

Pressure Injury Prevention with Staff Education

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Author Note

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She has no known conflict of interest to disclose.

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Abstract

Hospital-acquired pressure injuries (HAPIs) are a persistent and costly problem. Based on the evidence in published studies, this project team conducted a gap analysis of staff's pressure injury prevention (PIP) knowledge in an orthopedic/surgical inpatient unit using a psychometrically tested tool, the Pressure Ulcer Knowledge Assessment Tool (PUKAT 2.0). In accordance with the PUKAT 2.0 results, educational interventions were provided in one-on-one, short sessions addressing knowledge gaps over two weeks for a staff of 57 individuals. The PUKAT 2.0 tool was used to reassess staff knowledge of PIP two weeks after providing education. The team also examined the incidence of HAPIs before and after the educational intervention. Participants were nurses and nursing assistants in an orthopedic-surgical unit. The student's *t*-test was used to analyze pre- and post-education PUKAT 2.0 scores.

Results: The mean correct for the 26-item PUKAT 2.0 in the pre-intervention period was 15.57 ($SD = 4.69$) versus the post-intervention period 17.00 ($SD = 3.72$) out of a total possible of 26 correct. The results were not statistically significant $p=0.276$ with a small effect size, $d=0.30$. Comparing HAPIs before and after educational intervention, there was a decline from 2 HAPIs prior to the project start, down to 0 HAPIs after education was provided on the unit.

Conclusions: Consistent with findings in the literature, knowledge gaps were found in the areas of PI classification and observation, pressure and shear, and duration of pressure and shear among orthopedic-surgical bedside staff. Overall, an improvement was seen among before and after staff scores of PI knowledge. However, a larger sample size was needed to evaluate the effectiveness of in-person educational interventions on PIP for statistical significance.

Keywords: hospital-acquired pressure injury, Braden Scale, pressure injury prevention, education, knowledge, intervention

Pressure Injury Prevention and Education Project

Pressure injuries (PI) reflect a lapse in essential primary nursing care. Despite all the research and evidence-based interventions on PIP, HAPIs still need to be eliminated. Although there are validated tools and proven strategies to mitigate PI risk, including the Braden Scale (BS) and bundled interventions, frontline staff may still need to learn about those strategies. While knowing is not doing, learning to take the right action is imperative. Assessing PIP knowledge is an essential first step in addressing gaps in prevention.

Problem Statement

Reimbursement is often declined for treatments related to HAPIs, making it a costly problem for healthcare organizations. For example, the Centers for Medicare and Medicaid Services (CMS) have discontinued funding for treating HAPIs (Floyd et al., 2021; National Pressure Injury Advisory Panel [NPIAP], 2021; Vitale & Dzioba, 2021). A PI develops when blood, oxygen, and nutrients cannot reach an area of tissue, leading to ischemia, damage, and eventually, cell death – usually over a bony prominence (Gaspar et al., 2019; Geng et al., 2020). The overall prevalence of PIs is 12.8%, and HAPIs are 6% - 18.5% (Li et al., 2020; Tubaishat et al., 2018). Of these, 43.5% are stage I PIs, and 28% are stage II PIs (Li et al., 2020). If identified early, healthcare workers can reverse a stage I PI before the tissue injury progresses into a higher stage (NPIAP, 2021). Identification and appropriate action to rapidly address the problem, a stage I PI, before it progresses, is a proven strategy for PIP (NPIAP, 2021).

In the United States in 2019, there were 2.5 million cases of HAPIs (NPIAP, 2021). There are 8.3 HAPIs per 100 acutely ill patients, associated with 1.5% mortality (Padula & Delarmente, 2019). In Arizona, from 2004 to 2006, 22,855 hospital stays involved a diagnosis of

a PI (Arizona Department of Health Services, 2009b). Hospital stays with PIs increased by 5.2% from 2004 to 2006 (Arizona Department of Health Services, 2009a).

PIs are a leading, primarily preventable health problem that is increasing in incidence (Wyatt, 2022). The cost to the patient is extensive, including financial strain, increased length of hospital stays, pain, decreased mobility, increased risk of infection, reduced independence, poor body image, emotional distress, and increased likelihood of hospital readmission (Aloweni et al., 2019; Wyatt, 2022). Patients with HAPIs are also more likely to be sent to a skilled nursing facility rather than being discharged to home, away from independence and reducing their overall quality of life (Aloweni et al., 2019). Furthermore, PIs contribute to 60,000 deaths annually in the United States (Floyd et al., 2021; NPIAP, 2021; Padula & Delarmente, 2019).

In addition to the cost to the patient, there is a high financial cost to the healthcare facility. The average cost per patient with a PI varies. A stage I PI costs approximately \$2,000 (Vitale & Dzioba, 2021). Treating a stage II PI costs roughly \$8,000 (Vitale & Dzioba, 2021). A late-stage PI ranges from \$75,000 to \$150,000 per hospitalization (NPIAP, 2021). The cost burden to the United States is \$26.8 billion annually (NPIAP, 2021). Compared to the cost of prevention, which researchers have averaged to be approximately \$927 per patient, including the cost of supplies and productivity, investing in PIP efforts makes financial sense (Ebi et al., 2019; McLaughlin et al., 2022).

Purpose and Rationale

This project aimed to determine if education related to the BS, PIs, and bundled PIP would decrease HAPI incidence. This project was a small test of change to evaluate the effectiveness of a specific educational intervention on a single unit to increase knowledge regarding PIP and a bridge for teamwork at the target hospital for future collaborations.

Minimizing patient harm and increasing cost savings to patients as well as medical organizations was a desirable outcome of this project.

Background and Significance

An older adult is somebody who is 65 years old and above. In Arizona, 18.8% of the population is elderly, accounting for 39.6% of hospital stays (Arizona Department of Health Services, 2021; United States Census Bureau, n.d.). There are 299 hospitalizations for every 1000 adults aged 65 years and 452 hospitalizations for every 1000 adults aged 80 years and older, demonstrating that as people age, they use hospital services more (Arizona Department of Health Services, 2009b).

Persons Most at Risk for Developing Pressure Injuries

Increased age is a significant risk factor for HAPI development (Geng et al., 2020). This corollary relationship is due to increased morbidities, decreased mobility, reduced nutrition, sensory impairments, reduced circulation, incontinence, impaired immunity, and other elements associated with the natural aging process (Floyd et al., 2021; Nieto-Garcia et al., 2021; Zhang et al., 2021).

Assessing Pressure Injury Risk

The BS is the most widely used assessment tool for hospital pressure injury risk (Gaspar et al., 2022). It consists of six subscales evaluating a patient's sensory perception, activity level, mobility, nutritional status, and exposure to moisture, friction, and shear—all items that increase a patient's likelihood of developing a PI (Al-Otaibi et al., 2019; Braden & Maklebust, 2005; Floyd et al., 2021; Pittman et al., 2019). A patient is determined to be at low or high risk based on the score. Numerous researchers have determined that, based on the Braden subscales, tailored interventions can better meet the needs of each patient to reduce their risk of PI

progression (Floyd et al., 2021; Gaspar et al., 2022; Pittman et al., 2019). For example, for a patient with a low nutrition score on the BS, the healthcare worker can tailor their interventions focusing on nutrition, better reducing his overall PI risk. This project aimed to teach focused and individualized PI prevention.

Pressure Injury Prevention Bundles

Once healthcare workers identify patients to be at risk, interventions can be implemented based on individualized needs. Current best practice PIP bundles include:

- individualized care plans,
- appropriate support surfaces,
- repositioning and offloading,
- early mobilization,
- skincare,
- and nutritional assessment and intervention (Floyd et al., 2021; Gaspar et al., 2019; Nieto-Garcia et al., 2021; Pittman et al., 2019).

Based on the published evidence, with appropriate assessment and knowledge of best practices to avoid HAPIs, the incidence and prevalence of PIs should decline. However, clinicians' inconsistent adherence to bundled guidelines is well-documented. Factors attributed to PI prevalence include lack of clinician knowledge, the perceived complexity of assessment and interventions, and the limited availability of time and resources (Pickham et al., 2018; Zhang et al., 2021).

Internal Data

Established in 2007, the target hospital is part of a six-hospital not-for-profit organization in Arizona. All hospitals in the system are Magnet-designated, which means that nurses have

some level of autonomy over improving patient care (Bal, 2022). This hospital, located in a retirement community, primarily comprises older individuals. The hospital's mission is to improve the health and well-being of those it serves. A National Database of Nursing Quality Indicators (NDNQI) report for 2022 showed a HAPI prevalence for stage II or higher at the target organization of ten HAPIs hospital-wide (Press Ganey, 2023). From the patient's and their family's perspective, even a single PI can be devastating.

PICOT Question

A preliminary review of the literature led to the PICOT question: “Among registered nurses and patient care technicians working on an inpatient orthopedic-surgical unit, (P) how does assessing knowledge and providing education on hospital-acquired pressure injury prevention (I) compared with current practice (C) affect healthcare workers’ knowledge and understanding of hospital-acquired pressure injury prevention, thereby ultimately decreasing PI prevalence in hospitalized patients (O) over three months (T)” and led to the following exhaustive search.

Literature Review

Search Strategy

An extensive literature review was conducted to answer the PICOT question. The following databases were searched – Cochrane, CINAHL, and PubMed. With a filter for publication within the past five years, the Cochrane Library search yielded one article (see Appendix A). The initial CINAHL search yielded 221 results (see Appendix B). Adding a time filter for articles published in the last five years reduced the number of articles to 97. The PubMed search for articles published in the previous five years yielded 76 articles (see Appendix C). Reference mining produced an additional 20 articles.

Keyword Selection, Limitations, Inclusion, and Exclusion Criteria

Keywords for the searches included *HAPI, pressure ulcer, pressure injury, pressure sore, bed sore, prevention, nurse, education, knowledge, and hospital*. The inclusion criteria for review included patients in a hospital setting. Exclusion criteria were the pediatric population, nursing homes, outpatient, and home settings.

Critical Appraisal and Synthesis of Evidence

The validity, reliability, and applicability of the studies selected to support the background of this project and the PICOT were assessed using Melnyk and Fineout-Overholt's (2019) rapid critical appraisal (RCA) instrument. The selected research studies met the standards of the RCA tool in addition to demonstrating minimal bias. Levels of evidence (LOE) were assigned using Melnyk and Fineout-Overholt's (2019) hierarchy of evidence pyramid. In the hierarchy of evidence, level one is the highest LOE, with resources stemming from clinical practice guidelines, systematic reviews, or meta-analyses of randomized controlled trials (Melnyk & Fineout-Overholt, 2019). Level seven is the lowest level of evidence, with resources coming from expert opinions and reports from authorities in the field (Melnyk & Fineout-Overholt, 2019). LOE in this critical appraisal ranged from one to six, with most of the studies having an LOE of four (see Appendix D). In level four, a mid-range LOE, evidence comes from case-controlled or cohort studies (Melnyk & Fineout-Overholt, 2019). Of the ten studies, two were systematic reviews, two were quality improvement projects, two were cross-sectional and descriptive, two were quasi-experimental studies, one was a longitudinal study, and one was a retrospective/prospective cohort study.

Gap in Pressure Injury Prevention Knowledge

From the review of the literature, globally, researchers have assessed nurses' knowledge of PIP, with results demonstrating that nurses have an inadequate understanding of PI etiology and prevention (Araujo et al., 2019; Aydin et al., 2019; Bakar et al., 2022; Bobbink et al., 2022; Campoi et al., 2019; Ebi et al., 2019; Gedamu et al., 2021; Ghazanfari et al., 2022; Hoedl et al., 2019; Kennedy, 2023; Lee & Lee, 2022; Li et al., 2019; Lin et al., 2020; Liu et al., 2023; Lotfi et al., 2019; McLaughlin et al., 2022; Nobrega et al., 2023; Parisod et al., 2022; Saleh et al., 2019; Sari et al., 2021). This knowledge gap contributes to deficient PIP strategies. Nurses need to understand PI as an evidence-based practice (EBP) to apply the interventions successfully (Araujo et al., 2019).

Outcomes from a synthesis of the evidence demonstrated that healthcare workers' most substantial areas of knowledge including PIP, PI identification, topical skin protectants, risk assessments, patient education, and nutrition (See Appendix E; Araujo et al., 2019; Aydin et al., 2019; Barakat-Johnson et al., 2018; Campoi et al., 2019; Ebi et al., 2019). Appendix E also lists areas of weakest knowledge, including topical skin protectants, frequency of position changes, support surface selection, nursing care contraindicated in PIs such as massaging an area of redness, PI etiology, PI classification, PIP, and nutrition (Araujo et al., 2019; Aydin et al., 2019; Barakat-Johnson et al., 2018; Campoi et al., 2019; Ebi et al., 2019; Gedamu et al., 2021; Kennedy et al., 2023; Porter-Armstrong et al., 2018). There were areas of overlap between the subjects healthcare workers knew well versus those areas with the lowest knowledge, including PIP, PI classification, nutrition, and topical skin protectants.

There was a positive correlation between educational intervention and knowledge of PIP (Araujo et al., 2019; Campoi et al., 2019; Kennedy et al., 2023; Porter-Armstrong et al., 2018). However, the educational approaches varied greatly, including online, didactic, short, and long

educational interventions. From this evidence and synthesis, this project applied a pre- and post-knowledge assessment strategy to determine knowledge gaps of clinical staff, followed by an educational intervention to address those gaps. The feasibility and successful impact of short, in-person educational sessions using an illustrated PI guide were evaluated in this project.

