e the use of supportive surfaces, repositioning, nutrition interventions, and moisture management	Level VI Grade B

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
Powers, 2016	<p>Evaluate the effectiveness between two turning methods on patient positioning and nursing injuries.</p> <p>Re: Turning schedule</p>	Non-randomized cohort study	<p>N=59 Patients within a neuro-trauma ICU were assigned a team. SOC 30 – standard of care team with pillows PPS 29 -Prevalon turn and position system Inclusions: immobile Patients with length of stay >3 days Exclusion: pre-existing pressure ulcer</p>	<p>Investigators observed the teams for turning q2 hours, and noted the number of staff fused to turn, and the time of each turn. After the turn investigators measured the angle of turn using a clinometer. Patients were evaluated daily for presence of pressure ulcers. In addition, nurse injuries were documented and accounted for through an occupational health database.</p>	<p>Rates of pressure ulcers were statistically different SOC 6 v. PPS 1 p=.041 Number of numbers needed in SOC was 2.26 for 5.9 minutes v. PPS 1.97 for 1.35 minutes. PPS groups achieved a 30 degree turn while SOC group received a 20 degree turn. No significant difference in nurse injuries among the groups.</p>	Level IV Grade B
Moyse, Bates, Karafa, Whitman, and Albert 2017	<p>Evaluate the validity of the Vascular HAPI Risk Score instrument, a 10-point risk factor model for pressure ulcer development among patients with vascular disease</p> <p>Re: Vascular patients on HVU at higher risk than Braden Score reflects</p>	Retrospective chart review	<p>N=800 From chart reviews over 18month period Patients admitted to heart/vascular unit</p>	<p>The ten risk factors included lower right ankle-brachial index (<0.9 or >1.2) Braden score (<23..highest risk <10) intensive care unit stay (yes - increase risk) hematocrit values (<35% or >39.9%) female gender (yes-increase risk) nonwhite (yes-increase risk) atherosclerosis, diabetes mellitus, elevated BUN (>30 highest risk) and body mass index (<21 or 25<)</p>	<p>Out of the 800 patients, 16.1% of patients developed HAPI. Utilizing Logistic Regression with p<.01 factors black race, elevated blood urea nitrogen levels, diagnosis of atherosclerosis, body mass, index high hematocrit values, low right ABI, ICU stay diabetes mellitus, and low Braden Scale total score all had significant predictive power. Female gender was not found to have significant predictive power.</p>	Level VI Grade B

Author, year	Study objective/intervention or exposures compared	Design	Sample (N)	Outcomes studied (how measured)	Results	*Level and Quality Rating
Moore & Cowman, 2014	Identify if the use of a pressure ulcer risk assessment tool helps to reduce the rate of pressure ulcers in the healthcare setting. Re: Vascular patients on HVU at higher risk than Braden Score reflects	Systematic Review	N=2 (2009-2011) First study was a cluster randomized study in a nine-ward military hospital. A total of 106 patients were enrolled. Group A (3 wards) nurses received training and used Braden scale on patients. Group B (3 wards) received training but were not mandated to use Braden scale. Group C (3 wards) that used clinical judgment. Second study was single blind RTC that allocated patients to either Waterlow (410) or Ramstadius (411) or control -clinical judgement (410)	1. Comparison between Braden with training and Braden without. 2. Braden and training with clinical judgement. 3. Waterlow v. control 4. Ramstadius v. control 5. Waterlow v. Ramstadius	1. 16 ulcers developed in Braden scale group and 17 developed in training group. No statistical significance between the two groups. 2. 16 ulcers developed in Braden scale group and 16 also developed in the clinical judgement group. 3 7.5% of patients in Waterlow and 6.8% of control patients developed Pressure ulcers. Not significant 4. 5.4% Ramstadius and 6.8% control patients developed pressure ulcers, not significant 5. 7.5% of Waterlow and 5.4% of Ramstadius developed pressure ulcers, not statically significant. None of the included risk assessment tools showed significance	Level I Grade C

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

Melnyk, 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 C: Skin Assessment Tool

