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Implementing a skin care bundle on hypoperfusion skin: A Quality Improvement Project

Emily O'Connor
Sacred Heart University, oconnore2@mail.sacredheart.edu

Implementing a skin care bundle on hypoperfusion skin: A Quality Improvement Project

Emily O'Connor RN, BSN

A DNP project submitted in partial fulfillment of the requirements for the degree of

Doctor of Nursing Practice, Henley College of Nursing

Sylvie Rosenbloom DNP, APRN, FNP-BC, CDCES

Sacred Heart University Davis & Henley College of Nursing

This is to certify that the DNP Project Final Report by

Emily O'Connor

Has been approved by the DNP Project Team on

April 10th, 2024

For the Doctor of Nursing Practice Degree

DNP Project Faculty Advisor: Sylvie Rosenbloom DNP, APRN, FNP-BC, CDCES

Practice Mentor: Paula Bowley MSN, RN, CCRN

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Abstract

Significance and Background: Pressure injury rates have increased within the critical care population. Pressure injuries are known to increase pain, infection risk, length of stay leading to decreased quality of life. Thermal imaging cameras highlight areas of hypoperfusion, allowing staff to target these areas as high likelihood to progress to a pressure injury. Foam dressings have been shown to help decrease pressure injury acquisition. Prevention methods should utilize evidence-based skin care bundles and focus on known information and target areas. Combining knowledge from thermal cameras, foam dressings, turning every two hours and accurate use of documentation scale (Braden Scale), a clinical tool used to assess degree of risk for pressure injury can help providers decrease pressure injury rates.

Purpose: Educate nursing staff on the importance of pressure injury prevention and implement a new skin bundle to prevent hospital acquired pressure injuries and update the current skin care protocol.

Methods: The methodology used for this QI project the Plan-Do-Study-Act (PDSA) was from the Institute for Healthcare Improvement. A total of three PDSA cycles were completed. Thermal imaging indicating hypoperfusion to the coccyx triggers the initiation of the new skin care bundle protocol. Use of thermal camera is required within first 24 hours of patient's admission. Patients admitted were thermal imaged, if hypoperfusion was seen skin care bundle was implemented, foam dressing applied, turns Q2, documentation of hypoperfusion, foam dressing application, turns, and Braden Scale.

Outcomes: A total of 202 patients were seen during the implementation period. Protocol implementation during initial cycle was 100%, but then dropped to 38% which led to a cycle adjustment, thus increasing implementation to 71% still below target goal of 80% set by the DNP student. However, final adjustments made resulted in 98% implementation rate. During the project implementation 86% of the HAPI's acquired were a result of failure to initiate protocol or incomplete protocol initiation.

Discussion: Implementation of full skin care protocol (all criteria) lead to decreased HAPI's. Early identification of hypoperfusion on critically ill patients helps target areas of high-pressure injury risk. Next steps are presenting findings to staffing committee and board of directors in April to possibly implementation the new skin bundle on hospital floors. Discussion on how to effectively do so with only one thermal camera are also being assessed.

Keywords: critical care unit, pressure ulcers, hospital acquired pressure injuries, skin bundle, skin prevention, ICU, foam dressings, intensive care unit, prophylactic foam dressings and pressure injury prevention.

Problem Identification and Evidence Review

Description of the Problem

Deep tissue pressure injuries (DTPI) are formulated on areas of boney prominences of the body: coccyx, heels, elbows, and hips. These areas suffer from ischemia and shearing which increases the possibility of hypoperfusion (Koerner, 2019). Pressure injuries can be seen on various levels: subcutaneous tissue involvement to bone and muscle depth (Koerner, 2019). Deep tissue pressure injuries are a result of two main concepts decreased perfusion and decreased mobility, both of which are a huge concern for acutely ill patients within a critical care unit. Studies have showed increased rates of hospital acquired pressure injuries (HAPI) for patients hospitalized within a critical care unit compared to those hospitalized on general medical-surgical floors (Akbari, 2014; Coyer, 2017).

Hospital acquired pressure injuries are not only painful but can also prolong patient length of stay (LOS). Occurrences of HAPI's can incur notable financial burden on the healthcare system; increase infections, skin debridement, antibiotic requirements, and extended use of pain medications (Cox, 2022). Critical care patients are typically hemodynamically unstable and prone to developing pressure injuries and using a thermal imaging camera can help with early identification of pressure injuries thus allowing for early intervention such as proper skin care and use of prophylactic foam dressings (Koerner, 2019). The national benchmark for HAPI's has decreased by 7% based on epidemiological studies carried out by the National Pressure Ulcer Advisory Panel (Diaz-Caro, 2020). This institution's critical care unit had three HAPI in August 2023, four during July 2023 and three in June 2023.

Current skin care protocol in the critical care unit (CCU) of this institution uses a thermal imaging camera on all patients upon admission to the CCU. Thermal imaging is done to the

coccyx and bilateral heels for every patient, as the coccyx/sacrum is the area with the highest number of pressure injuries followed closely by heels (Al Aboud, 2023). Currently, the CCU has two separate policies for skin, one for thermal imaging camera and one for skin care/pressure injury prevention. (Appendix F). However, we do not have a protocol for the required skin care once a known area of hypoperfusion is found with the thermal imaging camera.

Currently, nurses utilize critical thinking to assess the use of thermal imaging of other body areas based on visual assessment alone. Once thermal imaging is completed, known areas of hypoperfusion are documented in the electronic health record (EHR) and on the white board in the patient's room. The CCU rooms have whiteboards that list areas for skin concerns, facilitating communications within the members of the healthcare team. Any area of hypo-perfusion is classified as an "area of interest" (AOI). Currently there is no set protocol beyond this. Our basic skin protocol calls for turning each patient left, right, supine every two hours, regardless of any areas of interest (Appendix F).

Barriers to preventing HAPIs are often associated with not only the key aspects of early identification and acquired injuries but also from lack of skin care/treatment care adherence by nurses (COX, 2022). Lack of skin care knowledge or access to foam dressings, accurate and timely skin assessment documentation, and adherence in using the thermal imaging camera to detect initial skin conditions of patients upon arrival to critical care unit can affect the development of HAPI and negatively impact patient outcomes.

This project is fully supported by the CCU manager, education department and critical care unit educator, the chief nursing operator and chief medical operator. This project will update the current policy through an addended section of the skin care protocol by utilizing evidence-based knowledge on HAPI prevention using the Model for Healthcare Improvement (PDSA).

Organizational Priority

This project is being fully supported by the CCU manager, education department and critical care unit educator as well as the chief nursing operator and chief medical operator. This project will update the current policy through an addended section of the skin care protocol by utilizing evidence-based knowledge on HAPI prevention within the critical care unit using the Model for Healthcare Improvement (PDSA).

Clinical Question

A search was conducted to properly identify the best skin care prevention methods in critical care hospitalized patients. The PICO question created was:

1. In adult CCU patients with hypoperfusion to coccyx (seen in thermal imaging) (P) Use of prophylactic foam dressing to coccyx (I), no foam dressing (C) affects pressure ulcer development (O).

Methods for Gathering External Evidence

A search of the following databases was conducted; CINAHL, PubMed, Medline, TRIP and Cochrane. The keywords searched were critical care unit, pressure ulcers, hospital acquired pressure injuries, skin bundle, skin prevention, ICU, foam dressings, intensive care unit, prophylactic foam dressings, pressure injury prevention. Limits/filters for all searches included, English language, and published between 2018 – 2023. The criteria for the external evidence review can also be seen in the Iowa Tool (Appendix A).

Evidence Search Plan for Internal Evidence

Through an inter unit appraisal of hospital-acquired pressure injuries, it was found that

pressure injuries are a continued problem. The CCU has had many hurdles, unit meetings, education, and alternative devices to try and help our staff (nurses and ancillary staff) decrease pressure injuries thus far, this has not been helpful.

Evidence Appraisal Results and Recommendations

Appraisal of all articles was conducted through the Rapid Critical Appraisal (RCA) Tools (Melnyk & Fineout-Overholt, 2019). Appendix B illustrates the use of the RCA tool for one of the articles appraised. Six articles were reviewed with five articles having levels of evidence ranging from I to II with one article at a level VI (Appendices C). An evidence summary table with details of the article appraisals was developed and can be found in Appendix E.

The evidence review is supportive of the use of assessment tools, such as the Braden scale (Johnstone, 2013; Forni, 2022; Santamaria, 2015; Kalowes, 2016). Studies have shown a high correlation between low Braden scale scores and high risk for pressure ulcer development (Kalowes, 2016). The evidence also demonstrates that the use of prophylactic foam dressings can decrease the incidence of HAPI's in acutely ill patients (Johnstone, 2013; Forni, 2022; Sillmon, 2021; Rahman-Synthia, 2023; Santamaria, 2015; Kalowes, 2016). Utilizing prophylactic foam dressings has also been shown to be cost-effective (Johnstone, 2013; Forni, 2022; Sillmon, 2021; Rahman-Synthia, 2023; Santamaria, 2015; Kalowes, 2016).

Based on the presented evidence, recommendations are to revise the current skin care protocol to incorporate the use of foam dressings, turning protocol, use of proper lotions/creams, early ambulation protocols, and low-air loss mattress use. The evidence also reports that the use of foam dressings to the coccyx for ICU patients may help prevent pressure ulcer acquisition (Johnstone, 2013; Forni, 2022; Sillmon, 2021; Rahman-Synthia, 2023; Santamaria, 2015; Kalowes, 2016). Recommendations based on the evidence are to continue admission/daily

Braden Scale use and use the foam dressing for pressure injury prophylaxis on areas of known hypoperfusion. (Johnstone, 2013; Forni, 2022; Sillmon, 2021; Rahman-Synthia, 2023; Santamaria, 2015; Kalowes, 2016).

Project Plan

Project Goals

One of the goals for this project is to educate staff about the proper use of foam dressings, wedges for turning and the use of thermal camera. The second goal of the DNP project is to update the current protocol for pressure ulcers with a fully inclusive skin care bundle for new admissions and transferred patients. Goal number three is to incorporate proper use of screening tools, thermal camera, and Braden scale in skin assessment of CCU patients.

Framework

The framework method chosen for this quality improvement (QI) project is the Institute for Healthcare Improvement (IHI) Institute, Plan-Do-Study-Act Model. This framework utilizes the aspect of simplicity through the implementation of QI methods (Science of improvement, 2023). It is a great method of singular unit QI implementation that can potentially successfully be implemented on a larger scale within an entire organization. Refinement or minor adjustments can be made based on findings within each testing cycle to result in better outcomes.

Context

The institution, where the DNP project was implemented, is a level two trauma center located in Waterbury, CT. The quality improvement (QI) project will be implemented in the critical care unit, an all-inclusive intensive care unit, serving patients with neurological, cardiac,

surgical, and medical ailments. The unit has 32 beds, 51 staff nurses, nine nurse's aides, two professional nursing aides (professional nurses' aides – nursing aids in school for nursing currently), a rotating list of medical and surgical residents with at least seven residents and two attendings who will be part of the proposed QI project.

Description of the setting

The setting is a mixed critical care unit, located in an inner city, a level two trauma center. This unit in which the QI project is being implemented is a 32-bed mixed intensive care unit. This unit focuses on medical, surgical, neurological, cardiac as well as cardiothoracic intensive care patients.

Description of participants and population

The patient population age is 18 years of age and older, typically seen with diagnoses of respiratory failure, sepsis, congestive heart failure, chronic obstructive pulmonary disease exacerbations and traumas.

The staff participating in the project are staff nurses; approximately 52 staff nurses as well as our ancillary staff including our patient care technicians, professional nursing assistants (those assistants currently in nursing school), as well as our dual role technicians who participate in both clericals as well as patient care technicians, in total we have 14 staff members in these roles.