Theoretical Framework

In nursing, applying successful, applicable theories from past work provides a structure for building a study or project. The realistic framework model (see Appendix F) illustrates the multiple factors contributing to patient outcomes, including healthcare workers' knowledge, attitudes, and behaviors (Teo et al., 2019). Key terms and concepts of this framework include the intrinsic and extrinsic context, which drive the mechanisms of actions, activities, and interactions leading to target outcomes, including patient safety, knowledge levels, attitudes shift, and practice change (Teo et al., 2019). The origin of this framework is from a case study in 2013 by authors Williams, Burton, and Rycroft-Malone evaluating infectious disease prevention among frontline healthcare workers. Teo and her associates (2019) modified the model, instead focusing on PIP, and streamlined the variables in each step. By utilizing this realistic framework model, the current project focused on one aspect of the intrinsic characteristics (knowledge) that ultimately results in patient safety outcomes, levels of knowledge, and, eventually, a change in practice.

Implementation Framework

In addition to nursing theory application, implementation frameworks provide validated support for developing a nursing project. The Iowa model revised (see Appendix G) is an often utilized, systematic model with a decision-tree flowsheet diagram guiding the stages of EBP development, especially in healthcare quality improvement (QI) initiatives (Buckwalter et al.,

2017). The target organization encourages EBP and nursing inquiry using the Iowa model as one of its implementation frameworks. The first step in the Iowa model is to identify the triggering issues or opportunities of the problem. In this EBP project, the issue that was identified was the PIP gap in knowledge. To state the question or purpose, the PICOT question ‘Among registered nurses and patient technicians working on an inpatient orthopedic-surgical unit, how does assessing knowledge and providing education on hospital-acquired pressure injury prevention compared with current practice affect healthcare workers’ knowledge and understanding of hospital-acquired pressure injury prevention, thereby ultimately decreasing PI prevalence in hospitalized patients over three months?’ was developed. The next step in the Iowa model is to form a team. The team developed to serve the purposes of the current EBP project included a DNP student, site champion, wound nurse, Chief Nursing Officer, and the nursing outcomes coordinator. Once a team is formed, the next step is to review the evidence. Evidence and synthesis tables were developed after reviewing the literature (see Appendix E). From the literature review, we designed a small test of change, guided by the Iowa model. Our test of change consisted of a pre- post design based on the evidence synthesized. Once a test of change is performed, the next step in the Iowa model is to review the results and share and discuss findings. The results were analyzed and shared with the hospital’s Nursing Research Council along with the target unit at their monthly unit-based council meeting. The logical next step of the Iowa model is to redesign the test of change based on feedback from the small test of change. Redesign and retesting will be combined into the sustainability portion of this project which will include a research project at the target hospital. The final step of the Iowa model is to share findings via poster presentation, podium, and publication.

Methods

Setting

The target hospital was a 128-bed, acute care, not-for-profit, surgical hospital in a city neighborhood in northern Arizona from September 3, 2023, through October 28, 2023 (see Appendix H). The project occurred on a 28-bed orthopedic-surgical unit in this facility. Staff for this unit included 38 registered nurses (RNs), four nursing supervisors, one nursing director, and 14 patient care technicians (PCTs).

Stakeholders

Several stakeholders stood to be affected by the implementation of this project. Critical stakeholders included patients and their families, nurses, nursing assistants, the unit nurse manager, administrative personnel, hospital educators, nursing research council members, specialty nursing services, the nursing outcomes coordinator, the site champion, and the facilitator of the DNP project.

Participants

The goal sample size was 56 pre- and post-intervention group participants. Inclusion criteria: all full-time and part-time RNs and PCTs working on an ortho-surgical unit who could read and write English and who agreed to participate. Exclusion criteria: healthcare workers who were not employed on the ortho-surgical unit, did not read or write English, and were under 18 years old.

Project Description

The project was a pre-post design comparing the PI knowledge of bedside RNs and PCTs in a single hospital unit before and after an educational intervention. Collected data incorporated a retrospective review of patients who developed PIs on the target unit before and after the

project intervention. The evaluation questions for this project included: (1) Did the educational intervention improve staff knowledge scores? and (2) Was there a decrease in HAPI incidence?

Study Design

The EBP project included paper surveys, the Pressure Ulcer Knowledge Assessment Tool (PUKAT 2.0), distributed over 2 weeks to participants before and then 4 weeks after an educational intervention. Numerous researchers investigating PIP have successfully trialed a before and after intervention assessment strategy (Araujo et al., 2019; Campoi et al., 2019; Kennedy, 2023).

Intervention

Based on the PI knowledge results of the initial PUKAT 2.0 surveys, PIP education was tailored to address gaps in understanding. Rolling education commenced for 2 weeks and included the distribution of a comprehensive, illustrated guide with the BS, PI staging, and interventions, along with focused one-on-one educational sessions in short, 5-minute intervals. The principal investigators provided education twice daily, using a roving, colorful education cart with nonmonetary prizes to encourage participation and reach both day and night shift staff.

Data Collection

The paper forms (see Appendix I) were numbered for data entry but had no identifiers linking them to the participants (see Appendix J). Staff had 2 weeks to complete the forms and place them in a sealed box in the unit breakroom. Four weeks after the education intervention, the principal investigators distributed post-education PI knowledge questionnaires (PUKAT 2.0) to the staff to complete and place in the sealed box again. Data from the forms were entered into an Excel spreadsheet and independently double-checked by two investigators. Based on the unique participant identification (see Appendix J), pre- and post-education PUKAT 2.0 scores

were paired for analysis. For HAPI incidence data, the target organization's senior clinical informaticist provided deidentified patient information to the investigators.

Instruments

To assess RN and PCTs' overall knowledge of PIs and to determine if the education was adequate, the PUKAT 2.0 was utilized. The PUKAT 2.0 (see Appendix I) is a 26-multiple-choice item test with six overarching themes: etiology, classification and observation, risk assessment, nutrition, prevention of PIs, and specific patient groups (Beeckman et al., 2010; De Meyer et al., 2019). The PUKAT 2.0 instrument was tested for validity and reliability by Manderlier et al. (2017) following Zwakhalen's psychometric testing framework, including content legitimacy reviewed by experts for clarity, logic, and readability. PUKAT 2.0 demonstrated evidence of content and construct validity and stability (Kielo et al., 2020; Manderlier et al., 2017). The quality of response alternatives (*a*-values) ranged between 0.01 and 0.70 (the ideal *a*-value is 0.10; Kielo et al., 2020; Manderlier et al., 2017).

De Meyer et al. (2019) successfully used the PUKAT 2.0 to evaluate nurses' and nursing assistants' knowledge about PIP over 22 months in Belgian hospitals as part of a more extensive research study. In this EBP project, the PUKAT 2.0 was delivered before the educational intervention for baseline data and the same scale was administered afterwards to compare scores.

An anonymous demographics questionnaire in the pre-assessment period also asked participants to share their age, gender, ethnicity, role (RN or PCT), years of experience, and education level. Furthermore, the post-assessment questionnaire included an open-ended qualitative survey asking respondents to provide feedback about the educational intervention.

Ethical Considerations

The target organization reviewed the project at its monthly nursing research council meeting. It was determined that the project would be IRB-exempt (see Appendix K) due to its status as an EBP project and the protection of participant identification and patient de-identification following HIPPA compliance. The ASU IRB also gave the project an exempt status (see Appendix L). A data usage agreement (see Appendix M) between the target organization and ASU was established for the HAPI data. A consent form was provided with each questionnaire describing the project's purpose and explaining that participation was voluntary. Consent from study participants was implied when they completed and submitted the PUKAT 2.0 questionnaire and demographic form.

Recruitment

Once IRB approval was granted, the co-investigator, hospital educator, and volunteer nurses spoke to nurses and PCTs on the orthopedic/surgical unit to build momentum for the project. Project flyers describing the project overview were posted in the break room. An information email describing the project was also sent to the RNs and PCTs on the target unit 2 weeks before the project start date.

Outcomes Measurement

The pre-and post-knowledge assessment tests (PUKAT 2.0) were analyzed using the student's paired *t*-test. Composite scores were compared for overall changes in knowledge scores. Descriptive statistics were used to describe the sample and the outcome variable. HAPI incidence on the target unit was evaluated in the 3 months post intervention and compared to the same 3 months in the prior year (see Appendix H).

Timeline

As delineated in Appendix H, the pre-intervention knowledge assessment occurred over 2 weeks, from September 3, 2023 to September 16, 2023. The educational intervention occurred from September 17, 2023 to September 30, 2023. The post-intervention knowledge assessment occurred from October 15, 2023 to October 28, 2023. HAPI incidence dates are stated in Appendix H.

Budget

The costs for this project totaled \$4,716.54, including the participants' time to complete the PUKAT 2.0, receive education, supplies, printing, food, and other miscellaneous (see Appendix N). The costs associated with HAPIs vary depending on the source but range from \$10,708 - \$14,506 (Padula & Delarmente, 2019) to \$500 - \$70,000 (Wound, Ostomy and Continence Nurses Society, 2016). Assuming a single HAPI is prevented with this project, there would be a savings of \$5,991.46 despite the expenses (see Budget Appendix N).

Results

The project investigators used Intellectus Statistics to store the data and analyze the results (Intellectus, 2023). Descriptive statistics were used to describe the sample demographics. The student's paired *t*-test was used to analyze the data. The critical value was established at $p < 0.05$ to determine statistical significance. Cohen's *d* was used to assess the effect of the intervention on the outcome variable.

In the pre-assessment stage, there were 39 participants, including 29 RNs and 10 PCTs. Of those 39 completed PUKAT 2.0 questionnaires, four individuals did not create a unique participant ID. The information field was left blank. Their questionnaires were therefore deemed ineligible to include. In the post-assessment stage, there were 29 participants. Fourteen matched

PUKAT 2.0 questionnaires were identified for analysis using the unique ID for matching. The final paired sample size was 12 RNs and 2 PCTs ($n=14$).

The average age of participants was 44.15 years ($SD = 13.11$, $Mdn = 47.00$). One participant chose not to include their age in the PUKAT 2.0 questionnaire. The average years of experience was 9.38 ($SD = 13.41$, $Mdn = 3.00$). The summary statistics can be found in Table 1.

Table 1

Participants' Average Age and Years of Experience

Variable	<i>M</i>	<i>SD</i>	<i>n</i>	Min	Max	<i>Mdn</i>
Age	44.15	13.11	13	26.00	67.00	47.00
Experience (yrs)	9.38	13.41	13	0.00	43.00	3.00

The predominant gender of participants was female (93%). Among the participants, 71% ($n=10$) had a bachelor's degree in nursing, and 14% had an associate's degree ($n=2$). Both of the PCTs had a PCT certificate. Most participants were Caucasian (57%) or Hispanic (21%).

Table 2

Participants' Demographic Information

Variable	<i>n</i>	%
Gender		
female	13	92.86
male	1	7.14
Ethnicity		
Caucasian	8	57.14
Asian/Pacific Islander	1	7.14
Hispanic/Latino	3	21.43
Caucasian + Hispanic	1	7.14
Persian	1	7.14
Role		
RN	12	85.71
PCT	2	14.29
Education		
BSN	10	71.43

ADN	2	14.29
PCT certificate	2	14.29

Out of a total possible score of 26, the pre-intervention PUKAT 2.0 average score was 15.57 (*SD* = 4.69, *Min* = 5.00, *Max* = 23.00, *Mdn* = 15.50). In percentages, that is an average of 60% correct. The post-intervention PUKAT 2.0 average score was 17.00 (*SD* = 3.72, *Min* = 10.00, *Max* = 24.00, *Mdn* = 17.50). In percentages, that is an average of 65% correct. The summary statistics can be found in Table 3.

Table 3

Pre-Intervention Mean Score vs Post-Intervention Mean Score

Variable	<i>M</i>	<i>SD</i>	<i>n</i>	Min	Max	<i>Mdn</i>
Pre-Intervention #Correct	15.57	4.69	14	5.00	23.00	15.50
Post-Intervention #Correct	17.00	3.72	14	10.00	24.00	17.50

The pre-intervention mean score of 15.57 and the post-intervention mean score of 17.00 were analyzed using a two-tailed paired samples *t*-test to determine if the improvement in scores was significantly different. The two-tailed paired samples *t*-test result was insignificant based on an *p* of 0.276. This finding suggests the difference in the mean of pre-intervention and the mean of post-intervention PUKAT 2.0 was not significantly different (*p* was not less than 0.05). The results are presented in Table 4. A bar plot of the means is shown in Figure 1. In statistics, Cohen's *d* evaluates the effect size of the matched scores (Intellectus, 2023). A Cohen's *d* value of 0.30 is a small effect size. This means that our 2-week educational intervention had a small effect on the post-intervention PUKAT 2.0 scores.