Patient Label

Skin Assessment Tool

****Not part of the medical record****

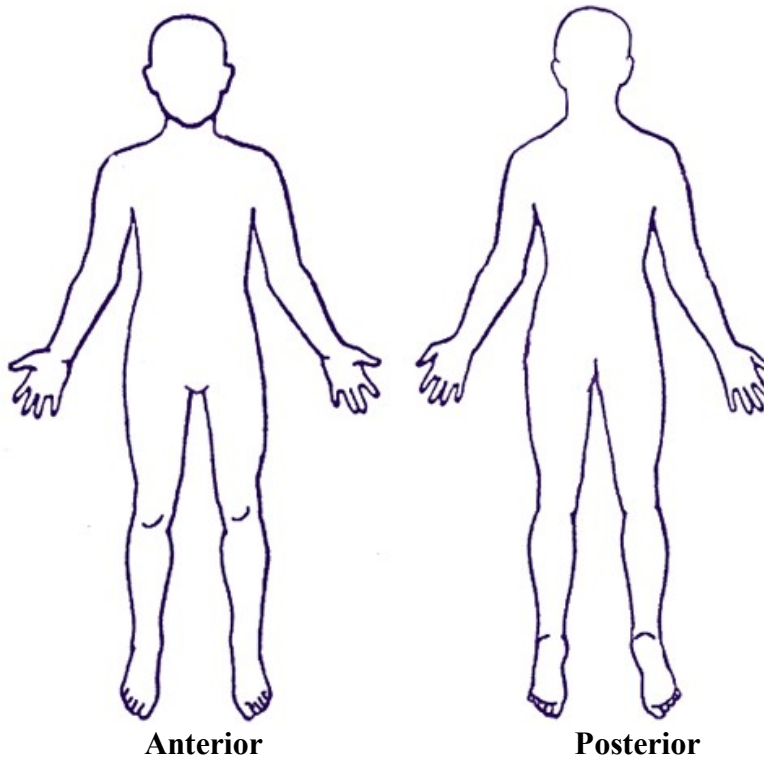
Please perform a two-nurse skin assessment on every admission to the HVU. Mark area on body template where skin abnormality is located using the codes below. Then transfer information into an EPIC LDA.

HVU Admission date: _____

Nurse #1: _____

Nurse #2: _____

Skin intact: Yes No



Key: A = Abrasion E= Ecchymosis ER = erythema B = blister L= laceration P= pressure injury

S= skin tear SW = surgical wound R = rash O = other













<p>Place appropriate nursing orders for:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Nutrition (review albumin and protein levels) <input type="checkbox"/> Wound nurse <input type="checkbox"/> # 2 Bed for Braden <18 <p>Epic documentation</p> <ul style="list-style-type: none"> <input type="checkbox"/> Insert LDAS for wounds listed above 	<p>Supply needs:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Pillows <input type="checkbox"/> Sacral preventive dressing <input type="checkbox"/> Skin care creams: <input type="checkbox"/> Chair cushion <input type="checkbox"/> Prevalon boots <input type="checkbox"/> Turning schedule sign
--	--

Appendix D: Turning Schedule

Turn Patient Q2 hrs:

Cross out the time with dry erase once completed

Circle the chair to indicate patient is in the chair and position has been shifted.

0200 Back		1400 Back	
0400 Right		1600 Right	
0600 Left		1800 Left	
0800 Back		2000 Back	
1000 Right		2200 Right	
1200 Left		0000 Left	

DOCUMENT!

Appendix E: HealthStream Education Module

Hospital Acquired Pressure Ulcer Prevention Admission Bundle

Courtney Crane RN BSN CCRN
DNP Student

Objectives

- Learner will be able to state the purpose of the HAPU admission bundle.
- Learner will be able to identify all aspects of bundle, and articulate the rationale for each aspect as they pertain to pressure ulcer prevention
- Learner will be able to complete post assessment quiz with a score of 80% or greater.

Purpose

- My name is Courtney Crane, I am a DNP student at the University of Maryland School of Nursing
- This project was selected because last year there were 5 pressure ulcers identified within the HVU
 - While 5 may not seem like a lot, pressure ulcers
 - Increase healthcare expenditures : pressure ulcers account for approximately \$9-11 billion dollars yearly in US healthcare costs
 - Increase morbidity : through an increase in pain, discomfort, and the added risk for sepsis
 - Increase in mortality : with approximately 60,000 deaths due to pressure ulcers annually
 - Of note, a patient from the HVU died last year from a HAPU

Purpose

- The purpose of this DNP project is to decrease incidence rates of hospital acquired pressure ulcers (HAPUs) through the implementation of an admission bundle that will provide tools for nursing staff to increase compliance rates of skin assessments, turning, and supportive measures for at risk patients

Survey Results

Back in April of 2018, I asked you to complete a survey to assess current practice, measure staff knowledge and attitudes towards pressure ulcer prevention and identify any barriers to implementation.

Results of the survey include:

- Staff reported an average confidence level of **7 out of 10** on utilization of the Braden Scale
 - Majority of patient risk of skin breakdown is determined by the Braden scale, it is important for staff to feel very confident utilizing this scale
- Only **50%** of staff stated they **turn their patients every two hours**
- Only **25%** of staff knew that admission skin assessments need to be **documented within two hours**
- Issues previously identified :
 - Patients sitting in chairs for >2hours who are unable to reposition or offload their weight.
 - Low nutrition scores – low albumin and protein levels and no nutritional consult placed

Post implementation Survey

Staff will be asked to repeat the survey during weeks 10-12 of implementation of the bundle to reassess current practice, measure any changes in staff knowledge and attitudes towards pressure ulcer prevention.

Components of the HVU Admission Bundle

- Why a bundle?
 - Pressure ulcers can develop for a magnitude of reasons, and a bundle approach allows for the incorporation of multiple preventative measures.
 - The admission bundle will target implementing these preventative measures ASAP.
 - *Early identification of risk -> early implementation of preventative measures -> reduction of pressure ulcer incidence*
 - Aspects of the bundle are based on evidence based practice, and specific components were selected based on results of the survey (needs of the unit).