Project Team and Roles

Table 1. Project Team and their Roles

Person	Role

Emily O'Connor DNP student	Project Manager
Paula Bowley -Primary Project Mentor	Project review for adherence with health system standards
Paula Bowely- CCU educator	Give expert opinion and guidance on skin care practice changes
Sylvie Rosenbloom	DNP project faculty advisor, EBP and QI expert
Steven Lema Alma Kimberly Mazzetti Katrina Monangas Denise Rickevicious Nicole Zinzalet	Peer Champions

Key Stakeholders, Staff, and Buy-in

Key stakeholders identified for this project include the chief nursing operator, chief medical officer, critical care manager, education department, critical care educator, surgical team, patients, and families. Staff members are essential to the success of this QI project. Key staff members implementing the skin care bundle will be nurses and professional nursing aides. Improvement on establishing goals of care and reducing invasive procedures was emphasized to get staff buy-in. The critical care manager, chief medical officer, and educator had expressed interest in aiding with the implementation of this QI project in hopes that an updated skin care protocol can be developed based on our QI findings. The peer champions also held a vital part within the QI project process, outcome measures, PDSA cycle changes and practice changes.

Description of the Practice Change

The Model for Healthcare Improvement guided this practice change project. In this section, the practice change plan for each step of the PDSA is described. The current policy has two practice protocols outlined in Appendix F. The policy was changed to include all admissions and transfers be thermal imaged within 24 hours of admission/transfer (Appendix F). Additionally, within the "interventions and managing pressure injury risk" section of the policy, patients whose thermal imaging showed hypoperfusion are to have a foam dressing applied to further prevent skin breakdown. The QI implementation changes made to the current protocol included the addition of a skin care bundle for patients with hypoperfusion seen on thermal imaging. The practice change is as follows: all patients entering the critical care unit should receive thermal imaging within 24 hours of arrival to the unit. If the imaging shows hypoperfusion this triggers the new skin bundle implementation which includes the application of foam dressing, turns every two hours, use of a foam wedge for the turns and documentation. Documentation includes: hypoperfusion locations, turns, Braden Scale, and foam dressing applied. Within the bundle, documentation of the thermal imaging completion and known areas of intertest (AOI) must be completed within 24 hours in the EHR. The current EHR used is Epic which currently has a section for documentation of findings after a thermal imaging scan.

Plan Phase

The DNP student met with the critical care educator and nurse educator who specialize in skin assessment and pressure injury staging to review the old skin care protocol, then in combination with newest evidence-based practice on pressure ulcer prevention methods, the team developed the new skin care bundle which incorporated the use of the skin breakdown assessment tool (Braden), thermal imaging camera (Scout), use of foam dressings, foam wedges, and turning every two hours.

Education for this was conducted during change of shift huddles on both day and night shifts, during this time education on all components of the bundle occurred with a primary focus on the use of the thermal imaging camera for bundle qualification, use of foam dressings, foam wedges, and turning every two hours. A discussion on protocol change, documentation expectations and exams were reviewed. A binder with all educational information was created. The binder is readily available in the nurse's station in the cart where all educational resources are located for easy access. The exams were given after each huddle (Appendix G), if staff members did not pass, a remediation session was conducted based on mutual time availability. The exams focused on information about thermal camera use, foam dressing application/removal criteria, and turning protocol understanding.

Evaluation plan

Evaluation began with education/return demonstration use of the thermal camera for assessment of proper use. The skills and understanding of the thermal camera were further evaluated through an examination given to staff. The thermal imaging cameras were just brought to our unit via a grant, 11 months prior to the DNP project implementation, this meant that every staff member needed to renew their thermal camera competency. Charts were initially reviewed every other day for the first PDSA, this was done by the DNP student and peer champions. Further into the project data collection was done twice weekly, given our frequent numbers of admissions and transfers, and continued steady chart reviews was essential.

The DNP student then focused on goal number two for the project which updated the current skin care policy with new protocols for skin care. The institution has a protocol for thermal camera use and one for skin care. If the institution combined both protocols, it may be

easier for nurses to adhere to the protocols. The DNP student focused on this exact aspect for the project.

The final goal of the project was to evaluate the use of the camera, use of prophylactic foam dressings to the areas of interest seen on thermal camera that depict the hypoperfusion, the number of pressure injuries acquired while in the critical care unit, and documentation completion. Once a patient is imaged, a side-by-side picture appears on the screen, the left being the initial visual picture and the right being the thermal image. Normal image, which is what can be seen by the naked eye, is used to highlight visualized color changes or wounds that can be seen easily. When interpreting the thermal picture, the nurse first assesses the color. There is a scale from green to blue to purple the closer to purple the more hypoperfused the area of skin is. A cursor becomes available, selection of skin that is more "blue/purple" will ensure the interpretation assessing the most affected aspects of the skin. Once an area is selected, the thermal imaging camera/computer data gives a number. This number allows the nurse to state if the skin is hypoperfused. The number indicating hypoperfused skin is -1.2. This number indicates that there is substantial hypoperfusion upon admission. The thermal imaging camera also provides the nurse with an inflammation score which ranges from the green (normal) to orange then red. Similarly, to the hypoperfusion side of the scale the closer to red, the more inflamed the skin is. This is helpful for patients who come in with severe cellulitis or other increased inflammatory conditions. While detecting inflammation can be useful for some our patients, this DNP student focused on the hypoperfusion only because this correlates with skin tissue breakdown.

Table 2. Barriers to Implementation and Strategies for Mitigation

Barrier	Strategy for Mitigating
Lack of nationally used standardized trigger criteria tool across the health system	Reviewing the EHR, Epic has a trigger for thermal imaging camera, however standardization of this EHR tracking is unknown.
Increasing nurse workload	Including trigger criteria tool into admission navigator database in the Epic EHR system
Resistance to change from current practices	Illustrate benefits of practice change using the evidence from staff and education department.

Sustainability with Mitigation Plan

Close monitoring of the bundle implementation and documentation was initially done every other day to ensure proper start of the project. After the first week no changes were made to the DNP project as implementation was going well. However, after the third week, the DNP student had to make some changes. There was a decreased in foam dressing application after proper interpretation of tissue hypoperfusion was made with the thermal imaging camera. A reminder flyer was added on the thermal camera. This was received well by staff and increased the overall use of the foam dressings. Two weeks later, the numbers were still not at goal so in addition to the flyer being added, foam dressing were then stocked on the thermal imaging cart for ease of access. This led to increased staff engagement with the DNP project. Bi-weekly emails were also sent out during the project implementation period with updates on numbers and helpful tips for ensuring all aspects of the bundle were being implemented.

Table 3. Project Timeline

Date	Action

September 2023	Met with DNP project mentor and reviewed DNP project and current protocols for skin care in critical care.
October 2023	DNP project proposal paper completion and paper presentation with advisor and mentor
October 2023	Finalized IRB approval from SHU and the institution
October 2023	Approval for SHU and institution IRB received
November 2023	Began educational sessions with staff until 80% participation and 80% pass rate of quizzes.
November 2023	Implementation of proposed practice change
December 2023-February 2024	Performed chart audits and adjustments to PDSA cycle based on feedback and staff adherence to proposed policy
March 2024	Compiled data from three-month intervention period for data display and interpretation
April 2024	DNP project final oral and paper presentation

Resources/Budget

Table 4. Estimated Project Costs

Expense	**Cost**	**Budget**
Material		
Educational handouts (New PCR policy, Pre and post survey, clinical questionnaire, EBP quality report)	Staples Hammermill Copy Plus 10-ream paper (8x11) = $37.99	$37.99

Poster Board	Elmer's Tri-Fold Foam Presentation Board, 4' x 3', White = $8.69 x2	$17.38
Poster Board (SHU poster)	36" x 46"	$45
Technology		
PowerPoint Presentation (Microsoft Office)	$114.99	$114.99
EPIC HER	$0.00	$0.00
Total:		$215.36

Dissemination Plan

The dissemination plan included an institutional policy, a poster board presentation, and final presentation on findings. A poster was created using the framework set forth by the project hospital. An executive summary was written for the practice setting, an abstract, and poster for Sacred Heart University DNP program was completed. Results were shared in the final poster board with the staff, nurse manager and nurse educator to discuss outcomes.

Ethical Review

This project was reviewed and approved by the hospital's IRB Board (Appendix I). This project was approved by the practice site and SHU IRB (per policy) was submitted. The project was IRB exempt because it is a QI project (Appendix I). Per DNP program policy the QI checklist was completed and demonstrated that this was a QI project (Appendix J). This DNP student successfully completed and obtained certification of CITI training for ethical practice

(Appendix K). The SHU clearance letter from clinical compliance offices appears in Appendix L.

Project Implementation

Project Implementation

The implementation was initiated with staff education sessions held at morning and night change of shift. Introduction/review of skin breakdown prevention methods was discussed with all required staff members (staff nurse and patient care associates were held accountable for this informational session attendance). Education focused on the current number of HAPI's and how these continue to be elevated for the unit, and that new skin bundle implementation may help improve patient outcomes and decrease HAPIs. Evidence based-practice was utilized to inform on combining attained knowledge of hypo-perfused areas, known preventative techniques and skin care bundles for HAPI prevention. A poster board was developed which included a summary of the key points presented during the education session. The poster board also incorporated the benefits for HAPI prevention (Appendix M). A list of all staff attending the meeting was kept by the DNP student, with a goal of 90% staff attendance. The staff was then asked to complete an exam on the information presented.

Thermal camera users require training annually to ensure proper use and knowledge of features. Education was formally assessed with a brief quiz, with a goal of 80% for all staff members, those who did not pass had a reteaching session and quiz review to ensure understanding of incorrect answers. Our critical care educational specialist was available for further teaching sessions as needed. A binder containing the information presented in the education sessions is kept on the unit and easily accessible to the staff.

The DNP student tracked the number of patients who qualified for the skin care bundle based on the admission log. The bundle was implemented if the patient was found to have hypoperfusion to the coccyx by thermal imaging. Project champions were selected to help identify patients who qualify for and assist with the use of thermal imaging, EHR documentation, foam dressing, foam wedge use as well as repositioning every two hours.

During cycle one, a trend found was the lack of full bundle implementation, most often it was found that the prophylactic dressings were not being placed on known areas of hypoperfusion. It was also noted that these instances were occurring when the DNP student or peer champions were not present to re-enforce implementation of the new skin bundle. The DNP student, site mentor, champions, and peers, discussed adjustments to be made to further enhance the second PDSA cycle**.** The changes this DNP student and her peer champions found to help alleviate current concerns and lapses in the cycle were to add a laminated reminder picture to the thermal imaging computer to visually remind staff about placing a foam dressing to areas of hypoperfusion. The DNP student also took advantage of morning and night shift huddle to review the standard and ask for input to protocol. Staff agreed with laminated reminders on thermal imaging cameras. Additionally, staff wanted to seek out additional peer champions to cover day and night weekend shifts.

As a result, a laminated reminder bundle card was added to the thermal imaging camera cart. This information was discussed at three huddles and an email was sent to the entire department as a reminder. Six additional peer champions were added to ensure that a peer champion was present on all shifts and every day including weekends. The final adjustment made during the last PDSA cycle was adding the foam dressings on the thermal imaging cart, for ease of access during initial thermal imaging.

Chart audits were performed twice weekly by the DNP student and the peer champions. Thermal imaging camera and room audits for use of foam wedges were conducted for the first two weeks of the implementation. Adherence was monitored by the DNP student, nurse educator and CCU manager. The DNP student followed up with individual staff who did not implement the bundle. Time was set aside for the morning and night shift huddles to receive and address staff concerns regarding the QI project. These concerns were addressed through "the PDSA model," adjustments were made as needed using the cyclic method seen in the PDSA model.

The DNP student continued to reassess and revise the policy and process protocols based on the data collected from the first PDSA cycle. This was done by assessing the total number of patients who met the criteria for the bundle and those who did not, and included those who were not assessed. The DNP student then accessed EHR for those qualifying patients and ensured proper documentation of foam application, repositioning every two hours, and foam wedges, and completion of thermal imaging. Patients still in the unit also had visual checks to assess for foam dressing use. The DNP student completed the first PDSA cycle and assessed implementation of all aspects of the bundle. The information gathered during the PDSA cycles was held on an encrypted, password protected computer in an excel spreadsheet, the spreadsheet did not include patient identifiers.

Project Implementation: PDSA

The DNP project was implemented during a holiday period where the hospital saw an increase in patient census and a decrease in staffing. This led the staff to not fully implementing the skin bundle. After this period, discussions with peer champions and staff meetings were held. A change was made by placing a flyer on the thermal imaging cart as a reminder to complete the

full protocol. This DNP student also sent out an email to all staff informing them of the change and other helpful hints such as including discussing the skin bundle implementation in handoff report and reminders for charge nurse to check off thermal imaging being completed.

