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California State University, Los Angeles

NURSES AND CERTIFIED NURSING ASSISTANTS BRIDGE THE PRESSURE INJURY
RESEARCH PRACTICE GAP IN LONG-TERM CARE

A DOCTORAL PROJECT

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DOCTOR OF NURSING PRACTICE

By

Tara Frazier

Doctoral Project Committee Approval:

Ahlam Jadalla, PhD, RN, Team Leader
Kholoud Khalil, PhD, RN, Team Member

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Author Note

Tara Frazier -  <https://orcid.org/0000-0002-5775-6912>
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ABSTRACT

Pressure injuries (PI) remain a common problem among geriatric residents in long-term care facilities (LTCF). More than 95% of PIs can be avoided, yet the prevalence of PIs in LTCFs is up to 32%. Implementing pressure injury clinical guidelines (PICG) into practice can reduce PIs. Nurses and certified nursing assistants (CNA) in LTCFs show inadequate knowledge of PIs and PI prevention. This quality improvement project addresses the lack of standardized PI training and adherence to PICGs in an LTCF in southern California. The purpose of this project was to develop and explore the impact of a PI educational workshop and PI prevention bundle to increase knowledge and improve adherence to PICGs. The educational workshop targeted licensed vocational nurses (LVN), registered nurses, and CNAs. The primary goal of this project was to prevent facility-acquired pressure injuries. This project used a pre-post-test design, which measured nurses' and CNAs' PI prevention knowledge. Using the Plan-Do-Study-Act model, a one-hour educational PI workshop and a PI prevention bundle were developed and implemented to guide evidence-based care. The results showed that facility-acquired PIs remained at zero throughout the project implementation. A paired sample *t*-test of pre-and post-knowledge showed a statistically significant increase in knowledge scores in all groups ($t= 8.16, p < .001$). PI education workshops combined with a PI prevention bundle can bridge PICGs into practice and prevent new occurrences of PIs. The literature on educating CNAs and LVNs on PICGs is scant, and further research is needed on PI prevention and PICG implementation in LTCFs.

Keywords: pressure Injury/ulcer, prevention, education, long-term care/nursing home, guidelines, bundle, geriatric, training, nurses, and certified nursing assistants

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Background

Most pressure injuries (PI) are preventable. Yet, PIs continue to be a common problem among geriatric residents in Long Term Care Facilities (LTCF). It is estimated that more than 95% of PIs can be prevented with proper prevention methods, yet the prevalence of PIs in LTCFs is up to 32.4% (Anthony & Safari, 2019; Centers for Medicare and Medicaid Services; [CMS], 2016; (European Pressure Ulcer Advisory Panel [EPUAP], National Pressure Injury Advisory Panel [NPIAP], Pan Pacific Pressure Injury Alliance [PPPIA], 2019). PIs affect an estimated 2.5 million patients, and 60,000 patients die each year from complications related to PIs in the United States (U.S.) (Agency for Health Care and Research and Quality; [AHRQ], 2014).

Geriatric residents (65 years and older) in LTCFs are especially vulnerable to PIs due to multiple risk factors and other age-related skin changes. PIs cause morbidity and mortality for geriatric patients LTCFs. The mortality rate among patients with PIs is 9% higher than for patients without these injuries (Amon, 2019). PIs can cause several adverse effects, including pain, psychological distress, a decline in autonomy, infection, reduced quality of life, and extended length of stay in the hospital (De Los Santos, 2021). In addition to poor quality of life, PIs pose a significant financial burden on healthcare globally. In the U.S, the cost of care associated with PIs is estimated to be between \$11.6 to \$26.8 billion annually, with individual care costs ranging from \$20,900 to \$151,700 per PI (AHRQ, 2014; NPIAP, 2021).

Previously referred to as pressure ulcers, PIs are localized damage to the skin and/or underlying tissue due to pressure combined with shear (NPIAP, 2022). PIs usually occur on bony prominences, such as the sacrum or heel, or are related to a medical device (NPIAP, 2022). PI

risk increases with immobility, incontinence, poor nutrition, moisture, and chronic illness. A facility-acquired pressure injury (FAPI) is a PI that develops after admission to an LTCF.

The burden of PIs is so significant that regulatory bodies have set benchmarks or financial penalties if residents develop FAPIs (Gunningberg et al., 2015). In 2008, CMS announced it would no longer pay for costs incurred for PIs that developed in the acute care setting. Although this policy has not been implemented in Long Term Care (LTC), significant penalties may occur in the form of federal deficiencies, fines, or a lower-quality star rating. In LTC, PIs are a quality indicator measured and reported through a Minimum Data Set (MDS). The LTC MDS is a standardized screening and assessment tool used as a comprehensive assessment for all residents in LTCFs. The comprehensive resident assessment data are completed at routine intervals and submitted to CMS for quality indicator reporting, billing, and PI prevalence data. CMS requires all LTCFs to submit resident risk assessment data on admission, quarterly, change or condition, and at discharge. Each LTCF is required to report PI quality measures as directed by the Improving Medicare Post-Acute Care Transformation Act. The reporting of quality PI indicator data is public record and is viewable on the CMS Nursing Home Compare website.

LTCFs are also known as nursing homes (NH), skilled nursing facilities, or long-stay institutions. The population in LTCFs typically includes individuals aged 65 or older who require skilled nursing care and assistance with daily living activities. Geriatric individuals experiencing cognitive impairment, chronic illness, or mobility limitations may require an extended or indefinite stay in an LTCF. Geriatric residents in LTCFs are at higher risk for FAPIs due to multiple risk factors and other age-related skin changes. The care rendered in LTCFs is primarily from licensed vocational nurses (LVN) and Certified Nursing Assistants (CNA). LVNs usually

work under the direct supervision of Registered Nurses (RN). CNAs are frontline healthcare workers who play a critical role in PI prevention (PIP) and spend twice as much time with patients as nurses (CMS, 2022). LVNs and CNAs are the backbones of LTCFs and carry out most PIP interventions.