Table 4

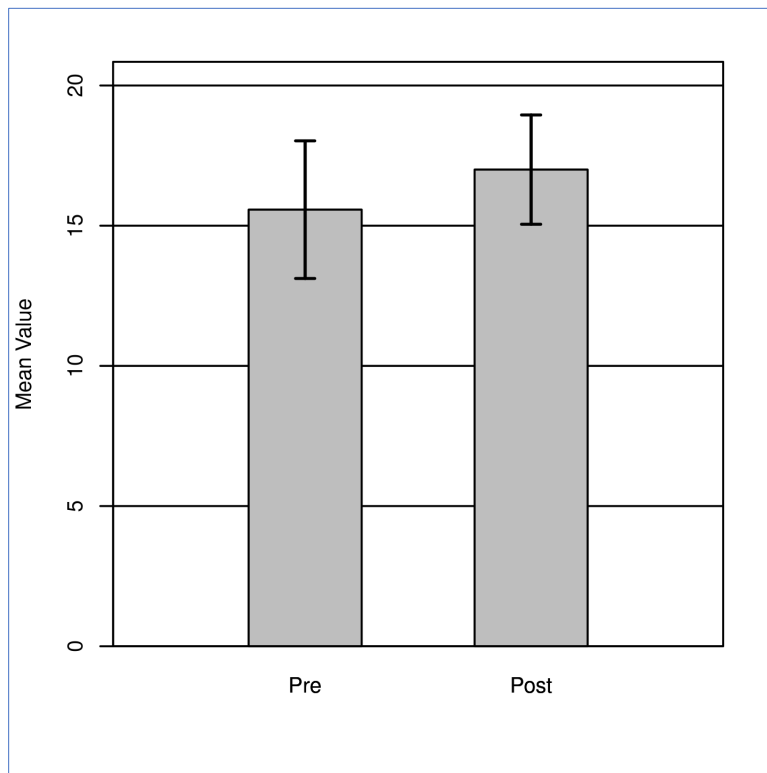
Two-Tailed Paired Samples t-Test for the Difference Between Pre-intervention PUKAT 2.0 and Post-intervention PUKAT 2.0

Pre-intervention PUKAT 2.0		Post-intervention PUKAT 2.0		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
15.57	4.69	17.00	3.72	-1.14	.276	0.30

Note. N = 14. Degrees of Freedom for the *t*-statistic = 13. *d* represents Cohen's *d*.

Figure 1

The means of Pre-intervention PUKAT 2.0 and Post-intervention PUKAT 2.0 with 95.00% CI Error Bars



The HAPI incidence in the pre-intervention period was two HAPIs, compared with zero HAPIs in the post-intervention period.

Discussion

Based on the student's *t*-test results, the $p=0.276$ did not meet our goal of statistical significance ($p<0.05$). In other words, our educational intervention did not significantly impact the post-intervention PUKAT 2.0 scores. Additionally, Cohen's *d* of 0.30 did not convey a strong nor medium effect of our educational intervention on the post-intervention PUKAT 2.0 scores compared to the pre-intervention PUKAT 2.0 scores. While the HAPI incidence went down from 2 HAPIs to 0 HAPIs, we cannot assume that our educational intervention was responsible for this beneficial outcome based on the small effect size.

Limitations

The most significant limitation of this project was the small sample size ($n=14$). A limitation stated by the participants was the difficulty of the PUKAT 2.0. Anecdotally, a pilot group of certified wound nurses at the target hospital took the PUKAT 2.0 to determine the level of difficulty prior to the implementation of this project. Their scores averaged 70 – 80%. Additionally, the time for completion of the PUKAT 2.0 was another unexpected factor. The suggested time to complete the test was 10 minutes. Participants noted that it took 20 to 30 minutes to complete. Also, the PUKAT 2.0 was created in another country. Wording on the test and PI concepts were foreign to clinical staff in the United States. When this limitation was suggested to the participants in a post-analysis report, they agreed that the wording of the PUKAT 2.0 was challenging. Therefore, creating and validating an American PI knowledge assessment tool for the inpatient setting would be helpful for future studies on PIP and education.

Sustainability

Currently, the target organization primarily uses an online educational platform to provide education systemwide. Early feedback from bedside staff, especially nurses, guided the current project away from using the online educational platform and instead using paper surveys, questionnaires, and in-person training. Results from this PIP effort will guide future education in the target facility and, potentially, systemwide.

Sustainability for this project has already begun. An upcoming study planned by the target organization and the principal investigators will incorporate lessons from this pilot project into a project related to PI risk assessments comparing old and new technologies.

Conclusion

The cost burden along with the suffering and adverse health sequelae for patients, provides a compelling argument to continue to work on PIP. Performing a small test of change,

based on the Iowa model revised framework, piloting a pre-post-educational intervention on a single ortho-surgical unit at a target hospital with a core team of stakeholders provided information to address PIs and created an opportunity for learning at the institution. Past evidence demonstrated a gap in nurses' knowledge regarding PIP. Consistent with findings in the literature, knowledge gaps were found in the areas of PI classification and observation, preventive measures to reduce the amount of pressure and shear, and preventive measures to reduce the duration of pressure and shear among orthopedic-surgical bedside staff. Forming an intervention based on the recommendations from the evidence synthesis resulted in the current project design and intervention. Overall, a small improvement was seen among before and after staff scores of PI knowledge. However, a larger sample size was needed to evaluate the effectiveness of in-person educational interventions on PIP for statistical significance. As demonstrated in the Iowa model, based on the findings from this EBP project, more work needs to be done to perform another small test of change to evaluate the effectiveness of PI education as prevention for HAPIs.

References

- Al-Otaibi, Y., Al-Nowaiser, N., & Rahman, A. (2019). Reducing hospital-acquired pressure injuries. *BMJ Open Quality*, 8(1), e000464. <https://doi.org/10.1136/bmjopen-2018-000464>
- Aloweni, F., Ang, S., Fook-Chong, S., Agus, N., Yong, P., Goh, M., Tucker-Kellogg, L., & Soh, R. (2019). A prediction tool for hospital-acquired pressure ulcers among surgical patients: Surgical pressure ulcer risk score. *International Wound Journal*, 16(1), 164-175. <https://doi.org/10.1111/iwj.13007>
- Araújo, T. M., Araújo, M. F. M., Barros, L. M., Oliveria, F. J. G., da Silva, L. A., & Caetano, J. A. (2019). Educational intervention to assess the knowledge of intensive care nurses about pressure injury. *Rev Rene Revista de Rede de Enfermagem do Nordeste*, 20, e41359. <https://doi.org/10.15253/2175-6783.20192041359>
- Arizona Department of Health Services. (2009a). *Diabetes*. Arizona Diabetes Coalition. Retrieved July 5, 2022, from <https://www.azdhs.gov/documents/prevention/tobacco-chronic-disease/diabetes/diabetes-fact-sheet.pdf>
- Arizona Department of Health Services. (2009b). *Facts and figures: Statistics on hospital-based care in Arizona 2004 – 2006*. AZDHS. <https://www.azdhs.gov/documents/preparedness/public-health-statistics/cancer-registry/hospital-based-care-az-2004-2006.pdf>
- Arizona Department of Health Services. (2024). *Arizona health status and vital statistics 2021*. AZDHS. <https://pub.azdhs.gov/health-stats/report/ahs/ahs2021/pdf/ahs2021.pdf>
- Aydin, A. K., Karadag, A., Gül, S., Avsar, P., & Baykara, Z. G. (2019). Nurses' knowledge and practices related to pressure injury: A cross-sectional study. *Journal of Wound, Ostomy,*

and Continence Nurses, 46(2), 117-123.

<https://doi.org/10.1097/WON.0000000000000517>

Bakar, N., Shohor, N. A., Latif, R. A., Munirah, S., Wahab, A., Zaki, M. A. A., & Kasim, M. M.

(2022). The effects of SSKIN care bundle on nurses' practice in prevention of pressure ulcer. *International Journal of Academic Research in Business and Social Sciences*, 12(7), 958-968. <http://dx.doi.org/10.6007/IJARBS/v12-i7/14325>

Bal, D. (2022, December 22). *What are Magnet hospitals? (And why it matters for nurses)*.

Nurse Journal. <https://nursejournal.org/resources/what-are-magnet-hospitals>

Barakat-Johnson, M., Barnett, C., Wand, T., & White, K. (2018). Knowledge and attitudes of nurses toward pressure injury prevention: A cross-sectional multi-site study. *Journal of Wound, Ostomy, and Continence Nursing*, 45(3), 233-237.

<https://doi.org/10.1097/WON.0000000000000430>

Beeckman, D., Vaderwee, K., Demarré, L., Paquay, L. Van Hecke, A., & Defloor, T. (2010).

Pressure ulcer prevention: Development and psychometric validation of a knowledge assessment instrument. *International Journal of Nursing Studies*, 47, 399-410.

<https://doi.org/10.1016/j.ijnurstu.2009.08.010>

Bobbink, P., Teixeira, C. M., Charbonneau, L., Chabal, L., Guex, C., & Probst, S. (2022). E-

learning and blended-learning program in wound care for undergraduate nursing students. *Journal of Nursing Education*, 61(1), 53-57. <https://doi.org/10.3928/01484834-20211203-03>

Braden, B., & Maklebust, J. (2005). Preventing pressure ulcers with the Braden Scale – An update on this easy-to-use tool that assesses a patient's risk. *The American Journal of Nursing*, 105(6), 70-72. <https://doi.org/10.1097/00000446-200506000-00031>

- Buckwalter, K. C., Cullen, L., Hanrahan, K., Kleiber, C., McCarthy, A. M., Rakel, B., Steelman, V., Tripp-Reimer, T., & Tucker, S. (2017). Iowa Model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14*(3), 175-182.
<https://doi.org/10.1111/wvn.12223>
- Campoi, A. L. M., Engel, R. H., Stacciarini, T. S. G., Cordeiro, A. L. P., Melo, A. F., & Rezende, M. P. (2019). Permanent education for good practices in the prevention of pressure injury: almost-experiment. *Revista Brasileira de Enfermagem Reben, 72*(6), 1646-1652. <http://dx.doi.org/10.1590/0034-7167-2018-0778>
- De Meyer, D., Verhaeghe, S., Van Hecke, A., & Beeckman, D. (2019). Knowledge of nurses and nursing assistants about pressure ulcer prevention: A survey in 16 Belgian hospitals using the PUKAT 2.0 tool. *Journal of Tissue Viability, 28*(2), 59–69.
<https://doi.org/10.1016/j.jtv.2019.03.002>
- Ebi, W. E., Hirko, G. F., & Mijena, D. A. (2019). Nurses' knowledge of pressure ulcer prevention in public hospitals in Wollega: A cross-sectional study design. *BMC Nursing, 18*:20. <https://doi.org/10.1186/s12912-019-0346-y>
- Floyd, N., Dominguez-Cancino, K., Butler, L., Rivera-Lozada, O., Leyva-Moral, J., & Palmieri, P. (2021). The effectiveness of care bundles including the Braden Scale for preventing hospital-acquired pressure ulcers in older adults hospitalized in ICUs: A systematic review. *The Open Nursing Journal, 15*(1), 74-84.
<https://doi.org/10.2174/1874434602115010074>
- Gaspar, S., Peralta, M., Budri, A., Ferreira, C., & Gaspar de Matos, M. (2022). Pressure ulcer risk profiles of hospitalized patients based on the Braden Scale: A cluster analysis.

- International Journal of Nursing Practice*, 28(6), e13038.
<https://doi.org/10.1111/ijn.13038>
- Gaspar, S., Peralta, M., Marques, A., Budri, A., & Gaspar de Matos, M. (2019). Effectiveness on hospital-acquired pressure ulcer prevention: A systematic review. *International Wound Journal*, 16(5), 1087-1102. <https://doi.org/10.1111/iwj.13147>
- Gedamu, H., Abate, T., Ayalew, E., Tegenaw, A., & Birhanu, M. (2021). Level of nurses' knowledge on pressure ulcer prevention: A systematic review and meta-analysis study in Ethiopia. *Heliyon*, e07648. <https://doi.org/10.1016/j.heliyon.2021.e07648>
- Geng, J., Yang, K., Cai, Y., Shi, J., Yin, M., & Wang, X. (2020). Appraisal and recommendation synthesis of guidelines and consensus for interventions of pressure ulcers: A protocol for systematic review. *Medicine (Baltimore)*, 99(21), e20417.
<https://doi.org/10.1097/md.00000000000020417>
- Ghazanfari, M. J., Karkhah, S., Maroufizadeh, S., Fast, O., Jafaraghaee, F., Gholampour, M. H., & Zeydi, A. E. (2022). Knowledge, attitude, and practice of Iranian critical care nurses related to prevention of pressure ulcers: A multicenter cross-sectional study. *Journal of Tissue Viability*, 31, 326-331. <https://doi.org/10.1016/j.jtv.2022.01.009>
- Hoedl, M., Eglseer, D., & Lohrmann, C. (2019). Structure, process, and quality indicators for pressure injury prevention and care in Austrian hospitals: A quality improvement project. *Journal of Wound, Ostomy, and Continence Nurses*, 46(6), 479-484.
<https://doi.org/10.1097/WON.0000000000000586>
- Intellectus Statistics [Online computer software]. (2023). *Intellectus Statistics*.
<https://statistics.intellectus360.com>

- Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14*(3), 175-182.
[doi:10.1111/wvn.12223](https://doi.org/10.1111/wvn.12223)
- Kennedy, E. (2023). An evidence-based approach to protecting our biggest organ: Implementation of a skin, surface, keep moving, incontinence/moisture, and nutrition/hydration (SSKIN) care bundle. *Journal of Doctoral Nursing Practice, 16*(1), 62-80. <http://dx.doi.org/10.1891/JDNP-2021-0040>
- Kielo, E., Suhonen, R., Ylönen, M., Viljamaa, J., Wahlroos, N., & Stolt, M. (2020). A systematic and psychometric review of tests measuring nurses' wound care knowledge. *International wound journal, 17*(5), 1209–1224. <https://doi.org/10.1111/iwj.13417>
- Lee, S. B., & Lee, H. Y. (2022). Impact of pressure ulcer prevention knowledge and attitude on the care performance of long-term care facility care workers: A cross-sectional multicenter study. *BMC Geriatrics, 22*:988. <https://doi.org/10.1186/s12877-022-03702-3>
- Li, J., Wu, X., Li, Z., Zhou, X., Cao, J., Jia, Z., Wan, X., Jiao, J., Liu, G., Liu, Y., Li, F., Song, B., Jin, J., Liu, Y., Wen, X., & Cheng, S. (2019). Nursing resources and major immobility complications among bedridden patients: A multicenter descriptive study in China. *Journal of Nursing Management, 27*, 930-938.
<https://doi.org/10.1111/jonm.12731>
- Li, Z., Lin, F., Thalib, L., & Chaboyer, W. (2020). Global prevalence and incidence of pressure injuries in hospitalized adult patients: A systematic review and meta-analysis. *International Journal of Nursing Studies, 105*, 103546.
<https://doi.org/10.1016/j.ijnurstu.2020.103546>

- Lin, F., Wu, Z., Song, B., Coyer, F., & Chaboyer, W. (2020). The effectiveness of multicomponent pressure injury prevention programs in adult intensive care patients: A systematic review. *International Journal of Nursing Studies, 102*, 1-14.
<https://doi.org/10.1016/j.ijnurstu.2019.103483>
- Liu, L. Q., Kelly, J., Di Cesare, M., Allan, H. T., & Traynor, M. (2023). The knowledge and attitudes regarding pressure ulcer prevention among healthcare support workers in the UK: A cross-sectional study. *Journal of Tissue Viability, 32*, 130-135.
<https://doi.org/10.1016/j.jtv.2022.11.004>
- Lotfi, M., Aghazadeh, A. M., Asgarpour, H., & Nobakht, A. (2019). Iranian nurses' knowledge, attitude, and behavior on skin care, prevention and management of pressure injury: A descriptive cross-sectional study. *Nursing Open, 6*, 1600-1605.
<https://doi.org/10.1002/nop2.365>
- Manderlier, B., Van Damme, N., Vanderwee, K., Verhaeghe, S., Van Hecke, A., & Beeckman, D. (2017). Development and psychometric validation of PUKAT 2·0, a knowledge assessment tool for pressure ulcer prevention. *International Wound Journal, 14*(6), 1041–1051. <https://doi.org/10.1111/iwj.12758>
- McLaughlin, J. M., Tran, J. P., Hameed, S. A., Roach, D. E., Anderson, C. R., Zhu, V. Z., Sparks, B. B., Phillips, L. G., Koutrouvelis, A. P., & Tyler, D. S. (2022). Quality improvement intervention bundle using the PUPPIES acronym reduces pressure injury incidence in critically ill patients. *Advances in Skin and Wound Care, 35*, 102-108.
<https://doi.org/10.1097/01.ASW.0000803248.34424.ce>
- Melnyk, B. M., & Fineout-Overholt, E. (2019). *Evidence-based practice in nursing and healthcare: A guide to best practice* (4th ed.). Wolters Kluwer.

- National Pressure Injury Advisory Panel (NPIAP). (2021). *2021 fact sheet: About pressure injuries in US healthcare*. NPIAP. www.npiap.com
- Nieto-Garcia, L., Carpio-Perez, A., Moreiro-Barroso, M., & Alonso-Sardon, M. (2021). Can an early mobilization program prevent hospital-acquired pressure injuries in an intensive care unit: A systematic review and meta-analysis. *International Wound Journal*, *18*(2), 209-220. <https://doi.org/10.1111/iwj.13516>
- Nóbrega, I. S., Medeiros, T. P. G., Bezerra, K. A., Marcolino, E. C., Santos-Rodrigues, R. C., & da Silva Soares, M. C. (2023). Analysis of nursing professionals' knowledge about pressure ulcer prevention: A cross-sectional study. *Escola Anna Nery* *27*, e20220219. <https://doi.org/10.1590/2177-9465-EAN-2022-0219en>
- Padula, W., & Delarmente, B. (2019). The national cost of hospital-acquired pressure injuries in the United States. *International Wound Journal*, *16*(3), 634-640. <https://doi.org/10.1111/iwj.13071>
- Parisod, H., Holopainen, A., Koivunen, M., Puukka, P., & Haavisto, E. (2022). Factors determining nurses' knowledge of evidence-based pressure ulcer prevention practices in Finland: A correlational cross-sectional study. *Scandinavian Journal of Caring Science*, *36*, 150-161. <https://doi.org/10.1111/scs.12972>
- Pickham, D., Berte, N., Pihulic, M., Valdez, A., Mayer, B., & Desai, M. (2018). Effect of a wearable patient sensor on care delivery for preventing pressure injuries in acutely ill adults: A pragmatic randomized clinical trial (LS-HAPI study). *International Journal of Nursing Studies*, *80*, 12-19. <https://doi.org/10.1016/j.ijnurstu.2017.12.012>

- Pittman, J., Beeson, T., Dillon, J., Yang, Z., & Cuddigan, J. (2019). Hospital-acquired pressure injuries in critical and progressive care: Avoidable versus unavoidable. *American Journal of Critical Care, 28*(5), 338-350. <https://doi.org/10.4037/ajcc2019264>
- Porter-Armstrong, A. P., Moore, Z. E., Bradbury, I., & McDonough, S. (2018). Education of healthcare professionals for preventing pressure ulcers. *The Cochrane Database of Systematic Reviews, 5*(5), CD011620. <https://doi.org/10.1002/14651858.CD011620.pub2>
- Press Ganey. (2023). *HonorHealth Scottsdale Thompson Peak Medical Center NDNQI*. Press Ganey Associates.
- Saleh, M. Y. N., Papanikolaou, P., Nassar, O.S., Shahin, A., & Anthony, D. (2019). Nurses' knowledge and practice and practice of pressure ulcer prevention and treatment: An observational study. *Journal of Tissue Viability, 28*, 210-217. <https://doi.org/10.1016/j.jtv.2019.10.005>
- Sari, S. P., Everink, I. H. J., Amir, Y., Lohrmann, C., Halfens, R. J. G., Moore, Z., Beekman, D., & Schols, J. M. G. A. (2021). Knowledge and attitude of community nurses on pressure injury prevention: A cross-sectional study in an Indonesian city. *International Wound Journal, 18*, 422-431. <https://doi.org/10.1111/iwj.13527>
- Teo, C. S. M., Claire, C. A., Lopez, V., & Shorey, S. (2019). Pressure injury prevention and management practices among nurses: A realist case study. *International Wound Journal, 16*(1), 153–163. <https://doi.org/10.1111/iwj.13006>
- Tubaishat, A., Papanikolaou, P., Anthony, D., & Habiballah, L. (2018). Pressure ulcers prevalence in the acute care setting: A systematic review, 2000-2015. *Clinical Nursing Research, 27*(6), 643-659. <https://doi.org/10.1177/1054773817705541>

United States Census Bureau. (n.d.). *Quick facts Arizona*.

<https://www.census.gov/quickfacts/fact/table/AZ/AGE775222#AGE775222>

Vitale, N. A., & Dzioba, D. A. (2021, February 1). *Why investing in hospital-acquired pressure injury prevention technology makes financial sense*. Healthcare Financial Management Association. Retrieved February 1, 2024, from <https://www.hfma.org/operations-management/care-process-redesign/why-investing-in-hospital-acquired-pressure-injury-prevention-te/>

Williams, L., Burton, C., & Rycroft-Malone, J. (2013). What works: A realist evaluation case study of intermediaries in infection control practice. *Journal of Advanced Nursing*, 69(4), 915–926. <https://doi.org/10.1111/j.1365-2648.2012.06084.x>

Wound, Ostomy, and Continence Nurses Society. (2016). *Guideline for prevention and management of pressure ulcers (injuries)*. WOCN clinical practice guideline series 2. WOCN Society.

Wyatt, R. (2022). Reducing hospital-acquired pressure injuries through measure-vention. *Advances in Skin and Wound Care*, 35(1), 43-47. <https://doi.org/10.1097/01.Asw.0000801528.12103.88>

Zhang, X., Wu, Z., Zhao, B., Zhang, Q., & Li, Z. (2021). Implementing a pressure injury care bundle in Chinese intensive care units. *Risk Management and Healthcare Policy*, 14, 2435-2442. <https://doi.org/10.2147/rmhp.S292579>

Appendix A

Database Search Screenshot: Cochrane

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Did you know you can now select fields from Search manager using the **S** button (next to the search box)? Search manager lets you add unlimited search lines, view results per line and access the MeSH browser using the new **MeSH** button.

pressure ulcer or bed sore or hospital-acquired pressure ulcer or hospital acquired pressure
 prevention
 staff education or knowledge
 hospital

(Word variations have been searched)

Cochrane Reviews 4 Cochrane Protocols 0 Trials 88 Editorials 0 Special Collections 0 Clinical Answers 0 More ▾

Date: Custom date range

2 Cochrane Reviews matching pressure ulcer or bed sore or hospital-acquired pressure ulcer or hospital acquired pressure in Title Abstract Keyword AND prevention in Title Abstract Keyword AND staff education or knowledge in Title Abstract Keyword AND hospital in Title Abstract Keyword - (Word variations have been searched)

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Intervention Review 25 August 2022
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Appendix B

Database Search Screenshot: CINAHL

The screenshot displays the CINAHL Plus with Full Text search interface. At the top, the search criteria are entered as: "pressure injuries , or pressure ulcers , or pressure prevention or intervention education hospital". Each term is in its own field with a "Select a Field (optional)" dropdown. A "Search" button is on the right, and a "Clear" link is below it. Below the search fields are links for "Basic Search", "Advanced Search", and "Search History".

On the left, the "Refine Results" sidebar shows the "Current Search" and "Boolean/Phrase" section with the search terms. Under "Expanders", "Apply equivalent subjects" is checked. Under "Limiters", "Full Text" and "Published Date: 20180101-20231231" are checked.

The main search results area shows "Search Results: 1 - 10 of 97". The first result is titled "1. Does implementation of a tailored **intervention** increase adherence to a National Safety and Quality Standard? A study to improve delirium care." It includes a citation from the International Journal for Quality in Health Care, a PMID of 1353-4505, and an AN of 149634739. The abstract text follows, starting with "Background: Delirium is commonly detected in older people after hip fracture..." and ending with "Implementation of the tailored **intervention** will increase adherence to National Safety and Quality Health Service".

Appendix C

Database Search Screenshot: PubMed

PubMed

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Sorted by: Best match

MY NCBI FILTERS 76 results Page 1 of 8

RESULTS BY YEAR Filters applied: Full text, in the last 5 years. Clear all

2018 2023

TEXT AVAILABILITY

- Abstract
- Free full text
- Full text

1 **Australian Nurses' Knowledge of Pressure Injury Prevention and Management: A Cross-sectional Survey.**
Cite Fulbrook P, Lawrence P, Miles S.
Share J Wound Ostomy Continence Nurs. 2019 Mar/Apr;46(2):106-112. doi: 10.1097/WON.0000000000000508.
PMID: 30801563 **Free PMC article.**
PURPOSE: The aim of this study was to assess **nurses' knowledge of pressure injuries** in order to gather benchmark data, identify **knowledge** gaps, and based on results, implement **educational** strategies to improve practice. ...Three hundred six part ...