This adjustment was conceived after the DNP student spoke with other members of the DNP project team to further request feedback on how to improve or lessen the burden of the skin bundle implementation. It was discovered in QI project rounds that the foam dressings were not being applied to the hypo-perfused skin. DNP student and peer champions reflected on how the protocol can be improved for ease of implementation, having the foam dressings stocked on the thermal imaging cart was initiated for ease of access. Lower rates of skin bundle initiation were seen with admissions and transfers occurring within the last hour or hour and half of shift changes. Feedback from staff revealed that skin bundle implementation was not a high priority. Further suggestions deliberated upon with the peer champions lead us to adding a discussion of thermal imaging findings within our handoff reports from shift to shift, to ensure full skin bundle implementation. All this information was sent out in an email to the entire staff. After adding the foam dressings to the thermal imaging cart, bundle implementation rates were back up.

Project Implementation Bundle:

1. All patients admitted or transferred into CCU will be thermal imaged for hypoperfusion within 24 hours.
2. All patients who show hypoperfusion to coccyx are to receive the skin bundle implementation.
3. A foam coccyx will be applied to the coccyx for prophylactic skin prevention.

4. Every patient will then be turned every two hours with a foam wedge per skin care protocol, Braden scale documentation, foam dressing application documentation, and Q2 turns documented.
5. DNP student will review charts for skin bundle implementation several times per week upon the first 2 weeks of project implementation.
6. Prior to discharge or transfer out of unit, the DNP student will assess coccyx for pressure injury acquisition/prevention.
7. The number of acquired pressure injuries will be collected and recorded.
8. Data collection will occur over a 12-week period.

Descriptions of deviations from project plan:

Deviations from the initial DNP project included the addition of peer champions. Peer champions were present during all shifts and weekends to encourage nurses and provide gentle reminders about the new skin bundle. Additionally, a laminated card and foam dressings were added to the thermal imaging camera to facilitate the skin bundle implementation.

Evaluation

Process Measures

The DNP student educated 91% of nurses and staff surpassing the 80% goal set by the DNP student. The average exam score was 97%. Success met in percentage of staff members educated on current policy and proposed changes.

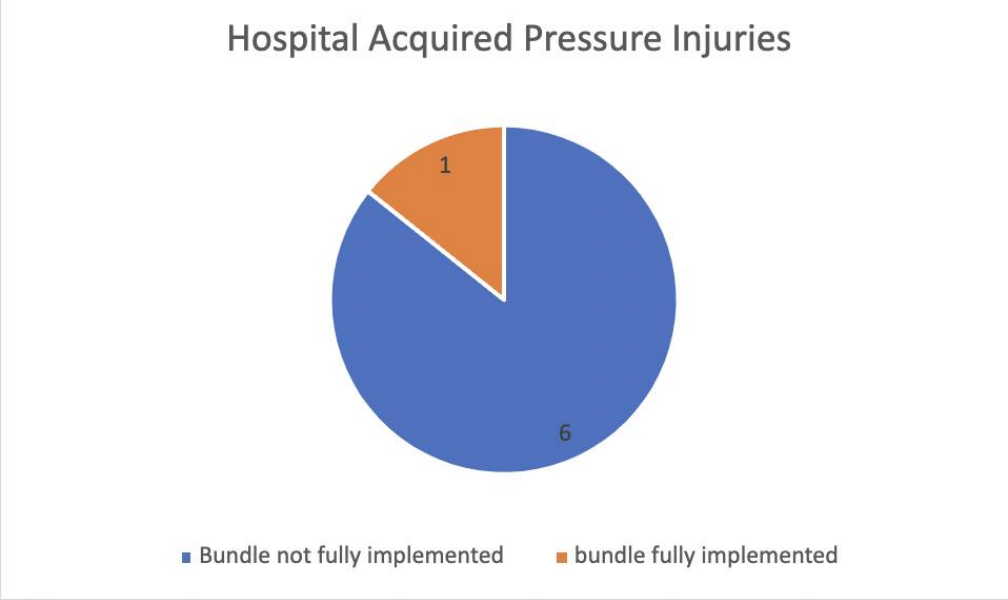
A total of 202 patients were admitted during the 12-week implementation period with 161 (80%) patients receiving thermal imaging. Of the 161 patients scanned, 94 (59%) of them had areas of hypoperfusion. Of the total 94 patients with hypoperfusion 80 (85%) of them had

full protocol completed by the staff during the implementation period. Fourteen of the 94 patients meeting criteria only had partial protocol implementation. During the first PDSA cycle, there were 18 total patients who met criteria for bundle implementation and only 7 (39%) patients received the full skin bundle. Of the 11 who did not have full skin bundle implementation, most lacked the foam dressing application (61%). During weeks three and four, the full skin bundle implementation decreased to 38%. After revising the skin bundle as described above, the full skin care bundle was implemented in 98% of the qualifying patients.

Decreased tissue hypoperfusion, is seen nearly 10 times more often in patients who require critical care (Norwicki, 2018). Previously stated evidence further shows its impact on increased pressure injury acquisition for critical care patients (Akbari, 2014). After the initial weeks of data collection and implementation, staff were still utilizing the thermal imaging camera, however it was noted upon data collection and discussion with peer champions that foam dressings were not being placed after known hypoperfusion, and most of these occurrences were being seen on night shift and change of shift admissions.

Outcome Measures

Pre-implementation plan showed 8 HAPI's over a three-month period. During the skin bundle implementation, there were a total of 7 HAPI's seen. Six HAPIs were on patients who did not receive the full skin bundle. Of these 6 patients, 3 were not thermal scanned and 3 did not have foam dressings placed after known hypoperfusion. The other patient who developed a HAPI received the full bundle implementation. However, this was a patient on multiple vasopressors, with a prolonged hospital stay (1.5 months in ICU), ventilator dependent and who ultimately scummed to his illnesses. Certain critical care patients are categorized as unavoidable HAPI's due to their acuity (Pittman, 2021).



Return on investment:

In the three months prior to project implementation, the institution had a total of 8 hospital acquired pressure injuries. Hospital acquired pressure injuries are associated with decreased turn compliance and lack of implementation of proper preventative skin measures. Increasing knowledge on skin care and wound prevention can increase skin bundle policy implementation which can lead to decreased HAPI.

During the implementation of the new skin bundle, only one patient who received the full skin bundle developed a HAPI. On average $34,292 is required for treatment cost due to HAPI (Wassel, 2019). As previously stated, there were a total of 8 HAPI seen in the twelve-week prior to the skin bundle implementation. These 8 HAPIs likely incurred additional expenses totaling approximately $274,336. The hospital saved about $226,044 based on the above costs.

Key Lessons Learned

Access to required skin care bundle items and physical reminders increased skin bundle implementation. Evidence of admission time had an adverse number of protocol implementation. Many lapses in initial thermal imaging were seen during change of shift admissions. Further lessons learned include that change is difficult to initiate, as well as maintain. The initial weeks of full implementation were so reassuring, but then decreased drastically. The need to revise the initial implementation plan felt like a failure. Having a strong group of peer champions involved was imperative for not only the data collection but the continued implementation efforts which contributed to the QI project success. Their combined brainstorming was also essential for project changes and QI project improvements made during each PDSA cycle.

Throughout this quality improvement project, the DNP student gathered the views of the unit, educators, and staff to improve the implementation of the full skin bundle including. The peer champions truly became part of the heart of the project pushing for everyone to implement the new skin bundle. The continued use of this new skin bundle can be easily transferred to other units and implemented successfully across the institution. The institution may be inclined to investigate any grants to purchase one or two more thermal cameras for other units with high incidents of pressure ulcers to help their prevention methods as well.

Sustainability

Currently the skin bundle is still being implemented, the DNP student spoke to the Chief Nursing Officer about hospital wide implementation efforts moving forward. The support seen throughout the QI project dipped at times, but supportive meetings with staff, staff feedback to DNP student as well as maintenance emails to serve as a reminder were adventitious in the QI project's success. Multiple PDSA cycles were utilized to benefit the skin bundle implementation.

Quality improvement projects require not only time but commitment to the enacted changes being made. Staff buy-in is essential, having a rapport with the staff was more than useful for increased excitement and follow-through. Peer champions were also essential in the successful implementation of this project. Hospitals are a 24-hour business, increased assistance on off-shift and weekends was essential as admissions occur at all hours of the day. Promotion of staff incentive for participating on QI projects could increase not only staff compliance but also involvement within the intervention process.

Dissemination

Implication of project results to organization, practice community:

Results were shared with the critical care department, manager, and educator who were more than pleased with results and staff engagement in protocol. This DNP student presented the project at a poster board presentation at SHU. A 10-minute presentation was done in at a hospital staffing committee meeting. Proposed adoption of the new skin bundle was discussed with the hospital's leadership and education teams.

Currently this DNP student is planning a presentation with the board of directors as well as the critical care committee to have this bundle protocol made into an official policy for the hospital. Further hopes are to have other units adopt the bundle, with further adjustments made as needed. Poster board presentation will be made by this DNP student as well during out May staffing committee meeting.

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Appendix A

	Date of Search	Database (Source and Link)	Search or MeSH Terms	Operators (AND, OR, NOT)	Limits Used	Yield (Number of Articles Identified)
Example	6/10/2022	PubMed	Postoperative pain, Complementary therapy	AND	English language, systematic reviews	94
	5/31/2023	CINAHL	Critical care, pressure ulcers, foam dressings	AND	English, 2012 -2023	8
	5/31/2023	CINAHL	Foam dressing to prevent pressure ulcers, and critical care or intensive care unit	AND	English and 2012 -2023	4
	5/31/2023	PubMed	foam dressings and pressure injury prevention	AND	English, 2012-2023, meta-analysis, RCT, systematic review	26
	5/31/2023	PubMed	foam dressings and pressure injury prevention in icu	AND	English, 2012-2023, meta-analysis, RCT, systematic review	5
	5/31/2023	Trip	foam dressing AND pressure ulcer prevention in critical care	AND , in	Critical care, since 2016,	7

Appendix B

Project Title: DNP-Project

Date: June 6, 2023

PICOT Question: In adult ICU patients with hypoperfusion to coccyx (seen in thermal imaging) (P) Use of prophylactic foam dressing to coccyx (I), no foam dressing (C), prevent pressure ulcers (O).

Article citation (APA): Sillmon, K., Moran, C., Shook, L., Lawson, C., & Burfield, A. H. (2021). The Use of Prophylactic Foam Dressings for Prevention of Hospital-Acquired Pressure Injuries: A Systematic Review. Journal of Wound, Ostomy & Continence Nursing, 48(3), 211–218. https://doi-org.sacredheart.idm.oclc.org/10.1097/WON.0000000000000762

Indicate the level of the study you are appraising Level 1

Recommendation for article inclusion in the body of evidence to answer your question: yes, this article should be included because it includes nearly all aspects of my PICO, the only area of difference is this article is generalized to any patient within the confines of the hospital whereas I am gearing my PICO to just my unit.

Overview

1. **Purpose of study, including research question(s) or** hypotheses does the use of prophylactic foam dressings help prevent Hospital acquired pressure injuries (HAPI)
2. **Design/Method:** systematic review
3. **Sample: 14** overall studies reviewed in this article for their systematic review of the topic with a total of over 1000 patients analyzed during their findings overall.
4. **Setting: Emergency** rooms, and ICUs in a variety of hospitals, this article narrowed down to. 14 other studies they gathered and collected evidence for, one being Danbury Hospital ICU.

Quality of the Study

Validity: Are the results of this study valid?

1. **Did the systematic review/meta-analysis address a focused clinical question?**

☒Yes ☐No ☐ Unknown

   a. **What was the focused clinical question?** Does the use of foam dressings decrease HAPI's?

2. **Was the search for relevant studies detailed and exhaustive?**

☒Yes ☐No ☐Unknown

Comment: their research narrowed their findings down after finding many duplicate studies and research that fit certain criteria but not others.

