Reducing Hospital Acquired Pressure Injuries; Implementation of a Best Practice Admission Bundle

Veronica L. Moreno

Under Supervision of

Madelyn O'Neal

Second Reader

Megan Rosenblatt

Clinical Site Representative

Karen Miga

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Correspondence regarding this DNP project should be directed to Veronica Moreno.
Email: veronicamoreno@umaryland.edu

Abstract

Problem: Hospital Acquired Pressure Injuries (HAPIs) affect over 2.5 million Americans annually, resulting in approximately 60,000 patient deaths from HAPI related complications (Agency for Healthcare Research and Quality, 2014). HAPIs lead to increased medical interventions, infections, extended hospital stays, and cost. A Medical-Surgical/Orthopedic unit in a large private, non-profit teaching hospital located in an urban area experienced a 150% rise in HAPI incidents from two cases in Fiscal Year (FY) 22 to five in FY23. Additionally, 63% of these injuries occurred within 14 days of admission. **Purpose:** To implement a HAPI Best Practice Admission Bundle (BPAB) as outlined by the Agency for Healthcare Research and Quality (AHRQ) guidelines to reduce HAPI rates on a Medical-Surgical/Orthopedic unit, an evidence-based practice change, over 15-weeks. **Methods:** A HAPI Best Practice Admission Bundle (BPAB) was implemented for all adult inpatients admitted to the unit. The bundle included a two-person comprehensive skin assessment and Braden scale assessment within eight hours of admission, prompting selection of an appropriate care planned interventions guided by the lowest Braden scale subcategory. The project lead conducted weekly HAPI BPAB audits to assess compliance and track HAPI incidences. Data dissemination occurred bi-weekly to the unit stakeholders followed by discussion for project improvement. **Results:** HAPI BPAB compliance documentation, with all three-components, ranged from 3.4% (n=1)-53.8% (n=13), with an average of 30.3%. Skin assessment, Braden assessment and care plan interventions ranged 76.9% (n=10) - 100% (n=24), with an average of 88.9%; 76.9% (n=10) -100% (n=24), with an average of 90.7%; 83.3% (n=6) -100% (n=12), with an average of 99.0% respectively. **Conclusions:** The implementation of a HAPI BPAB, incorporating Braden Scale subcategory-driven interventions to address HAPI risks at the time of admission, demonstrated a positive impact on HAPI outcomes**.** A HAPI BPAB allowed for customization of evidence-based intervention to address the targeted problem for the admitted patient. Despite low documentation of HAPI BPAB compliance, a HAPI BPAB was successful in preventing HAPIs during the 15-week period with no reported HAPI incidents.

Keywords: medical-surgical, hospital-acquired pressure injury, admission, care bundle

Reducing Hospital Acquired Pressure Injuries; Implementation of a Best Practice Admission Bundle

Hospital acquired pressure injuries (HAPI) affect over 2.5 million Americans annually, resulting in approximately 60,000 patient deaths from HAPI related complications (Agency for Healthcare Research and Quality, 2014). The financial burden associated with treating one HAPI can exceed $11,000, totaling to billions annually (Warshawsky, & Pascale,2024). HAPIs are identified as preventable by Medicare and Medicaid, leading to reductions in reimbursements hospitals receive for related care (The Joint Commission,2022), therefore, health systems have made substantial effort towards HAPI prevention.

The project site was a Medical-Surgical/Ortho unit in a large urban teaching hospital which experienced an increase in HAPI incidents from two cases in Fiscal Year (FY) 22 to five cases in FY23. The units' increased in HAPI events surpassed the hospital's HAPI incidence goal of zero. Many factors may have contributed to the rise in HAPI cases, including higher patient acuity, increased patient immobility, issues with confidence caring for HAPIs, and challenges related to staff workload and turnover. A fishbone diagram, as shown in Appendix A, was created to identify the root cause of increased HAPI incidence rates on the project unit. The primary root cause was identified as inconsistent prevention strategies leading to delay in the initiation of HAPI prevention interventions. Competing priorities often slowed down or lead to failed application of prevention strategies, highlighting the need for a bundled approach that aligned with the unit workflow and optimized care.

Available Knowledge & Specific Aims

A literature search was performed using PUBMED, Medline, Cochrane, and CINAHL to determine evidence to support practice change in HAPIs prevention using a HAPI Best Practice

Admission Bundle as outlined by the AHRQ. The search terms included “pressure ulcer”, “pressure injury”, “pressure sore”, “prevention”, “program”, “bundle”. The initial search yielded 1,419 results. 349 articles were removed due to being duplicates, 1,024 were excluded due to falling outside seven years (2017-present) followed by the elimination of 20 more due to not having full text available and title/ abstract review. Of the 26 remaining articles, additional articles were excluded due to the level of evidence, not available in English, and for taking place on pediatric units. The remaining articles were selected to establish the most current and relevant research studies as shown in Appendix B The literature was then reviewed to determine the advantages with a bundled approach to HAPI prevention using a HAPI Best Practice Admission Bundle (BPAB) as outlined by the Agency for Healthcare Research and Quality. The level of evidence using the Johns Hopkins Nursing Evidence-Based Practice Model for the seven articles were evaluated as one level II, eight level III, and five level V (Appendix C).

Altaş, & Çelik, (2023) found a pressure injury prevention care bundle that included risk assessment with the Braden Scale, skin assessment, skin care, positioning, and regulation of nutrition and fluid intake reduced the number of HAPIs in high-risk patients. Meanwhile, Soban et al.(2011) consistently showed decreases in HAPIs with implementation of interventions of “best practices”. Huang et al. (2021) discussed evidence of the reliability of the use of a bundle for the prevention of pressure injuries. Based on a synthesis of evidence (Appendix D), the quality rating for these articles is “B.” Based on the evidence level and quality, there is good and consistent evidence to support a practice change. A HAPI BPAB guided by the AHRQ Preventing Pressure Ulcers in Hospitals Toolkit was an appropriate choice to address the prevention interventions. The toolkit comprised evidence-based interventions and best practices to support a problem-focused practice change for addressing HAPI rates within the selected inpatient population (AHRQ, 2014).

The HAPI Best Practice Admission Bundle (BPAB) was an evidence-based quality improvement intervention to support a problem focused practice change addressing HAPI rates. The current and desired processes are outlined in Appendix E and F, respectively. The purpose of this quality improvement project was to implement a HAPI Best Practice Admission Bundle (BPAB) as outlined by the Agency for Healthcare Research and Quality (AHRQ) guidelines to reduce HAPI rates on a Medical-Surgical/Orthopedic unit, an evidence-based practice change, over 15-weeks.

Rationale

The Theoretical Framework of Complex Innovation Implementation was selected due to its systematic approach to implementing an intervention (Appendix G). The framework acknowledged the need to understand the context of the organization, while considering the multifaceted aspects of innovation and the potential effects on the organization to develop tailored strategies. The key concepts included management support, availability of resources, implementation policies and practices, innovation-value fit, implementation climate, champions, and implementation effectiveness to support innovations like the HAPI BPAB, based on the current evidence to provide patients the most beneficial outcomes. The organization had multiple key components that served as a foundational basis to improve the success of the innovation with reliable outcomes (Helfrich et al. 2007). The organization's fiscal year 2024 annual operating plan demonstrated managements' strong commitment to achieving the highest levels of quality and safety. The plan focused on updating and expanding the process for evidence-based projects into practice, which helped to ensure the innovation-value fit. A strong emphasis was placed on forming an open environment to create collaborative problem solving and change, supported with the integration of available site resources and unit skin champions. These characteristics show the setting was a good fit for the project which were essential for successful project implementation effectiveness and sustainability.

Methods

Context

The project site was an 18-bed Medical-Surgical/Ortho unit in a large urban teaching hospital, primarily caring for spine, joint replacement, and ORTHO-trauma related injuries. The unit's patient population had increased risk factors for HAPIs, including those with limited mobility, post-anesthesia, use of opioid medications, perineural infusion, numerous lines/drains, and a history of falls, highlighting a need for preventative HAPI strategies. The unit's culture, climate, and site resources were assessed using the Context Assessment Index(CAI), a validated tool. The CAI assessed the unit culture, leadership and evaluation on a continuum from weak to strong. The unit's culture assessment score was determined as strong (81.25%), indicating the unit had clear values and beliefs. Additionally, individuals demonstrated understanding of roles and responsibilities while collaborating as a team. Leadership was determined to be moderately strong (71.4%) demonstrating transformational leadership, clear roles, and support of effective teamwork. Evaluation of nurses also had moderately strong indicators (76.54%) exhibiting use of feedback methods, use of multiple sources of information and maintain effective organizational structure. Areas for improvement fell under statements regarding empowering the team to teach, learn and manage tasks, and integrating the patient more in each process related to their own care. The CAI overall showed strong context indicators reflecting the unit's potential to adopt quality improvement changes. The project site was dedicated to practicing evidence-based care as shown by its commitment to consecutive re-designation of the pathway to excellence, recognition as a high reliability organization (HRO) and progress towards Magnet designation. The unit was committed to support these efforts through participation in various committees and had a history of supporting change for previous improvement projects. The wound nurses, skin committee and skin champions were resources utilized to support the proposed change. These components provided a solid groundwork for the implementation of the HAPI BPAB. Approximately 300 patients were expected to be impacted by HAPI BPAB implementation.