The Joint Commission on Accreditation of Healthcare Organizations and CMS use PI clinical guidelines (PICG) to evaluate PIP and PI treatment in LTCFs. PIP and the implementation of clinical guidelines in LTC are challenging due to various factors. They include budget constraints, understaffing, high turnover, limited staff knowledge, and limited access to advanced technologies (Demarr et al., 2012; Donoghue, 2009; Harrington et al., 2020). The Coronavirus pandemic exacerbated these known issues and created a multitude of new challenges, such as prolonged patient isolation and limited staff exposure (Polancich et al., 2021). Limiting family and caregiver interaction during the COVID-19 pandemic may have also decreased on-time repositioning and created a lack of communication between the clinical team and families on behalf of the patients (Polancich et al., 2021). Individuals diagnosed with COVID-19 are almost twice as likely to develop a PI (Montgomery et al., 2022; NPIAP, 2022).

Despite being the primary caretakers, nurses and CNAs in LTCFs may have inadequate knowledge of PI and PIP. The quality of care a resident receives is directly related to the knowledge and competency of the clinical staff working in LTC (Manderlier et al., 2017). Successful implementation of PICGs into practice requires nurses and CNAs to be knowledgeable. Staff education to enhance knowledge is fundamental in fostering adherence to evidence-based PICGs and improving care. Preventing PIs requires knowledge, competency, and adherence from all frontline caregivers – LVNs, RNs, and CNAs.

Problem Statement

A concern was raised in a 98-bed LTCF in Southern California related to an increase in FAPIs during the Coronavirus pandemic. PI prevalence at this LTCF was 8.9% in long-stay high-risk residents, higher than the California average of 7.4% (CMS, 2022), supporting the need to consistently implement PICGs and improve knowledge and adherence to risk reduction PI practices. Knowledge gaps and lack of standardized PI training for CNAs and nurses were identified and contributed to poor adherence to PIP protocols. PI education and training are lacking in LTCFs, and it is important to understand baseline knowledge to identify opportunities for improvement. Thus, this project addresses the need for adherence to PICGs and standardized PIP education training for nurses and CNAs in LTC.

Additional concerns were identified related to the improper use of support surface pressure redistribution devices. The staff at the project facility (PF) demonstrated a knowledge gap regarding the proper use of low air loss (LAL) support surfaces regarding appropriate linen layers and pressure settings. In a visual spot check in June 2022 at the PF, only 25% of residents on LAL mattresses had the correct pressure setting, and 50% had the recommended one-linen layer or less. Support surfaces, such as specialized mattresses or overlays, and seat cushions play a significant role in PIP and are strongly recommended for high-risk individuals. LAL mattresses are support surfaces designed to help prevent skin breakdown by distributing a patient's body weight over a broad surface and maintaining optimal skin temperature and moisture levels. The proper use of support surfaces is critical to device efficacy and, if misused, can contribute to PI development. PICGs advise limiting the number of linens and pads placed on support surfaces (EPUAP, NPIAP, PPPIA, 2019). However, due to the high prevalence of incontinent residents in LTC, multiple layers of linens, such as briefs, draw sheets, and incontinent pads, are often used.

With each additional linen layer between the patient and device, the ability to redistribute pressure is reduced, and the exertion of pressure increases, increasing the risk of PIs (EPUAP, NPIAP, PPPIA 2019). Additionally, nurses must correctly set the pressure on the LAL mattress based on the patient's weight. If a pressure setting is too high for the patient, the mattress is too firm and can cause skin damage. If the pressure setting is too low, the patient may lie directly on the metal bed frame beneath the mattress.

Purpose Statement

This Quality Improvement (QI) project aimed to implement a Pressure Injury Prevention Bundle (PIPB) and a PIP educational workshop to increase knowledge and improve adherence to evidence-based PICGs at a 98-bed LTCF in Southern California. The education was implemented through a workshop targeting licensed LVNs, RNs, and CNAs.

Objectives

The specific objectives of this project were to:

- a. Prevent FAPIs
- b. Assess and improve the baseline level of nurses' and CNAs' knowledge relevant to PIP practices and PIGCs
- c. Implement an evidence-based PIP workshop educational program for all clinical staff
- d. Evaluate adherence to PICGs as demonstrated by timely and accurate PI risk assessment and comprehensive skin assessment, appropriate use of support surfaces, and the appropriate number of linen layers placed between a resident and surface

This practice change was expected to prevent FAPIs, increase PI knowledge, and improve adherence to evidence-based PICGs at the PF.

Supporting Framework

Research has shown that the sustainability of educational interventions can be challenging (Fleischer et al., 2015). Several frameworks and tools exist to guide and sustain improvements in healthcare organizations. The Plan-Do-Study-Act (PDSA) methodology, derived from the Healthcare Improvement Model, is one of the most frequently used tools in quality improvement (Christoff, 2018; Institute for Healthcare Improvement [IHI], 2022). The PDSA cycle follows a four-step cyclic systematic approach that incorporates the scientific method pragmatically. These steps include planning, doing, studying, and acting. Appendix A shows how the PDSA steps were applied to the project. This framework encourages a methodical learning process from start to finish (IHI, 2022). Each change should be individually tested on a small scale (Christoff, 2018). An underlying goal of the PDSA methodology is to encourage teamwork and learning throughout the process. After the framework was selected, the QI team started planning. The steps of the PDSA model are discussed below.