3. **Did the systematic review/meta-analysis include RCTs?** ☒Yes ☐No

   a. **Was criteria used to select articles for inclusion?** ☒Yes ☐No

   b. **What were the criteria for inclusion?** ☒Yes ☐No

   c. **Random assignment to treatment groups?** ☐Yes ☒No

   d. **Analyzed in assigned groups?** ☒Yes ☐No

   e. **Complete follow-up of subjects?** ☐Yes ☒No

   f. **Blind?** ☐Yes ☒No

   g. **Double-blind?** ☐Yes ☒No

Comments: article was a systematic review of many other articles within their topic of choice.

4. **Did the systematic review/meta-analysis include non-RCTs?**

☒Yes ☐No ☐Unknown

   a. **Was criteria used to select articles for inclusion?** ☒Yes ☐No

b. **What were the criteria for inclusion?** Hospital patients at risk for HAPI

c. **Analyzed in assigned groups?** ☒Yes ☐No

d. **Complete follow-up of subjects?** ☐Yes ☒No

e. **Blind?** ☒Yes ☐No

f. **Double-blind?** ☒Yes ☐No

5. **Were the included studies appraised to be highly quality by the authors?**

☒Yes ☐No ☐ Unknown

Comments: They started their search with over 300 articles for their evidence and came down to 14 total articles. They had several articles lower on the level of evidence but were used due to their high correlation to this SR.

6. **Were the methods consistent from study to study?**

☒Yes ☐No ☒Unknown

a. **Were the populations in the studies included comparable?** ☒Yes ☐No

b. **Were the outcomes, interventions, and exposures measured the same way in the groups being compared in the included studies?** ☒Yes ☐No

Comments: I believe that the outcomes are strictly based on the acquisition of pressure ulcers or not so that is pretty much cut and dry however their interventions and exposures could be different so it's hard for this to be a black and white question as they used a multitude of articles within their systematic review.

7. **Were the results consistent across the included studies?**

☒Yes ☐No ☒ Unknown

Comments: again, the overwhelming evidence shows that the use of foam dressing to high areas of interest like the coccyx and the heels does help to prevent skin breakdown however further research should be done to assess whether or not this has to do with skin care bundles or the time frame in which the **application of the dressing** was applied within.

8. **Was there freedom from conflict of interest?** ☐Yes ☐No ☒ Unknown

    - Sponsorship/funding agency
    - Investigators

    Comments: through reading this it does not feel as though there were any conflicts of interest as there was a multitude of different studies across many states including some right here in Connecticut however I did not have access to all of the different studies within their systematic review however I hope to gain access to them as I move forward because I think that they could be helpful within my own project.

9. **Was the date range of the cited literature current?** ☒Yes ☐ No ☐Unknown

    a. **What date ranges were included?** 2010 **to** 2017

    b. **If older literature was included, why?** The older literature was also included older being (13 years at this point) due to the fact they had the same foundational questions and were using the same interventional methods for their studies so the evidence would not change based on a year, as the interventional methods were foam dressings, there is not drastic change in implementation of the dressings or the fabrication of the dressings.

    Comments: Click here to enter text.

Reliability: Are these valid study results important?

10. **What were the main results of the systematic review/meta-analysis?**

    a. **For each individual study**:

i. **Statistical Significance (*p* value): the** systematic review did not go over specific P values.

ii. **Confidence Interval and/or Standard Deviations: the systematic review did not go over specific confidence intervals are standard deviations**.

iii. **How precise was the intervention/treatment? The systematic review did not review intervention treatments and precision methods to reflect if it was wide or narrow**.

1. **Narrow/wide?** Click here to enter text.

b. **For the summary statistic?**

i. Statistical significance (*z* statistic): Click here to enter text.

ii. Were the studies heterogeneous? ☐Yes ☐No

iii. Confidence Interval: Click here to enter text.

iv. Effect size: Click here to enter text.

v. Did it favor the intervention? ☒Yes ☐No

vi. Did it favor the control? ☐Yes ☒No

Comments: the favor was that the use of foam dressings within patients in an ICU setting was helpful and prevented pressure injuries.

11. **Were the results clinically significant?** ☒Yes ☐ No ☐Unknown

a. Were the following reported: NNT, NNH, OR RR? ☐Yes ☒No

Comments: Click here to enter text.

12. **Were potential confounders identified?** ☒Yes ☒. No ☐Unknown

a. **Were the potential confounders discussed in the relationship to the results?**

☒Yes ☐No

Comments: the time frame of when the foam dressings were applied, in ED, upon arrival to ICU or within 24 hours of arrival in ICU. The other confounder would be use of skin care bundle or not, floating the heels, turning every two hours.

13. **Were adverse events identified?** ☐Yes ☒ No ☐Unknown

    Comments: I did not see any adverse effects discussed; however, I know that some people are against using foam dressings prophylactically due to possible skin tears from the adhesive, however this was not discussed in their systematic review.

Applicability/Generalizability: Can I apply these valid, important study results?

14. **Can the results be applied to my population of interest?** ☒Yes ☐No ☐Unknown
    a. **Is the treatment feasible in my care setting?** ☒Yes ☐No
    b. **Do the outcomes apply to my population of intere**st? ☒Yes ☐No
    c. **Are the likely benefits worth the potential harm and costs?** ☒Yes ☐No
    d. **Are the subjects/participants in this study similar to my population of interest?** ☒Yes ☐No
    e. **Were all clinically important outcomes considered?** ☒Yes ☐No
15. **Will you use the study/article in your practice to make a difference in outcomes?** ☒Yes ☐No ☐Unknown
    a. **If yes, why would you do this & how?** I already believe in the use of prophylactic foam dressings to high areas of interest for skin breakdown, especially in the ICU where skin breakdown is highest due to hemodynamic instability.
    b. **If not, why would you not include the results to make a difference?** Click here to enter text.

Strength of Study

Level of study: ☒ I ☐II ☐III ☐IV ☐V ☐VI ☐VII

Quality of Study: ☒High ☒Medium ☐Low

Strength = Level + Quality

What is the strength of this study? I think this is a strong study. The only thing I would want to look into more would be the comparisons for initiation of foam dressings as well as the skin care bundles, used or not used. These were some of the topics discussed for further examination in their conclusion as well. However I do feel as though if this systematic review were a bit more detailed and went into some of the specific results of the studies I would've given a higher quality while it's level one due to the fact it's a systematic review I do feel as though they could've been more specific within their findings rather than just the use of their evidence chart that they laid out which was helpful however was not specific into each study's findings.

What is your recommendation for article inclusion in the body of evidence to answer your question?

☒Include this article in the body of evidence (place article on evaluation and synthesis table)

☐Do NOT include this article in the body of evidence.

Additional comments: I will also be using their references from the articles they used within their own study and ensure I analyze them as well to boost up my articles for my DNP.

Appendix C

	Articles Selected from Evidence Review					
X (copy symbol as needed)	1	2	3	4	5	6
Level I: Systematic review or meta-analysis			X	X		
Level II: Randomized controlled trial		X			X	X
Level III: Controlled trial without randomization						
Level IV: Case-control or cohort study						
Level V: Systematic review of qualitative or descriptive studies						
Level VI: Qualitative or descriptive study, CPG, Lit Review, QI or EBP project	X					
Level VII: Expert opinion						

Appendix D

	Articles Selected from Evidence Review					
↑, ↓, —, NE, NR, ✓ (select symbol and copy as needed)	1	2	3	4	5	6
pressure injury acquisition	↓	↓	↓	↓	↓	↓
cost savings for hospital	↑	↑	NR	NR	NR	↑
Additional skin care bundles associated	NR	NR	✓	NR	NR	✓
Use of same foam dressing as my CCU.	✓	X	NE	NE	X	✓
Pain associated with pressure injury	↓	NE	NE	NE	NE	NE
Baseline skin assessment	✓	✓	NR	X	✓	✓

SYMBOL KEY

↑ = Increased, ↓ = Decreased, — = No Change, NE = Not Examined, NR = Not Reported, ✓ = applicable or present X- no

Appendix E

	Conceptual Framework	**Design / Method**	**Sample/Setting**	**Major Variables Studied and Their Definitions**	**Outcome Measurement**	**Data Analysis**	**Findings**	**Level of Evidence**	**Quality of Evidence: Critical Worth to Practice**
Author Year Title County Funding	**Theoretical basis for study**		**Number Characteristics Exclusion criteria Attrition**	**Independent variables IV1 = IV2 = Dependent variables**	**What scales used - reliability info (alphas)**	**What stats used**	**Statistical findings or qualitative findings**	**Level =**	**Strengths Limitations Risk or harm if implemented Feasibility of use in your practice**
Article 6									
Kalowes P, Messina V, Li M. Five-Layered Soft Silicone	To compare the difference in incidence rates of	RCT	This article has a reference box for	**IV1: control group; no foam dressings one typical**	**SKIN bundle *, Braden Scale**	Descriptive statistics were used to analyze patients'	Our findings have demonstrated a statistically and clinical	**Level II**	**This article also uses the exact same foam dressings**

Foam Dressing to Prevent Pressure Ulcers in the Intensive Care Unit. Am J Crit Care. 2016 Nov;25(6): e108-e119. doi: 10.4037/ajcc2016875. PMID: 27802960.	hospital-acquired pressure ulcers (HAPUs) in critically ill patients between those treated with usual preventive care and a 5-layered soft silicone foam dressing versus a control group receiving usual care. Second goal of the article was to determ		inclusion criteria, though it is best to place that in itself than try to type it all out.	**care/SKIN bundle** **IV2: intervention group, foam dressings AND SKIN bundle used** **DV1: pressure ulcer acquisition.**		characteristics and all physiological and demographic variables. Pressure ulcer cumulative incidence was compared between the 2 groups and by anatomical site per patient through the calculation of inferential statistics and use of the Fisher exact test. Poisson regression analysis was used to	ly significant benefit for the application of the 5-layered Mepilex Border Sacrum foam dressing for the prevention of pressure ulcers when used in combination with thorough risk assessment and evidence-based pressure ulcer prevention via the SKIN bundle .34 H		**that we used within my unit as well as the Braden scale they also went into further detail and breakdown on each patient's level of hemodynamic instability in terms of mechanical ventilation, vasopressor use, sedation, bedrest and hemodialysis**

	ine risk factors in CCU patients in terms of cost savings.					analyze the significance of incidence rate ratio, comparing specific factor level (variables) against a reference category to identify final high-risk variables.			**all large factors associated with skin break down.** The incidence rate of HAPUs was significantly less in patients treated with the foam dressing than in the control group (0.7% vs 5.9%, P = .01). Time to injury survival analysis (Cox proportional hazard models)

									revealed the intervention group had 88% reduced risk of HAPU development (hazard ratio, 0.12 [95% CI, 0.02-0.98], P = .048). Showing clinical significance within the intervention group showing 88% improved skin breakdown numbers with a 95% confidence interval. This was a

									study combining basic preventative care and foam dressing use for skin breakdown prevention.
Article 5									