Components of the HVU Admission Bundle

- 2 Nurse skin assessment of patient within 2 hours of admission
- C2 beds ordered for patients with Braden score ≤ 16
- Sacral preventative dressings for patients with Braden score ≤ 16
- Turning schedules posted

HVU Admission Bundle

Implementation of Admission Bundle will start **Monday September 10th**, and compliance with the components of the bundle will be tracked for 12 weeks.

TWO RN Skin Admission Assessment

- “Patient will have a systematic skin assessment on admission within 2 hours” - Current AAMC policy *GNP14.6.11 – Skin and Wound*
- Why two nurse skin assessment?
 - New evidence states two nurse assessments help to improve confidence, communication and compliance
- Use of *Skin Assessment tool*
 - Worksheet to help document skin breakdown/wounds/LDAs
 - These can be found in binder by charge nurse station
 - Return completed forms to the binder

Patient Label

Skin Assessment Tool

Not part of the medical record

Please perform a two-nurse skin assessment on every admission to the NCU. Mark area on body template where skin abnormality is located using the codes below. Then transfer information into an ERIC/LDA.

NCU Admission date: _____

Nurse #1: _____ Nurse #2: _____

Skin intact: Yes No

Key: A = Abrasion E = Erythema ER = erythema B = blister L = laceration P = pressure injury

S = skin tear SW = surgical wound R = rash O = other

Place appropriate nursing orders for: <ul style="list-style-type: none"> <input type="checkbox"/> Wash/lin (include alcohol and protein levels) <input type="checkbox"/> Wound nurse <input type="checkbox"/> # 2 Bed for Braden <18 <input type="checkbox"/> Epic documentation <input type="checkbox"/> Insert LDAs for wounds listed above 	Supply needs: <ul style="list-style-type: none"> <input type="checkbox"/> Pillows <input type="checkbox"/> Sacral preventive dressing <input type="checkbox"/> Skin care creams <input type="checkbox"/> Chair cushion <input type="checkbox"/> Preceptile boots <input type="checkbox"/> Timble schedule sign
---	--

Benefits of two nurse assessment

- Helping hands for turning and getting patients settled at time of admission
- Assistance entering LDAs in EPIC when applicable
- Assistance entering Wound nurse consults in EPIC when applicable
- Another clinical colleague to help assure high risk patients are identified and early interventions are initiated:
 - Sacral dressing
 - #2 bed
 - Nutrition consult
 - Appropriate skin care products
 - Prevalon boots
 - Extra pillows for turning

Braden Scale

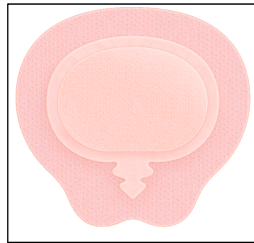
- “The Braden scale, a risk assessment tool that guides the clinician in determining a patient’s level of risk for developing a pressure injury, is the tool used for the adult population to determine risk for pressure related skin damage.”
 - Current AAMC policy *GNP14.6.11 – Skin and Wound Assessment, Prevention and Management*
- It is important to look beyond your shift
 - *Looking back*, is the patient’s Braden score decreasing over time?
 - Have individual items within the subscales been addressed in daily rounds?
 - Nutrition consult?
 - Nursing consult
 - *Look beyond the patient’s physical size or appearance. Are the patient’s albumin and protein levels low?*
 - Is physical therapy involved to help with mobility?
- *Patients with a score ≤ 16 should receive a C2 bed and a sacral preventative dressing (if appropriate).

