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ABSTRACT

The quality department used adaptive leadership and the plan-do-study-act cycle to decrease pressure injury (PI) rates. After identifying gaps, the pressure injury prevention bundle was developed and implemented to bring evidence-based nursing practice to frontline nurses. Organisational rates of PI was followed for 4 years (2019–2022) and a smaller subset of 88 patients were followed in the prospective arm. Using statistical analysis, the decrease in PI rates (90%) and severity is significant ($p<0.5$) and sustained compared with the year prior to interventions.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The impact of hospital-acquired pressure injuries on quality of life, healthcare and costs is well known and also the importance of prevention.
⇒ Decreasing pressure injuries is well documented in the literature.

WHAT THIS STUDY ADDS

⇒ This study adds the importance of leadership in the sustainability of decreased pressure injury rates.
⇒ This study went beyond the initial implementation period of a change in practice, extending the monitoring period to a 4-year span following the outcomes.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The effect of the study provides insight on the amount of dedicated leadership required for prevention of hospital-acquired pressure injuries, a significant safe and quality concern.
⇒ This study provides evidence-based nursing interventions and reveals the process to decrease, prevent and sustain.

INTRODUCTION

The complex challenges of healthcare require an adaptive approach to nursing leadership. Doing more with less in healthcare is leading to burn out in nursing and ultimately compromising patient outcomes.[1 2] The adaptive leadership style allows nurse leaders to focus on improving patient outcomes while improving operational efficiency and improving work life quality instead of layering on more tasks.[1 2] Adaptive leadership involves leaders diagnosing the clinical problem then innovating solutions after disrupting the process.[1 2] Having nursing quality indicators depend on simply asking nurses to do more is risky approach.[1 2] Nurses impact outcomes and nursing practice environments is within nursing leadership to change.[1 2] Nursing practice environments has the potential to impact nursing-sensitive patient outcomes. One of the nursing-sensitive indicators is pressure injuries (PIs).[3]

Our team applied an adaptive leadership style to addressing the high rates of PIs at our organisation. This approached forced us to critically examine the organisation's current prevention practices instead of layering on more tasks. It was a bold approach disrupting current practices to invent a new approach in PI prevention. We felt strongly that the current approach was not the right method for prevention. The Joint Commission points out that PIs are preventable and severe hospital-acquired pressure injuries (HAPIs) are considered a sentinel event.[3] Currently, PIs cost healthcare US$3.3 billion to US$11 billion annually while chronic PIs have an estimated annual cost of US$22 billion.[3] The high cost and incidence of PIs continue to exist despite nurse scholars suggesting appropriate evidence-based nursing interventions to prevent certain PIs.[3–6] We compared best evidence-based practices from the literature with our current practices to identify gaps in practice.[5] Ultimately, the gaps are opportunities to improve outcomes while improving operational efficiency and improving work life quality.

BACKGROUND

The quality department of an urban 260-bed hospital with an average yearly census of 65,000 patient days in Northern California identified an opportunity to improve HAPI rates. The organisation was experiencing higher rates of incidence than comparable organisations. Within 2018, the organisation had 253 HAPIs with 18 reportable HAPIs. Using the plan-do-study-act (PDSA) cycle for improvement and an adaptive leadership style, the quality department approached the opportunity to prevent HAPIs.[1 2 7 8]

The first step in the PDSA process is a gap analysis.[7 8] The gap analysis revealed the

current nursing interventions for HAPI prevention were not evidence based or even current best practice. There was a lack of evidence-based products to off-load pressure points, lack of clarity on when to implement interventions and misidentification of PIs. The gap analysis further identified the current processes were not operationally efficient and significantly decreased work life quality. Contributing to the concerns of operational inefficiency and work life quality was the concept of moving patients onto higher level support surfaces then stepping patients down and frequent turns. The act of moving patients from one support surface to another is increase in work, a physical burden to nurses moving hard to move immobile patients. In summary, the current practices were not efficient, hindered work life satisfaction and had poor patient outcomes.

The findings from the gap analysis allowed the quality team to plan and then implement a strategy to decrease HAPIs within a framework that improved operational efficiency and work life quality. We hypothesised that patient outcomes would improve as measured by decreased rates of HAPIs with implementation of evidence-based nursing interventions which are operationally efficient and improve work life quality.