Intervention

The HAPI BPAB was the evidence-based intervention implemented in this project. The bundle included the three key components of the AHRQ toolkit: (1) completion of witnessed comprehensive skin assessment, (2) use of a pressure ulcer risk assessment, and (3) care planning with best practice intervention (National Pressure Ulcer Advisory Panel; European Pressure Ulcer Advisory Panel; Pan Pacific Pressure Injury Alliance, 2019). This project focused on care planning to address the Braden scale subcategories scoring <2, impacting risk and initiating interventions upon admission. A multidisciplinary team consisting of unit leadership, the project lead, and skin champions were formed to aid the progression of this project over the 15 week implementation period.

The project unit HAPI prevention education sessions on components of the HAPI BPAB were completed as in-service presentations led by the project lead to review materials and allowed for questions from the unit nurses and PCTs during the first week of implementation. Starting the second week, nurses completed the HAPI BPAB and corresponding audit survey for all admitted patients to the unit. Within eight hours of admission, the nurses completed a two-person comprehensive skin assessment Braden scale to determine the presence of any preexisting skin abnormalities and determine any area-sensory perception, skin moisture, activity, mobility, friction and shear, and/or nutritional status-that required additional support determined by a Braden subscale score of <2. Care planning was comprised by the selection of appropriate best practice interventions guided by the lowest Braden scale subcategory.

Throughout the project HAPI BPAB flyers were present in multiple locations in high traffic areas around the unit made visible to nursing staff to ensure the most accurate information was available. Quality audits were conducted as a strategy to evaluate implementation consistency. Additional tactics and strategies included formal commitment and continuing support from the nursing director, regular email updates, the inclusion of daily huddle announcements, evaluation of HAPI prevention knowledge, educational in-service sessions, weekly newsletter reminders, presence of a large educational poster summarizing HAPI BPAB for reference in the charting room, incentives for nursing participation and skin champions to aide nursing staff with question as well as provide opportunities for feedback. A Gantt Chart was used to display timeline and tasks completed throughout this project (Appendix H).

Measures

This project included structural and process changes during the 15-week implementation period to achieve the outcome goal. The implementation outcome data for HAPI occurrence was retrieved from the project site's quality and safety HAPI dashboard. Prior to education and training, the unit's nursing staff used a Quick Response (QR) code to complete the "pressure ulcer baseline assessment" survey provided by the project lead to determine additional education training needs during the first week. Staff attendance for completion of HAPI BPAB education/training was marked on a staff attendance sign-in sheet. The completion of the bundle components: witnessed comprehensive skin assessment, pressure injury risk assessment [Braden scale], and Braden scale subcategory score focused care plan were completed by staff nurses on all admissions. The admitting nurse documented the implementation of the "HAPI Best Practice Admission Bundle" using the Audit tool via QR code into REDCap for each patient. Data completeness was assured in all audit surveys for this project with the use of mandatory fields. The consistency of the HAPI BPAB implementation to all admitted patients were tracked with the use of a "Unit Admission Log" completed by the project lead weekly to ensure the inclusion of all eligible participants. The sustained use and adherence of the HAPI BPAB to all admitted patients was captured as a part of "HAPI Best Practice Equity Audit" via weekly review by the project lead. The data collection audit tools is displayed in Appendix I, FiguresI1-I4.

Data was disseminated to unit staff by biweekly updates on project progress via emails, newsletters, social media updates, flyers, and shift huddle announcement. Adjustments were made to address identified barriers preventing staff from fully incorporating the HAPI BPAB into everyday practice and establish new methods to encourage compliance based off responses to incentives and feedback. The measurement plan is displayed in Appendix J.

Analysis

Weekly audits in REDCap were completed during all 15-weeks of implementation. Descriptive statistics such as measures of central tendency were used to evaluate the quantitative data collected and were plotted on a run chart. Using time as a variable, the presence runs, shift or trends within the data allowed inferences to be made to determine of the presence of common cause or special cause variation and to identify barriers and facilitator of success throughout the implementation. Qualitative data was used to gain understanding of the reason behind the data variations through regular unit meeting feedback and observation.

Ethical considerations

To ensure the safety and confidentiality of the data collected, all audits were limited to only necessary information, which included date, room number, and medical record number (MRN). To protect patient privacy only hospital computers or other hospital approved devices were used in either the patient's room or the unit's designated charting room to enter data accessed from the electronic health record. All data was submitted via Quick Response (QR) code into REDCap, a HIPPA compliant, VPN and password protected server. The project lead and the project faculty were the only individuals with access to the collected data. All data tools with patient identifiers were marked and de-identified prior to any data download. All efforts were made during the duration of the project to prevent mishandling of information. Conflicts of interest to be disclosed included being a paid employee at the project organization and paid employment on the project unit. To minimize the effect of these conflicts of interest, all project-related activities occurred outside of working hours. Charting and data collected followed the HIPAA training on patient information protection, CITI training on research ethics, and compliance and safety that were completed for the purpose of this project. Non-human Subjects Research Determination from the University of Maryland's Human Resource Protections Office was completed prior to the implementation of this project to ensure appropriate protections (Appendix K). Internal review by the institution was completed through the department of nursing research to ensure standards were met. A unit admission log was used and cross check with generated unit reports by the project lead to ensure no participants were excluded.

Results

The unit admissions ranged from 13 to 29 patients per week, for a total of 338 patients. 100% of nursing staff completed the pressure ulcer baseline knowledge assessment and participated in training on the HAPI best practice admission bundle. HAPI BPAB compliance documentation, with all three-component, ranged from 3.4% (n=1)-53.8% (n=13), with an average of 30.3%. The documentation of the individual component of skin assessment, Braden assessment and care plan interventions ranged 76.9% (n=10) - 100% (n=24), with an average of 88.9%; 76.9% (n=10) -100% (n=24), with an average of 90.7%; 83.3% (n=6) -100% (n=12), with an average of 99.0% respectively. HAPI BPAB Participation was higher during night shifts (65.1%, n=54) compared to day shifts (34.9%, n=29) over the course of the 15-weeks. The weekly HAPI BPAB implementation data is displayed in Appendix L.

The HAPI BPAB intervention data showed five total runs which is considered common cause variation for 14 points of data. The drop in HAPI BPAB compliance found in week 3 was attributed to the project lead and champion being absent from the unit. During this time there was a pattern on non-adherence and after investigation the project lead learned admissions at the project site occurred during night shift. The resulting positive trend during weeks 3-8 were due to changing the check-ins to night shift and were considered special cause variation. The increase in HAPI BPAB compliance in week 10 can be attributed to the additional presence of the project lead and champions on the unit. An additional special cause variation noted by the positive trend during weeks 9-14 was a result of a direct change to the implementation with dissemination of project compliance progress being changed from biweekly to weekly.

Incentives like candies or small gifts were adopted as effective forms of encouragement and due to the success, the project lead filled the unit’s designated locker with snacks which had a HAPI BPAB reminder sticker attached to each one. A positive shift occurred from week 11 to week 16, indicating HAPI BPAB compliance improvement was likely related to the changes in incentives and the frequency of project updates to stakeholders. Three occurrences of missing data were found. After further investigation, one was determined to be a duplicate entry. The other two missing points were audits initiated but not completed and therefore were excluded from analysis. No unintended consequences were suspected during implementation.

Some of the implementation facilitators for this intervention included the project's alignment with hospital's quality and safety standards, use of the unit's skin champions, and support from unit's leadership team. Implementation barriers that arose during the project course were resistance to change by nursing staff, absence of Braden scale sub-categories interventions requirements from unit policy, and time constraints. Modification incorporated to combat the barriers included alteration of the project lead unit presence, use of multi-methods of communication, and incentive to encourage project participation.

Discussion

Despite the low completion all three components of the project intervention, findings suggest that a HAPI BPAB is successful in preventing HAPIs with no reported HAPI incidents throughout the 15-week implementation period. Although the unit was initially receptive to the HAPI BPAB, this was not carried throughout the implementation. The unit requires regularly delivered incentives and communication on project status to maintain participation levels. The unit's collaborative work efforts are hindered, due to the patient care technicians limited electronic record view, only having access to the overall Braden score and not the subcategory breakdown to help facilitate the HAPI BPAB component under the guidance of nursing staff. The integration to previously established admission workflow has made the HAPI BPAB easy to remember and apply by nursing staff. Nursing staff encounter challenges completing the HAPI BPAB documentation due to the audit required entry of a medical record number, which has added to the process. Multiple staff report opening but not completing the audit since they did not have the information on hand and often forget to return to complete the form which has resulted in failure to meet the goal of 100% completion of HAPI BPAB documentation. The highest documentation percentage has been 53.8%.

The project outcomes support the literature statements that multicomponent prevention programs reduce pressure injury rates. The observed outcome of zero pressure injury incidences during the implementation period supports these finding, indicating a bundled approach including use of risk assessment tools, witness skin assessments and early intervention strategies can significantly improve positive patient outcomes and reduce harm. HAPI BPAB reduces treatment costs, improves patient outcomes, and effectively uses healthcare resources. Sustainability of the project has been insured with the rollout of a new clinical practice guideline maintains the focus on subcategory specific interventions. The new clinical guidelines outlines pressure injury prevention strategies aligned with each Braden subcategory. Limitations observed were low audit completion rates, inconsistences without incentives, and difficulty maintaining staff engagement. The highlighted limitations demonstrate a gap were future policy changes to reinforce expectations would improve consistency and accountability. Future HAPI prevention efforts would benefit from future QI focused on supportive collaborative approaches incorporating the whole healthcare team to improve multidisciplinary efforts.