2 **Nurses' Knowledge and Attitudes towards Prevention of Pressure Ulcers.**
Greš Halász B, Bérešová A, Tkáčová Ľ, Magurová D, Lizáková Ľ.
Int J Environ Res Public Health. 2021 Feb 10;18(4):1705. doi: 10.3390/ijerph18041705

Appendix D

Evaluation Table

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
<p>Araujo et al., 2019</p> <p>Country: Brazil</p> <p>Funding: none disclosed</p> <p>Bias: none stated</p>	<p>Adult learning theory</p> <p>inferred</p>	<p>Design: longitudinal study</p> <p>Method: pre-and post-education assessments</p> <p>Purpose: to compare the knowledge of RNs before and after an educational intervention</p>	<p>N = 9</p> <p>Demographics: All female nurses, avg age 36 years (range 23-55 yrs); avg time since graduation 12.88 yrs (range 2-30 yrs)</p> <p>Setting: Hospital/ ICU</p> <p>Exclusion: none stated</p> <p>Attrition: 3 RNs</p>	<p>IV = online education</p> <p>DV = PU knowledge</p>	<p>Data Collection: Sociodemographic questionnaire and Pressure Ulcer Knowledge Test (PUKT). Also, satisfaction and attitudes.</p> <p>Data Dependability: PUKT was validated in Brazil; the other assessment tools' validity wasn't mentioned</p>	<p>Statistical Tests Used: SAS software calculates percentages, means, medians, and standard deviations. The McNemar test was used in the posttest analysis.</p>	<p>DV: Average PUKT score before educ intervention: 81.1%</p> <p>After educ intervention: 84.6%</p>	<p>LOE: Level 4</p> <p>Strengths: a validated tool (PUKT)</p> <p>Weakness: small sample size; satisfaction and attitudes surveys not validated</p> <p>Feasibility: online education was 15-20 hours – not realistic for busy nurses</p> <p>Application: pre-post-intervention strategy</p>
<p>Aydin et al., 2019</p> <p>Country: Turkey</p> <p>Funding: The authors declare no conflicts of interest.</p>	<p>Depth of Knowledge (DoK) Framework -- inferred</p>	<p>Design: cross-sectional, descriptive study</p> <p>Method: data were collected via self-administered questionnaires to nurses at a wound conference</p> <p>Purpose: to determine nurses' knowledge and practices regarding PI and</p>	<p>N = 347</p> <p>Demographics: 42% BSN, 9.5% wound-ostomy nurses, 67% cared for patients with PIs on a weekly basis</p>	<p>A. Nurses' mean knowledge scores</p> <p>B. Last completed nursing program</p> <p>C. Number of cases of PI care provided in a week</p> <p>D. Current practice area</p>	<p>Data Collection: Data Collection Form for Determining Nurses' Knowledge and Practices Related to Pressure Injuries</p> <p>Data Dependability: the questionnaire was developed by the researchers and sent to 3</p>	<p>Statistical Tests Used: demographic and prof data were summarized using descriptive statistics. The Kolmogorov-Smirnov test</p>	<p>A. Mean knowledge score: 57.37% (out of 100% possible)</p> <p>B. Health vocation high school: 34, ADN: 38, Undergraduate program: 201, MSc/PhD: 74</p>	<p>LOE: Level 6</p> <p>Strengths: large sample size</p> <p>Weakness: The questionnaire used was not psychometrically tested. Practice</p>

Key: **BS** Braden Scale, **FREQ** frequent, **HAPI** hospital-acquired pressure injuries, **HAPU** hospital-acquired pressure ulcer, **ID** identification, **IMPL** implementation, **INDIV** individual, **INPT** inpatient, **LOE** levels of evidence, **NSG** nursing, **ORG** organization, **PI** pressure injury, **PIP** pressure injury prevention, **PIPM** Pressure Injury Predictive Model, **PRISMA** Preferred Reporting Items for Systematic Reviews and Meta-Analyses, **PTS** patients, **PU** pressure ulcer, **RQ** research question, **SR** systematic review, **SUBST** substantially

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
Bias: None stated or inferred		identify relationships between these factors and professional nurse characteristics	Setting: nurses attending a wound conference Exclusion: none stated Attrition: 14 surveys were not completed (out of 361)	E. Participation in wound training in the previous 2 years	nurse educator specialists	was used. The Kurskal-Wallis H and Mann-Whitney U tests were also used.	C. Cases: None: 115, 1-2: 137, 3-4: 53, ≥5: 42 D: Surgical clinic: 108, ICU: 96, Med-Surg: 55, Stoma and Wound Care: 33, Other: 55 E: Yes: 124, No: 223	patterns were self-reported. Feasibility: A questionnaire to assess nurses' knowledge is Application: applicable to the current proposed project
Barakat-Johnson et al., 2018 Country: Australia Funding: none disclosed Bias: none stated or inferred	Realistic Framework Model (inferred)	Design: multi-site cross-sectional study Method: Data collected via emailed questionnaires as well as paper versions Purpose: to examine the knowledge and attitudes of nurses on PIP and determine if the relationship between knowledge, attitudes, and years of experience	N= 988 Demographics: RNs – 1/3 practicing 5-10 yrs. RNs who practice <1yr was 5.3% Setting: 3 acute care hospitals, a rehab hospital, and 5 community health centers Exclusion: non-RNs, RNs outside of the study area Attrition: 3,123 surveys were distributed, and 998 were returned. Of	A. Assessing nursing knowledge related to PIP B. Assessing nursing attitudes related to PIP	Tools: Pressure Ulcer Knowledge Test (PUKT) and the Moore and Price Staff Attitude Scale Validity/Reliability: both instruments were validated to assess nurses' knowledge of PIs and explore their attitude toward PIP	Statistical Tests Used: data from paper surveys were entered into an electronic database and analyzed using SPSS. Pearson correlations to evaluation association between years of experience and knowledge and attitude scores	Outcomes: A. The mean score of PUKT was 35.21 (74.9%), and the median score was 36 (76.5%), with a cut-off score of 70% for satisfactory knowledge. B. Mean attitude score was 44.43 and median score 44. Max score is	LOE: Level 4 Strengths: large sample size Weaknesses: PIP practice not measured Feasibility: questionnaire to assess nurses' knowledge of both feasible and applicable Application: see above

Key: **BS** Braden Scale, **FREQ** frequent, **HAPI** hospital-acquired pressure injuries, **HAPU** hospital-acquired pressure ulcer, **ID** identification, **IMPL** implementation, **INDIV** individual, **INPT** inpatient, **LOE** levels of evidence, **NSG** nursing, **ORG** organization, **PI** pressure injury, **PIP** pressure injury prevention, **PIPM** Pressure Injury Predictive Model, **PRISMA** Preferred Reporting Items for Systematic Reviews and Meta-Analyses, **PTS** patients, **PU** pressure ulcer, **RQ** research question, **SR** systematic review, **SUBST** substantially

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
			those, 749 were complete.					
<p>Campoi et al., 2019</p> <p>Country: Brazil</p> <p>Funding: The authors have disclosed no potential conflicts of interest, financial or otherwise.</p> <p>Bias: participants were recruited (sample bias)</p>	<p>Stages of educational intervention based on the Method of the Arch (p. 1648)</p>	<p>Design: quasi-experimental study</p> <p>Method: Pre-test, educational intervention, posttest</p> <p>Purpose: to verify the effectiveness of educational intervention by assessing nurses' knowledge on pressure ulcer prevention measures</p>	<p>N = 95</p> <p>Demographics: Hospital nurses, avg 33.47years 12.6% had undergrad educ. 73.7% specialization training. 12.6% MSN. 1.1% PhD.</p> <p>Setting: teaching hospital in Brazil</p> <p>Exclusion: RNs who attended the educ intervention prev; those who did not complete educational intervention</p> <p>Attrition: 37 nurses</p>	<p>IV: educational intervention</p> <p>DV: knowledge assessment scores</p> <p>Intervention consisted of hybrid education: three face-to-face meetings, one per week, combined with interactive virtual learning environment – 12 hours classroom, 18 hours online learning (30 hrs total)</p>	<p>Data Collection: Sociodemographic data instrument, and the Pieper Knowledge Test (41-question tool)</p> <p>Data Dependability: Cronbach α coefficient was .92 for the 72-item test. The correlation coefficient between test and retest for 30 nurses was 0.81.</p>	<p>Statistical Tests Used: The data collected were compiled into an Excel spreadsheet and analyzed using SPSS, version 21.0. Descriptive statistics were used to design measures of central tendency, frequencies and dispersion for demographic variables. The student's t-test was used to compare avg of right answers before and after intervention.</p>	<p>Mean correct answers in the pre-test: 78.8%</p> <p>Mean correct answers in the posttest: 88.8% (p<0.001)</p>	<p>LOE: Level 4</p> <p>Strengths: moderate sample size</p> <p>Weakness: length of education is difficult for bedside nurses to comply with</p> <p>Feasibility: the length of the education is not feasible for the proposed project</p> <p>Application: the pre-test, education intervention, posttest design are applicable to the proposed project</p>
<p>Ebi et al., 2019</p> <p>Country: Ethiopia</p>	<p>Depth of Knowledge (DoK) Framework (inferred)</p> <p><i>And</i></p>	<p>Design: descriptive multicenter cross-sectional study design</p> <p>Methods: data was collected using structured two validated self-administered instruments</p>	<p>N = 212</p> <p>Demographics: 61.8% of the nurses were male. Mean age 28.2 years (range</p>	<p>Variables of interest were:</p> <p>Nurses' knowledge related to pressure ulcer prevention</p>	<p>Tools: Questionnaire with three parts: demographic characteristics, Pressure Ulcer Knowledge Test Tool (PUKT), a list of barriers to the</p>	<p>Statistical Tests Used: EPI data version 3.1 statistical package. SPSS version 20.0. Categorical</p>	<p>Outcomes: The mean score of nurses' knowledge about PUP was 43% (out of 100% possible).</p>	<p>LOE: Level 4</p> <p>Strengths: multi-center, cross-sectional study more generalizable; large sample size</p>

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
<p>Funding: The authors declare no conflicts of interest</p> <p>Bias: none stated or inferred</p>	Realistic Framework Model (inferred)	<p>of PU knowledge tests to assess nurses' knowledge</p> <p>Purpose: to assess nurses' knowledge and perceived barriers to pressure ulcer prevention in public hospitals in Wollega</p>	<p>21-54 yrs). The majority (69.8%) had a diploma in nursing. 71.2% had 5-10 yrs clinical nsg experience</p> <p>Setting: Five hospitals in Wollega</p> <p>Exclusion: none listed</p> <p>Attrition: 8 nurses</p>	Nurses' perception of barrier to care for pressure ulcer prevention	<p>implementation of PU prevention</p> <p>Validity/ Reliability:</p> <p>PUKT was validated for difficulty, discriminating index, and quality of response alternatives. The list of barriers were adapted from the literature and modified by the researchers.</p>	<p>variables were computed as frequencies and percentages. Continuous variables compiled as mean and standard deviation (<i>SD</i>). Statistical significance was set a $p < 0.05$.</p>	<p>Perceived barriers included: lack of staff/heavy workload (54.7%), shortage of pressure-relieving devices (55.2%), lack of training (51.9%), and lack of multidisciplinary initiative (47.6%)</p>	<p>Weakness: unusual number of male nurses</p> <p>Feasibility: administering three questionnaires is feasible</p> <p>Application: applicable to project and target institution</p>
<p>Gedamu et al., 2021</p> <p>Country: Ethiopia</p> <p>Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors</p>	Depth of Knowledge (DoK) Framework (inferred)	<p>Design: systematic review and meta-analysis</p> <p>Method:</p> <p>A systematic review of all of the cross-sectional studies on nurses' knowledge of the prevention of PU were reviewed based on PRISMA</p> <p>Purpose: to assess the overall level of nurses' knowledge about the</p>	<p>N = 1530 (from 6 studies)</p> <p>Demographics: All original, cross-sectional studies conducted only in Ethiopia in the English language</p> <p>Setting: Teaching and non-teaching hospitals in Ethiopia</p>	Evaluating the knowledge of hospital nurses regarding pressure ulcer prevention	<p>Tools: All of the studies used self-administered questionnaires to test the knowledge of nurses about PUP</p> <p>Validity/ Reliability:</p> <p>Studies used the PUKAT, which is valid and reliable</p>	<p>Statistical Tests Used:</p> <p>STATA version 11 statistical software. Based on heterogeneity between the studies, the data were analyzed using a random effects model.</p>	<p>Outcome: The overall knowledge of nurses' on PUP was 46.24% (95% CI: 26.63-65.85)</p>	<p>LOE: Level 1</p> <p>Strengths: the number of nurses increased the statistical significance of the findings</p> <p>Weakness: Ethiopian review, less generalizable to US nurses</p> <p>Feasibility: utilizing the PUKAT 2.0 to assess nurses'</p>

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
<p>Bias: publication bias was mentioned and tested using funnel plot asymmetry, Egger’s correlation test, and Begg-Mazumdar Rank correlation test</p>		prevention of pressure ulcers	<p>Exclusion: Research outside of Ethiopia</p> <p>Attrition: Of 352 studies identified, 346 were excluded based on inclusion and exclusion criteria</p>					<p>knowledge is very feasible</p> <p>Application: very applicable to the proposed project</p>
<p>Kennedy, 2023</p> <p>Country: USA</p> <p>Funding: The author received no specific grant or financial support for the research, authorship, or publication of the article.</p> <p>Bias: None disclosed or inferred.</p>	Methodological framework for QI project: Plan, Do, Study, Act (PDSA) cycle	<p>Design: PDSA QI pilot project</p> <p>Method: PI prevention education with pre- and post-knowledge intervention assessments</p> <p>Compliance with bundle documentation was also tracked</p> <p>Purpose: to increase nurses’ knowledge of PIP, to increase knowledge of the SSKIN bundle, and to pilot the use of the SSKIN bundle in a clinical setting</p>	<p>N = 6</p> <p>Demographics: 83.3% full-time RNs, 16.7% part-time RNs, 33.3% 16+ yrs experience, 33.3% 6-10 yrs experience, 16.7% 11-15 yrs experience, 16.7% 1-5 yrs experience</p> <p>Setting: inpatient rehab unit</p> <p>Attrition: none</p>	<p>Major Themes Studied: Utilization of AHRQ, IHI, and WOCN recommendations for PDSA implementation of PI prevention.</p>	<p>Tools: Lippincott Healthstream Pressure Injury Prevention Module and pre- and post- tests. Post-survey on the bundle pilot. AHRQ compliance checklist tool.</p> <p>Validity/Reliability: Psychometric testing results of the Lippincott surveys were not mentioned.</p>	<p>Statistical Tests Used: A general comparative analysis of the pre- and posttest answers was compiled on Excel spreadsheets for review. Quantitative methods were used to analyze completeness of documentation of SSKIN bundles over a 4-week implementation period</p>	<p>Average pre-education scores: 88.89%</p> <p>Post-education scores: 98.15%</p> <p>Documented compliance with all elements of the bundle was 77%</p> <p>After implementation of the skin bundle, zero new Stage 3 or Stage 4 HAPIs for two years</p>	<p>LOE: Level 5</p> <p>Strengths: utilized evidence-based tools provided by AHRQ, IHI</p> <p>Weaknesses: low sample size; surveys not psychometrically tested</p> <p>Feasibility: providing edu and testing via Healthstream is feasible</p> <p>Application: pre- and post- testing with an educational intervention is identical to the</p>