METHODS

The strategy to decrease HAPIs centred around categorising the gaps into three categories: people, products and process (table 1). The quality team then addressed each gap. One of the key gaps was developing a wound care team consisting of certified wound care nurses who completed the accredited Wound Ostomy Continence Nursing Education Programme (WOCNEP). Next the organisation spent resources to acquire products identified by the gap analysis as lacking and developed the process. The products to prevent PIs have a depth of research to support evidence-based nursing practice while improving operational efficiency and work life quality.[1–10]

The products and process are transparent and standardised for all patients across the organisation. The process easily identifies which patients benefit from the products and nursing interventions that are part of the pressure injury prevention bundle (PIPB).[3 5 7 8] The PIPB consists of appropriate pressure relieving support surface, turn and position overlay, foam bordered dressings, moisture management with moisture wicking fabric, peri-care and attention to devices and implementation timeline.[3–17] Products to offload pressure and protect from shear, friction and moisture were standardised throughout the organisation and made available on all units as part of the PIPB (table 2).

The process for implementation of the PIPB for all immobile patients is on admission. Patients are identified using a simplified risk assessment tool which consists of two questions.[7 18] A positive response to either question signifies implementation of the PIPB. The risk assessment consists of the following two questions: is the patient immobile and or non-verbal. While immobility is an obvious risk factor, the non-verbal patient is also at high risk as they cannot ask to be repositioned or

Table 1 Summary of gap analysis

	Gap analysis findings	Response
People	► No certified wound ostomy continence nurse on staff. ► General lack of knowledge in maintaining skin integrity. ► No one to lead pressure injury prevention initiative. ► Lack of knowledge on use of bordered foam dressing.	► Hired certified wound ostomy nurse. ► Three nurses participated in an accredited WOCNEP and sat for boards. ► Training material developed for maintaining skin integrity. ► Certified wound care nurses lead pressure injury prevention. ► Collaboration with certified wound care nurses working in industry to provide nursing education.
Products	► No evidence-based products available. ► No effective way to offload heel pressure. ► No pressure offloading turn and position system. ► No effective way to manage and wick moisture and urine.	► Collaboration with material and supply chain directors to stock pressure offloading products on the units. ► Added turn and position system, offloading boots. ► Heel bordered foam dressings. ► Moisture wicking fabric and adult briefs.
Process	► Complicated unclear process for initiating higher level support surface. ► Policy not consistent with current evidence-based practice. ► No clear time frame for initiating pressure injury prevention. ► Relying on a person process for identifying patients with pressure injuries.	► Standardised support surface for the ICU. ► Standardised use of overlay across the organisation. ► Updated the policy. ► Clear messaging pressure injury prevention is implemented on admission. ► Created an automated process to identify patients with pressure injuries or at risk for pressure injuries.

ICU, intensive care unit; WOCNEP, Wound Ostomy Continence Nursing Education Programme.

Table 2 Evidence-based intervention implemented on admission: PIPB

Area of concerns	Interventions
Heels	Protect them by floating on Z-Flo positioner, place Mepilex dressings or use the Z-Flex boots.
Sacrum	Turn/Reposition every 2 hours as tolerated while making sure patient is off the sacrum, using the Tortoise turn and position system; place Mepilex Sacral Dressing.
Ears	Use the Z-Flo positioner and make a well for the ear, use the positioner to support the head and keep the endotracheal tube from resting on the face.
Devices	Rotate your device position every 2 hours if possible—even a micro change helps, wrap foam dressing cut in thin strips around nasal cannulas; get creative—the key is to change the position, wick up any moisture.
Face	With bilevel or continuous positive airway pressure, try to alternate pressure points using different interface and place gel pads or foam dressing under points of contact.
Bony prominence	Protect with a Mepilex foam dressing (think elbows, knees, spinal process).
Moisture	InterDry in the skin folds, under tracheostomy ties, around tubing; skin barrier ointment, adult briefs, skin care.

PIPB, pressure injury prevention bundle.

the non-verbal status signifies other healthcare concerns which impact skin integrity.

No additional risk assessment tools were implemented. All immobile patients are considered at risk for skin breakdown for the entire period of hospitalisation until the individual can independently move out of bed and walk. Any patient with a skin integrity concern is consulted to the wound care team for an evaluation and treatment plan. The certified wound care nurse team confirms the aetiology of the skin breakdown.

The PIPB implementation was rolled out within the framework of adult learner theory.[19] The quality team recognised the different learning styles and offered PIPB education through different medias. The different medias included: online self-paced interactive learning activities, quick read flyers, emails and in-person in-services facilitated by certified wound care specialist working with industry. For 4 years, the initial education was followed up with every 6 weeks in servicing, a monthly newsletter and real-time feedback when the bundle was not implemented.

While all immobile patients required implementation of the PIPB, 88 patients were randomly chosen to participate in the prospective descriptive study portion of the quality improvement project. The 88 enrolled patients were followed daily until discharge. Patients enrolled in the study were rounded on daily to ensure implementation of the PIPB. Patients not enrolled in the study were rounded on weekly as the standard of care with a final skin check at discharge.

INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria included all individuals over the age of 18 years, identified as immobile at admission to the intensive care unit (ICU), assessed by quality team for bundle implementation within 2 hours of admission and had not passed away within 48 hours of admission. Exclusion criteria included individuals with PIs present on admission, pre-existing wounds over pressure points or extensive traumatic wounds. Patients who passed away within 48 hours of admission were not included in the study.

IMPLEMENTATION

PIPB go-live was 11 February 2019. The ICU were converted to all low air loss mattress on advanced frames. All units were stocked with turn and position overlays, pressure relieving heel floating boots, bordered foam sacral and heel dressings, skin protectant, moisture wicking fabric. In-servicing was provided every 6 weeks throughout 2019 to 2022 with monthly reminders for implementing the PIPB. Patients meeting criteria were enrolled between 1 May 2019, and 30 November 2019. Pressure injury rates monitoring continued for the rest of 2019 and throughout 2020, 2021 and 2022.

DATA ANALYSIS

Data analysis includes descriptive statistics of the prospective group and comparison of means for the organisation's yearly PI rates. After completing descriptive statistics, we looked at organisation-level data for the incidence of HAPI. We looked at 4 years of postintervention data using one-tailed t-test, comparing the number of HAPI pre-implementation (2018), severity of skin damage using the categorisation model provided by the National Pressure Injury Advisory Panel and location of skin damage.

The second level of analysis explored the individuals enrolled in the prospective arm of the study. For the individuals enrolled in the prospective portion of the study, descriptive analysis was done using SPSS V.24 (IBM, Armonk, New York, USA).[20] G*power analysis[21] established a sample size of 88 patients. Categorical data were analysed using percentages, whereas continuous variables were analysed using mean±SD.

RESULTS

The null hypothesis is rejected and the quality team's hypothesis that patient outcomes would improve as

Table 3 Total number of HAPIs across the organisation and type

	2018	2019	2020	2021	2022
Total # of PIs	206	54	26	22	20
Reportable					
Stage 3	16	0	0	2	1
Stage 4	0	0	0	0	0
Unstageable	2	0	0	0	0
Non-reportable					
Stage 1	0	17	6	0	0
Stage 2	157	20	12	16	12
Deep Tissue Injury	31	17	8	4	7
One-tailed t-test year-over-year total		0.297	0.350	0.459	0.476

Average yearly patient days: 65 000.
HAPI, hospital-acquired pressure injuries; PIs, pressure injuries.

measured by decreased rates of HAPIs with implementation of evidence-based nursing interventions which are operationally efficient and improve work life quality is accepted ($p<0.5$). Pressure injury rates decreased year-over-year in both occurrence and severity across the organisation. The number of PIs decreased significantly with the implementation of the bundle decreasing by 90% and have sustained over the 4 years.

The decrease in occurrence is significant and sustained (table 3). Severity of PIs decreased. There were no occurrences of full-thickness skin breakdown related to pressure for two consecutive years. In years 3 and 4 (2021, 2022), there were a total of three stage 3 PIs and on a deeper dive of those instances the PIPB was not implemented on admission.

The numbers of stage 2 PIs decreased with low rates sustained over 4 years (table 3). To confirm the low rates of stage 2 PIs, the wound care team cross-checked charts for documentation of incontinence dermatitis. There was no increase in the number of incontinence dermatitis documentation.

Within the group of 88 patients who were followed daily from admission to discharge, there was no occurrence of skin breakdown (table 4). Patients age ranged from 23 to 95 years (64±15). All patients were immobile which placed them at risk for skin breakdown. Severity of illness as measured by the sequential organ failure assessment ranged between 4 and 12 with a mean of 6.71 indicating >15% likely of mortality. Diagnosis on admission included stroke (26%), septic shock (19%), acute respiratory distress syndrome (15%), cardiogenic shock (10%), trauma (9%), congestive heart failure (8%), myocardial infarction (8%) and intracranial haemorrhage (5%).

DISCUSSION

Nursing buy-in is essential for process change to improve outcomes.[1 2] The adaptive nursing leadership theory guided the process for decreasing PI rates which resulted in a process that has sustained decreased rates of PI over the past 4 years. The ongoing implementation of the PIPB suggests that the bundle fits into the nurse's workflow, improves work life quality and decreases operational burden.[1] Sustained practice change requires demonstratable benefits, established routine or institutionalisation and adaptation.[1 2 22–24] The combination of leadership support, innovation and process engages nurses in implementing new practices.[1 2 22–24] Four years of sustained low PI rates suggests adaptability of the PIPB.