Conclusion

The implementation of a HAPI BPAB, incorporating Braden Scale subcategory-driven interventions to address HAPI risks at the time of admission, demonstrated a positive impact on HAPI outcomes. The positive impact on HAPI outcomes leads to lower financial burdens, enhanced patient wellbeing, and ensures efficient use of resources. Identifying individual risk factors such as mobility, moisture, and sensory perception at the time of admission, allowed for immediate initiation of personalized prevention. A HAPI BPAB allows nurses additional autonomy in decision making while providing evidence-based guidance for selecting prevention strategies. The use of the HAPI BPAB proactively supports early intervention and help reduce the incidence of pressure injuries improving healthcare delivery and patient quality and safety outcomes. The HAPI BPAB has potential to be adopted and spread due to its structured approach and ability to be integrated into various inpatient settings. The results stress the value of integrating an evidence-based intervention like the HAPI BPAB into clinical practice as a safe and effective means to achieve better patient outcomes by reducing pressure injuries.

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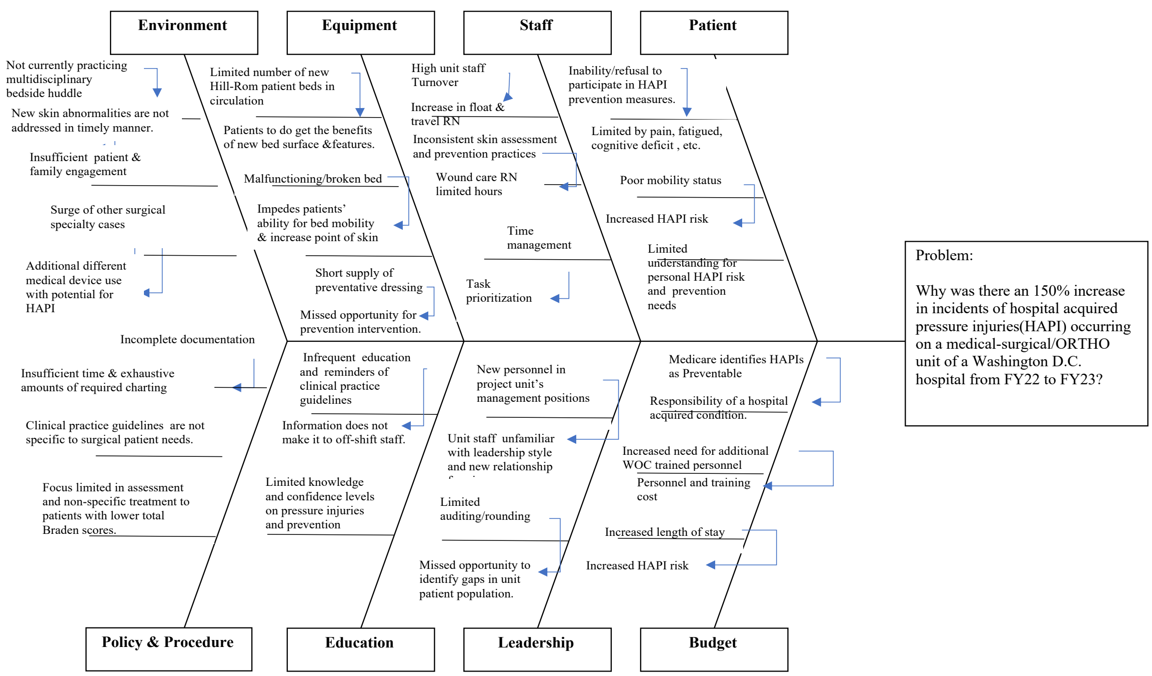
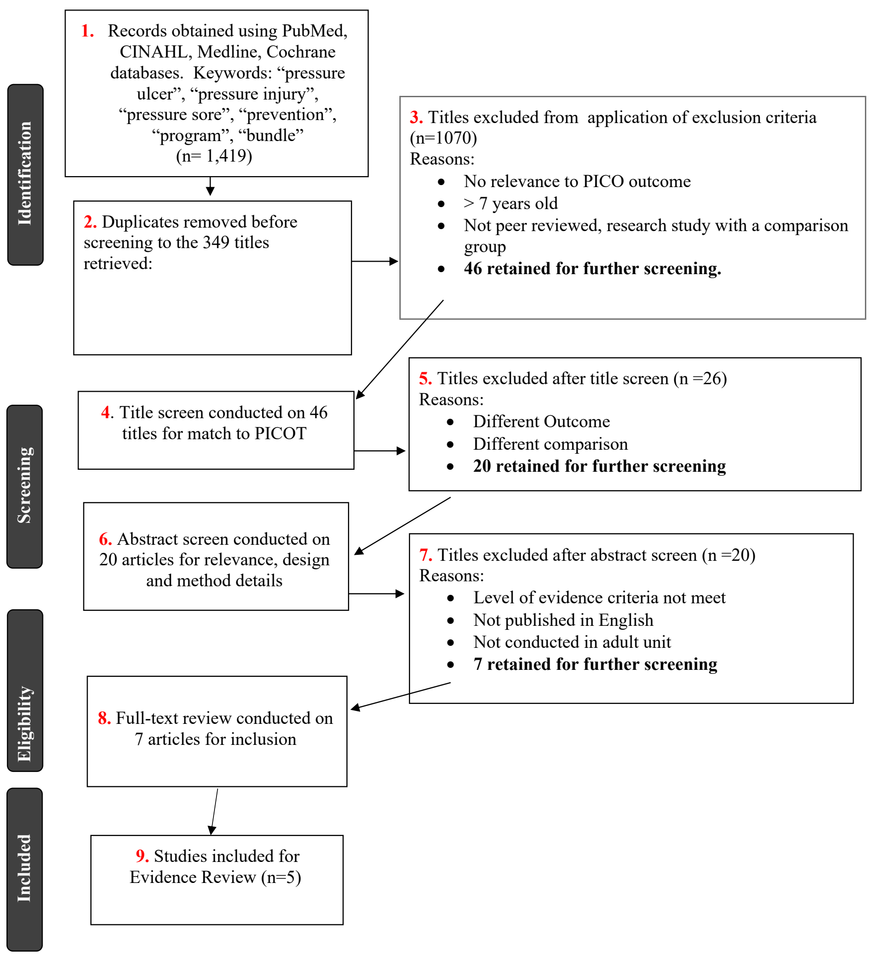
Appendix A
Fishbone Diagram



Appendix B
PRISMA



Appendix C
Evidence Review Table

Amr AA, Yousef AM, Amirah MF, Alkurdi MH. (2017).A pre-post study evaluating the effectiveness of a new initiative, the "PRESSURE Bundle," Compared with standard care in reducing the incidence and prevalence of sacral pressure ulcers in Critically Ill Patients in an intensive care unit in Riyadh, Saudi Arabia. Saudi Crit Care J ;1:75-9 Level: III Grade: B					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions
To address shortcomings in consistency and quality of care in pressure ulcer prevention	Pre-post study	Sampling technique: convenience Eligible Participants: all new patients admitted to the ICU, at risk of developing a pressure ulcer (Braden scale score <18), no partial thickness sacral pressure ulcers, 16 years of age or over and had an ICU stay of more than 24 h. Setting: Largest Intensive care unit in Saudi Arabia Hospital in Riyadh, Saudi Arabia Excluded: spinal injury cases or head trauma cases, patients who had	Control Protocol: standard care Intervention Protocol: "PRESSURE Bundle" a risk assessment tool - BRADEN scale. Documentation of Braden scale score, skin assessment, and incidence of sacral pressure ulcers at admission and q8 hours Daily education sessions were given to staff. Assessment for all patient dietary needs and high protein intake management of sacral shear strain, self-adhesive, foam	Dependent variable: pressure ulcers DV measure: Incidence rate of new pressure ulcers(new case in given time period)- per 1000 hospital inpatients prevalence of sacral pressure ulcers(proportion of population who have case in a given time period[old or new])	Statistical Result: decrease in the prevalence of sacral pressure ulcers in the intervention group (4.75%) compared with the control group (22.7%) at the end of the treatment period ($P < 0.001$) significant reduction in the incidence of new pressure ulcers in the 2 months treatment period ($n = 1$, 0.3%) compared with the control group ($n = 16$, 4.6%; $P < 0.001$). Conclusion: Data supports the effectiveness of the "PRESSURE bundle" in preventing sacral pressure ulcers

<table>
<tr><td></td><td></td><td>been admitted to the ICU postoperatively for less than 48 h.
Accepted: All patients were treated as per study protocol(n=690)
Control: standard care (n = 330)
Intervention: treatment group (n = 360)
Power Analysis: n/a
Group homogeneity: n/a</td><td>dressing- changed weekly.
Air mattresses and pillows - pressure reduction from support surfaces with the head of the bed elevated at <30°
turning position schedule was undertaken q2 hours.
Treatment fidelity: wound care team was responsible for all data collection, education, follow-up, and implementation.</td><td></td><td></td></tr>
<tr><td colspan="6">Roberts, S., McInnes, E., Bucknall, T., Wallis, M., Banks, M., & Chaboyer, W. (2017). Process evaluation of a cluster-randomized trial testing a pressure ulcer prevention care bundle: a mixed-methods study. Implementation Science, 12(1), 1–9. https://doi-org.proxy-hs.researchport.umd.edu/10.1186/s13012-017-0547-2 Level: III Grade: B</td></tr>
<tr><td>Purpose or Hypothesis</td><td>Type of Evidence and Research Design</td><td>Sample (population, size, setting)</td><td>Intervention Procedures</td><td>Primary Outcome/Measures</td><td>Results Conclusions</td></tr>
</table>