BRADEN SCALE					
BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK					
Patient's Name _____	Evaluator's Name _____			Date of Assessment _____	
SENSORY PERCEPTION: ability to respond meaningfully to pressure-related discomfort	1. Completely Limited Unresponsive (does not react, flinch, or grimace) to painful stimuli. Skin is unresponsive to pinprick or temperature changes. Limited ability to feel pain over most of body.	2. Very Limited Responsive only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness.	3. Slightly Limited Responsive to verbal commands. Responds to verbal commands, but not to non-painful stimuli. Communicates discomfort or the need to be turned.	4. No Impairment Responds to verbal commands. Responds to verbal commands. Responds to the need to be turned.	
MOISTURE: degree to which skin is exposed to moisture	1. Completely Moist Skin is kept moist almost constantly by perspiration, urine, etc. Compresses is detected and care given if patient is incontinent or incontinent.	2. Very Moist Skin is often, but not always moist. Lines must be changed at least once a shift.	3. Occasionally Moist Skin is occasionally moist, requiring or needs to be changed approximately once a day.	4. Usually Moist Skin is usually dry, lines rarely require changing at routine intervals.	
ACTIVITY: degree of physical activity	1. Bedfast Confined to bed.	2. Chairfast Unable to walk without aid of non-weight-bearing assistive device. Cannot bear own weight and/or must be assisted into chair or wheelchair.	3. Walks Occasionally Walks occasionally during day, but not for very short distances, with or without assistance. Speaks majority of each shift in bed or chair.	4. Walks Frequently Walks multiple times at least twice a day and moves room at least once every few hours during waking hours.	
MOBILITY: ability to change and control body position	1. Completely Incontinent Does not make even slight changes in body or extremity position without assistance.	2. Very Limited Makes occasional slight changes in position but unable to make frequent or significant changes independently.	3. Slightly Limited Makes frequent though slight changes in body or extremity position independently.	4. No Limitation Makes major and frequent changes in position without assistance.	
NUTRITION: usual food intake pattern	1. Very Poor Never eats a complete meal. Usually eats more than 1 or only food offered. Eats 2 servings or less of protein meal or dairy products per day. Needs fluids poorly. Does not take a liquid dietary supplement.	2. Probably Inadequate Eats only a complete meal and usually eats more than 1 or only food offered. Protein intake includes only 1 serving of meat or dairy products per day. Occasionally will take a dietary supplement.	3. Adequate Eats over half of most meals. Eats most dairy products per day. Occasionally will take a dietary supplement.	4. Excellent Eats most of every meal. Never misses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.	
FRICTION & SHEAR:	1. Problem Requires moderate to maximum assistance in moving. Complete sliding without sliding against sheets is impossible. Frequently slides out of bed or chair requiring frequent repositioning with manual assistance. Requires continuous or frequent attention to prevent complete friction.	2. Potential Problem Requires moderate to maximum assistance in moving. Complete sliding without sliding against sheets is impossible. Frequently slides out of bed or chair. Requires frequent repositioning with manual assistance. Maintains neutral good position in chair or bed most of the time but occasionally slides down.	3. No Assistance Problem Moves freely or requires minimum assistance. Complete sliding without sliding against sheets is possible. Frequently slides out of bed or chair. Requires frequent repositioning with manual assistance. Maintains good position in bed or chair.	4. No Assistance Problem Moves freely and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.	
© Copyright Barbara Braden and Nancy Bergstrom, 1988. All rights reserved.				Total Score _____	

Patients with a Braden ≤ 16

C2 beds

- Current evidence supports the use of low-air loss beds (C2 beds) in the prevention of skin breakdown compared to standard hospital beds
- C2 beds can be independently ordered by RN's
- Patients should be placed on C2 beds as soon as possible
- *You know it is a C2 bed by looking for the sticker on the wheels*



Sacral Preventative Dressings

- Current evidence support the use of prophylactic sacral dressings, they were found to be effective in reducing HAPU incidence rates as well as cost-beneficial
- Entire dressing should be removed and replaced with new sacral foam dressing every 72 hours or if dressing is soiled, saturated, damaged or no longer adherent
- Apply to dry skin & place the narrow end of the dressing a minimum of 2cm above the anal sphincter.
- Write the date on the outer layer of the dressing and capitol "P" for prevention
- Incontinent patients should not receive a preventive dressing
- For more information see AAMC policy *GNP14.6.11 – Skin and Wound Assessment, Prevention and Management : Use of Preventative Multilayer Sacral Foam Dressing*

Turning Schedule

- “ The general recommendation is turn the patient every 2 hours” - Current AAMC policy *GNP14.6.11 – Skin and Wound Assessment, Prevention and Management*
- Turn schedule should be initiated after every patient is admitted to unit
- Schedule should be posted in every patients room
 - Each hour patient is turned should be crossed off by RN.
 - When a patient is OOB, the chair symbol should be crossed off
- Turning schedule should act as a cue in patient's room to prompt routine change in positioning.
- Current evidence states the cues help to prompt nurses and increased frequency of turning which lead to decrease rates of skin breakdown.

Turn Patient Q2 hrs:

Cross out the time with dry erase once completed
Circle the date to indicate patient is in the chair and position has been shifted

0200 Back		1400 Back	
0400 Right		1600 Right	
0600 Left		1800 Left	
0800 Back		2000 Back	
1000 Right		2200 Right	
1200 Left		0000 Left	

DOCUMENT!

Patients who cannot offload their weight, should only be in chair for 2 hour increments

Dos and Don'ts of sitting in a chair

DO

- Make sure a waffle cushion is used on each patient
- Encourage the patient to shift position often
- Have the patient stand every two hours if able
- Physically turn the patient on their side while in the chair if immobile
- Make sure heels are floated off of leg rest

Don't

- Let the patient sleep in the chair over night
- Forget to reposition the patient every 2 hours

Other pressure ulcer prevention interventions:

- No more than 3 layers under the patient
- No diapers unless ambulating. Do not use blue incontinence pad as a diaper by pulling it up between the patients legs
- Float heels off the bed
 - Heels-up pillow
 - Prevalon boots
 - Pillows
- Use appropriate skin care ointments for correct condition

STOP HAPUs from the START

- Complete 2 RN skin assessments at admission to help identify pre-existing breakdown and ASSESS for RISK
- Early assessment of risk leads to early initiation of preventative methods
 - C2 beds ordered for patients with Braden score ≤ 16
 - Sacral preventative dressings for patients with Braden score ≤ 16
 - Turning schedules posted



Thank you for your help with my DNP
project aimed at reducing HAPUs on the
HVU!