The Planning Step

The first step in the PDSA cycle involves identifying a change for improvement and creating specific objectives and benchmarks for the proposed outcomes. According to Christoff (2018), in this step, a project's who, what, where, and when is decided. The project lead (PL) conducted an extensive literature review, and evidence-based PI guidelines were reviewed to plan this QI project. During the initial planning meeting, the leadership team at the LTCF identified FAPIs and poor adherence to PIP as critical problems and a priority for the facility. Although PI protocols were in place, a severe gap in practice was apparent. Once the goal was

established, the PIP QI team was created. The team consisted of eight individuals – a wound specialist Nurse Practitioner (WSNP) and the PL, a wound specialist Medical Doctor (MD), two wound care nurses, one CNA, the Director of Nursing, one administrator, and the Director of staff development.

Fishbone Diagram

Using the fishbone diagram, the team conducted a root-cause analysis of the practice gaps relevant to PIP. The fishbone diagram displays the contributing factors to PI development at the PF. A fishbone diagram, also known as a Cause-and-Effect Diagram or Ishikawa Diagram, was used to organize and summarize the QI team's feedback about the factors contributing to a problem. A fishbone diagram is a visual tool that organizes and displays current knowledge about potential problems and practice variations (Langley et al., 2009). The project's fishbone diagram (Appendix B) illustrates one hour of brainstorming about the possible causes for the increased number of FAPIs and poor staff adherence to PIP protocols. After organizing and analyzing the diagram, six central topics were identified: *People, Process, Policy, Materials, Environment, and Supplies*. The *People* category had the most challenges, and the team voiced heavy workload and nurse turnover as "the root of the problem." The leadership team said staff was educated on PIP, but it was a "broken record," and adherence was poor at the bedside. It was suggested that orientation and training were lacking, and newly hired CNAs and nurses' onboarding process felt "rushed." It was also noted that the CNAs did not prioritize high-risk residents or understand PI risk factors. Understanding the team's organizational challenges prompted the creation of the driver diagram.

Driver Diagram

After analyzing the potential causes of the problems, a driver diagram was created to lay the framework for what changes would result in improvement (Appendix C). According to the IHI (2022), driver diagrams show the relationship between the aim of the project and the drivers that will contribute to achieving a specific purpose. This visual tool aids in the organization of ideas and theories in QI (Langley et al., 2009). The driver diagram was updated throughout the implementation of the project as the PDSA cycles were adopted, abandoned at the end of planning, and project materials and resources were developed.

The following resources/materials were created for this project: PIPB flow chart, PIP workshop curriculum and PowerPoint slide deck, Pre and Post CNA knowledge test, and a consent form. A project timeline and table of methods were created and updated to help organize and guide the project (Appendices D & E). In addition, copyright permissions were obtained for the Braden Scale II and the Pieper-Zulkowski Pressure Ulcer Knowledge Test (PZ-PUKT) (Appendices F and G). The actions taken in the *planning* step directed the actions taken in the second step of the PDSA cycle.

The Doing Step

After an effective planning process, the *Do* step began. In this step, changes were carried out, and observations, data, and outcomes were recorded and monitored. A one-hour evidence-based PIP workshop educational session was delivered in person to nurses and CNAs at the PF. The PIP workshops were held over two weeks at various times and dates to capture different shifts and availability. The educational session incorporated key elements of PICGs, such as PI risk assessment, skin assessment, skin care, repositioning and offloading, nutrition, and support surfaces. A pre-PI knowledge test was administered to nurses and CNAs immediately before the

session, and an identical post-test was administered five months later. The PIPB flow chart was introduced one week after the workshop, and PIPB intervention adherence data were collected weekly from the electronic medical record (EMR) and randomly through visual spot checks. The actions taken in the *Doing* step prompted the initiation of the *Studying* step.

The Studying Step

The *Study* step included the evaluation, analysis, and interpretation of the data from the previous step. During this step, the results were analyzed using run and control charts. The data analysis was used to assess success in achieving the project outcomes. The PI knowledge post-tests were initially planned for three months later but were administered five months later to evaluate knowledge retention. Pre- and post-results from the PI knowledge tests were compiled and analyzed using a paired sample *t-test*. Weekly data were collected on adherence to PIP, including timeliness of the Braden Scale Risk assessment and comprehensive skin assessment, appropriate LAL pressure setting and linen layers between a resident and the LAL surface. PI incidence data were collected monthly. The PL looked for any special cause variation and trends in data. After data compilation and analysis, results were shared with staff to reward positive behavior and encourage continued adherence. The barriers to implementation were identified and discussed with the team. After data were collected and analyzed in the *Study* step, the final stage of the PDSA cycle, acting, began.

The Acting Step

In the last step of the PDSA cycle, *acting*, the team reviewed changes that occurred and made decisions to adopt, adapt or abandon the change (Taylor et al., 2014). In this *Act* step, the team evaluated PI outcomes and determined that the project was ready to be fully implemented with a few adaptations. The PDSA cycles demonstrated success, and a long-term implementation

plan was developed. To ensure sustainability of the desired project outcomes, a virtual on-demand PIP workshop will be offered and required during the onboarding process for newly hired nurses and CNAs.

The PDSA framework assisted the team in planning and carrying out each step of the process logically. The framework also helped the team establish a long-term implementation plan to improve adherence to evidence-based PIP.

Review of Literature

The purpose of this literature review was to determine the effects of an evidence-based PIP education program on knowledge and PI outcomes in a LTCF. A thorough literature review was conducted to provide the foundation for this doctoral project. This review serves to enhance the knowledge base and awareness of PICGs for nurses and CNAs in LTC.