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
								target project – very applicable!
<p>Lin et al., (2020)</p> <p>Country: United States (8), Australia (1), United Kingdom (2), Saudi Arabia, Brazil, Argentina, Netherlands, and Turkey.</p> <p>Funding: School of Nursing and Midwifery seeding fund 2018, Griffith Univ, Australia</p> <p>Bias: No conflicts of interest to disclose</p>	PIPIM	<p>Design: Systematic review</p> <p>Method: 5 databases searched from 2000 – May 2018</p> <p>The study protocol was based on the Preferred Reporting Items for Systematic Reviews and Meta-analysis statement</p> <p>Purpose: To evaluate the effectiveness of PIP programs in the adult ICU population</p>	<p>N = 21 peer-reviewed papers</p> <p>Sample size varied from 78 – 399, with a median of 202</p> <p>Demographics: Adults ≥ 18yrs</p> <p>Setting: Hospital ICUs</p> <p>Attrition: none stated</p>	<p>IV: Content analysis was used to categorize program components. Implementation strategies were grouped into 6 classifications:</p> <ol style="list-style-type: none"> 1. Dissemination strategies 2. Implementation process strategies 3. Integration strategies 4. Capacity building strategies 5. Sustainability 6. Scale up strategies <p>DV: Outcome measures for PIP programs were divided into 3 categories:</p> <ol style="list-style-type: none"> 1. Pt outcomes 2. Care process outcomes 3. Organizational outcomes 	<p>Tools: Quality Improvement Minimum Quality Criteria Set (QIMQCS)</p> <p>Mixed Methods Appraisal Tool (MMAT)</p> <p>Validity/Reliability: The QIMQCS and MMAT are valid and reliable tools previously used in other research</p>	<p>Statistical Tests Used: Narratively summarized characteristics of the included papers; content analysis was conducted to analyze extracted data and finalized in tables.</p>	<p>The majority of the studies found a significant decrease in PI cumulative incidence and period prevalence. Statistical significance was listed case by case.</p> <p>Structured and multi-faceted approach to PIP has been shown to be effective</p>	<p>LOE: Level 6</p> <p>Strengths: Multi-country but mostly US – generalizable</p> <p>Weaknesses: Many of the studies had a before and after design – less rigorous LOE</p> <p>Feasibility: feasible to replicate in a QI project</p> <p>Application: included important concepts like sustainability and who is performing the tasks (ex. educ, audits, etc).</p>
<p>McLaughlin et al., 2022</p> <p>Country: USA</p>	Realistic Framework Model (inferred)	<p>Design: retrospective/prospective cohort study</p> <p>Method: retrospective data collection</p>	<p>N = 930 patients</p> <p>Demographics: Inpatients with a LOS longer than</p>	Major Themes Studied: Leadership initiatives included unit poster displays and informational flyers.	<p>Tools: surveys to ICU staff asking them to evaluate their knowledge before and after the educational/promotional sessions during the first</p>	<p>Statistical Tests Used: Statistical and cost analyses were performed</p>	<p>PI incidence pre-intervention: 37 (6%) Post-intervention: 7(2%) P=0.005</p>	<p>LOE: Level 4</p> <p>Strengths: large sample size</p> <p>Weaknesses: validity and</p>

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
<p>Funding: Institutional grant funding from the Univ of Texas</p> <p>Bias: None disclosed or inferred</p>		<p>(preintervention), a QI bundle focusing on PI prevention, visual tools, and staff/patient education was developed, and data were prospectively collected (postintervention)</p> <p>Purpose: to assess whether a QI bundle focusing on prevention is effective in reducing PI incidence, costs, and delaying PI onset</p>	<p>48 hrs and a BS 18 or less</p> <p>Setting: Academic tertiary ICU</p> <p>Attrition: not stated</p>	<p>Morning and evening training sessions to educate ICU staff on PIP. Study coordinator assessed compliance with protocol implementation via weekly rounds including reviewing education.</p>	<p>6 months of the prospective study. Staff were asked to identify barriers to protocol implementation and/or provide suggestions for optimization. A self-report questionnaire was provided for staff to document overall compliance with the protocol during the study duration.</p> <p>Validity/Reliability: there was no mention of psychometric testing</p>	<p>comparing both cohorts.</p> <p>Demographics - univariate statistics by means and SDs or counts and percentages. Differences btwn groups were assessed by Welch two-sample two-way t test and Mann-Whitney U test.</p>	<p>Predicted cost savings \$826,810</p> <p>Staff were compliant with the bundle 80% of the time</p>	<p>reliability of questionnaires and surveys unknown</p> <p>Feasibility: with leadership support, this QI project is feasible</p> <p>Application: results with reduced PI incidence and cost savings, strong selling point to hospital leadership</p>
<p>Porter-Armstrong et al., (2018).</p> <p>Country: UK, USA, Norway, Netherlands</p> <p>Funding: HSC Research and Development Division of the Public Health Agency (UK)</p> <p>Bias: performance bias and</p>	<p>Theoretical causal pathway and pressure ulcer conceptual framework</p>	<p>Design: systematic review of randomized control trials</p> <p>Method: systematic review using GRADE criteria in five databases of RCTs that evaluated the effect of educational intervention delivered to healthcare staff in any setting to prevent PUs</p> <p>Purpose: to assess the effects of educational interventions for hc professionals on PUP</p>	<p>N= 5 studies</p> <p>Demographics: hospitals and nsg homes</p> <p>Setting: hospital inpatient or outpatient depts, community clinics</p> <p>Exclusion: studies not RCTs, purpose of study not the focus of this SR</p>	<p>Interventions: <u>Education</u></p> <ul style="list-style-type: none"> - compared with no educ intervention - comparison of diff educ interventions <p>Primary Outcomes:</p> <ol style="list-style-type: none"> 1. Change in hc prof knowledge 2. Change in hc prof behavior 3. Incidence of new PUs 	<p>Tools: Pressure ulcer knowledge test developed for the study; Norton Scale to determine PI risk score</p> <p>Validity/Reliability: pressure ulcer knowledge test psychometric evaluation not stated; Norton scale valid and reliable (lots of literature on this scale)</p>	<p>Statistical Tests Used: Review Manager 5 for meta-analysis for continuous, dichotomous and ordinal data – represented in forest plots</p> <p>Continuous data: means, SD, overall mean difference, confidence interval</p>	<p>Outcome: Pts assoc with the training, monitoring, and observation group: 11.4% developed PI compared to control group: 18% Intervention group PI incidence: 11.4%, non-intervention group PI incidence: 10%</p>	<p>LOE: Level 1</p> <p>Strengths: evaluation of the studies by SR investigators, randomized control trials</p> <p>Weaknesses: risk of bias; included studies outside of hospital setting</p> <p>Feasibility: mixed, this SR covered different project types</p>

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Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	LOE; Application; Generalization
selective reporting			Attrition: 278 records initially screened, 5 finally selected			Ordinal data: proportional odds regression		Application: different educ modalities

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Appendix E
Synthesis Table

Study (Author, year)	Araujo et al., 2019	Aydin et al., 2019	Barakat-Johnson et al., 2018	Campoi et al., 2019	Ebi et al., 2019	Gedamu et al., 2021	Kennedy et al., 2023	Lin et al., 2020	McLaughlin et al., 2022	Porter-Armstrong et al., 2018
Design LOE	Longitudinal study LOE: 4	Cross-sectional, descriptive study LOE: 6	Cross-sectional, multi-site study LOE: 4	Quasi-experimental study LOE: 4	Descriptive study LOE: 4	SR and meta-analysis LOE: 1	QI Project LOE: 5	SR LOE: 1	Retrospective/prospective cohort study LOE: 4	SR LOE: 1
Sample										
<i>n subjects</i>	9	347	988	95	212	1530	6	78 -399 (median 202)	930	n/a
<i>Type of subject</i>	RNs	RNs	RNs	RNs	RNs	RNs	RNs	Patients	Patients and RNs	RNs, healthcare workers
<i>M-Age (years)</i>	36	unknown	not stated	33.47	28.2	not stated	not stated	not stated	59 (pts)	not stated
<i># studies (SR)</i>						6		21		5
Setting										
<i>Inpatient</i>	ICU	Wound Mgmt Congress	Multi-site, acute care and rehab hospital, community health centers	Teaching hospital	Public hospitals	Teaching hospitals	Rehab Unit in hospital	Multi-site, ICU	ICU	Hospitals, community clinics, homes, nursing homes

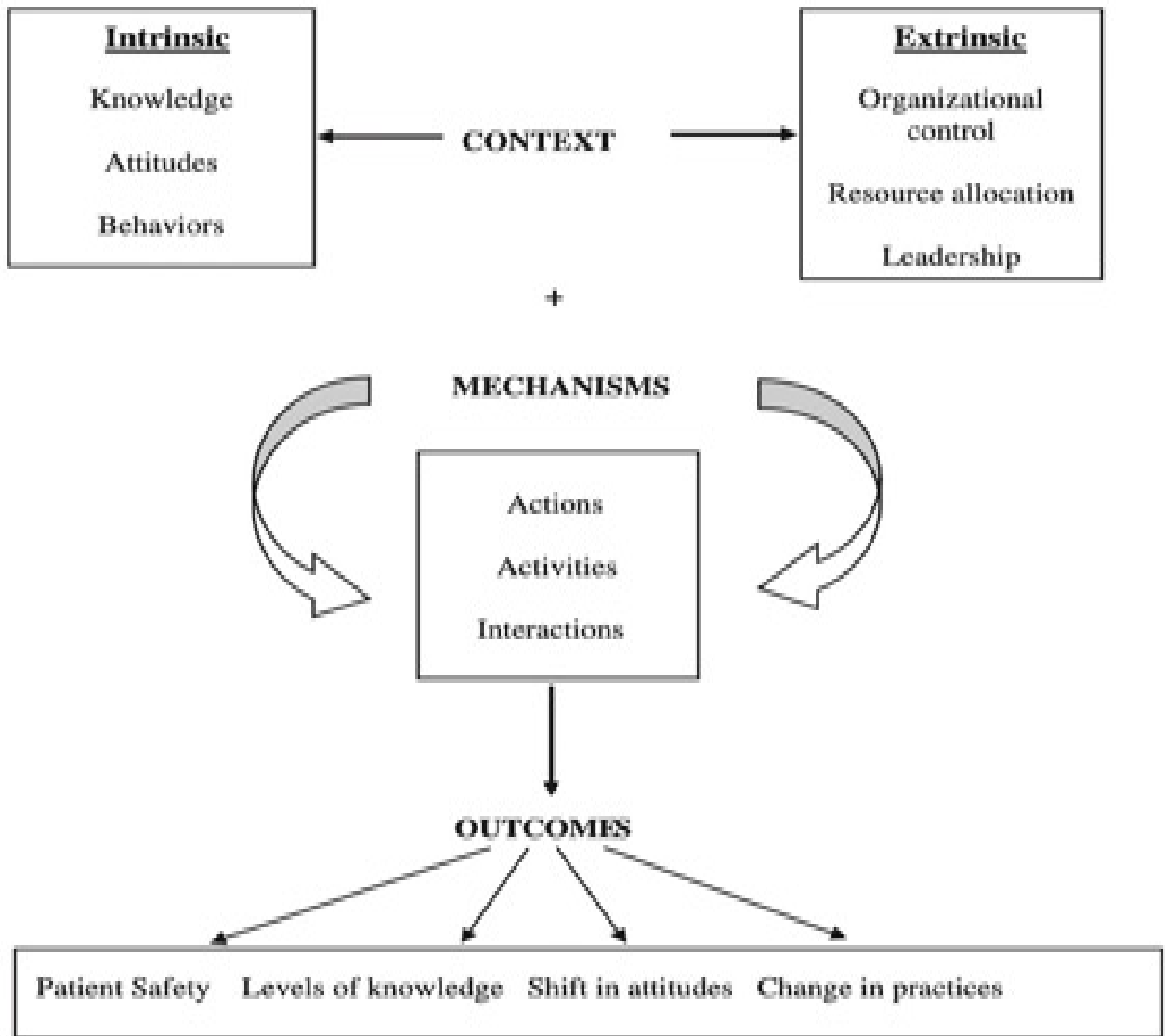
Key: **ALT** adult learning theory **AHRQ** Agency for Healthcare Research and Quality **CLASS** PI classification **CONTRA** nursing care that is contraindicated in the prevention of PI **DBR** questionnaire developed by the researchers **DOK** Depth of Knowledge Framework **EDUC** patient education **ETIOL** PI etiology **FREQ** frequency of position changes **LOE** level of evidence **M-Age** Mean Age **MOA** Method of the Arch **NC** no change **NUTR** nutrition **PDSA** plan do study act cycle **PI** Pressure injury **PIP** pressure injury prevention **PIPM** pressure injury prevention model **PU** Pressure Ulcer **PUKT** Pressure Ulcer Knowledge Test **PUKAT** Pressure Ulcer Knowledge Assessment Tool **QI** Quality Improvement **RFM** Realistic Framework Model **RISK** risk-assessments **SR** Systematic Review **SSS** support surface selection **TCP** theoretical causal pathway and pressure ulcer conceptual framework **TOP** topical skin protectants