Please proceed to the quiz.

For questions or comments

crcane@umaryland.edu

410-627-0255

Appendix F: HealthStream Education – Assessment

Question # 1 Components of this admission skin bundle include all of the following except:

- 1) 2 nurse skin assessment
- 2) Diapers and skin barrier ointments for incontinent patients
- 3) C2 beds for at risk patients
- 4) Turning schedules

Question # 2 Skin assessments with another nurse should be completed within ___ hours of a patient's admission to the HVU

- 1) 4 hours
- 2) 12 hours
- 3) 1 hour
- 4) 2 hours

Question # 3 Patients' should be placed on a C2 bed and get a sacral preventative dressing if their Braden scale score is _____

- 1) <16
- 2) <18
- 3) ≤ 16
- 4) ≤ 18

Question # 4 Turning schedules should be posted in _____

- 1) Every patient room
- 2) Patients with Braden scores ≤ 16
- 3) Patients with Braden scores ≤ 18
- 4) Patients with Braden score <16

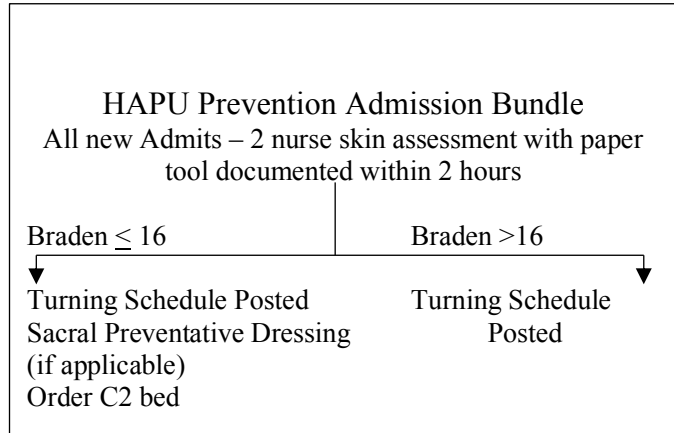
Question #5 According to the AAMC policy *GNP14.6.11 – Skin and Wound Assessment, Prevention and Management*, Sacral preventative dressings can remain on patients' skin if soiled for _____

- 1) 12 hours
- 2) 24 hours
- 3) 48 hours
- 4) 72 hours

Appendix G: Audit Tool

Room #		
CSN #		
Braden scale score		
Admit to Unit <24 hour		
Pressure Injuries Present		
Preventative sacral dressing in plan		
Preventative Dressing Applied		
Nutrition Consult Present		
Nutrition Consult Placed		
Wound Consult Present		
Wound Consult Placed		
OOB in chair seat cushion in room		
OOB in chair-Seat cushion brought to room		
Diaper Present		
# 2 Bed in use		
#2 Bed ordered		
Turning Scheduled		

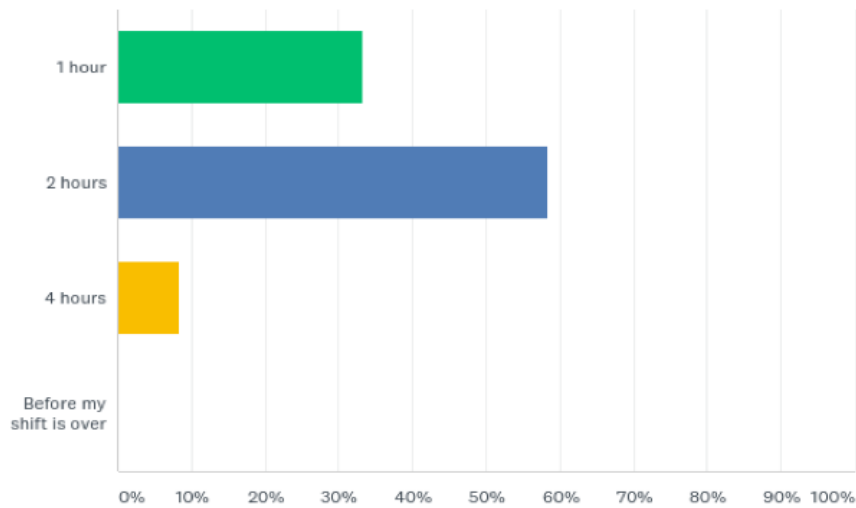
Appendix H: HAPU Prevention Badge



Appendix I: Post-Implementation *Survey of Current Practice*

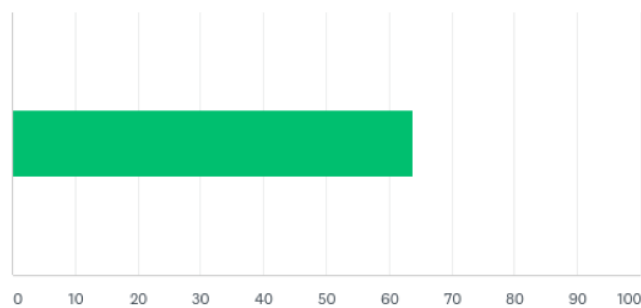
Q1: When a patient is admitted to the unit, a skin assessment should be performed within