Search Strategy

The literature search for this project was conducted using CINAHL, PubMed, CMS, International Pressure Injury Clinical Practice Guidelines (IPICPG), and AHRQ resources. The search terms included: Pressure injury/ulcer, prevention, education/training, long-term care/skilled nursing home, clinical guidelines, bundle, nurses, certified nursing assistants, and geriatric. Other search terms included the Braden scale, risk factors, competency-based education, knowledge, and barriers. No time limiters were applied to the literature search due to the limitations of high-quality experimental studies focusing on LTC settings. The majority of the studies included were conducted within the last ten years. The literature search included articles from all countries, and only articles written in English were selected. Articles were excluded if they pertained to pediatric or adolescent populations. Overall, the literature revealed a need for more high-quality quantitative research conducted in LTC settings.

Certified Nursing Assistants

CNAs are frontline healthcare workers who play a critical role in PIP in LTCF. The quality of their care impacts resident outcomes and quality of life. According to CMS (2001), CNAs spend twice the amount of time with patients as nurses do, and they provide the most direct care, making them instrumental in the early recognition of skin issues and PIP.

California requires a minimum of 100 clinical hours and 50 didactic hours to be eligible to sit for the CNA examination (California Department of Public Health [CDPH], 2017). A study examining the relationship between CNA training requirements and resident outcomes found that states requiring more clinical hours than the federal minimum have better overall patient outcomes and lower odds of adverse events (Trinkoff, 2016). The minimum required hours are consistent statewide; however, the amount and quality of PIP training in each CNA program vary. Wogoman (2016) noted that 19.36 % of CNAs received no PI training in their CNA program; the same percentage of respondents reported not receiving PI training on the job.

CNA Professional Standards

Although CNAs are not licensed healthcare professionals, they adhere to professional standards and job responsibilities. Scope of practice is a legal term for licensed professionals, such as nurses. In California, LTCFs adhere to the California Code of Federal Regulations (42 CFR 483), which outlines professional responsibilities and CNAs job duties (McMullen et al., 2015). The CDPH defines the state and federal CNA requirements and is responsible for approving CNA training programs and examinations (CDPH, 2017). CNA care tasks and responsibilities pertaining to PIP include performing basic patient care that focus on the safety and protection of patients, personal care, basic nursing skills, communication, skincare, transfers, repositioning, range of motion, bowel and bladder training, and assisting with eating and hydration (McMullen et al., 2015). CNAs cannot perform the functions of licensed nurses, including medication administration, invasive procedures, ostomy care, or performing sterile procedures (CDPH, 2017). Depending on the state and facility protocol, CNA care duties can be expanded to include advanced tasks such as applying ointments and dressings to wounds,

ostomy, and foley catheter care. These duties are not included in CNAs roles and responsibilities at the PF due to the facility's policy and procedures.

Many states have considered expanding the CNA professional duties if guided by proper education and training to optimize patient care. Promoting the resident's right to be free of abuse, mistreatment, and neglect and reporting suspicions to facility staff is of utmost importance within the CNA role. At a minimum, the aforementioned tasks and duties are the employment responsibilities that CNAs are liable to provide in LTCFs. Based on the requirements defined by CDPH and California federal and state requirements, it is reasonable to expect that CNAs participate in PIP and reporting of skin conditions to their supervising RNs as a legal and moral duty to their patients. Practicing outside of this would defy professional standards and principles of healthcare ethics and put patients at risk for malpractice, maleficence, and negligence.

Nursing and CNA Hours Per Resident

CMS establishes staffing hours in LTCFs based on minimum hours per resident per day (HPRD). Compared to RNs and LVNs, CNAs have the highest HPRD at 2.8 – 3 hours compared to 0.55 and 0.75 hours for LVN and RNs, respectively (Harrington et al., 2020). However, CNAs in LTCFs typically spend more than the minimum time due to residents' higher complex care needs and the prevalence of impaired mobility, impaired cognition, and incontinence.

International Clinical Pressure Injury Practice Guidelines

Implementing clinical practice guidelines in practice has been shown to reduce the risk of PIs effectively (EPUAP, NPIAP, PPPIA, 2019). In 2019, EPUAP, NPIAP, and PPPIA joined forces to publish an updated ICPIPG. The ICPIPG is 405 pages long and contains 575 PIP and PI treatment recommendations. A rigorous scientific methodology was used to critically appraise all available PI and PIP research studies conducted between 2013 and 2017 and create evidence-

based recommendations for preventing and treating PIs. The ICPIPG applies to all clinical settings and guides CMS PIP policies. ICPIPG developers determined the strength of evidence (SOE) for each recommendation and rated it based on the overall strength of the body of literature. The strength of the evidence rating system ranges from A, B1, B2, and C. The essential PIP recommendations and their SOE are as follows:

- Prompt PI risk assessment - SOE: B
- Prompt comprehensive skin assessment - SOE: B
- Routine repositioning and mobility - SOE: A
- Skincare and microclimate control - SOE: C
- Support surfaces and pressure redistribution for high-risk patients - SOE: C
- Nutritional support or supplementation - SOE: A

Pressure Injury Risk Factors

Several intrinsic and extrinsic factors place individuals at risk for PI development. The major risk categories include limited activity and mobility, compromised skin status, poor perfusion and oxygenation, inadequate nutritional status, increased moisture, body temperature, limited sensory perception, and poor general medical status (AHRQ, 2014; EPUAP, NPIAP, PPPIA, 2019). Specific populations and medical conditions place individuals at higher risk for PI development, such as older age, palliative care, fractured hip, paralysis, acute or critically ill, tobacco use, Diabetes Mellitus, and Peripheral Vascular Disease (AHRQ, 2014; EPUAP, NPIAP, PPPIA, 2019). Geriatric residents in LTCFs tend to have several contributing risk factors, which puts them in a higher risk category and creates a considerable challenge in PIP (EPUAP, NPIAP, PPPIA, 2019).