To evaluate processes underpinning implementation of the Pressure ulcer prevention care bundle(PUPCB) and explore end-users' perceptions of it, in order to give a deeper understanding of its effects.	pre-specified, mixed-methods study	Sampling technique: Convenience Eligible Participants: recruitment of individuals was assessed by comparing the total numbers of patients screened and recruited at each site to determine the proportion of the target population included in the study. Setting: eight Australian hospitals -focused on four intervention hospitals. Excluded: Discharged, acutely ill, refusal participation, withdrew from study. Accepted: Total Participants (n=1598) Control: Participants at control sites (n=799) Intervention: Participants included patients and nurses on study wards at intervention sites.	Control Protocol: Did not receive PUPCB Intervention Protocol: PUPCB includes brochure, poster and DVD. key messages: (1) keep moving; (2) look after your skin; and (3) eat a healthy diet. based on current literature and international evidence-based guidelines, which indicate that immobility, poor skin hydration and malnutrition are modifiable risk factors for pressure ulcer(PU) Treatment fidelity: Key messages did not vary between different patient groups. Equal emphasis was given to quantitative and qualitative data.	Dependent variable: PUPCB delivery DV measure: components of the PUPCB delivered and time spent with patients.	Statistical Result: main trial: PU occurred in 6.1% of intervention and 10.5% of control patients, and PU incidence was 9.6 and 20.1 per 1000 person-days in the intervention and control groups, respectively (incidence rate ratio 0.48; 95% CI 0.33, 0.69; $p < 0.001$). After adjusting for clustering and covariates (age, baseline PU, body mass index, admission cause, residence and comorbidities), the hazard ratio was 0.58 (42% risk reduction, $p = 0.198$). Conclusion: High level of recruitment and reach Care bundle accepted by patients and nurses due to benefits. no major failures relating to implementation of the intervention.

		(n=799) Power Analysis: n/a Group homogeneity: n/a			
Altaş, G., & Çelik, S. (2023). Evaluation of a Pressure Injury Prevention Care Bundle in an ICU in Turkey. Advances in Skin & Wound Care, 36(12), 658–665. https://doi-org.proxy-hs.researchport.umd.edu/10.1097/ASW.0000000000000070 Level: II Grade: B					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To evaluate a pressure injury (PI) prevention care bundle in ICU patients diagnosed with internal diseases.	quasi-experimental design	Sampling technique: Convenience Eligible Participants: 18 years or older, did not have any PIs, were expected to stay in the ICU for at least 24 hours, were diagnosed with an internal disease (respiratory system, cardiovascular, neurologic, renal, metabolic, oncologic, abdominal, or infectious disease), and provided written informed consent. Setting: 21-bed ICU of a training and research hospital in Istanbul, Turkey. Excluded: younger than 18 years, already had a PI, were expected to stay in the ICU for fewer than 24 hours or had intensive care indications other than an internal disease. Accepted: Participating patients (n = 98)	Control Protocol: routine care included risk assessment with the Braden Scale, position changes every two to three hours, and elevating the heels when necessary. These applications varied according to the nurses' workload and the condition of the patient. Intervention Protocol: PI prevention care bundle includes risk assessment with the BS, skin assessment, skin care, positioning, and regulation of nutrition and fluid intake. Treatment fidelity: All nurses working in the ICU completed the training program. Approval was obtained from the Ethics Committee All nurses and participants provided verbal and written consent.	Dependent variable: Pressure ulcer DV measure: Pressure ulcer prevalence rates(proportion of population who have case in a given time period[old or new])	Statistical Result: statistically significant between-group difference in PI development; whereas PIs developed in 100% (n = 49) of the control group patients, this rate was 61.2% (n = 30) among the intervention group patients. Conclusion: the rate of PI development was lower, which indicates that the care bundle was effective.

		Control: control group patients received routine clinical care (n = 49) Intervention: Intervention group patients received the PI prevention care bundle. (n = 49) Power Analysis: a total of 98 patients (49 per group) were required with significance set at P <.05. Group homogeneity: n/a			

Lin, F., Wu, Z., Song, B., Coyer, F., & Chaboyer, W. (2020). The effectiveness of multicomponent pressure injury prevention programs in adult intensive care patients: A systematic review. International Journal of Nursing Studies, 102. https://doi-org.proxy-hs.researchport.umd.edu/10.1016/j.ijnurstu.2019.103483 Level: III Grade: B

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To evaluate the effectiveness of pressure injury prevention programs in reducing pressure injury prevalence and incidence in the adult intensive care population.	Systemic review	Sampling technique: comprehensive literature search was conducted by searching databases including PubMed (NCBI platform), EMBASE (embase.com), Medical Literature Analysis and Retrieval System Online (MEDLINE) (Ovid), Cumulative Index to Nursing and Allied Health Literature (CINAHL) (EBSCOhost), and Cochrane Library databases Eligible Participants: adult ICU; were published in English or Chinese; reported a multicomponent (more than two components) intervention; reported on the implementation strategies used to implement the program; and reported on program outcomes. Setting: n/a Excluded:	Control Protocol: routine care (unspecified) Intervention Protocol: Variations of Pressure prevention bundle/ program	Dependent variable: Pressure ulcers. DV measure: Pressure ulcer incidences rates.	Statistical Result: majority of the studies found a significant decrease in pressure injury cumulative incidence and period prevalence. Conclusion: identified a variety of both quality improvement projects and research studies. world-wide priority for ICUs. implementation strategies varied, based on who implemented the strategies.

		Letters, commentaries, editorials, and conference abstracts/presentations or if outcome results for adult ICU patients could not be separated from other patient populations. Accepted: 21 papers Control: n/a Intervention: n/a Quality appraisal was conducted by two authors by using the Quality Improvement Minimum Quality Criteria Set, and the Mixed Methods Appraisal Tool			

Martin, D., Albensi, L., Haute, S., Froese, M., Montgomery, M., Lam, M., Gierys, K., Lajeunesse, R., Guse, L., & Basova, N. (2017). Healthy Skin Wins: A Glowing Pressure Ulcer Prevention Program That Can Guide Evidence-Based Practice. Worldviews on Evidence-Based Nursing, 14(6), 473–483. https://doi-org.proxy-hs.researchport.umd.edu/10.1111/wvn.12242
Level: III Grade: B

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To determine the effectiveness of the pressure ulcer prevention program (PUPP) in reducing the prevalence of Pressure ulcers (PU), to determine the effectiveness of the online tutorial in increasing hospital staff's knowledge level about PU prevention, and to explore frontline staff's perspectives of the PUPP.	mixed methods study	Sampling technique: convenience Eligible Participants: all admitted patients over 18 years of age who provided verbal consent. Setting: 304-bed community hospital in Winnipeg, Canada Excluded: Patients admitted prior to day one and those who didn't give consent Accepted: 480 total sample size Control: 242 hospitalized patients Intervention: 239 in-patients Power Analysis: sample size of 90 required for the pre-test post-test design used to answer the first research question. total sample size of 480 was required for the second research question. Group Homogeneity: age ,education and	Control Protocol: Current care(unspecified) Intervention Protocol: The PU screening and referral form was completed by nurses within the first eight hours of a patient's admission and then repeated every 48 hours. For patients with length of stays over eight hours in the emergency department and all patients in the intensive care unit, nurses completed and documented these assessments every 24 hours. High risk scores (dependent on the category) alerted nurses to the need to refer to specialist. Treatment Fidelity: approval from two research ethics boards an informational letter provided. incentives to participate.	Dependent variable: Pressure ulcers. DV measure: Incidence rates of new pressure ulcers(new case in given time period) prevalence of sacral pressure ulcers(proportion of population who have case in a given time period[old or new])	Statistical Result: A comparison of initial and repeat observational surveys (n = 239) identified a statistically significant reduction in the prevalence of PU to 7.53% ($p < .001$). The online tutorial enhanced staff knowledge level with a statistically significantly higher mean post-test score (n = 80). Thirty-five frontline staff shared their perspectives of the PUPP with "it's definitely a combination of everything" and "there's a disconnect between what's needed and what's available" as the main themes. Conclusion: Incorporating evidence-based PU prevention into clinical practice greatly reduced the prevalence of PUs among hospital in-patients.

		position were closely split into each group	survey teams with a wound care trained nurse		

Avşar, P., & Karadağ, A. (2018). Efficacy and Cost-Effectiveness Analysis of Evidence-Based Nursing Interventions to Maintain Tissue Integrity to Prevent Pressure Ulcers and Incontinence-Associated Dermatitis. Worldviews on Evidence-Based Nursing, 15(1), 54–61. https://doi-org.proxy-hs.researchport.umd.edu/10.1111/wvn.12264
Level: III Grade: B