Study (Author, year)	Araujo et al., 2019	Aydin et al., 2019	Barakat-Johnson et al., 2018	Campoi et al., 2019	Ebi et al., 2019	Gedamu et al., 2021	Kennedy et al., 2023	Lin et al., 2020	McLaughlin et al., 2022	Porter-Armstrong et al., 2018
Interventions										
<i>Knowledge test</i>	PUKT	DBR	PUKT	Pieper Knowledge Test	PUKT	PHUKET	AHRQ test		DBR	DBR
<i>Educational intervention</i>	√			√			√	√	√	√
<i>Educ type</i>	online			hybrid			hybrid, printed and online	e-learning, in-person training	in-person training	didactic, video, e-learning
Outcomes/Themes										
<i>Greatest areas of knowledge</i>	PIP	CLASS, TOP	RISK	EDUC	NUTR	not stated	not stated	not stated	not stated	not stated
<i>Weakest areas of knowledge</i>	TOP	FREQ, SSS	FREQ	CONTRA	ETIOL, CLASS, PIP	PIP	NUTR	not stated	not stated	CLASS
<i>Correlation btwn educ intervention and knowledge</i>	↑			↑			↑			↑
<i>Attitudes</i>	↑		↑	↑			↑			
<i>PI incidence</i>	NC							↓	↓	↓
<i>Theoretical framework</i>	ALT	DOK	RFM	MOA	DOK	DOK	PDSA	PIPM	RFM	TCP

Key: **ALT** adult learning theory **AHRQ** Agency for Healthcare Research and Quality **CLASS** PI classification **CONTRA** nursing care that is contraindicated in the prevention of PI **DBR** questionnaire developed by the researchers **DOK** Depth of Knowledge Framework **EDUC** patient education **ETIOL** PI etiology **FREQ** frequency of position changes **LOE** level of evidence **M-Age** Mean Age **MOA** Method of the Arch **NC** no change **NUTR** nutrition **PDSA** plan do study act cycle **PI** Pressure injury **PIP** pressure injury prevention **PIPM** pressure injury prevention model **PU** Pressure Ulcer **PUKT** Pressure Ulcer Knowledge Test **PUKAT** Pressure Ulcer Knowledge Assessment Tool **QI** Quality Improvement **RFM** Realistic Framework Model **RISK** risk-assessments **SR** Systematic Review **SSS** support surface selection **TCP** theoretical causal pathway and pressure ulcer conceptual framework **TOP** topical skin protectants

Appendix F

Realistic Framework Model

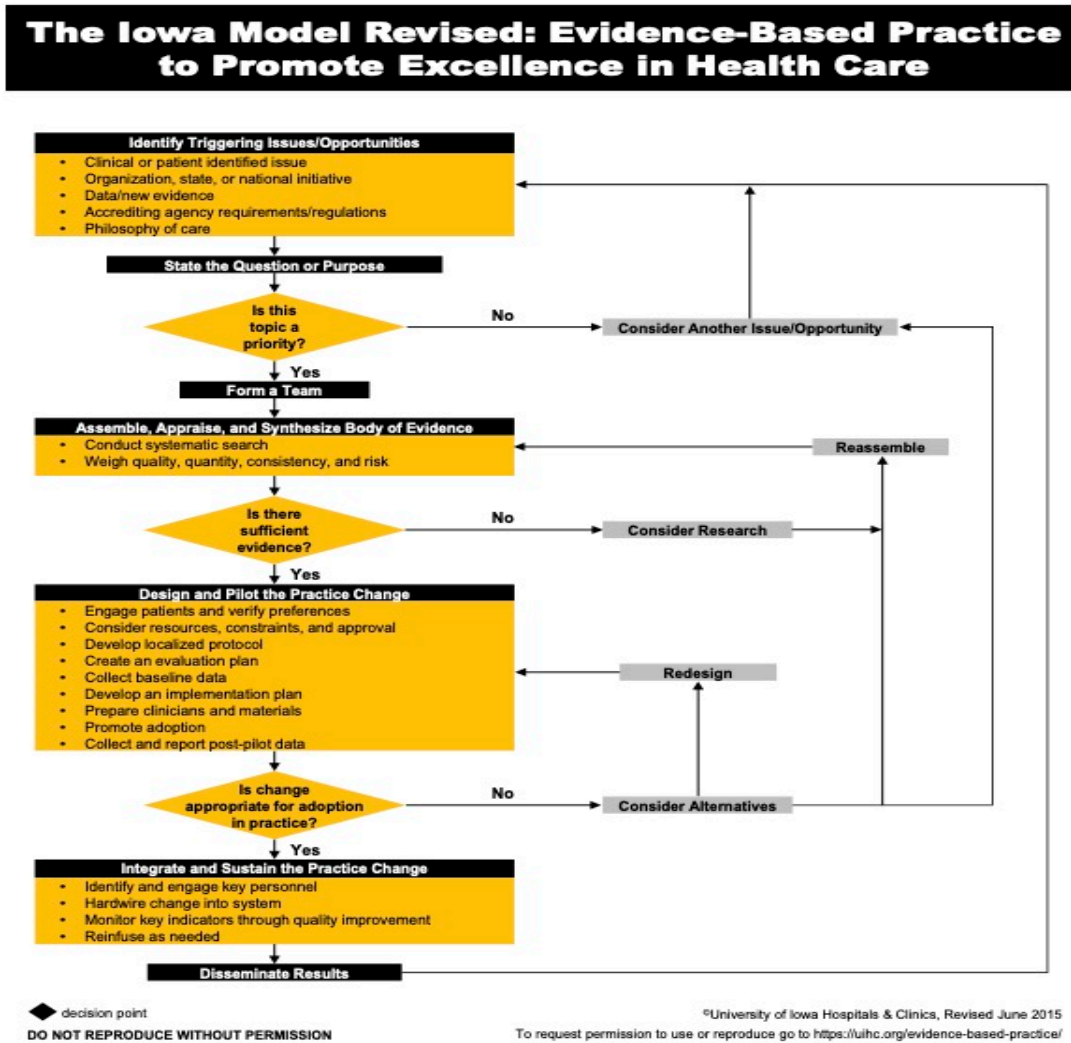


From “Pressure Injury Prevention and Management Practices Among Nurses: A Realistic Case Study,” by C.S.M. Teo, C.A. Claire, V. Lopez, & S. Shorey, 2019, *International Wound Journal*, 16(1), p. 155 (<https://doi.org/10.1111/iwj.13006>). Copyright 2019 by John Wiley & Sons Ltd.

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Appendix G

Implementation Framework - The Iowa Model-Revised



From “Iowa Model of Evidence-Based Practice: Revisions and Validation,” by K.C. Buckwalter, L. Cullen, K. Hanrahan, C. Kleiber, A.M. McCarthy, B. Rakel, V. Steelman, T. Tripp-Reimer, & S. Tucker, 2017, *Worldviews on Evidence-Based Nursing*, 14(3), p. 178 (<https://doi.org/10.1111/wvn.12223>).

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Appendix H**Timeline**

Pre-Intervention Period	Intervention Period	Intermission	Post-Intervention Assessment Period
9/3/23 - 9/16/23	9/17/23 - 9/30/23	10/1/23 - 10/14/23	10/15/23 - 10/28/23
2 weeks	2 weeks	2 weeks	2 weeks

HAPI Comparison
10/1/23 - 12/31/23
10/1/22 - 12/31/22

Appendix I

Pressure Injury Knowledge Assessment Tool 2.0

Theme 1: Etiology and development

1. Which statement is correct?

- a. Malnutrition causes pressure ulcers.
- b. A lack of oxygen causes pressure ulcers.
- c. Moisture causes pressure ulcers.

2. Extremely thin patients are more at risk of developing a pressure ulcer than obese patients.

- a. True, the contact area involved is small and thus the amount of pressure is higher.
- b. False, the pressure is less extensive because the body weight of those patients is lower than the body weight of obese patients.
- c. False, the risk of developing a vascular disorder is higher for obese patients. This increases the risk of developing a pressure ulcer.

3. What happens when a patient, sitting in bed in a semi-upright position (60°), slides down?

- a. Pressure increases when the skin sticks to the surface.
- b. Friction increases when the skin sticks to the surface.
- c. Shearing increases when the skin sticks to the surface.

4. Which statement is correct?

- a. Soap can dehydrate skin and thus the risk of pressure ulcers is increased.
- b. Moisture from urine, feces, or wound drainage causes pressure ulcers.
- c. Shear is the force which occurs when the body slides and the skin sticks to the surface.

5. Which statement is correct?

- a. Recent weight loss, which has brought a patient below his or her ideal weight, increases the risk of pressure ulcers.
- b. Very obese patients using medication that decreases the peripheral blood circulation are not at risk of developing pressure ulcers.
- c. Poor nutrition and age have no impact on tissue tolerance when the patient has a normal weight.

6. There is NO relationship between pressure ulcer risk and:

- a. Age
- b. Dehydration
- c. Hypertension

Theme 2: Classification and observation

1. Which statement is correct?

- a. A pressure ulcer extending down to the fascia is a stage 3 pressure ulcer.
- b. A pressure ulcer extending through the underlying fascia is a stage 3 pressure ulcer.
- c. A stage 3 pressure ulcer is always preceded by a stage 2 pressure ulcer.

2. Which statement is correct?

- a. A blister on a patient's heel is always a pressure ulcer of stage 2.
- b. All stages (1, 2, 3, and 4) of pressure ulcers involve loss of skin layers.
- c. When necrosis occurs, it is a stage 3 or a stage 4 pressure ulcer.

3. Which statement is correct?

- a. Friction or shear may occur when moving a patient in bed.
- b. A superficial lesion, preceded by non-blanchable erythema is probably a friction lesion.
- c. A kissing ulcer (copy lesion) is caused by pressure and shear.

4. In a sitting position, pressure ulcers are most likely to develop on:

- a. Pelvic area, elbow, and heel
- b. Knee, ankle, and hip
- c. Hip, shoulder, and heel

5. Which statement is correct?

- a. All patients at risk of pressure ulcers should have a systematic skin inspection once a week.
- b. The skin of patients seated in a chair, who cannot move themselves, should be inspected every two to three hours.
- c. The heels of patients who lie on a pressure-redistributing surface should be observed at a minimum daily.

Theme 3: Risk assessment

1. Which statement is correct?

- a. Risk assessment tools identify all high-risk patients in need of prevention.
- b. The use of risk assessment scales reduces the cost of prevention.
- c. A risk assessment scale may not accurately predict the risk of developing a pressure ulcer and should be combined with clinical judgement.

2. Which statement is correct?

- a. The risk of pressure ulcer development should be assessed daily in all nursing home patients.
- b. Absorbing pads should be placed under the patient to minimize the risk of pressure ulcer development.
- c. A patient with a history of pressure ulcers runs a higher risk of developing new pressure ulcers.

Theme 4: Nutrition

1. Which statement is correct?

- a. Malnutrition causes pressure ulcers.
- b. The use of nutritional supplements can replace expensive preventive measures.
- c. Optimizing nutrition can improve the patients general physical condition which may contribute to a reduction of the risk of pressure ulcers.

Theme 5: Preventive measures to reduce the amount of pressure/shear

1. The sitting position with the lowest contact pressure between the body and the seat is:

- a. An upright sitting position, with both feet resting on a footrest.
 - b. An upright sitting position, with both feet resting on the floor.
 - c. A backwards sitting position, with both legs resting on a footrest.
- 2. Which repositioning scheme reduces pressure ulcer risk the most?**
- a. Supine position–side 90° lateral position–supine position–90° lateral position–supine position–...
 - b. Supine position–side 30° lateral position–side 30° lateral position–supine position–...
 - c. Supine position–side 30° lateral position–sitting position–30° lateral position–supine position–...
- 3. Which statement is correct?**
- a. Patients who are able to change position while sitting should be taught to shift their weight at a minimum every 60 minutes while sitting in a chair.
 - b. In a side-lying position, the patient should be at a 90° angle with the bed.
 - c. Shearing forces affect a patient's sacrum maximally when the head of the bed is positioned at 30°.
- 4. If a patient is sliding down in a chair, the magnitude of pressure at the seat can be reduced the most by:**
- a. A thick air cushion
 - b. A donut shaped foam cushion
 - c. A gel cushion
- 5. For a patient at risk of developing a pressure ulcer, a visco-elastic foam mattress...**
- a. Reduces the pressure sufficiently and does not need to be combined with repositioning.
 - b. Has to be combined with repositioning every 2 hours.
 - c. Has to be combined with repositioning every 4 hours.
- 6. A disadvantage of a water mattress is:**
- a. Shear at the buttocks increases.
 - b. Pressure at the heels increases.
 - c. Spontaneous small body movements are reduced.
- 7. When a patient is lying on a pressure-reducing foam mattress...**
- a. Elevation of the heels is not necessary.
 - b. Elevation of the heels is important.
 - c. He or she should be checked for "bottoming out" at least twice a day.