COVID-19

COVID-19 is the newest risk factor identified in PI development. Patients with COVID-19 are at increased risk for PIs related to mechanical ventilation and medical devices, prone positioning, immobility, vascular etiology, and overall disease process (Montgomery et al., 2022). Patients with a positive COVID-19 diagnosis are more likely to develop a PI (Montgomery et al., 2022; NPIAP, 2021). A rapidly growing body of literature has identified COVID-19-related skin manifestations (Black et al., 2020; Darlenski & Tsankov, 2020; Montgomery et al., 2022; NPIAP, 2021). COVID-19 skin changes can include rashes, livedo, acral areas or erythema or purpura, vesicular eruptions, pustules, ‘purple skin,’ or necrosis (Bouaziz et al., 2020; Galván Casas et al., 2020; Guan et al., 2020; Recalcati, 2020). Some COVID-19 skin manifestations can present similarly to a deep tissue PI and can be misdiagnosed as PIs. (Black et al., 2020). The NPIAP white paper offers clinical guidance for differentiating COVID-19 cutaneous symptoms from PIs (Black et al., 2020).

Pressure Injury Risk Screening and Assessment

Using a standardized process, PI risk screening is a central component of PIP and a necessary first step in identifying at-risk individuals (EPUAP, NPIAP, PPPIA, 2019). Initial PI risk screening should be conducted on admission, ideally at the first contact with a healthcare professional and no later than eight hours after admission (EPUAP, NPIAP, PPPIA, 2019). Several PI risk-screening tools are available and used in clinical practice. However, it is important to note that PI risk assessment tools alone do not reduce PIs but should guide prevention intervention strategies based on risk.

Braden Scale for Predicting Pressure Sore Risk

The Braden Scale for Predicting Pressure Sore Risk was introduced more than thirty years ago by Barbara Braden and Nancy Bergstrom. The Braden Scale is the most widely used PI risk tool in the US (EPUAP, NPIAP, PPPIA, 2019) and is the tool used in the PF. A newer, updated version, Braden Scale II, was used in this project (Appendix H). The Braden Scale risk assessment should be administered and documented within eight hours of a new residents' admission by an RN, weekly for the first month, with a change of condition, and quarterly after that. The Braden Scale was not always administered at the PF on the same day of admission or at the recommended frequency.

The Braden Scale II consists of six subscales: *sensory perception, moisture, activity, mobility, nutrition, friction, and shear*. Each subscale is ranked numerically and determines PI risk based on a summative score of 6 (lowest) to 23 (highest). A lower score indicates a higher risk for PI development, and a higher score indicates a lower risk. The cut-off score to prompt PIP interventions at the PF is 18 or less. The total score places individuals into four risk categories – not at risk, mild risk, moderate to high risk, and very high risk (Appendix H, Table 1). A PIP care plan should be implemented for each subscale identified.

As the most popular tool used, the Braden Scale has been well-studied and demonstrates a high level of reliability and validity (EPUAP, NPIAP, PPPIA, 2019). Although highly reliable in predicting PI risk, the Braden Scale does not consider all-important PI risk factors (EPUAP, NPIAP, PPPIA, 2019). If nurses rely solely on the Braden Scale, they may fail to assess clinical PI risk factors, such as diabetes or arterial insufficiency. For example, a patient with a history of PI or with a current PI is automatically at high risk clinically, even if the Braden Scale score

indicates "no risk." Identifying and assessing clinical risk factors on admission is equally as important as accurately completing a PI risk tool.

A screening tool is only as reliable as the person completing it is. Although the Braden Scale is the most used tool, typically nurses do not understand how to use it correctly. The reliability and validity in predicting PI depend on the nurse's knowledge and experience in completing the Braden Scale (EPUAP, NPIAP, PPIA, 2019). There is considerable nurse-to-nurse variation in interpretation and accuracy when completing the Braden Scale (Choi & Kim, 2013). The Braden Scale terminology is subjective and lacks operational definitions; thus, clinical judgment is vital for interpretation. Nurses may interpret patient characteristics and subscales differently. For example, one nurse may consider a fully incontinent patient to be "occasionally moist," whereas another may categorize this as "constantly moist." The researchers, who were experts in wound care, identified vague operational definitions on the Braden Scale such as "occasionally," "often," "most of the body," and "very short distance." The study showed that "skin is often, but not always moist" was interpreted by nurses in 15 different ways, and "walks very short distances" was interpreted in 19 different ways (Choi & Kim, 2013). These significant variations in the Braden Scale interpretation can result in patients placed in the incorrect risk category and threaten the tool's accuracy which ultimately can lead to inaccurate PI risk assessment and potentially missed PIP interventions. These findings emphasized the need for PIP education to include operational definitions of the Braden Scale with competency-based training to test and reinforce accurate completion and interpretation of the scoring system. The new Braden II Scale incorporates operational definitions of some vague terms identified on the original Braden Scale.

Moore and Cowman (2019) conducted a Cochrane review to determine if using structured, systematic PI risk tools reduced the incidence of PIs. However, in the two eligible studies, the evidence was not reliable enough to propose that using structured, systematic tools reduced the incidence and severity of PIs. A systematic review with meta-analysis by García-Fernández et al. (2014) sought to evaluate skin assessment tools and nurses' clinical judgment to determine the risk of PI development. This meta-analysis revealed positive PI predictive capability with the use of the Braden Scale tool compared to clinical judgment alone (García-Fernández et al., 2014). Adequacy of knowledge and limited training in screening tools can impact nurses' completion of PI risk tools. Based on these findings and PICGs, one may conclude that clinical judgment alone is inadequate to predict PI development and should be used in combination with a validated screening tool.