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions
To determine the cost-effectiveness and efficacy of evidence-based (EB) nursing interventions on increasing tissue tolerance by maintaining tissue integrity.	intervention study	Sampling technique: convenience Eligible Participants: all admitted patients over 18 years of age who provided verbal consent. Setting: 1,100-bed university hospital in Ankara, Turkey. cardiovascular surgical care intensive care unit (CSICU) and the chest diseases intensive care unit (CDICU) Excluded: Patients admitted prior to day one and those who didn't give consent. Accepted: A total of 154 patients Control: No application was made related to the pressure ulcer and incontinence-associated dermatitis.	Control Protocol: Routine nursing care-not receiving program; performed twice a day and after any fecal or urinary incontinence episodes. Intervention Protocol: Braden pressure ulcer risk assessment scale (BPURAS), tissue integrity monitoring, PU identification, and IAD severity (IADS) instrument, as well as a cost table for all interventions. Treatment fidelity: The researcher visited the ICU at least once a day during the research period. prepared training content was presented to three lecturers, who were experts in wounds	Dependent variable: Skin integrity status DV measure: BPURAS was used to evaluate PU. medical device-related pressure ulcers (MDRPUs).	Statistical Result: The percentage of patients with impaired tissue integrity was significantly different between the intervention (18.2%) and control (54.5%) groups ($p = .000$) The intervention group had a significantly higher average cost of prevention ($\bar{X}$ = \$204.34 ± 41.07 vs. $\bar{X}$ = \$138.90 ± 1.7; $p = .000$ and a higher, although nonsignificant cost of treatment ($\bar{X}$ = \$201.63 ± 48.67 vs. $\bar{X}$ = \$190.09 ± 42.20; $p = .160$), when compared with the control group Conclusion: verified training programs comprising an EB care protocol are effective and contribute to increased tissue tolerance. mean cost of the nursing initiatives to increase tissue tolerance and the average daily treatment cost per patient were both higher in the intervention group compared to the control group

		n = 77 patients Intervention: Received training program. n = 77 patients Power analysis: n/a Group homogeneity: n/a			

Padula, W. V. (2017). Effectiveness and value of prophylactic 5-layer foam sacral dressings to prevent hospital-acquired pressure injuries in acute care hospitals: An observational cohort study. Journal of Wound, Ostomy & Continence Nursing, 44(5), 413-419. doi:10.1097/WON.0000000000000358
Level: III Grade: B

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To measure the effectiveness of prophylactic 5-layer foam sacral dressings to prevent hospital acquired pressure injury rates.	Retrospective, observational cohort	Sampling technique: convenience Eligible Participants: adult patients 18 years or older who were hospitalized at least five days across in a acute care setting Setting: 38 acute care hospitals of the University Health System Consortium Excluded: stage 3, 4, or unstageable pressure injuries on admission Accepted: 912 hospital-quarters Control: 281 hospital-quarters Intervention: 631 hospital-quarters Power analysis: 38 hospitals needed to detect a clinically statistically significant reduction in pressure. Group homogeneity: n/a	Control Protocol: Routine care without foam dressing Intervention Protocol: Application of a prophylactic 5-layer foam sacral dressings Treatment fidelity: approval from the Johns Hopkins Institutional Review Board	Dependent variable: Pressure ulcers. DV measure: AHRQ Patient Safety Indicator #3 (PSI-03) Defines HAPIs as stage 3, 4, or unstageable pressure injuries	Statistical Result: Significant pressure injury rate reductions in US acute care hospitals between 2010 and 2015 were associated with the adoption of prophylactic 5-layer foam sacral dressings within a prevention protocol (-1.0 cases/quarter; P = .002) cost effectiveness: Average cost of dressing $7 and average cost of PSI3 treatment $70,000. Conclusion: Prophylactic 5-layer foam sacral dressings are an effective component of a pressure injury prevention protocol.

Amon, B. V. (2019). Achieving 1,000 Days with Zero Hospital-Acquired Pressure Injuries on a Medical-Surgical Telemetry Unit. MEDSURG Nursing, 28(1), 17–21.Level: V Grade: B					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To decrease hospital acquired pressure injury (HAPI) prevalence and incidence below the national NDNQI monthly mean through a bundled intervention program.	A single, qualitative study	Sampling technique: Convenience Eligible Participants: All patients admitted to the 32-bed adult medical-surgical telemetry unit. Setting: 32-bed adult medical-surgical telemetry unit in an urban academic, Magnet-designated teaching hospital Excluded: Patients/ or family member that refused to participate. Accepted: All admitted patients to the 32-bed adult medical-surgical telemetry unit who are open to participating. Control: none Intervention: comprehensive prevention bundle Power analysis: N/A Group Homogeneity: N/A	Control Protocol: N/A Intervention Protocol: Beginning on 6/2014,the intervention was initiated. A comprehensive prevention bundle which included two-nurse -skin-assessments on the unit admission or transfer, use of moisture wicking , prophylactic foam border dressing and appropriate skin surfaces, early mobility, mandatory HAPI training, unit champion. Intervention fidelity: No control groups. All patient on the project unit received prevention intervention bundle unless they refused.	Dependent variable: Pressure ulcers. DV measure: HAPI incidence and prevalence Monthly audit was preformed using the NDNQI survey tool.	Statistical Result: A decrease in HAPI rates on the project unit was identified since the onset of project initiation. The unit achieved 1,000 days HAPI free and zero incidence of HAPI for over three years. Conclusion: HAPI prevention program was determined effective in reducing HAPI and decreasing associated costs. Increased staff awareness, and interprofessional collaboration were key to the success of the intervention. The intervention The intervention boosted knowledge of HAPI prevention and increased awareness of the challenges HAPIs in the hospitalized patients.

Soban, L. M., Hempel, S., & Munjas, M. R. B. A. J. L. V. (2011). Preventing Pressure Ulcers in Hospitals: A Systematic Review of Nurse-Focused Quality Improvement Interventions. The Joint Commission Journal on Quality and Patient Safety, 37(6), 245. https://doi.org/10.1016/S1553-7250(11)37032-8 Level: III Grade: B					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

A systematic review was conducted "to: (describe the kinds of intervention strategies used; (2) describe the types of process and outcome measures reported; and (3) examine the interventions' effects on outcomes."	Systematic review with meta-analysis	Search Method: six electronic databases were searched(PubMed, CINAHL, Cochrane Library of Systematic Reviews, CENTRAL, and DARE, and the Web of Science for publications from January 1990 to September 2009. As well as QI-intervention funding agencies(AHRQ). Search terms included "pressure sore", "pressure ulcer", "bed sore", "prevention and control", "quality indicators", etc. Search yielded 1646 studies. Eligible Participants: 314 were appropriate for screening and 39 studies met criteria. English Language, after 1990, hospital setting, experimental design, testing QI intervention, presences of data for nursing	Control Protocol: Controls varied across studies but typically involved routine care initiated by a hospital or unit before project implementation. Intervention Protocol: Pressure prevention programs. Included: Staff education, skin assessment, and risk assessment tools as well as multiple implementation strategies with protocol-based care. Treatment fidelity: All patient on the received the prevention bundle	Dependent variable: pressure ulcer DV measure: pressure ulcer incidence rate patient outcome measures only, process of care measures only or patient outcome and nursing process of care measures	Statistical Result: From the 16 studies reporting pressure ulcer incidence, the pooled risk difference across studies was –.07 (95% confidence interval [CI]: –0.0976, –0.0418; p < .0001) Conclusion: Studies reporting pressure ulcer incidences show a decrease after the implementation of interventions. Most frequently reported intervention strategies was comprised of "best practices". Almost all the studies it was concluded that the intervention had a positive effect.

		process or patient outcome. Setting: Studies represented nine different countries. US(27), Australia, UK ,Netherlands, Israel, Sweden, Canada, Turkey, and Italy. Excluded: 276 studies were excluded. Ineligible study design, not quality improvement, non-hospital setting, intervention not specific to pressure ulcers, no eligible outcome measure, from prior to 1990, examined only heel or cervical pressure ulcers, background to paper in sample or not English. Accepted: 39 studies included in review Control: present in studies; varied Intervention: Pressure prevention intervention; varied			

		Power analysis: N/A Statistical heterogeneity: found across studies I - squared = 69.7%			

Huang, C., Ma, Y., Wang, C., Jiang, M., Yuet Foon, L., Lv, L., & Han, L. (2021). Predictive validity of the Braden scale for pressure injury risk assessment in adults: A systematic review and meta-analysis. Nursing Open, 8(5), 2194–2207. https://doi-org.proxy-hs.researchport.umd.edu/10.1002/nop2.792 Level: III Grade: B

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To evaluate the accuracy of the Braden Scale in assessing pressure injury risk.	Systematic review and meta-analysis	Search method: five electronic databases PubMed, EMBASE, CINAHL, Web of Science and the Cochrane Library published between 1973–2020 . Search terms found supplementary appendix 1. Eligible Participants: Must meet: 18 years old or older pressure injuries free Provide true positive, false positive and true negative for predicting risk. (n=6441) Setting: across various setting including wards, ICU, Long term care facility, and acute care unit Excluded: Failed to obtain complete data. Letter, comment and meeting abstract. Duplicate publications (n=6381)	Control Protocol: n/a Intervention Protocol: utilization of risk assessment specifically the Braden scale Treatment fidelity: No control group specified.	Dependent variable: probability of a positive result DV measure: Predictive validity	Statistical Result: The pooled sensitivity was 0.78 (95% CI: 0.74 to 0.82), and the pooled specificity was 0.72 (95% CI: 0.66 to 0.78) Conclusion: moderate predictive validity for assessing pressure injury risk. more suitable for mean age <60 years, hospitalized and the Caucasian population.