With the decrease in PI rates, there is a ripple effect in decreasing operational burden which includes direct and indirect costs.[4 7 10–16] Indirect costs include the time spent investigating and reporting HAPIs.[25] Direct costs are related to the healing and management of the PI.[4] PIs impose costs of approximately US$22 billion annually on healthcare, as this organisation has avoided PIs year-over-year for 4 years, there are cost savings implied with this bundle.[4]

The addition of certified wound care nurses to clarify aetiology of skin breakdown and stage PIs may contribute to the decrease in rates.[25] Skin breakdown or a compromise in skin integrity is often misclassified as a PI. An expert such as a certified wound care nurse seeks to identify the aetiology of skin breakdown.[26–28] Mislabelling skin breakdown as PIs is common, given the complex nature of skin breakdown.[29] Accurate identification of skin breakdown aetiology requires advanced didactic and clinical training.[26–28] Commonly misidentified skin breakdown includes skin death in critically ill or end-of-life patients and skin breakdown-related another aetiology other than pressure.[30] Accurate early identification of skin breakdown aetiology facilitates appropriate treatment plans.[25–30] Erroneous labelling of skin breakdown as PIs delays care and may cause more harm to the patient. Early and accurate identification of PIs leads to preventing further skin damage.

Table 4 Group demographics and outcomes (total n=88)

Patient Demographics	
Age, mean±SD (range), years	64±15 (23–95)
Sex	
Male	68 (77)
Female	20 (23)
Body mass index, mean±SD (range), kg/m^2	27.38±8.23 (15–54)
Race	
White	31 (35)
Hispanic	31 (35)
Asian	26 (30)
Limited mobility	88 (100)
At risk for pressure injury	88 (100)
Length of stay, mean±SD (range), days	18.04±13.29 (1–117)
SOFA, mean±SD (range)	6.71±2.87 (4–12)
Admitting diagnosis	
Stroke	23 (26%)
Septic shock	17 (19%)
Acute respiratory distress	13 (15%)
Cardiogenic shock	9 (10%)
Trauma	8 (9%)
Congestive heart failure	7 (8%)
Myocardial infarction	7 (8%)
Intracranial haemorrhage	4 (5%)
Skin integrity alteration during hospitalisation	
Incontinence-associated dermatitis	2
Surgical incision site	7
Pressure injury	0

SOFA, sequential organ failure assessment.

Simplifying the process to implement PIPB starting with early identification of at-risk patients and evidence-based prevention intervention removes common barriers in preventing PIs.[3 7–10] Patients are identified on admission as at risk by using a simplified tool which consists of two questions. If the answer is yes to either the patient being immobile or non-verbal then the patient is considered at risk. The at-risk status is the trigger for nurses to implement the PIPB and triggers a consult to the wound care nurse.

The PIPB itself consists of evidence-based nursing interventions with a rich history of successful interventions.[7 10–18 23 26–36] The PIPB addresses early identification of at-risk patients, protecting boney prominences, intrinsic and extrinsic moisture, prolonged exposure to pressure from devices or surface.[10–18 23 26–36] Each well-known risk factor is addressed with nursing interventions that are simple and quick to implement. The research and development of each product results in nursing interventions that are effective and efficient, allowing ease in application and utilisation.[23 26–36]

All products used in the bundle are multifunctional. Decreasing the workload for the nurses, for example, the turn and position product used in this bundle is multifunctional by preventing shear forces while the patient is in bed with the head elevated and relieving pressure with the use of non-powered air bladders. The turn and position overlay supports pressure relief, microclimate management, turning and positioning, stays under the patient without any negative effects and facilitates transfers.[32] The five-layered bordered foam in different shapes are interchangeable for use over the sacrum, heels, elbows, scapula, knees and under devices.[35] Having a product that facilitates skin integrity and wound care allows the nurse to use judgement for utilisation without having to remember complex algorithms.

LIMITATIONS

Limitations for this study include not exploring the impact of nursing engagement in this process. To fully understand the efficacy of leadership proposing PIPB, nursing engagement and nurses understanding of PI prevention requires exploration. While the prospective sample size was limited in size and time frame, monitoring rates over a 4-year period encompasses a large sample size. A retrospective review of all patients who developed skin integrity alterations is warranted to better understand what risks are not managed with the implemented PIPB.

CONCLUSION

To prevent HAPIs in a manner that is sustainable was achieved at our organisation by implementing a nursing process which is operationally efficient and improves work life satisfaction. The decreased rates of PIs sustained over the last 4 years with an average patient days at 65 000 suggests a simplified PIPB has the potential to prevent PIs.

IMPLICATIONS

The adaptive leadership style coupled with PDSA to implement an evidence-based PIPB has the potential to prevent PIs year-over-year which improves quality of life for patients, improves outcomes for organisations and saves healthcare dollars.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

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