Answered: 12 Skipped: 0



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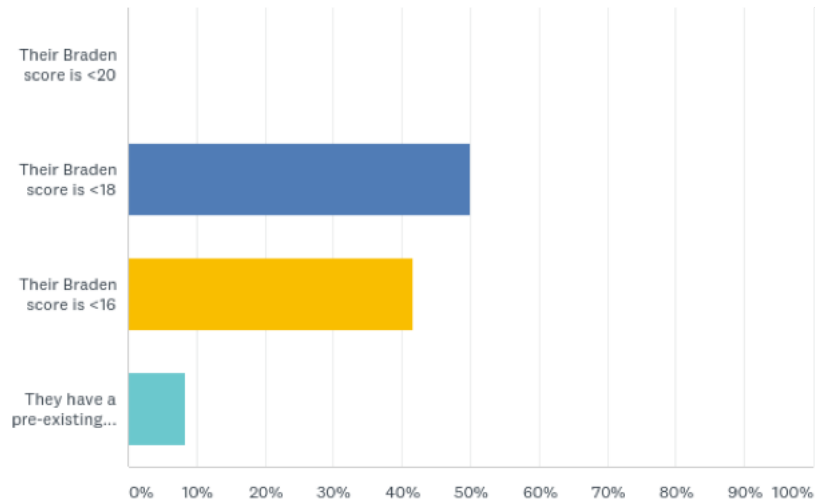
Q2: On a scale of 1 -10, how confident are you in using the Braden scale to accurately capture your patient's risk for skin breakdown?



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Q3: I identify a patient as high risk for skin breakdown when

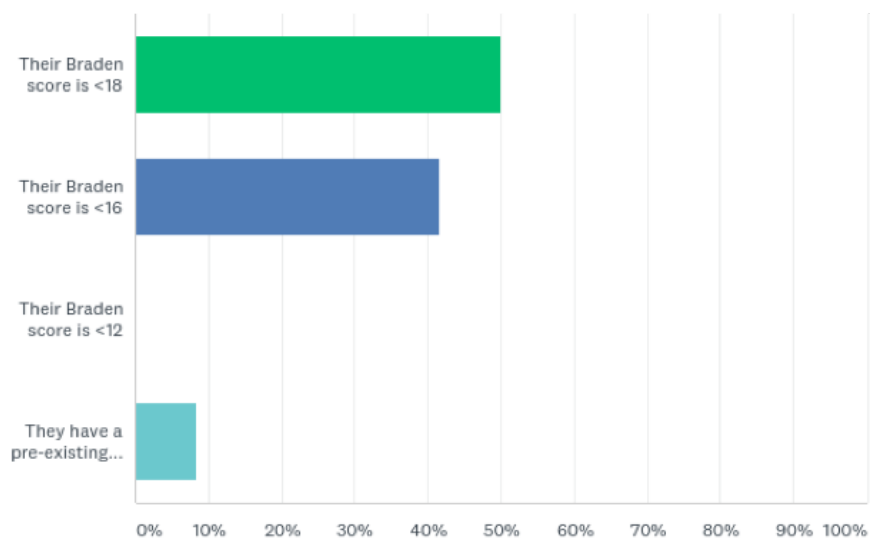
Answered: 12 Skipped: 0



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Q4: I place a preventative sacral dressing on my patients when

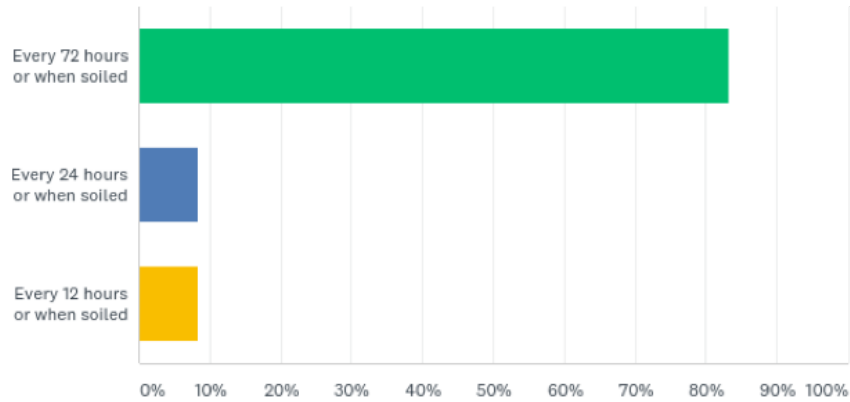
Answered: 12 Skipped: 0



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Q5: Sacral Preventative dressings should be changed