		Accepted: includes 60 qualitative and quantative synthesis studies Control: none Intervention: utilization of the Braden scale Power analysis: n/a Group homogeneity: n/a			

Codilla, Jerome and Yema, Jamie Mae.(2023). 4 Eyes on Skin: A Standardized Electronic Documentation of 2 RN Skin Assessment to Reduce Hospital-Acquired Pressure Injuries on a Progressive Care Unit Providence Nursing Research Conference 2023 – Present. 1. https://digitalcommons.providence.org/prov_rn_conf_annual/2023/posters/1 Level: V Grade: B					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To eliminate HAPI incidence in PCU through implementation of a standardized two RN skin assessment and co-sign component within four hours of patient admission and transfer.	Quality improvement	Sampling technique: convenience Eligible Participants: all new patients admitted to unit Setting: 34-bed progressive care unit Excluded: none Accepted: All patients admitted(n= 600) Control: data collected prior to admission Intervention: two nurse skin assessment Power Analysis: n/a Group homogeneity: n/a	Control Protocol: standard care(not specified Intervention Protocol: Standardized two RN skin assessment& documentation with cosign component using the smart phrase (.4eyesskincheck). Staff education and return demonstration.	Dependent variable: pressure ulcers DV measure: Incidence rates of new pressure ulcers(new case in given time period)	Statistical Result: HAPI incidence one month post intervention was zero. HAPI incidence three months postintervention was one. Conclusion: Multistep approach improved patient outcomes with education, surveillance, and staff accountability. Significant changes in culture occurred from the initiation of Two nurse skin check

Soban, L. M., Kim, L., Yuan, A. H., & Miltner, R. S. (2017). Organizational strategies to implement hospital pressure ulcer prevention programs: findings from a national survey. *Journal of nursing management*, *25*(6), 457–467. https://doi.org/10.1111/jonm.12416 Level: V Grade: B					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To describe the presence and operationalization of organizational strategies to support implementation of pressure ulcer prevention programs across acute care hospitals in a large, integrated healthcare system.	A cross-sectional, key informant National Survey	Sampling technique: Data were collected by an email survey to all Chief Nursing Officers in Veterans Health Administration acute care hospitals. Eligible Participants: all VHA acute care hospitals -Surveys sent to 124 nurse leaders. Excluded: four sites because they did not deliver acute care Accepted: 120 hospitals Control: n/a Intervention: 120 hospitals. Power Analysis: n/a Group homogeneity: n/a	Control Protocol: n/a Intervention Protocol: Comparison of Implementation Strategies to Support Pressure Ulcer Prevention Programs pressure ulcer programs: NPUAP, AHRQ, VHA, IHI Implementation strategies -policy - committee -wound care specialist -champions -data collection -education Treatment fidelity: n/a	Dependent variable: Pressure ulcers DV measure: pressure ulcer prevalence	Statistical Result: Organizational strategies were high reports in the pressure ulcer prevention programs. Programs varied in which operational strategies elements were used. Conclusion: pressure ulcer prevention programs have not been implemented to their full potential to achieve consistent and sustainable outcomes

Agency for Healthcare Research and Quality.(2024).University of Missouri Health Care Decreases Pressure Injuries and Saves in Avoidable Costs.https://www.ahrq.gov/patient-safety/about/uni-missouri-healthcare.html Level: V Grade: B					
Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

To assess the need for hospital-acquired pressure injury (HAPI) reduction and the system's readiness to create focused efforts around this goal in alignment with the AHRQ toolkit	Quality Improvement impact story	Sampling technique: Convenience Eligible Participants: . Setting: University of Missouri (MU) Health Care Excluded: n/a Accepted: n/a Control: n/a Intervention: Power Analysis: n/a Group homogeneity: n/a	Control Protocol: the first phase focused on general HAPI prevention (February 2019 - July 2020) Intervention Protocol: Second phase focused on reducing risk related to equipment (February 2021 - September 2021). Interventions varied and distributed across the continuum of intervention effectiveness utilizing people, process, and technology. Most impactful was SWARM a debrief process.	Dependent variable: PSI-03 (reportable pressure injuries) DV measure: Incidences of PSI-03	Statistical Result: Pre-implementation 26 PSI-03 events and the post-implementation period saw only two, a 92% reduction. Conclusion: substantial and sustained improvements were noted as a result of this project and the implementation of the AHRQ toolkit.

Agency for Healthcare Research and Quality.(2018).Connecticut Hospital Reduces Pressure Injuries Using AHRQ Toolkit. https://www.ahrq.gov/news/newsroom/case-studies/201802.html Level: V Grade: B

Purpose or Hypothesis	Type of Evidence and Research Design	Sample (population, size, setting)	Intervention Procedures	Primary Outcome/Measures	Results Conclusions

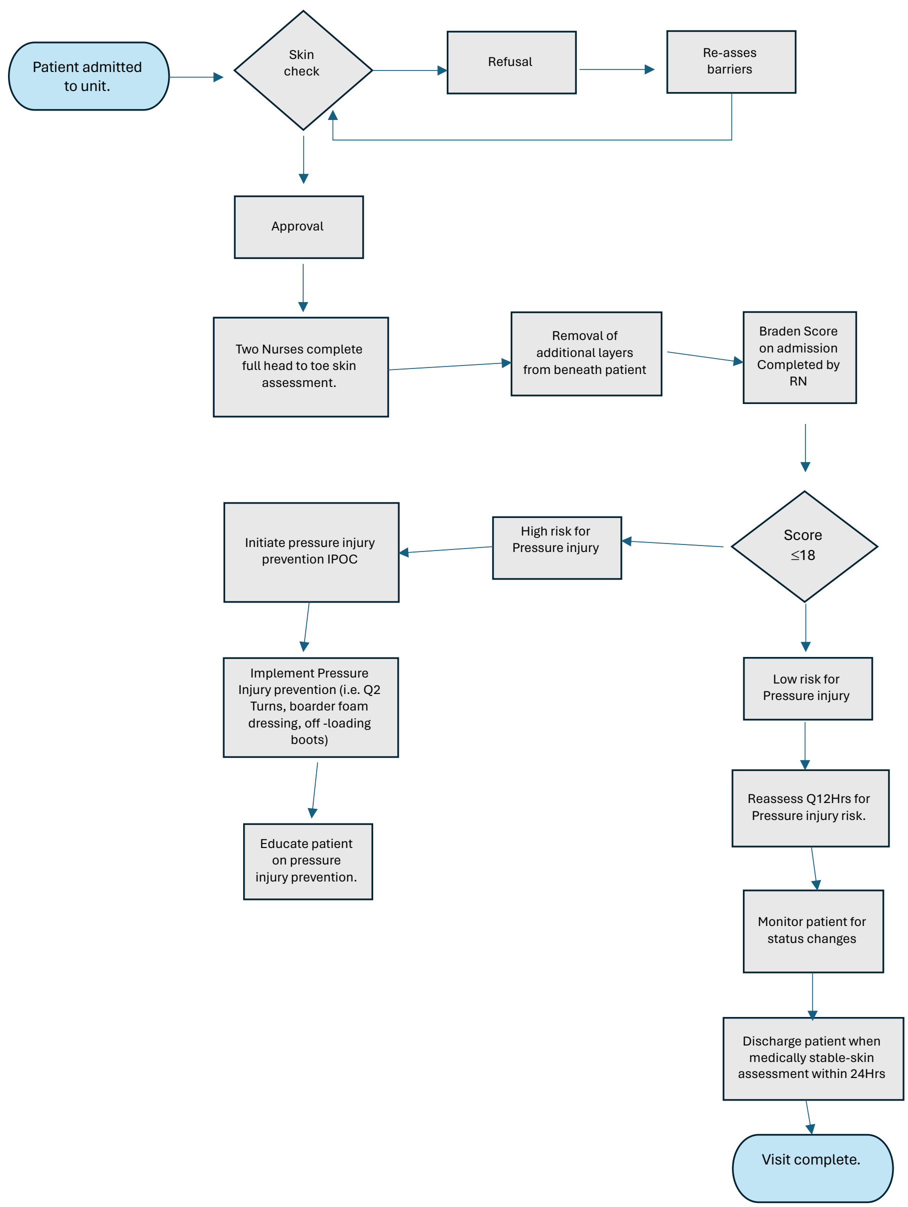
To implement the AHRQ toolkit in order to reduce HAPIs.	Case study	Sampling technique: Convenience Eligible Participants: admitted patients in critical care and medical-surgical units Setting: Saint Francis Hospital and Medical Center, a 617-bed hospital in Hartford, CT Excluded: n/a Accepted: n/a Control: n/a Intervention: Power Analysis: n/a Group homogeneity: n/a	Control Protocol: pre-intervention strategies Intervention Protocol: • knowledge of and attitude testing • Implementing new policies and procedures. • Educating clinical staff and CNA. • Staging pressure injuries on a 1-4 scale. • "skin rounds" to check skin condition for high-risk patients. Treatment fidelity: Followed AHRQ very closely and embraced change	Dependent variable: Pressure injuries rate. DV measure: Incidence of pressure injuries	Statistical Result: more than 60 percent hospital-acquired pressure injuries reduction using an AHRQ toolkit. Significantly below the benchmark for pressure injury rates Conclusion: Staff became acutely aware of pressure injuries and reporting procedures. Use of AHRQ toolkit was effective in decreasing HAPIs