Santamaria N, Gerdtz M, Sage S, McCann J, Freeman A, Vassiliou T, De Vincentis S, Ng AW, Manias E, Liu W, Knott J. A randomized controlled trial of the effectiveness of soft silicone multi-layered foam dressings in the prevention of sacral	The aim of this trial was to investigate the effectiveness of multi-layered soft silicone foam dressings in preventing intensive care unit (ICU) pressure ulcers when applied in the emergency department to 440 trauma and critically ill patients.	RCT	**Inclusion:** ED and ICU admission for critical illness and/or major trauma Over 18 years of age Exclusion: Suspected or actual spinal injury precluding the patient being turned Pre-existing sacral or heel pressure ulcer Trauma to sacrum and/or heels	**IV1: foam dressings applied in ED – intervention group. IV2: control group: No foam dressings applied.** **DV1: pressure ulcer acquisition**	Australasian Triage Scale score and the Braden scale. Fisher Exact test – all patients.	The analysis was based on intention to treat (ITT). 440 patients total between intervention and control group.	multi-layered soft silicone foam dressings are effective in preventing pressure ulcers in critically ill patients when applied in the emergency department prior to ICU transfer. The experimental event rate (EER) was 3·1% whereas the control event rate (CER) was 13·1%; therefore, the	**Level II**	**This article was unique because it was based on patients that were going to be known ICU patients and the foam dressings were applied in the ED prior to the official transfer into the ICU. I also really liked their inclusion and exclusion criteria becaus**

and heel pressure ulcers in trauma and critically ill patients: the border trial. Int Wound J. 2015 Jun;12 (3):302 -8. doi: 10.111 1/iwj.1 2101. Epub 2013 May 27. PMID: 23711 244; PMCI D: PMC7 95035 0.							absolute risk reduction (ARR) was 10% which provides the number needed to treat (NNT) value of 10. There were no adverse events related to the dressings used throughout the study.		**e certain patients are more prone to pressure ulcers based on their inability to be turned in rotated such as the spinal cord injury patients. All patients were randomly chosen in ED, and all basic skin prevention care was performed to all. Meplex foam**

									dressings were applied to only the intervention group. HOWEVER, all dressings were applied in ED upon dissemination of ICU need regardless of other required destination first (OR, IR or bedside procedures) Daily Braden scores. The experimental

									event rate (EER) was 3·1% whereas the control event rate (CER) was 13·1%; therefore, the absolute risk reduction (ARR) was 10% which provides the number needed to treat (NNT) value of 10. There were no adverse events related to the dressings used throughout

									the study.
Article 4									
Rahman-Synthia SS, Kumar S, Boparai S, Gupta S, Mohtashim A, Ali	preventive effectiveness of silicone dressings among patients admitt	Systematic review Studies assessing the effectiveness of silicone dressin	**Inclusion criteria:** 1) randomized controlled trials (RCTs) or observational	**IV1: ICU patients with foam dressings applied** **IV2: Non-ICU**	New Castle Ottawa Scale used for non-bias information. As well as The	11 studies were included in the final analysis. Silicone dressings	The present meta-analysis suggests that silicone dressings consistently	**Level I**	**The systematic review and meta-analysis of over 11 different studies**

D. Prophylactic use of silicone dressing to minimize pressure injuries: Systematic review and meta-analysis. Enferm Clin (Engl Ed). 2023 Jan-Feb;33(1):4-13. doi: 10.1016/j.enfcle.2022.05.002. Epub 2022 Jun 6. PMID: 35680115.	ed in intensive care units and non-intensive care unit's settings	g on the incidence of PI on the sacral area were included. Evaluations were reported as risk ratios (RRs) with 95% confidence interval, and analysis was performed using a random-effects model.	studies; 2) patients admitted in critical care, surgical wards, or aged care facilities; 3) compared outcomes between intervention (protective dressing) and control group (no silicone protective dressing) or standard care; 4) included incidence of PIs/PUs.	**patients with foam dressings.** **DV1: Decreased pressure ulcer acquisition.**	Cochrane Risk of Bias Tool (CRBT	significantly reduced the incidence of PI compared to usual care (RR: 0.30, 95% CI: 0.19−0.45, P < 0.01). We found no significant difference between results of studies conducted in intensive care settings (RR = 0.25, 95% CI: 0.15−0.43, P < 0.01) and nonintensive	reduce the incidence of PI in intensive as well as in non-intensive care settings, regardless of the type of dressing used.		**is a wonderful compilation of evidence that not only supports the use of foam dressings to decrease pressure injuries but also that the specific foam dressings used are the same exact ones that we use within my unit at work. However, they do also**

						care settings (RR = 0.38, 95% CI: 0.17−0.83, P = 0.01) (P-interaction: 0.39). Silicone dressings reduced the risk of developing PI among patients using five-layer foam Border dressing (Mepilex® Sacrum) (RR: 0.31, 95% CI: 0.20−0.48, P < 0.01), and dressing			**compare it to MedSurg patients that are less hemodynamically unstable and show that there was no difference between them and the hemodynamically unstable patients, but both of those independent variables aside show decreased pressure injuries. Not**

						Allevyn Gentle Border ® (RR: 0.10, 95% CI: 0.01−0.73, P = 0.02) with no significant difference upon subgroup analysis (P-interaction: 0.27).			**found in this article was any baseline skin assessment tool such as the Braden scale.**
Keeper Article 1									
JOHNSTONE, A., & McGOWN, K. (2013). Innovations in the reduction of pressure ulceration	The aims were to prevent incidences of ulceration caused by moisture, friction, and shear;	Quality improvement with use of foam dressing to coccyx to improve patient outcomes and	Inclusion criteria: All high-risk patients (i.e., Waterlow score >15). Bariatric surgery. Immob	IV1: use of foam dressings DV1: development of pressure injury	Braden Scale criteria, as well as all inclusion criteria.	Pressure ulcers acquired.	Qualitative findings, decreased pressure injury and improved cost savings and pain reduction	Quality improvement Level VI	Also, strong focus on cost-savings in this article, however, has strong background information and

and pain in critical	reduce the incidence of pain associated with skin damage; and promote cost-effectiveness in the prevention of sacral lesions.	decrease pain associated with pressure injuries while decreasing hospital cost.	ility, spinal cord injury (i.e., paralysis). Liver failure. Cardiac instability. Diabetes. Sedation. Malnutrition. Mechanical ventilation. Age >65 years. Surgical procedure >8 hours. Heart disease. Vasopressors >48 hours. Peripheral vascular disease. Past history of				reported by patients.		same foam dressings my unit uses for coccyx dressings, so this exact data is helpful.

			pressure ulcers. Major trauma. Traction. Hemodynamically unstable.						
Keeper Article 2									
Forni C, Gazineo D, Allegrini E, Bolgeo T, Brugnolli A, Canzan F, Chiari P, Evangelista A, Grugnetti AM, Grugnetti G, Gubertì M, Matarese M, Mezzalira E, Pierboni L,	whether a multi-layer silicone-adhesive polyurethane foam dressing shaped for the sacrum prevents PUs development in addition to standard PU preventive care for at-risk	Open-label, parallel group, multi-center randomized controlled trial.	709 in-hospital patients at risk for pressure ulcers from 25 medical, surgical, and intensive care units of 12 Italian hospitals. 55-others declined partici	**IV1: intervention group, foam dressing use** **I2: control ground, no foam dressings used** **DV1: pressure ulcer reduction/prevention**	**Braden scale, revised Braden scale as well as a** log-binomial model; which adjusts for other variables not addressed in Braden scale.	**Multi-level breakdown of pressure injuries acquired, < stage 2 or less than. Also, the LOS associated with the timing of acquisition of the pressure injury, typical**	**50% relative risk reduction in those treated with foam dressing compared to those not. With a 95% CI. This was also confounded with evidence for cost-effective saving**	**LEVEL II**	**I think this article will be very helpful because it not only uses the exact scale, we use the Braden scale, but it also had a relatively high reduction of risk associated in**

Prosperi L, Sofritti B, Tovazzi C, Vincenzi S, Zambiasi P, Zoffoli C, Ambrosi E; Multischiume Group. Effectiveness of a multi-layer silicone-adhesive polyurethane foam dressing as prevention for sacral pressure ulcers in at-risk in-patients: Randomized controlled	hospitalized patients.		pation and 81 did not meet other organizational protocol.			**ly found on day 4; intervention or control group this was found to be true.**	**s given the tracking of average number of dressings used per patient as well.**		**their outcomes section. They are specific foam dressings I would need to look further into to see if it's comparative to the ones that we use at work. I also liked that they had a detailed list of inclusion and exclusion criteria.**

trial. Int J Nurs Stud. 2022 Mar;127:104172. doi: 10.1016/j.ijnurstu.2022.104172. Epub 2022 Jan 8. PMID: 35124474.									
KEEPER 3									
Sillmon, K., Moran, C., Shook, L., Lawson, C. & Burfield, A. (2021). The Use of Prophylactic Foam Dressings for Prevention of Hospital-	The purpose of this systematic review was to identify and evaluate the use of prophylactic foam dressings for prevention of hospital-	A systematic review was conducted in accordance with the Preferred Reporting Items of Systematic Reviews and Meta-	The sacral area as a preventative measure for the development of HAPI formation, in adult ICU patients (older than 18	**All articles reviewed had their own IV/DV. Mix of only foam dressings, skin care bundles, education and skin care**	**Braden scale, pressure injury risk scale, or other facility specific grading scales not listed specifically in**	**Specific stats were not disclosed in this SR; however, each individual article should have their own stats, overall findings on**	**Again, findings were briefly discussed but no specifics were detailed in this overall SR of many articles.**	**LEVEL I**	**I use this article for one of my other assignments this past semester and again I still think it rings true that it is exactl**

Acquired Pressure Injuries. *Journal of Wound, Ostomy and Continence Nursing, 48*(3), 211-218. doi: 10.1097/WON.0000000000000762.	acquired pressure injuries (HAPIs).	analysis Statement (PRISMA).	years), were included in the review. We excluded studies that (1) evaluated preventive interventions other than application of prophylactic foam dressings, (2) exclusively addressed pressure injury risk factors and risk assessment strategies, (3) did not specifically identify	**bundles.**	**findings.**	**improved skin outcomes were briefly discussed for each article.**			**y focused on what I want to focus on for my project but gives me not just one article but at least eight others to also look at all from the same source given the fact that I now have all of these other articles I can look at based on the studies that they used for**

			HAPI, (4) exclusively focused on health care costs, and (5) did not enroll adult participants receiving care in an ICU. No restrictions related to publication date were imposed.						**their systematic review. I plan on looking through those more in depth over the next few months.**

Appendix F

[redacted]

SKIN INTEGRITY: CLINICAL GUIDELINES FOR PRESSURE INJURY PREVENTION

Effective Date: March 2022

LOCATION(S) Procedure is Applicable to:
- ☐ Saint Francis Hospital and Medical Center
- ☐ Mount Sinai Rehabilitation Hospital
- ☐ Johnson Memorial Hospital, Inc.
- ☐ The Mercy Hospital, Inc.
- ☒ Saint Mary's Hospital, Inc.
- ☐ Trinity Health Of New England Medical Group

To be reviewed every three years by: *Nursing Department*

Review By: March 2025

PURPOSE

The purpose of this guideline is to establish a process for assessing and intervening to maintain skin integrity in patients identified at various risk categories through utilization of the Braden Scale for Predicting Pressure Injury Risk, to prevent or minimize pressure injuries, to promote wound healing and support skin integrity.

SCOPE

RN staff in adult inpatient clinical areas

PRACTICE GUIDELINES

1. The skin integrity of all inpatients will be initially assessed by a Registered ***Nurse within 2 hours of admission and documented within 24 hours***, daily, at the time of transfer, post-procedure and at discharge for the presence of skin breakdown and pressure injury.
2. All adult inpatient units will utilize the Braden Scale to assess pressure injury risk at time of admission and daily with the following exceptions: Nirenberg Center for Women and Infants, Behavioral Health and One-Day Admission.

NURSING ASSESSMENT

1. Determine level of risk using the Braden Scale on admission, daily, post-operatively/post procedure and transfer.
2. Target nursing interventions to address identified pressure injury risks.
3. Perform head-to-toe skin assessment. If skin intact, document in Head-to-Toe Flowsheet. If skin breakdown and/or wound present, create a line, drain, airway column (LDA) and document on the LDA daily or at time of dressing change if interval greater than daily (i.e., three times per week Wound VAC dressing change).

4. Measure and record wound size (length, width, and depth) at time of admission, when initially identified, transfer, discharge, with significant change in wound condition/stage and every Wednesday.
5. Assess skin turgor.

INTERVENTIONS FOR MANAGING PRESSURE INJURY RISKS

1. Manage Moisture:
    a. Clean & dry skin with each incontinence episode.
    b. Apply moisture barrier cream/ointment every 8 hours & with incontinence care to protect and maintain skin integrity.
    c. For severely denuded skin, use disposable washcloths to cleanse skin.
    d. For moist areas (skin folds, under breasts, groin) consider using a specialty moisture wicking fabric to separate and absorb.
    e. If signs of fungal infection are noted, obtain order for antifungal product.
2. Positioning: (Adapt for Altered Sensory Perception)
    a. Limit time of any position while in bed and/or chair (every 2 hours is indicated for at risk patients with a Braden score of 18 or less)
    b. Reposition patient using lift pad or other transfer device to prevent pressure/ friction/ shear.
    c. Inspect skin over bony prominences. Avoid positioning on reddened areas.
    d. Relieve pressure under heels. Float heels using pillows.
        i. Consult provider for appropriate boot therapy.
    e. Provide for pressure redistribution: position off compromised skin areas.
    f. Assess and reposition any medical devices, when appropriate to minimize pressure injury
3. Reduce Friction and Shear:
    a. Utilize appropriate lift pad/lift device to move up in bed or out of bed when patient unable to move independently.
    b. While up in chair patient should reposition every 30-60 minutes, with assistance as needed. Consider use of chair cushion.
    c. Use adhesive remover wipes to remove adhesive on fragile skin. Prior to re-application, use skin protective wipe.
4. Promote Activity:
    a. Encourage mobility unless contraindicated.
    b. If patient activity level is less than baseline, request PT consult. Implement PT recommendations.
5. Promote Nutrition:
    a. Encourage adequate PO intake.
    b. If nutritional intake inadequate and /or wound present:
        i. Order Nutritional Consult
        ii. Consult with MD regarding nutritional assessment.
    c. If diarrhea present, collaborative with provider, dietician, and pharmacist to identify and treat cause.
6. Provide Patient & Family Education:

a. Assess patient and family knowledge of causes of skin breakdown and methods of prevention.
b. Explain rationale for nursing interventions for managing pressure injury risks.