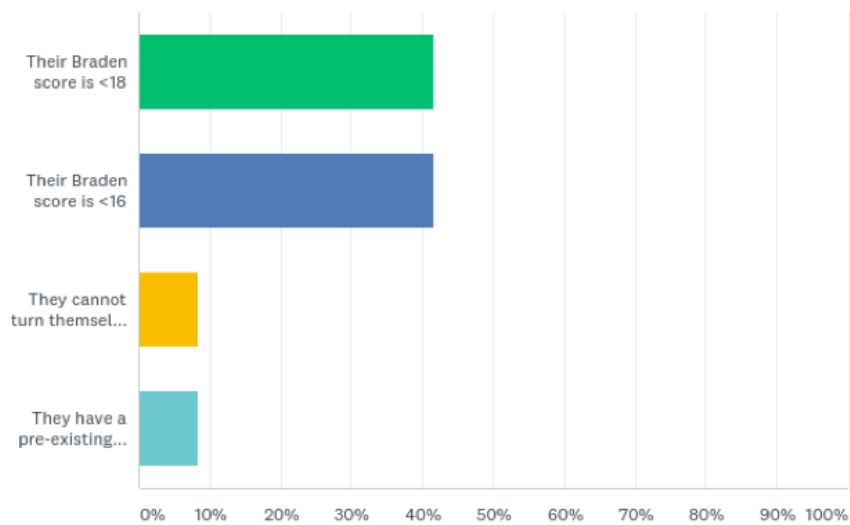
Answered: 12 Skipped: 0



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Q6: I place my patient on a C2 bed when

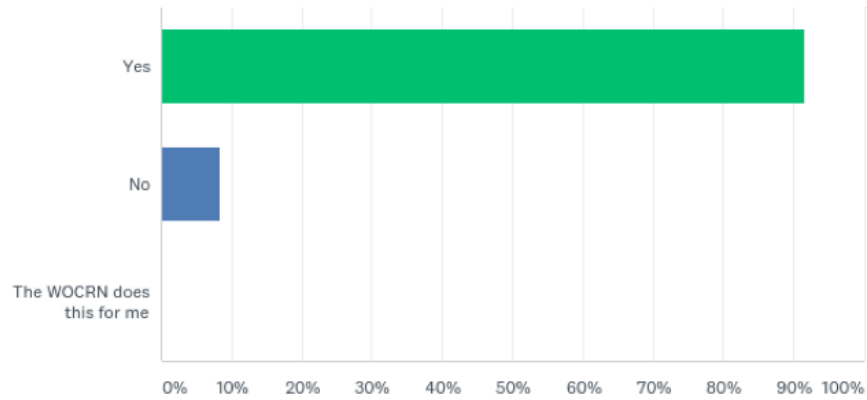
Answered: 12 Skipped: 0



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Q7: I know how to independently order a C2 bed

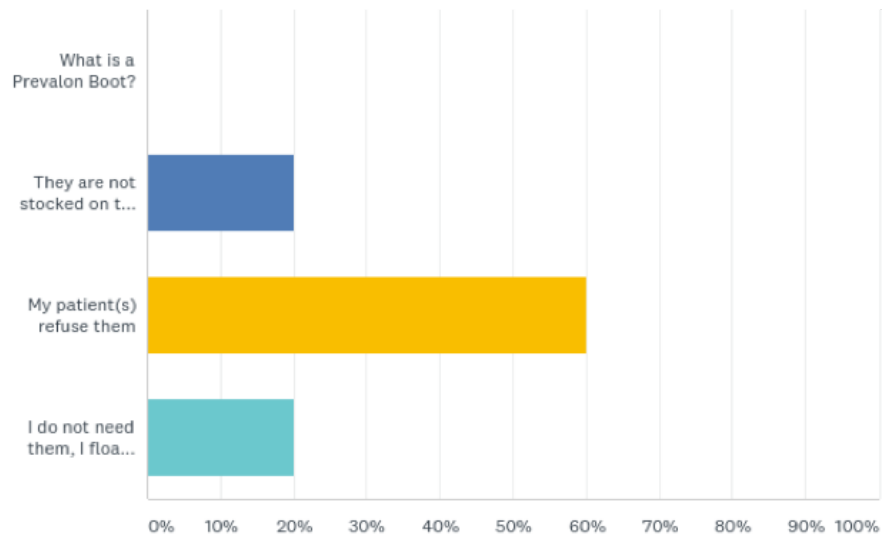
Answered: 12 Skipped: 0



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Q8: Prevalon Boots for heel protection are not utilized frequently on the unit because

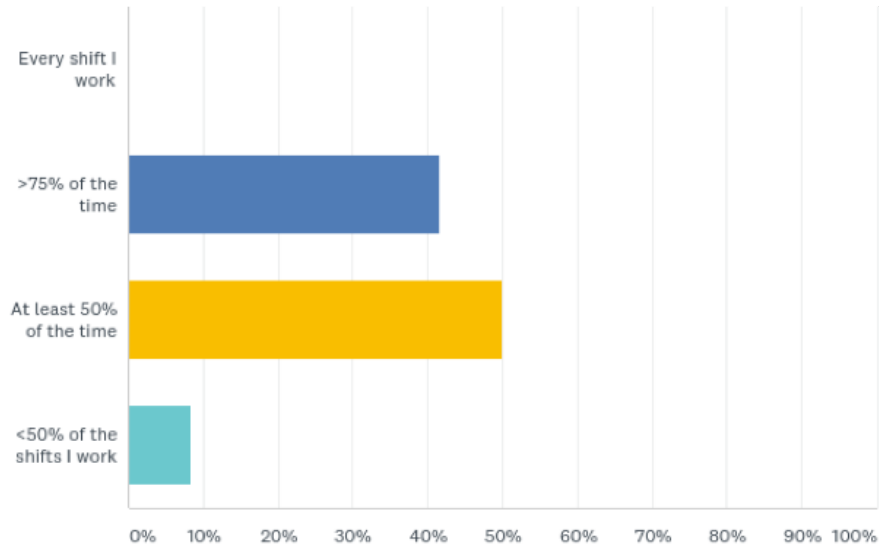
Answered: 10 Skipped: 2



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Q9: I can honestly say that I turn my patients every two hours