Appendix D
Evidence Synthesis Table

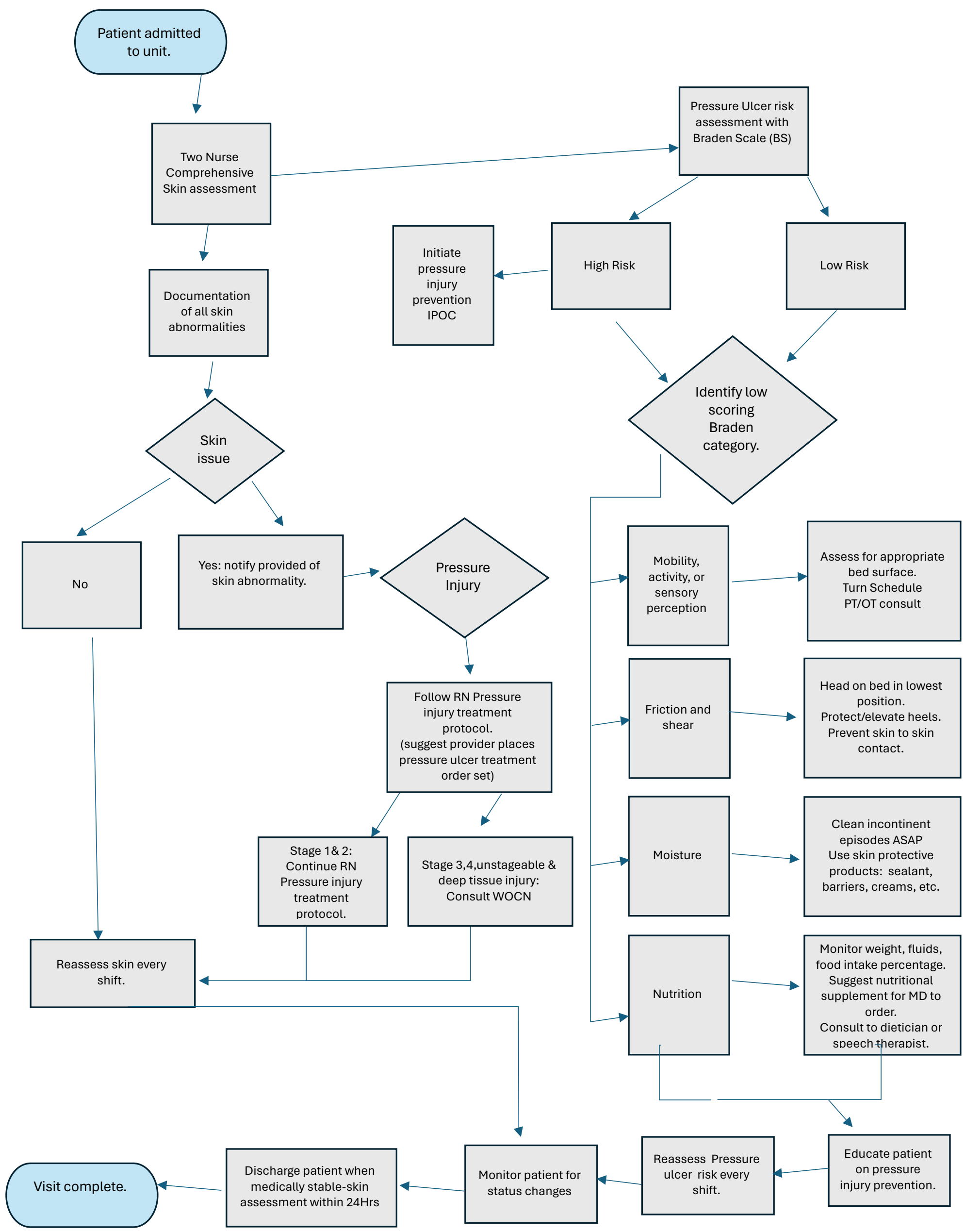
PICOT: In patients in a medical-surgical/ORTHO unit, how does a HAPI prevention admission bundle compared with current pressure prevention practices reduce the incidences of pressure injuries within 15 weeks?			
JHNEBP Model Level	**Total Number of Sources**	**Author and Quality Rating of each study**	**Synthesis of Findings**
Project Title: **Reducing Hospital Acquired Pressure Injuries; Implementation of a Best Practice Admission Bundle**			
Level 1 Experimental study · Randomized Controlled Trial (RCT) · Systematic review of RCTs with or without meta-analysis	--	--	--
Level II Quasi-experimental studies · Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis	1	Altaş,G. & Çelik,S,(2023) B	Study finds pressure injury prevention care bundle that includes risk assessment with the Braden Scale, skin assessment, skin care, positioning, and regulation of nutrition and fluid intake reduced the number of HAPIs in high-risk patients.
Level III Non-experimental study · Systematic review of a combination of RCTs, quasi-experimental, and non-experimental studies, or non-experimental studies only, with or without meta-analysis · Qualitative study or systematic review of qualitative studies with or without meta-synthesis	8	Amr et al.(2017) B Roberts et al.(2017) B Lin et al.(2020) B Martin et al.(2017) B Avşar,P., & Karadag. (2018) B Padula, W.V.(2017) B Huang, C. et al(2021) B	Lin et al.(2020),Martin et al.(2017), Avşar,P., & Karadağ,A. (2018), all found that pressure prevention bundles appear to be effective in lowering the rate of pressure injuries in adult patients. Amr et al.(2017) delves is the financial aspect of pressure prevention show a small increase in cost for the intervention group. Roberts et al.(2017) evaluates the process of implementing a pressure prevention bundle from the end-user perspective. Huang, C. et al(2021) A risk assessment was mentioned in most

		Soban, L. M. et al,(2011)B	of the bundles. this publication shows evidence of its reliability. Padula, W.V.(2017) focuses on the effectiveness of one component of the pressure prevention bundles- foam dressings in adult patients. Soban, L. M. et al,(2011) Studies consistently show decrease in HAPIs with implementation of interventions("best practices").
Level IV Opinion of respected authorities and/or reports of nationally recognized expert committees/consensus panels based on scientific evidence	--	--	--
Level V Evidence obtained from literature reviews, quality improvement, program evaluation, financial evaluation, or case reports · Opinion of nationally recognized expert(s) based on experiential evidence	5	Codilla, J. and Yema, J, (2023) B AHRQ, (2018)B AHRQ, (2024)B Soban, L. M. et al,(2017)B Amon, B. V., (2019)B	Codilla, J. and Yema, J.(2023)Quality improvement project indicating witnessed two-person skin check have an impact on HAPI prevention. AHRQ, (2018) Case study indicating quality improvement using AHRQ PU toolkit effective in decreasing PU in inpatient population. AHRQ, (2024) Impact story showing using AHRQ PU toolkit effectively lowering PU in large hospital system. Soban, L. M. et al,(2017) compared four PU prevention programs intervention strategies suggesting use are effective but could be more even more successful. Amon, B. V., (2019). HAPI prevention program reduced HAPIs in med-surg setting while Increasing staff awareness, collaboration, and knowledge.
Overall Quality Rating w/rational and Recommendation: B Rating. The articles reference scientific evidence ,some control, consistent results, fairly definitive conclusions, and reasonable recommendations			
Recommendations Based on Evidence Synthesis • Good and consistent evidence to support practice change.			

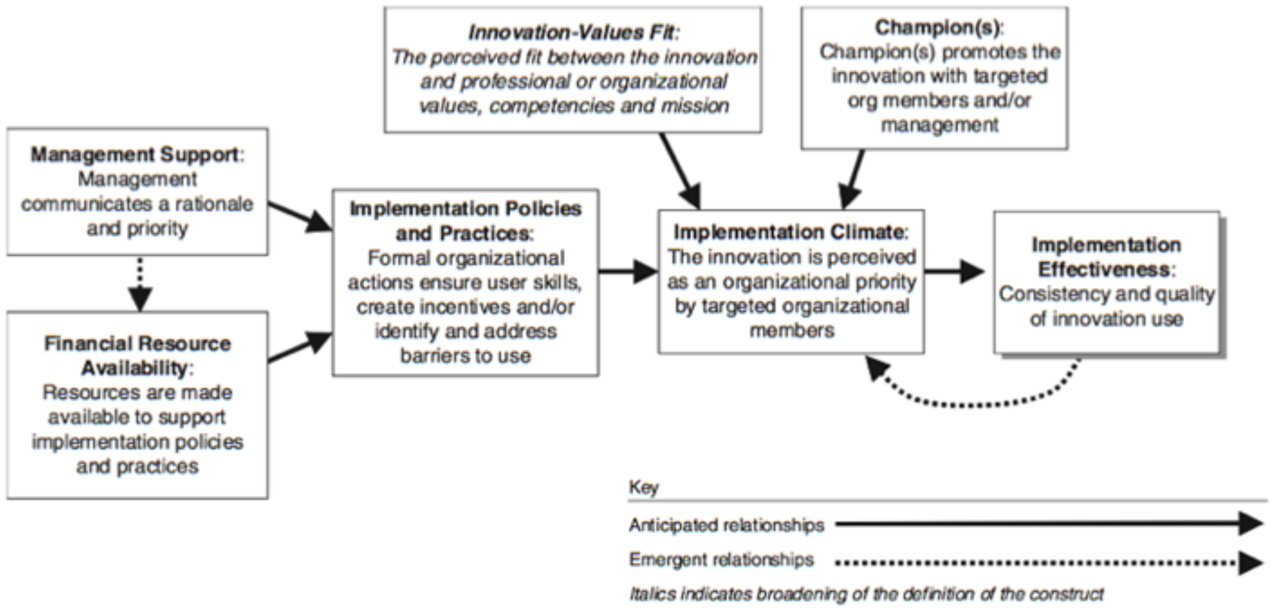
Appendix E
Current Process Map



Appendix F
Desired Process Map



Appendix G
Theoretical Framework for Complex Innovation Implementation



Source: Helfrich, C.D., Weiner, B.J., McKinney, M.M. & Minasian. L. (2007). Determinants of implementation effectiveness adapting a framework for complex innovations. Medical Care Research and Review, 64(3), 279-303 doi: 10.1177/1077558707299887