Theme 6: Preventive measures to reduce the duration of pressure/shear

- 1. Repositioning is an accurate preventive method because...**
 - a. The magnitude of pressure and shear will be reduced.
 - b. The amount and the duration of pressure and shear will be reduced.
 - c. The duration of pressure and shear will be reduced.
- 2. Fewer patients will develop a pressure ulcer if...**
 - a. Food supplements are provided.
 - b. The areas at risk are massaged.
 - c. Patients are mobilized.

3. Which statement is correct?

- a. Patients at risk lying on a non-pressure-reducing foam mattress should be repositioned every two hours.
- b. Patients at risk lying on an alternating-pressure air mattress should be repositioned every 4 hours.
- c. Patients at risk lying on a visco-elastic foam mattress should be repositioned every 2 hours.

4. When a patient is lying on an alternating-pressure air mattress, the prevention of heel pressure ulcers includes:

- a. No specific preventive measures
- b. A pressure-reducing cushion under the heels
- c. A cushion under the lower legs elevating the heels

5. If a bedridden patient cannot be repositioned, the most appropriate pressure ulcer prevention is:

- a. A pressure-redistributing foam mattress
- b. An alternating pressure air mattress
- c. Local treatment of the risk areas with zinc oxide paste

From "Pressure Ulcer Prevention: Development and Psychometric Validation of a Knowledge Assessment Instrument," by D. Beeckman, K. Vaderwee, L. Demarré, L. Paquay, A. Van Hecke, & T. Defloor, 2010, *International Journal of Nursing Studies*, 47, p. 407-408. (<https://doi.org/10.1016/j.ijnurstu.2009.08.010>). Copyright 2009 by Elsevier Ltd. Reprinted with permission.

Appendix J**Instructions for Generating a Participant ID**

Pressure Injury Prevention Education Survey—Initial Assessment

1

Participant ID: _____

Date: _____

Generate a Participant ID

A unique ID is needed to match a participant's initial assessment with their final assessment. Please follow these steps to generate a participant ID.

1. Note the *two* digits representing the day of the month when you were born. (e.g., born May 4; note "04")
2. Note the *four* digits representing the year of your high school graduation. (e.g., graduated 1987; note "1987")
3. Generate your participant ID by placing these numbers together. ("041987" using the examples above)
4. Enter your participant ID at the top of this page.

Appendix K
Permission Letter

June 28, 2023

Maria Gonzales, MSN, RN, CWCN, CCRN
Crystelle Johnson, BSN, RN, CWOCN
[REDACTED]

RE: Scholarly EBP Initiative
Pressure Injury Prevention and Education

Dear Maria:

Thank you for your submission of the above-referenced project summary. The [REDACTED] Network Research, EBP, Development and Innovation Council has reviewed your project and endorsed for EBP Initiative without IRB requirement.

The Council is interested in the results of your project. When your project is completed, please reach out to me to schedule a time to present your project with results to the REDI Council. If you have any questions, please contact me.

Sincerely,

Jackie Figueras

Jackie Figueras, MSN-Ed, RN, NEA-BC, NPD-BC, CPC
Network Director of Professional Practice
[jfigueras@\[REDACTED\].com](mailto:jfigueras@[REDACTED].com)

Appendix L

IRB Exemption



APPROVAL: EXPEDITED REVIEW

[Tammy Tyree](#)

EDSON: DNP

-

Tammy.Tyree@asu.edu

Dear [Tammy Tyree](#):

On 8/10/2023 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Pressure Injury Prevention and Education
Investigator:	Tammy Tyree
IRB ID:	STUDY00018332
Category of review:	(5) Data, documents, records, or specimens (7)(a) Behavioral research (7)(b) Social science methods
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Consent Informational Letter 2023-08-05, Category: Consent Form; • Data Usage Agreement, Category: Other; • IRB Social Behavioral Protocol Pressure Injury Prevention Education 2023-08-12, Category: IRB Protocol; • Recruitment Material, Category: Recruitment Materials; • Supporting documents 2023-08-12, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB approved the protocol effective 8/10/2023. Continuing Review is not required for this study.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Maria Gonzales

Appendix M

Data Usage Agreement

Proposed Data Use Arrangement - Summary for Executive Data Governance Committee

This form shall be completed and submitted to the Executive Data Governance Committee for the approval of any data use arrangement where HonorHealth will share its data with an independent organization for purposes that do not directly involve ██████████ or are outside of a collaboration with ██████████. This form does not need to be completed or submitted for approval for any proposed data use arrangement outlined in Appendix 1 of this document.

1. Description of Other Party (the "Company")

Company name: Arizona State University (ASU)

Is Company organized in the United States? Yes No

Type of business: For-profit Nonprofit charitable 501(c)(3) Nonprofit (but not 501(c)(3))

Has HonorHealth worked with this Company before? Yes No

If yes, describe: previous evidence-based practice and quality improvement projects

2. Purpose(s) of Proposed Data Arrangement:

Explain purposes and check each item that is applicable, below: to determine if educating nurses and patient care technicians on an ortho-spine unit will decrease hospital-acquired pressure injuries (HAPI) incidents

- ██████████ product or service development
- The Company's product or service development
- Other (third party's) product or service development
- Help ██████████ gain experience with analyzing its own data (internal use)
- General marketing of ██████████ services to the public
- Targeted marketing to specific patients by ██████████
- Targeted marketing of non-██████████ goods/services to patients by the Company or a third party
- Marketing to physicians by Company or other third party
- Marketing to ██████████ employees

3. Population(s) Whose Data will be Collected and/or Used (check each item that may apply)

- ██████████ patients (if this will be a subset of patients—for example, based on a particular diagnosis, procedure or discharge plan—please explain): de-identified HAPI data for specified periods 9/17/22 - 12/17/22 compared with 9/17/23 - 12/17/23 including age, sex, contributing factors to pressure injury, location of the wound, description of the wound, and Braden scale score at time of injury on L3 ortho-spine unit.
- ██████████ employees
- ██████████ medical staff members

Proposed Data Use Arrangement - Summary for Executive Data Governance Committee

Innovation Care Partners (ICP) Participants

4. Individual's Consent (check any that apply)

- Individual will consent to data use on a form that is comprehensible and explicit about uses of data
- Individual will consent but form allows for the use of data for purposes that are not clearly specified
- There will be no individual consent for data collection and use but the data are not sold or given to third parties other than the Company
- There will be no individual consent for data collection and the data will be shared with or sold to additional third parties

5. Data elements (to be collected and/or used)

How many individuals' data would be included (state approximate number or range)? ~10

Is PHI included? Yes No

If PHI is included, are data elements within the definition of a "Limited Data Set"¹? Yes No

Would data be de-identified? Yes No

If yes (de-identified), which method of de-identification? Safe harbor method Expert opinion method

If deidentified, who would perform the de-identification? ██████████ The Company Other

Is any aspect of patient's diagnosis included (such as test results or actual diagnosis)? Yes No

Is any aspect of patient's treatment details included? Yes No

Is genetic or genomic information included? Yes No

Are images included (e.g., CT, MRI)? Yes No

Would the data set include elements such as age, height, weight, or physical description? Yes No

Would the data set include race, ethnicity, sex, or gender? Yes No

Would the data set include the individual's location or any element of an address? Yes No

Would the data set include any individual contact information (phone, e-mail, etc.)? Yes No

6. Safeguards:

Will Company agree not to contact patients? Yes No

¹ See Appendix 2

Proposed Data Use Arrangement - Summary for Executive Data Governance Committee

Will Company agree not to identify or attempt to identify patients? Yes No

Will Company agree not to combine or allow others to combine data with other data to identify patients? Yes No

Have the Company's security posture/protocols been reviewed and approved the [redacted] Information Security Department? Yes No

7. Compensation or Cost Reimbursement

Will Company reimburse [redacted]'s incremental costs? Yes No

Will Company reimburse [redacted]'s fully allocated costs? Yes No

Other proposed compensation, if applicable: _____

Will proposed compensation be unrelated business income (check with HH Finance team) Yes No

Proposed Data Use Arrangement - Summary for Executive Data Governance Committee

Appendix 1: Proposed data use arrangements that do not need to be referred to the [redacted] Executive Data Governance Committee (but may be referred to the Committee if they present novel questions)

Data research (1) that is Institution Research Board (IRB) approved, (2) that includes one or more bona fide scientific questions, (3) the results of which will lead to generalizable knowledge, (4) the results of which may be published by [redacted] and its research investigators, and (5) that is registered on clinicaltrials.gov.

Data contributed to a collaborative research project (or a data registry operated by) a charitable 501(c)(3) exempt nonprofit or public (governmental) entity that will also permit use of the project or registry data (which may be aggregated data) by [redacted] without a charge to [redacted] or for a cost-based fee

Data shared under a standard [redacted] Data Use Agreement with a charitable 501(c)(3) exempt nonprofit or public (governmental) entity if (1) approved by the Legal Department, (2) the protocol for which includes one or more bona fide scientific questions, and (3) the results of which will lead to generalizable knowledge

Proposed Data Use Arrangement - Summary for Executive Data Governance Committee**Appendix 2: Limited Data Set**

A Limited Data Set cannot include any of the following identifiers of the individual who is the subject of the Protected Health Information, or of relatives, employers or household members of the individual:

(i) Names; (ii) Postal address information, other than town or city, State, and zip code; (iii) Telephone numbers; (iv) Fax numbers; (v) Electronic mail addresses; (vi) Social security numbers; (vii) Medical record numbers; (viii) Health plan beneficiary numbers; (ix) Account numbers; (x) Certificate/license numbers; (xi) Vehicle identifiers and serial numbers, including license plate numbers; (xii) Device identifiers and serial numbers; (xiii) Web Universal Resource Locators (URLs); (xiv) Internet Protocol (IP) address numbers; (xv) Biometric identifiers, including finger and voice prints; and (xvi) Full face photographic images and any comparable images.

Appendix N
Project Budget

Phase	Expense Item	Expense	Cash Expense	In-Kind Support	Savings
Pre-Test	Personnel: Investigator & co-investigator time to deliver questionnaires, explain project, collect questionnaires	~6 hours \$50/hr: \$300		\$300 (100%)	
		RN \$12.50 each x38: \$475 PCT \$5 X14: \$70 Supervisor \$15x4: \$60			
	Personnel: 15-min per person to review & complete forms	Director \$20x1: \$20		\$625 (100%)	
	Supplies: Questionnaire packet – 5-pages including PUKAT 2.0 questionnaire (3 pgs), demographics (1 pg), consent (1 pg)	0.10/page X5 X60: \$30		\$30 (100%)	
	Supplies: Box to collect completed forms	\$5 each X2: \$10		\$10 (100%)	
	Supplies: Pens	0.41/each X60: \$24.60	\$24.60		
	Advertising: Informational flyers	\$2/page X4: \$8		\$8 (100%)	
	Food: Coffee	\$20/traveler X4: \$80	\$80		
	Food: Pastries	~\$15 X4: \$60	\$60		
	Education	Personnel: Investigator, co-investigator, Nurse Educator, 4 bedside nurses	~20 hrs total \$50/hr: \$1000		\$1000 (100%)
		RN \$8.33 each x38: \$316.67 PCT \$3.33 X14: \$46.67 Supervisor \$6.67x4: \$26.67			
Personnel: 10-min per person to review education		Director \$13.33x1: \$13.33		\$403.34 (100%)	
Supplies: Educational brochures 5 full pages, dbl-sided, color glossy		\$10 ea X60: \$600		\$600 (100%)	
Food: Coffee		\$20/traveler X4: \$80	\$80		
Food: Pastries		~\$15 X4: \$60	\$60		
Food: Pizza		4 Pizzas: ~\$100 x2 \$200	\$200		
Food: Soda		\$5 for 12 cans X2 \$10	\$10		
Food: Candy & Snacks for roving education		\$100	\$100		

Phase	Expense Item	Expense	Cash Expense	In-Kind Support	Savings
Post-Test	Personnel: Investigator & co-investigator time to deliver questionnaires, explain project, collect questionnaires	~6 hours \$50/hr: \$300		\$300 (100%)	
	Personnel: 15-min per person to review & complete forms	RN \$12.50 each x38: \$475 PCT \$5 X14: \$70 Supervisor \$15x4: \$60 Director \$20x1: \$20		\$625 (100%)	
	Supplies: Questionnaire packet -- 4-pages including PUKAT 2.0 questionnaire (3 pgs), consent (1 pg)	0.10/page X4 X60: \$24		\$24 (100%)	
	Supplies: 2 Post-tests with answers & rationales to be posted in break room and bathroom	0.10/page X10 pgs X2: \$2		\$2 (100%)	
	Food: Coffee	\$20/traveler X4: \$80	\$80		
	Food: Pastries	~\$15 X4: \$60	\$60		
	Supplies: Box to collect completed forms	\$5 each X2: \$10		\$10 (100%)	
	Supplies: Pens	0.41/each X60: \$24.60	\$24.60		
	Savings: Cost savings for one pressure injury prevented				\$ 10,708
	Total Expenses		\$4,716.54	\$779.20	\$3,937.34

Total cost \$4,716.54 minus total saved for one pressure injury avoided \$10,708 equals a savings of \$5991.46 by the target organization for this project.

Total cost for each patient with a pressure injury \$10,708 - \$14,506 inpatient - not covered by Medicare (Padula & Delarmente, 2019).

Coloplast is donating the educational booklets (\$600 in savings).