GENERAL WOUND CARE INTERVENTIONS

1. Initiate interventions to manage factors contributing to pressure related skin breakdown. (refer to #1 –6 listed above).

    a. Relieve pressure to at risk/compromised skin areas.

2. ***Assess for pain***: Consult with provider to determine appropriate plan for pain management.
3. ***Cleanse the Wound:*** Cleanse the wound prior to each dressing change.
4. ***Surgical Wound Consult to Debride the Wound*** (if indicated): If slough or eschar noted in wound bed, consult provider/wound nurse for wound management plan.
5. ***Protect Wound Edges:*** Protect peri-wound area from excessive moisture (prevent maceration of wound edges)
6. ***Provide Moist Wound Bed Environment:*** Select appropriate dressing to support moist wound environment.
    Address the following factors when providing wound care:

    i. Consider amount of wound drainage when choosing appropriate dressing.
    ii. Eliminate dead space by loosely filling all cavities.
7. ***Secure and Protect Wound:*** Secure dressing to provide wound coverage and protection of peri-wound area.

REPORTABLE CONDITIONS

1. Notify provider with significant changes in wound condition: i.e., increased wound drainage, odor, induration, erythema, etc…
2. Follow Saint Mary's Hospital guidelines for reporting of all hospital acquired pressure injuries:
    a. Notify provider and obtain Surgical Wound Consult (for verification of pressure injury staging, if uncertain of staging)
    b. Complete an incident report and PI Huddle Form.
    c. Notify Nurse Manager

DOCUMENTATION

1. Braden Scale for Predicting Pressure Sore Risk: To be completed upon admission, daily, postoperatively, post-procedure and at time of transfer.
2. Pressure Injury / Wound Care Documentation: Complete upon identification of pressure injuries/wound and once in every 24 hours with dressing change. *Exception – if dressing change interval is greater than every 24 hours, document at time of each dressing change.

3. Measure and record wound size (length, width, and depth) at time of admission, when initially identified, transfer, discharge, with significant change in wound condition/stage.
4. Document skin assessment daily.
5. Mark date, time, and care provider initials on all dressings
6. Include skin/wounds and treatment plan during hand-off communication (shift to shift, with transfer) and during multidisciplinary patient care rounds.
7. Patient and family education related to skin care and prevention strategies.

DEFINITIONS

Pressure Ulcer and Stages according to the National Pressure Ulcer Advisory Panel (NPUAP)

Pressure Injury Definition:

A pressure injury is localized damage to the skin and underlying soft tissue usually over a bony prominence or related to a medical or other device. The injury can present as intact skin or an open ulcer and may be painful. The injury occurs because of intense and/or prolonged pressure or pressure in combination with shear. The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities, and condition of the soft tissue.

Pressure Injury Stages

Stage 1:

Non-blanchable erythema of intact skin. Intact skin with localized area of non-blanchable erythema, which may appear differently in darkly pigmented skin. Presence of blanchable erythema or changes in temperature or firmness may precede visual change. Color changes do not include purple or maroon discoloration; these may indicate deep tissue pressure injury.

Stage 2:

Partial-thickness loss of skin with exposed dermis. The wound bed is viable, pink, or red, moist, and may also present as an intact or ruptured serum-filled blister. Adipose (fat) is not visible and deeper tissues are not visible. Granulation tissue, slough and eschar are not present. These injuries commonly result from adverse microclimate and shear in the skin over the pelvis and shear in the heel. This stage should not be used to describe moisture associated skin damage (MASD) including incontinence-associated dermatitis (IAD), intertriginous dermatitis (ITD), medical adhesive related skin injury (MARSI), or traumatic wounds (skin tears, burns, abrasions).

Stage 3:

Full-thickness loss of skin, in which adipose (fat) is visible in the ulcer and granulation tissue and epibole (rolled wound edges) are often present. Slough and/or eschar may be visible. The depth of

tissue damage varies by anatomical location; areas of significant adiposity can develop deep wounds. Undermining and tunneling may occur. Fascia, muscle, tendon, ligament, cartilage and/or bone are not exposed. If slough or eschar obscures the extent of tissue loss this is an unstageable pressure injury.

Stage 4:

Full-thickness skin and tissue loss with exposed or directly palpable fascia, muscle, tendon, ligament, cartilage, or bone in the ulcer. Slough and/or eschar may be visible. Epibole (rolled edges), undermining and/or tunneling often occur. Depth varies by anatomical location. If slough or eschar obscures the extent of tissue loss this is an Unstageable Pressure Injury.

Unstageable:

Full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar. If slough or eschar is removed, a Stage 3 or Stage 4 pressure injury will be revealed. Stable eschar (i.e., dry, adherent, and intact without erythema or fluctuance) on the heel or ischemic limb should not be softened or removed.

Deep Tissue Injury:

Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration, or epidermal separation revealing a dark wound bed or blood-filled blister. Pain and temperature change often precede skin color changes. Discoloration may appear differently in darkly pigmented skin. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface. The wound may evolve rapidly to reveal the actual extent of tissue injury or may resolve without tissue loss. If necrotic tissue, subcutaneous tissue, granulation tissue, fascia, muscle, or other underlying structures are visible, this indicates a full thickness pressure injury (Unstageable, Stage 3 or Stage 4). Do not use DTPI to describe vascular, traumatic, neuropathic, or dermatologic conditions.

Pressure Injury on Mucous Membranes:

Mucosal membrane pressure injury is found on mucous membranes with a history of a medical device in use at the location of the injury. Due to the anatomy of the tissue these ulcers cannot be staged. Examples: pressure injury that develop on nasal mucosa from oxygen nasal prongs or nasogastric tube; pressure injury on inside of lip from endotracheal tube; pressure injury on rectal mucosa from rectal tube, etc.…

Additional Pressure Injury Definitions

Medical Device Related Pressure Injury: Medical device related pressure injuries result from the use of devices designed and applied for diagnostic or therapeutic purposes. The resultant pressure injury generally conforms to the pattern or shape of the device. The injury should be staged using the staging system

BRADEN SCALE

Score 19-23:	*Minimal Risk*
Score 15-18:	Low Risk
Score 13-14:	Moderate Risk
Score ≤12:	High Risk

RESPONSIBLE DEPARTMENT

Department of Nursing

RELATED PROCEDURES AND OTHER MATERIALS

European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel, Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline. NPUAP, EPUAP, Pan Pacific Pressure Injury Alliance: 2014

APPROVALS

Husnain Kermalli, MD, MS
Chief Medical Officer

Shawna Edwards, MSN, RN
Chief Nursing Officer

Initial Approval: March 7, 2021

Subsequent Review/Revision(s):

Appendix G

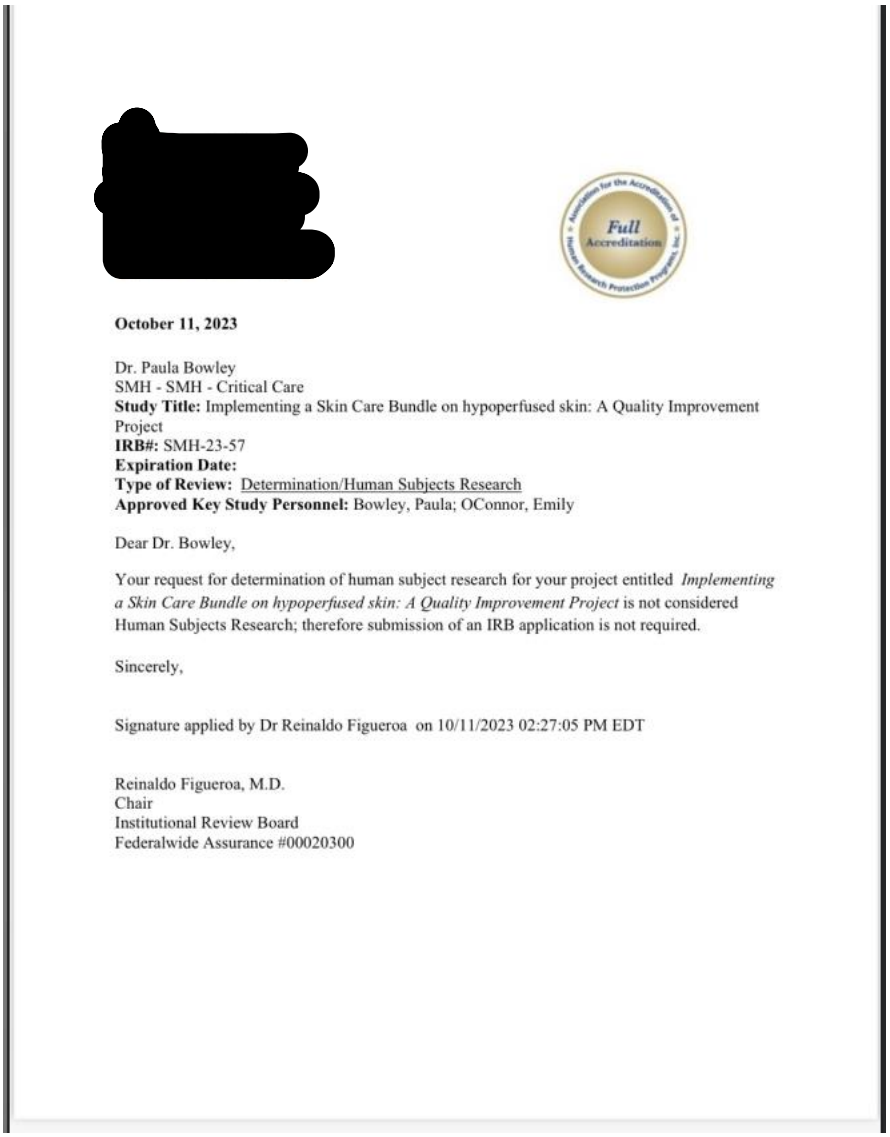
Thermal Imaging Knowledge Assessment

1. What Patient identifiers are required for initiating a thermal imaging profile on our Scout: thermal imaging camera?
    a. First and last name
    b. MRN
    c. DOB
    d. Ethnicity
    e. All the above
2. It is crucial to have the thermal imaging camera always in a straight angle, up and down and not sideways?
    a. True
    b. False
3. When using the details of thermal camera what is the threshold for an "area of interest" (AOI)
    a. +/- 1.0
    b. +/- 1.2
    c. +/- .6
    d. +/- 2.5
4. Once we have a known AOI, which step is not required?
    a. A wound consult for open area wounds
    b. Putting AOI on white board
    c. Tell the wound nurse.
    d. Documenting AOI in Epic
5. What is not part of our "new" skin care bundle?
    a. Use of a foam wedge
    b. Use of foam dressing to hypo-perfused skin
    c. Lotion on AOI
    d. Q2 turn compliance.

Appendix H

A	B	C	D	E	F	G	H
Room number	Admission date	thermal imaging	AOI to coccyx Y/N?	foam dressing	foam wedge	Braden Scale	Q2 turns

Appendix I



October 11, 2023

Dr. Paula Bowley
SMH - SMH - Critical Care
Study Title: Implementing a Skin Care Bundle on hypoperfused skin: A Quality Improvement Project
IRB#: SMH-23-57
Expiration Date:
Type of Review: Determination/Human Subjects Research
Approved Key Study Personnel: Bowley, Paula; OConnor, Emily

Dear Dr. Bowley,

Your request for determination of human subject research for your project entitled *Implementing a Skin Care Bundle on hypoperfused skin: A Quality Improvement Project* is not considered Human Subjects Research; therefore submission of an IRB application is not required.