Comprehensive Admission Skin and Tissue Assessment

Performing an accurate, comprehensive skin assessment on admission to any healthcare facility is equally as crucial as assessing PI risk. Comprehensive skin assessment is a critical component of PIP and treatment. A head-to-toe skin assessment should be conducted as soon as possible after admission to a healthcare facility (EPUAP, NPIAP, PPPIA, 2019). Eighty percent of PIs occur within the first two weeks of admission, and 96% occur within the first three weeks (Ayello & Lyder, 2008, Chapter 12). A skin assessment's accuracy and reliability depend on the skill, knowledge, and competency of the healthcare professional performing the assessment. Clinical practice guidelines recommend two nurses ("four eyes") conduct the skin assessment together, to improve accuracy. At the PF, the nurses who performed the admission skin assessments were usually not dedicated wound care nurses and were inexperienced in skin

assessment and PI identification. As a result, skin assessments were not conducted on admission or were inaccurate, leading to delayed interventions and care.

Repositioning, Offloading, and Mobility

Repositioning and mobility are fundamental components of PIP and are associated with a lower risk of PI development (EPUAP, NPIAP, PPPIA, 2019). Extended periods of lying or sitting in one position can result in tissue damage (NPIAP, 2022). The 2019 IPICPGs advocate routine repositioning for all individuals with PIs or at risk for PIs unless clinically contraindicated (EPUAP, NPIAP, PPPIA, 2019). Routine repositioning regimens can include a schedule, such as every two hours, and require an intentional change in body position with a 30, 45, or 90-degree angle (Gillespie et al., 2020). Appropriate repositioning should offload body prominences while not increasing pressure on the opposing side. High and moderate-quality randomized controlled trials (RCT) reported on-time adherence to repositioning regimens ranging from 53% to 84% (Bergstrom et al., 2013; Manzano et al., 2014; Yap et al., 2022).

Many healthcare organizations advise repositioning every two hours, which had been considered the standard of care for many years. However, the benefits of two-hour repositioning are not substantiated in the literature. Numerous studies have explored repositioning but report conflicting findings regarding the recommended turning frequency. The “correct” turning frequency is not clearly defined in the international guidelines or literature. Repositioning a patient every two hours can be a tedious and nursing-intensive task that can disrupt a patient's sleep. Research shows that facility adherence to every two-hour repositioning program is suboptimal in LTC (Yap et al., 2022). Due to a lack of empirical evidence, PICGs no longer advocate for every two-hour repositioning and recommend frequency based on patients' individualized PI risk, activity, and mobility level (EPUAP, NPIAP, PPPIA, 2019). A newly

published RCT with 992 residents from nine nursing homes compared two, three, and four-hour repositioning intervals. The results showed no PI development regardless of turning frequency of two, three, or four-hour intervals (Yap et al., 2022). The Yap et al. (2022) study was a moderate-quality RCT that concluded two-hour repositioning protocols in NHs can be relaxed to three or even four-hour intervals without compromising care. Of note, all participants in the study were on seven-inch high-density foam mattresses.

High-risk individuals may require more frequent repositioning (hourly), such as those with complete immobility or multiple risk factors. On the other hand, patients who are acutely ill, hemodynamically unstable, or experiencing pain may not tolerate repositioning (EPUAP, NPIAP, PPPIA, 2019). Two high-quality RCT studies found that repositioning individuals more regularly lowers the incidence of PI (Defloor et al., 2005; Moore et al., 2011). Contrary to this, two moderate-quality RCTs showed no significant reduction in PIs with more frequent turning (Bergstrom et al., 2013; Manzano et al., 2014). However, the latter studies lacked statistical power to measure a clinically significant effect.

A high-quality RCT concluded no statistically significant difference in PI incidence between two and four-hour scheduled patient repositioning (Manzano et al., 2014). However, all patients were on pressure-redistribution bed systems, and were critically ill, intensive-care patients (Manzano et al., 2014). Evidence from a moderate-quality Cochrane review with eight RCTs confirmed the high level of uncertainty regarding the frequency of PI repositioning in the literature (Gillespie et al., 2020). The variation in study results may be attributed to high heterogeneity, including risk, participant age, healthcare setting, support surfaces used, and adherence to repositioning regimens (Gillespie et al., 2020). Although the recommended repositioning frequency is unclear in the literature, all studies noted that routine repositioning

(every two, three, or four hours) is effective at reducing PI development in comparison to no repositioning (Bergstrom et al., 2013; Gillespie et al., 2020; Manzano et al., 2014; Moore et al., 2011). Based on expert discussions at a wound conference in April 2022, every three-hour repositioning may become the new standard of care (Black, 2022). Due to an overall lack of well-designed studies, there remains insufficient evidence to recommend one repositioning schedule or regimen over another (Gillespie et al., 2020).

In addition to a routine repositioning schedule, IPICPGs recommend repositioning a patient using a 30-degree side-lying and upright position rather than 90 degrees. (EPUAP, NPIAP, PPPIA, 2019). The 30-degree or less angle reduces both interface pressure and shearing forces. A moderate quality, level one study reported that individuals positioned using a 90-degree side-lying position were 3.7 times more likely to develop a PI than at a 30-degree angle (Moore et al., 2013). PI guidelines also strongly recommend implementing an early mobility program to increase activity (EPUAP, NPIAP, PPPIA, 2019). Early mobility can be encouraged by incorporating physical therapy and mobility training early in the patient's hospital stay. The overall body of literature supports integrating repositioning, offloading, and mobility into all healthcare organizations' PIP protocols.