Appendix H
GANTT Chart

HAPI Prevention Admission Bundle
Veronica Moreno
MWHC-Med-surg/ ORTHO unit

Project Start date: January 2024
Goal completion date: May 2025

	Steps	Month										
		1 Feb	2 Mar	3 Apr	4 May	5 Jun	6 Jul	7 Aug	8 Sep	9 Oct	10 Nov	11 Dec Onward -Spring 2025
Identification	1. Complete CITI training											
	2. Complete HIPPA training											
	3. Identify team members											
	4. Determine role/responsibilities											
	5. Identify practice problem-root cause											
	6. Develop an EBP question											
	7. Determine need for EBP project											
	8. Context assessment											
	9. Identify Stakeholders											
Evidence	10. Conduct internal & external search for evidence											
	11. Summarize the individual evidence											
	12. Appraise the level & quality of each piece of evidence											
	13. Synthesize findings											
	14. Develop best evidence recommendations											
Development	15. Develop a Project plan											
	16. *Submit Project Proposal											
	17. Site IRB inquiry											
	18. REDCap											
	19. Develop action plan											
	20. Develop education plan											
	21. *Site Presentation and Approval											
	22. * IRB determination											
Implementation	23. Secure support & resources to implement action plan											
	24. Implement action plan (go-live)											
	25. Education/training											
	26. Monitor Progress											
	27. Collect Data											
	28. Develop Dissemination plan											
	29. *Develop Manuscript											
Evaluation &	30. Analyze results											
	31. Report results to stakeholders											
	32. Identify next steps											
	33. *Submit Final Manuscript											
	34. Disseminate findings											

Appendix I
Measurement instruments/tools

Figure I1

HAPI Best Practice Admission Bundle Audit

Please complete the survey below.

Thank you!

1) Shift
- ◯ 7a-7p
- ◯ 7p-7a

2) Date of Admission: __________________________

3) MRN: __________________________

4) Completion of two-nurse witnessed skin assessment with 8 hours of admission
- ◯ Yes
- ◯ No

5) Pressure Injury/wound on Admission
- ◯ Yes
- ◯ No

6) Braden Scale Score on Admission: __________________________

7) Braden Scale subcategory with Lowest Score (less than or equal to 2):
- ◯ Sensory Perception
- ◯ Moisture
- ◯ Activity
- ◯ Mobility
- ◯ Nutrition
- ◯ Friction & Shear

Please identify the intervention(s) initiated on admission for Braden subcategory with lowest score (less than or equal to 2)

	Assessed for the appropriate bed	Use wedge/ EHOB	Introduced turn schedule	Check medical devices	PT/OT consult
8) Sensory Perception	☐	☐	☐	☐	☐

	Head of bed in lowest position	Protect and elevate heels	Prevent skin-to-skin contact	Use ceiling lift or Blue/purple slide sheet to move patient
9) Friction & Shear	☐	☐	☐	☐

	Frequently offer toileting assitance	Use skin protective products (barriers,creams, sealants, etc.)	Select the appropriate device for urine collection	Use ofmoisture-wickingg pad
10) Moisture	☐	☐	☐	☐

	Measure the patient weight	Monitor fluid and food intake percentages	Suggest nutritional supplements for the provider to order	Dietician/speech therapist consult
11)				

Figure I2

HAPI Prevention
Page 1

Unit Admission Log

Record ID	____________
Today's date	____________
Admission Date	____________
MRN	____________
Room #	____________
Admission from	____________
Days on unit	____________
Patient discharged?	◯ Yes ◯ No
Discharge date	____________
Discharge to	____________
Patient Tranferred?	◯ Yes ◯ No
Transfer date	____________
Transfer to	____________

Figure I3

HAPI Prevention
Page 1

HAPI Prevention Equity Audit

Record ID	________________________
Week #	________________________
Total admissions	________________________
Total completed 2-nurse witness skin assesment	________________________
Total completed PU risk assessment [Braden]	________________________
Total completed subcategory-specific care planning	________________________
Total completed non-subcategory care planning	________________________

Figure I4

Page 1

Staff Pressure Ulcer Baseline Assessment Tool

Please complete the survey below.

1) Medstar Username

____
((i.e. VLM3))

2) For which factors in the Braden Scale are you evaluating the patient's ability to respond to verbal command?
- ◯ Activity
- ◯ Mobility
- ◯ Sensory/Perception
- ◯ Friction/Shear

3) How often should you assess and document skin condition?
- ◯ Daily
- ◯ Once a shift
- ◯ Upon admission and discharge, every shift, and as patient condition warrants
- ◯ Upon admission and discharge

4) What can you do when one of your patients has discoloration of the skin (red, purple, blue) indicating pressure?
- ◯ See what happens over the next 24 hours.
- ◯ Let the next nurses know about it. Start a skin care plan.
- ◯ Place the patient on a pressure-reducing surface and explain to the patient and family that the patient needs to limit pressure to the area.
- ◯ B&C from above

5) Who is the primary person accountable for patient skin assessment, pressure ulcer prevention, and documentation?
- ◯ Wound Ostomy Nurse
- ◯ RN
- ◯ Nursing assistant
- ◯ All of the above

6) What is the most common reason a patient gets a pressure ulcer?
- ◯ Patient is a smoker.
- ◯ Patient is very thin.
- ◯ Patient is incontinent.
- ◯ Patient does not move.

7) How often should you look at every patient's skin to look for signs of redness or discoloration?
- ◯ Daily, when patient bathes.
- ◯ Every time the patients asks me to look.
- ◯ Every 8 hours.
- ◯ Every Shift

8) The correct procedure for checking an air mattress every shift is
- ◯ Push down and if it feels soft it is OK.
- ◯ Ask the patients if it feels like there is enough air underneath them.
- ◯ Do a hand check by placing palm up and feeling for a cushion of air under the heaviest areas of the body.
- ◯ The air mattress should be OK once it is blown up and does not need to be checked.

9) What should you report to about your patient every shift?
- ◯ Skin tears
- ◯ Discoloration of skin, such as red, blue, or purple
- ◯ Open sores
- ◯ All of the above

Appendix J
Measurement Plan

All admitted patients to project site over 18 years of age will be eligible for the HAPI prevention admission bundle. To ensure patient inclusion in the project and intervention equity the project sites resource nurses will be asked to remind and assist nurses to complete the three components of HAPI prevention bundle on admission.

Project Structure, Process, Outcome Goals	Measurement Procedures (who will collect data, when, how, from where)
1. 100 percent of staff nurses and PCTs on the Med-Surg/ORTHO unit will be evaluated on HAPI prevention understanding determine additional education training needs during the first week of implementation.	Who: The project lead When: Week one of implementation How: a Quick Response (QR) code through REDCap to complete in-person with unit nursing staff Where: “pressure ulcer baseline assessment”
2. 100 percent of staff nurses and PCTs on the Med-Surg/ORTHO unit will receive training on the HAPI best practice admission bundle during the first week of implementation	Who: The project lead When: Week one of implementation How: a staff attendance sign-in sheet completed in-person with unit nursing staff Where: Marked off at the completion of HAPI BPAB education/training

3. 100 percent of patient admitted to the Med-Surg/ORTHO unit will experience the three components of HAPI best practice admission bundle during the 15-week implementation period.	Who: The project lead When: 15 week implementation period How: a Quick Response (QR) code through REDCap to completed by nursing staff upon patient admission Where: "HAPI Best Practice Admission Bundle" audit, "Unit admission log" audit and EHR audits
4. 100 percent of patients admitted to the med surg/ORTHO unit during the 15-week intervention period will have no incidence of HAPIs	Who: The project site When: 15 week implementation period How: EHR audits and reviewed HAPI related safety events Where: the project site's quality and safety HAPI dashboard

Appendix K
Non-human Subjects Research Determination

UNIVERSITY of MARYLAND BALTIMORE

Full Accreditation

University of Maryland, Baltimore
Institutional Review Board
Phone: (410) 706-5037
Fax: (410) 706-4189
Email: hrpo@umaryland.edu

NOT HUMAN RESEARCH DETERMINATION

The IRB and the HRPO, as part of the Office of Accountability and Compliance is committed to excellence and customer service. Please take a moment to tell us how we are doing: HRPO/IRB/OAC Customer Feedback Survey

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Date: July 19, 2024

To: Madelyn O'Neal
RE: HP-00111576
Name: NDNP 811: Reducing Hospital Acquired Pressure Injuries; Implementation of a Best Practice Admission Bundle

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This letter is to acknowledge that the UMB IRB reviewed the information provided and has determined that the submission does not require IRB review. This determination has been made with the understanding that the proposed project does not involve a systematic investigation designed to develop or contribute to generalizable knowledge **OR** a human participant (see definitions below).

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are human subject research in which the organization is engaged, please submit a new request to the IRB for a determination.

Definitions –

Human Research: Any activity that either:
- Is "Research" as defined by DHHS and involves "Human Subjects" as defined by DHHS ("DHHS Human Research"); or
- Is "Research" as defined by FDA and involves "Human Subjects" as defined by FDA ("FDA Human Research").

Research as Defined by DHHS: A systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.

Research as Defined by FDA: Any experiment that involves a test article and one or more human subjects, and that meets any one of the following:
- Must meet the requirements for prior submission to the Food and Drug Administration under section 505(i) of the Federal Food, Drug, and Cosmetic Act meaning any use of a drug other than the use of an approved drug in the course of medical practice;

Appendix L
Run Chart