Sincerely,

Signature applied by Dr Reinaldo Figueroa on 10/11/2023 02:27:05 PM EDT

Reinaldo Figueroa, M.D.
Chair
Institutional Review Board
Federalwide Assurance #00020300

Appendix J

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 moan, flinch, or grasp) to painful stimuli, due to diminished level of con-sciousness or sedation. OR limited ability to feel pain over most of body	**2. Very Limited** Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over ½ of body.	**3. Slightly Limited** Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	**4. No Impairment** Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort..
MOISTURE degree to which skin is exposed to moisture	**1. Constantly Moist** Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	**2. Very Moist** Skin is often, but not always moist. Linen must be changed at least once a shift.	**3. Occasionally Moist:** Skin is occasionally moist, requiring an extra linen change approximately once a day.	**4. Rarely Moist** Skin is usually dry, linen only requires changing at routine intervals.
ACTIVITY degree of physical activity	**1. Bedfast** Confined to bed.	**2. Chairfast** Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	**3. Walks Occasionally** Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair	**4. Walks Frequently** Walks outside room at least twice a day and inside room at least once every two hours during waking hours
MOBILITY ability to change and control body position	**1. Completely Immobile** Does not make even slight changes in body or extremity position without assistance	**2. Very Limited** Makes occasional slight changes in body or extremity 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. Rarely eats more than ⅓ of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.	**2. Probably Inadequate** Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feeding	**3. Adequate** Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products per day. Occasionally will refuse a meal, but will usually take a supplement when offered OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs	**4. Excellent** Eats most of every meal. Never refuses 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 lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction	**2. Potential Problem** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	**3. No Apparent Problem** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.	

Appendix K

[redacted]

IRB Revision: July 2017

Skin Integrity: Clinical Guidelines for Pressure Injury Prevention

Paula Bowley

[redacted]

Co-Investor:
Emily O'Connor

[redacted]

Version Date:September 2023

[redacted]

Data Collection Sheet

Study Title: Skin Care Bundle

Principal Investigator: Paula Bowley

Variables:

- Age on admission
- Gender
- MRN #
- Completion of Scout thermal imaging protocol in Epic
- Intervention applied
- Development of HAPI (Hospital Acquired Pressure Injury) and if so, stage of pressure ulcer

Version date: *September 2023*

[redacted]

INSTITUTIONAL REVIEW BOARD

WAIVER OR ALTERATION OF CONSENT AND INDIVIDUAL AUTHORIZATION FOR DISCLOSURE OF PROTECTED HEALTH INFORMATION

Instructions:

In order to access or use an individual's protected health information in the conduct of research without the express authorization of the individual, the Principal Investigator must provide certain information related to the health information requested.

1. Complete this form if you want to *waive* or *alter* the informed consent requirements for the study
2. ***Waiver*** request please ***Complete questions 1-12***
3. *Alteration* request please ***Complete questions 1-13***
4. The Principal Investigator must sign and date the last page

The most common type of study that the [redacted] IRB would permit a complete waiver of informed consent would be a **"Retrospective Chart Review and/or certain types of Prospective Chart Review"**

The most common type of study that the [redacted] IRB would permit an alteration of informed consent would be a **"Certain types of Prospective Studies"**

Please contact the following [redacted] IRB Staff if you have questions about this form:

[redacted]

[redacted]

Institutional Review Board [redacted]
QI vs Research Checklist

Quality Improvement vs. Research Checklist		
This table is intended to compare and contrast the general characteristics of quality improvement (QI) and clinical research activities. For each item, choose the column to which the project most likely relates- QI or Research. You may only select ONE answer. Indicate N/A for those sections that do not apply. Retain the completed assessment in your project files.		
Intent and Background		
	Quality Improvement	**Research with Human Participants**
1.	Describes the nature and severity of a specific performance gap. ☒ **Yes** ☐ No ☐ N/A	Identifies a specific deficit in scientific knowledge from the literature. ☐ Yes ☐ No ☐ N/A
2.	The focus is to improve a specific aspect of health or healthcare delivery that currently needs to be consistently and appropriately implemented at this site. (Maybe due to HCAHPS, Culture of Safety, and Engagement Surveys). ☒ **Yes** ☐ No ☐ N/A	Proposes to address or identify specific hypotheses to develop new knowledge or advance the current understanding. ☐ Yes ☐ No ☐ N/A
Methods		
	Quality Improvement	**Research with Human Participants**
3.	Mechanisms of the intervention are expected to change over time (i.e., iterative in nature) in response to ongoing feedback; adjustments are made as one progresses through the process to refine. ☒ **Yes** ☐ No ☐ N/A	The specific protocol defines the intervention, interaction, and use of collected data and tissues, plus the project may rely on the randomization of individuals to enhance confidence in differences. ☐ Yes ☐ No ☐ N/A
4.	The plan for intervention and analysis includes an assessment of the system (i.e., process flow diagram, fishbone, etc.). ☒ **Yes** ☐ No ☐ N/A	May use qualitative and quantitative methods to make observations and compare groups to answer the hypotheses. ☐ Yes ☐ No ☐ N/A
5.	Statistical methods evaluate system-level processes and outcomes over time with statistical process control or other practices. ☒ **Yes** ☐ No ☐ N/A	Statistical methods primarily compare differences between groups or correlate observed differences with a known health condition. ☐ Yes ☐ No ☐ N/A

Version: 2.0
IRB Approval Date: September 2023

Appendix L

[redacted]

Long Wave Infrared Thermography (SCOUT)

Effective:
May 2022

LOCATION(S) Policy is Applicable to:

[redacted]

To be reviewed every three years by:
Critical Care Committee

Review By: May 2025

PURPOSE

Use approved technology for the purpose of measuring and documenting unseen parities and disparities of metabolic activity, perfusion, and blood flow to pressure areas on a high-risk patient's body. Sacrum and heels are routinely scanned based on these sites being the areas of greatest risk, statistically. Equipment utilized: Long Wave Infrared Thermography (LWIT- the SCOUT)—a non-invasive, non-radiating visual and thermal imager that provides clinicians with the ability to assess patients' skin integrity.

Objectives for this technology include:

1. Increase recognition of DTI
2. Evaluate efficacy of interventions
3. Decrease DTI prevalence
4. Utilize scans to implement an effective pressure injury prevention and treatment plan of Care

POLICY

1. Upon admission to the Critical Care/Cardiovascular Care Units, nurses will conduct a "4 Eyes" 2 RN head to toe skin assessment and soft tissue assessment.
2. During assessment, transfer on to the unit or returning from an OR/procedure > 4 hours (within 4 hrs), nurses will capture 3 thermal imaging scans (SCOUT) within the first 4 hours of patient's admission of the Sacrum/Coccyx and Bilateral Heels.
   Additionally, any questionable areas that are prone to pressure injuries may be imaged as well.
3. Analyze the image pairs: a Control Area Selection and a Profile Line.
4. Document any anomaly in the electronic medical record in the admission/transfer note. If visible skin changes are present, open the appropriate LDA and document findings.

5. If a partial or full-thickness pressure injury occurs during the patient's stay and it occurs in the same anatomical location where existing signs and symptoms were documented as present on admission, the pressure injury is NOT to be documented as hospital-acquired.

POPULATION OR CLINICAL CONDITION

All admitted/transfer patients or patients returning from an OR/Procedure > than 4 hours to the Critical Care Unit/Cardiovascular Units.

See Addendum for Scout Protocol Guidelines.

RESPONSIBLE DEPARTMENT

Critical Care Unit

APPROVALS

Husnain Kennalli, MD, MS
Chief Medical Officer

Shawna Edwards, MSN, RN
Chief Nursing Officer

Initial Approval: 4/2022

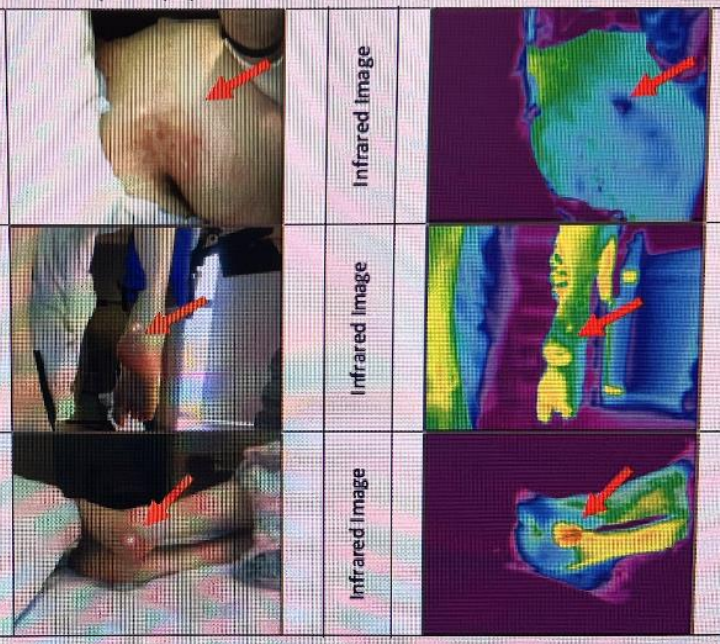
Subsequent Review/Revision(s):

Scout Protocol Skin Assessment Protocol Guidelines

1. Upon admission, nurses conduct a "4 Eyes"/ 2 RN head-to-toe skin and soft tissue assessment per our current practice guidelines.
2. During assessment, transfer on to unit or returning from OR/procedure > 4 hours (within 4 hrs), or transfer out of the unit, capture 3 Scout image pairs of the Sacrum/Coccyx and Bilateral Heels.
   a. Additionally, any questionable areas that are prone to pressure injuries may be imaged as well.
      e.g. if the patient was found down on right side, then image the right trochanter
3. After the remainder of patient care is provided, analyze the image pairs:
   a. **Control Area Selection**: select an area of intact, adjacent tissue to achieve a baseline reference point.
   b. **Profile Line**: if anomaly is present, this documents the location and quantifies the anomaly.
4. If an anomaly is identified (4a), then the relevant findings are to be documented and reported within the medical record using the following narrative (4b) and intervention options (4c)

4a. Example Anomalies

Anatomical Area #1 Sacrum/Coccyx (w/ Example Anomaly)	Visual Image	Infrared Image
Anatomical Area #2 Left Heel (w/ Example Anomaly)	Visual Image	Infrared Image
Anatomical Area #3 Right Heel (w/ Example Anomaly)	Visual Image	Infrared Image



4b.