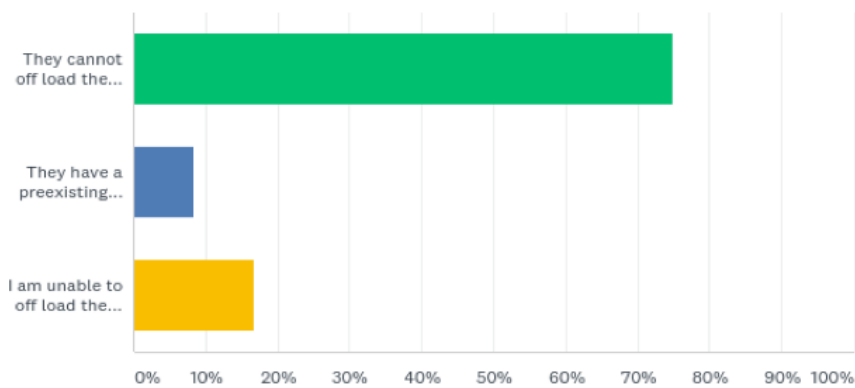
Answered: 12 Skipped: 0



Powered by  SurveyMonkey

Q10: When I get my patients out of bed to the chair, it is unsafe for them to stay in the chair for longer than 2 hours if

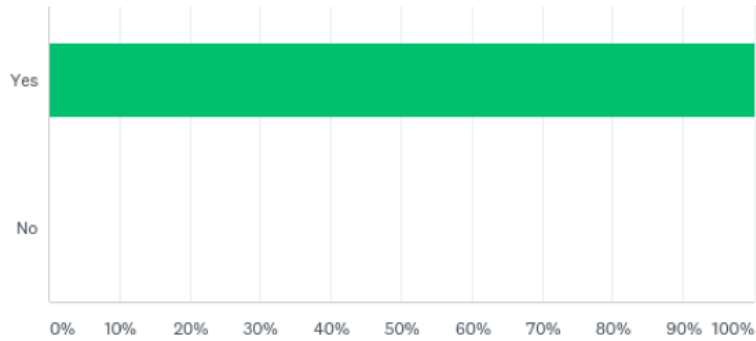
Answered: 12 Skipped: 0



Powered by  SurveyMonkey

Q11: I understand the term "off-loading" weight, and know strategies to implement with my patients while they are in the chair

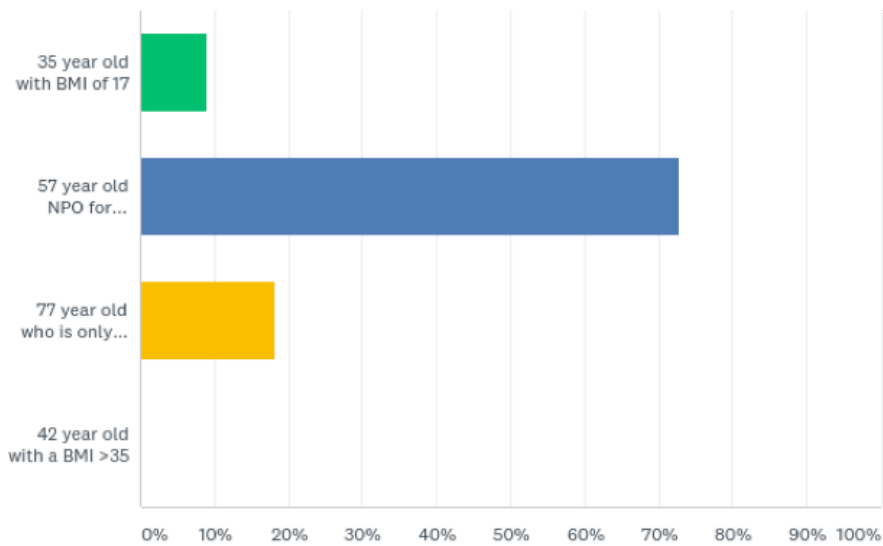
Answered: 12 Skipped: 0



Powered by  SurveyMonkey

Q12: Which of the following patient's nutritional status does not put them at a high risk for a pressure ulcer

Answered: 11 Skipped: 1



Powered by  SurveyMonkey

Q13: I feel confident in understanding how my patient's nutritional status affects their risk of skin breakdown and feel confident in addressing at risk patients to the multidisciplinary team during rounds