Heel Offloading

Heels are one of the most common locations for PIs, and 39.9% of PIs occur on the heels (EPUAP, NPIAP, PPPIA, 2019). The heels are vulnerable due to the anatomy, small surface area, a small volume of subcutaneous tissue, and high risk of shear and pressure forces (EPUAP, NPIAP, PPPIA, 2019). Not only are heel PIs common, but they can also be the most severe PIs. ICPIPGs advise keeping heels free from the surface of a bed for individuals with a PI or at high risk of development (EPUAP, NPIAP, PPPIA, 2019). Optimal heel offloading can be achieved

using a specifically designed heel suspension device or floating the heels on pillows. Although pillows are the most accessible method, heel suspension devices are preferred for long-term heel elevation for individuals with a current PI or those who are not likely to keep their legs on pillows (EPUAP, NPIAP, PPPIA, 2019). Studies found fewer PIs using heel suspension devices versus routine care (Baath et al., 2016; Donnelly et al., 2011). In the PF, staff reported that many patients who frequently move about in bed or have cognitive impairments are unlikely to keep their heels floated on pillows. The low supply of pillows and supplies is another area to address to ensure adequate offloading and repositioning. The PF staff saw these as primary barriers to effective heel offloading. Much of the clinical staff at the PF were also unaware of heel suspension devices or their recommended use.

Skin Care

Aging skin is especially vulnerable to breakdown due to decreased elasticity and dryness. Maintaining good skin integrity is another key component of PIP. A routine skin program includes keeping the skin clean and dry, avoiding alkaline soaps and cleansers, and protecting the skin from moisture (EPUAP, NPIAP, PPPIA, 2019). The normal pH level of the skin is between 4.0 -7.0, and it is recommended to avoid using cleansers or soaps with high pH levels (EPUAP, NPIAP, PPPIA, 2019). Individuals receiving structured skin programs, including foam cleansers and hygiene care, have a lower incidence of PIs (Park & Kim, 2014). A significant reduction in PIs was associated with the use of a skin hygiene program that included a pH-balanced (pH 5.5) foam cleanser versus standard hospital soap (pH 9.5-10.5) (EPUAP, NPIAP, PPPIA, 2019). A proactive moisturizing regimen can also help prevent adverse effects such as skin breakdown or dermatitis (EPUAP, NPIAP; PPPIAP, 2019). Prophylactic silicone foam dressings protect the

skin and can reduce the risk of PIs (EPUAP, NPIAP, PPPIA, 2019; Wound, Ostomy and Continence Nurses Society-Wound Guidelines Task Force, 2017).

Support Surfaces and Pressure Redistribution

Support surfaces can mitigate PI risk by redistributing pressure, reducing friction and shear, and managing the skin's microclimate (EPUAP, NPIAP, PPPIA, 2019). Support surfaces may include powered or non-powered bed systems, mattresses, seat cushions, or overlays and are classified as pressure-relieving or pressure-reducing (EPUAP, NPIAP, PPPIA, 2019). Most support surfaces in LTCFs are pressure-reducing due to affordability (McInnes et al., 2018). The PF used alternating pressure overlays for at-risk residents and LAL mattress beds for those with PIs. IPICPGs advise against using multiple linen layers when caring for a patient on a support surface (EUPAP, NPIAP, PPPIA, 2019; Williamson et al., 2013a). Linen layers and incontinent pads on support surfaces with LAL features may interfere with airflow, which impedes the performance of the support surfaces (EPUAP, NPIAP, PPPIA, 2019). Statistically significant findings ($p < 0.001$) from a level five study showed increases in sacral pressure for all combinations of additional bed linens compared to one fitted-sheet (Williamson et al., 2013b). IPICPGs discourage using plastic-backed incontinent pads with a LAL bed. The staff at the PF demonstrated a knowledge gap regarding the proper use of support surfaces, especially involving LAL mattresses pressure setting and recommended linen layers.

Nutrition

Nutrition plays a fundamental role in PIP and treatment. All patients admitted to LTCFs should be screened on admission using a validated nutritional screening tool and evaluated by a registered dietician. Poor nutritional intake and dehydration are linked to PI development and poor healing outcomes (EPUAP, NPIAP, PPPIA, 2019). Patients with PIs, malnutrition, or

dehydration should be considered for individualized nutritional supplementation and increased protein intake. IPICPGs recommend providing high-calorie, high-protein, arginine, zinc, and oral dietary supplements for all individuals with a PI or at risk of malnutrition (EPUAP, NPIAP, PPPIA, 2019). Implementing PICGs into practice requires increasing staff knowledge, clinical judgment, and competency.

Knowledge, Clinical Judgement, and Competency

Knowledge

Nurses and CNAs' knowledge and understanding of PIP strategies are critical for preventing PIs. Knowledge is essential for providing evidence-based care ([EBC] NPIAP, 2019). The nurses' and CNAs' knowledge of PIP correlates directly to the quality of care they provide to patients (Manderlier et al., 2017). However, research indicates that nursing knowledge of PIs and PIP is suboptimal (Lavallée et al., 2018; Gillespie et al., 2020; Gunniberg et al., 2015). A Cochrane review reported that nurses lacked awareness of basic research regarding PIs and PIP and were not accessing relevant research, such as Cochrane reviews or clinical guidelines, to guide their PI practices (Gillespie et al., 2020). CNAs would not be expected to read clinical guidelines, but many elements of PIP are the CNA's responsibility. The evidence suggests that nurses rely on colleagues or intuition rather than evidence-based recommendations to guide their clinical decision-making (Gillespie et al., 2020). At the PF, nurses and CNAs voiced inadequate staffing and time constraints as key barriers to poor attendance at the facility educational in-services. Yet, nurses perceived that the primary barrier impeding PIP was their limited knowledge and skills (Barakat-Johnson et al., 2018; Lavallée et al., 2018). On the other hand, CNAs and nurses who perceived themselves to have adequate knowledge of PIP could not elaborate on their organization's specific PIP protocols (Lavallée et al., 2018). There is a large

body of evidence evaluating nurses' knowledge levels on PIP; however, it is difficult to compare findings since numerous instruments were used to test PIP knowledge (EPUAP, NPIAP, PPPIA, 2019). ICPIPG recommends assessing PI knowledge regularly using a valid tool with sound psychometric properties. The PZ-PUKT was the validated tool administered to test PI knowledge for nurses at the PF. Studies show a relationship between PI knowledge and skill performance, which suggests that improving knowledge will directly impact the quality of PIP a nurse provides (Tallier et al., 2017; Lee et al., 2016). Knowledge of PIP is expected to improve clinical judgment and nursing competency.