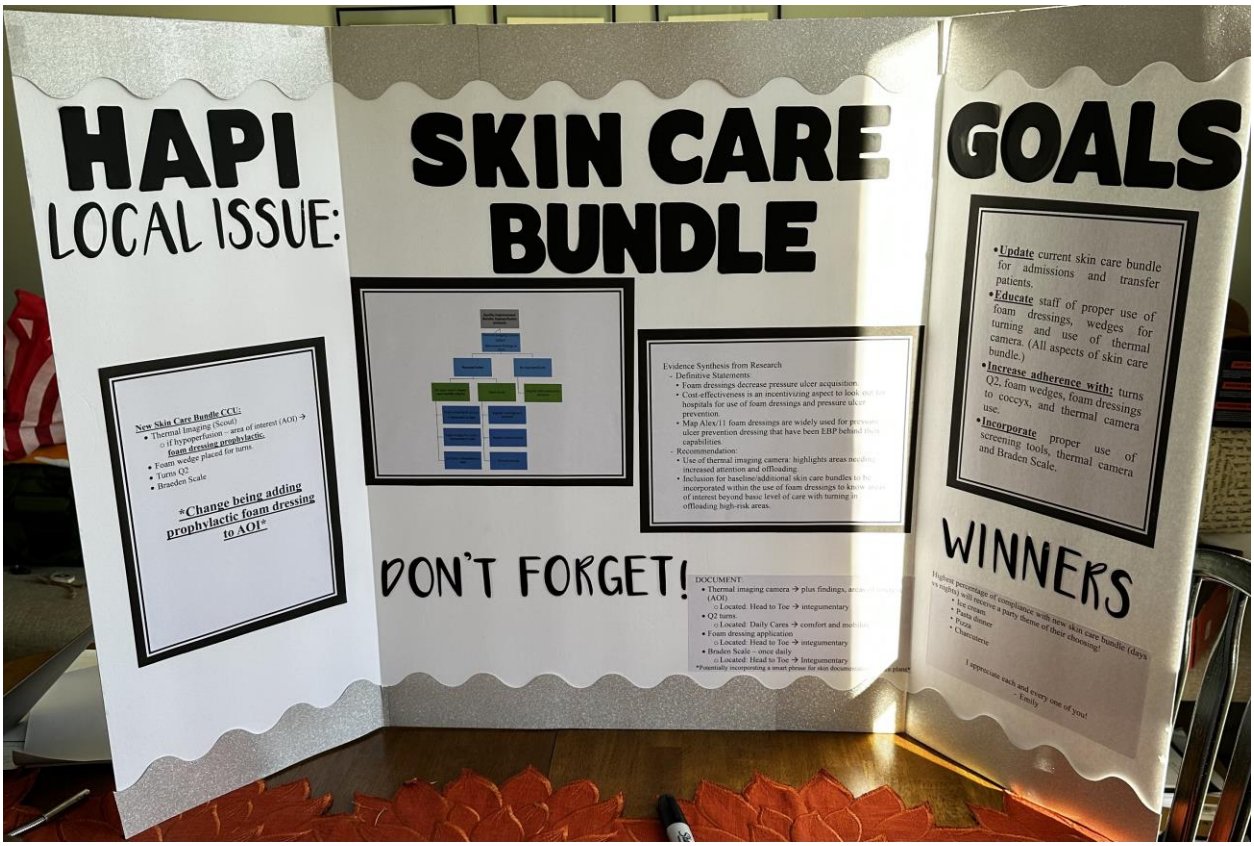
Medical Record Narrative	In admission/transfer nursing note: document "upon admission this pt. presented with s/s of deep tissue pressure injury of the (anatomical location) as reflected by a (+ or -) degree Celsius anomaly of intact skin". If visible skin changes, open appropriate LDA and document findings.

4c.

	Sacrum/Coccyx	Bilateral Heels
Intervention Options	Document interventions (for example moisture barrier, q 2 hr turning L/R/L/R, prophylactic foam dressing, etc....)	Document interventions (for example float heels, heel lift boots, etc....)

5. If partial or full-thickness pressure injury manifestation occurs during the patient's stay and it occurs in the same anatomical location where existing signs/symptoms were documented as present on admission, then the pressure injury is NOT to be documented as hospital-acquired.
6. If remains in unit for > 3 days or if area of concern identified, consider rescanning.

Appendix M


HAPI
LOCAL ISSUE:
New Skin Care Bundle CCU:
• Thermal Imaging (Scout)
○ if hyperperfusion – area of interest (AOI) →
foam dressing prophylactic
• Foam wedge placed for turns
• Turns Q2
• Braden Scale
Change being adding prophylactic foam dressing to AOI
SKIN CARE BUNDLE
DON'T FORGET!
GOALS
•Update current skin care bundle for admissions and transfer patients.
•Educate staff of proper use of foam dressings, wedges for turning and use of thermal camera. (All aspects of skin care bundle.)
•Increase adherence with: turns Q2, foam wedges, foam dressings to coccyx, and thermal camera use.
•Incorporate proper use of screening tools, thermal camera and Braden Scale.
WINNERS
I appreciate each and every one of you!
Emily

Appendix N

DR. SUSAN L. DAVIS, R.N., & RICHARD J. HENLEY COLLEGE OF NURSING
Sacred Heart University

Implementing a Skin Care Bundle on Hypoperfused skin: A Quality Improvement Project

Emily O'Connor BSN, RN; Sylvie Rosenbloom DNP, APRN, FNP-BC, CDCES; Paula Bowley MSN, BSN, RN
Contact: Emily O'Connor, RN BSN. emily.oconnor@mail.sacredheart.edu

[redacted]

Rationale

- Hospital acquired pressure injuries (HAPI's) cause pain, prolong length of stay (LOS), incur notable financial burden on the healthcare system, increase infection risks, skin debridement, and can require and extend use of pain medications.
- Critical care patients are typically hemodynamically unstable and prone to developing pressure injuries thus, using a thermal imaging camera can help with early identification of pressure injuries thus allowing for early intervention such as proper skin care and use of prophylactic foam dressings.
- The national benchmark for HAPI's has decreased by 7% based on epidemiological studies carried out by the National Pressure Ulcer Advisory Panel.

Background

Internal Data

- Institution's critical care unit: 15 HAPI's reported last year.
- Current skin care prevention policy is the same used for the entire hospital and does not have any specific adjustments for this critical care level patients and their HAPI prone skin.

External Data

- Mepitel foam dressings are widely used for pressure ulcer prevention dressing that have been EBP behind their capabilities.
- national benchmark for HAPI's has decreased by 7% based on epidemiological studies carried out by the National Pressure Ulcer Advisory Panel. This institution's critical care unit had three HAPI in August 2023, four during July 2023 and three in June 2023.

PICO Question

In adult ICU patients with hypoperfusion to coccyx (seen in thermal imaging) (P) Use of prophylactic foam dressing to coccyx (I), no foam dressing (C) prevents pressure ulcers (O).

Implementation Plan

Design: Quality Improvement project

Setting/Population: 18 years of age and older, typically seen with diagnoses of respiratory failure, sepsis, congestive heart failure, chronic obstructive pulmonary disease exacerbations and traumas. The setting is with a mixed critical care unit at my institution, located in an inner city, a level two trauma center.

PDSA Cycle

Methods

Information Sources CINAHL, PubMed, Medline, TRIP and Cochrane.

Key Words: care unit, pressure ulcers, hospital acquired pressure injuries, skin bundle, skin prevention, ICU, foam dressings, intensive care unit, prophylactic foam dressings, pressure injury prevention

Results

- Total of 202 patients were admitted during 12-week implementation period.
- 161 (79.7%) patients were thermally imaged.
- 94 patients met criteria for bundle implementation – 46.5% had hypoperfusion
- 80 (98%) patients had full bundle protocol implemented –Only 1 HAPI acquired with full bundle implementation – (1.06%) – national benchmark is less than 7%.

Recommendations

Summary of Evidence

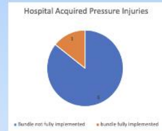
Definitive Statements:

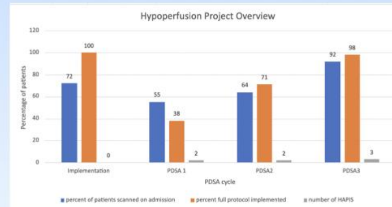
- Cost-effectiveness is an incentivizing aspect to look out for hospitals for use of foam dressings and pressure ulcer prevention.

Recommendations

- Use of thermal imaging camera: on all admissions and transfers
- If hypoperfusion seen:
  - Apply foam dressing to coccyx
  - Use foam wedge for turns
  - Braden Scale
  - Q2H turns
  - Documentation of areas of interest from thermal imaging, turns, use of foam, use of foam wedge for turns and Braden Scale.

Outcomes





Sustainability Plan

- Presentation of findings and to board of directors, staffing committee and CCU.
- Finalize a full policy change- working with Chief Nursing Operator on finalization and ability to utilize outside of CCU.
- Continued reinforcement of use of Scout through peer champions and DNP student.
- Thermal cart remains stocked with foam dressings and reminder for placement after known hypoperfusion.

Lessons Learned

- Presence is essential when implementing a quality improvement project
- Staff engagement is difficult to maintain but inclusion with shared decision-making increases compliance.

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Appendix O

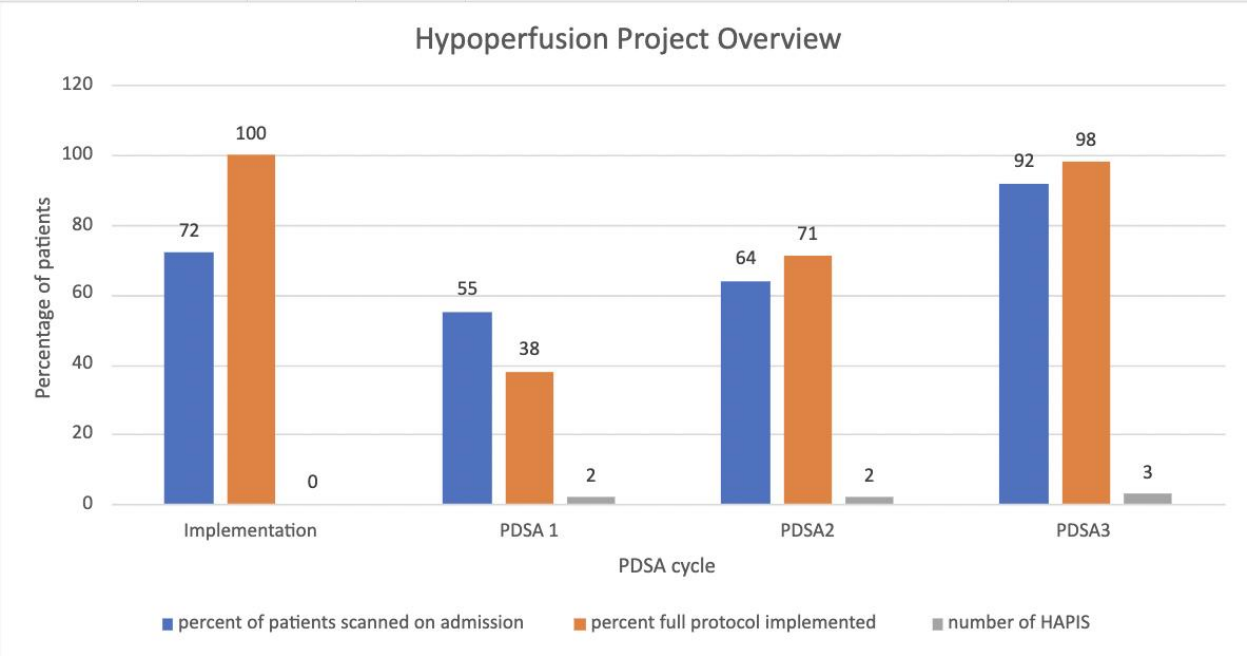
Executive summary (organization)

Skin is the largest organ of the body and should be top priority in terms of care, specifically for those at increased risk for skin tissue breakdown. Hospital acquired pressure injuries (HAPI) can increase hospital length of stay, infection risk, and hospital costs. Thermal imaging camera use allows users to identify areas of hypoperfusion. Foam dressings applied to hypoperfused areas have been shown to help prevent HAPI in patients hospitalized in a critical care unit.

For this QI project, the Plan-Do-Study-Act model was utilized to guide the implementation of a skin bundle. In the plan phase, thermal imaging and skin care policies were reviewed. Discussion of adding a skin care bundle was presented to staff members to create a new skin bundle policy. In the Do phase, the skin care bundle was implemented with several changes made to improve its implementation. Staff had to implement the new skin bundle and document this new bundle in an already inserted section within the EHR documentation. The study phase focused on assessing the process outcomes and total number of HAPI's acquired.

Initiation of the QI project started strongly with 25 admissions and 72% of these being thermal imaged. The first change consisted of a reminder added to the thermal camera regarding the use of foam dressings. An email was sent to the staff updating them on the progress thus far. During the next period, a total of 34 patients qualified for the bundle and only 19 (55%) of these were thermal imaged and 7 (38%) received the full skin bundle. There was a second change put into place during the second PDSA cycle which included a follow-up email reminder and tips for success. Additionally, foam dressings were now available on the thermal imaging cart for easier access. During these weeks, there were 31 patients who qualified for the skin bundle. There

were 20 patients (64%) who received thermal imaging, and 5 patients qualified and received the full skin bundle. An update on the progress and implementation rates was emailed to all staff involved. A total of 202 patients seen during the data collection period, 161 patients were thermal imaged, 94 (58%) patients qualified for the bundle, 80 (85%) of those patients had protocol initiation. During the implementation, only one patient who received the full skin bundle developing a HAPI.



In summary, this QI project has not only shown to be successful in pressure injury prevention but furthermore the cost savings could beneficial for the institution.