Clinical Judgment

Prevention of PIs requires both state-of-the-art knowledge and sound clinical judgment. Clinical judgment is a crucial component of risk and skin assessment and is necessary for PIP. As it pertains to PIs, clinical judgment is the cognitive actions carried out by a healthcare professional to interpret and synthesize information on the health status of individuals to derive a diagnosis about their PI risk and need for PIP (EPUAP, NPIAP, PPPIA, 2019). Clinical judgment should be grounded in up-to-date knowledge, utilization of information sources and methods, team collaboration, ongoing evaluation, and critical thinking (EPUAP, NPIAP, PPPIA, 2019). For example, clinical judgment is necessary to interpret each subscale of the Braden Scale in order to design a patient's individualized PIP interventions. Kim et al. (2020) conducted a systematic review and meta-analysis of 23 studies on PI training. They demonstrated that PI training when used as an intervention in RCTs resulted in a statistically significant increase in clinical judgment ($p < .001$); however, their analysis of observational studies showed no significant difference in clinical judgment one to three months after the intervention. Kim et al. (2020) found that educational programs, including clinical judgment, are more effective than

when only knowledge about PIP is reviewed. Knowledge and clinical judgment are obtained through education and training, which help to improve competency.

Competency

The American Nurses Association (2018) defines nursing competency as “an expected level of performance that integrates knowledge, skills, ability, and judgment.” Nurses are expected to demonstrate competency throughout their professional careers to promote the highest level of patient safety and care. Competency in PIP can be acquired through experience and learning. While some nurses may have experience in the management of PIs, they may lack up to date knowledge and skills. Competency can be evaluated by using tools that capture knowledge and performance. The PIP Workshop incorporated at the PF utilized hands-on competency-based training with direct observation to verify skills and identify areas for improvement. Knowledge, clinical judgment, and competency can be enhanced with education and training in PIP.

Education and Training

Zulkowski and Ayello (2005) investigated nursing knowledge about PIP and PI treatment and noted that nurses in their study had a C to C+ level of knowledge based on the validated PZ-PUKT tool (Zulkowski & Ayello, 2005). In the US, the root cause surrounding the increased incidence of PIs can be traced back to insufficient wound care education in nursing programs (Ayello et al., 2017). A survey across 33 states, including 77 facilities, evaluated PI content in US nursing schools. This survey found that not all schools were teaching PIP, and only 56% to 57% were teaching about PIs in LTC (Ayello et al., 2017). Implementation of PIP and PI clinical guidelines can only be successful if nurses are aware of the EBP guidelines and educated on how to integrate them into practice. This can be achieved through education and training. Numerous studies show that evidence-based PIP education can reduce the risk and prevalence of FAPIs and

improve staff knowledge (Rummel et al., 2021; Wogamon, 2016; Young et al., 2015; Zubkoff et al., 2021). PICGs strongly recommend that nurses and CNAs receive PI education (NPIAP, 2019). Kim et al. (2020) conducted a systematic review and meta-analysis of 23 studies examining PI education's impact on nurses' knowledge and clinical judgment. Three RCTs showed that knowledge scores increased after PI training and knowledge retention was sustained over a six to 12-month period. However, observational studies (n=20) in this meta-analysis showed that knowledge was not sustained beyond six months. A proposed explanation for the contrasting findings between the RCT and observational study results is the low-quality of the observational studies that Kim et al. (2020) investigated. These studies had small sample sizes, considerable heterogeneity, and high attrition.

Delivery of A Multifaceted Educational Program

The literature reveals that incorporating a range of teaching styles into an educational program is more effective in improving outcomes and increasing knowledge than programs that consist of one modality (EPUAP, NPIAP, PPPIA, 2019; Kim et al., 2020; Zubkoff et al., 2021). Multifaceted PI educational programs combine theory with practice and may incorporate didactic, hands-on skills, group work, problem-solving activities, and ongoing support from a wound care expert (EPUAP, NPIAP, PPPIA, 2019). The frequency of education impacts the sustainability of knowledge, and a one-time educational in-service is less effective in sustaining knowledge than recurrent and routine educational in-services (Kim et al., 2020). Education and training help enhance knowledge, and clinical judgment, which leads to overall nursing competency.

Summary

Given the unique complexities of geriatric residents in LTCFs, this population is especially vulnerable to develop PIs, which are a persistent and challenging health concern in LTCFs. The overall lack of knowledge, clinical judgment, education, and awareness of evidence-based PICGs are directly related to the incidence of PIs in LTC settings. The literature highlighted the significance of improving nurses' knowledge of PIs and the benefit of implementing PICGs into practice to reduce PI prevalence. The overall body of literature demonstrated a need to place more emphasis on PIP and PI treatment in the LTC setting. The findings suggest an urgent need for well-designed clinical trials that focus on PIP and treatment methods used in LTCFs.

Methods

Design

This QI project utilized a pre and post-test intervention design guided by the PDSA framework. The nurses' and CNAs' knowledge regarding PIP practices was assessed pre-and post-intervention. The PI prevalence and incidence were collected each month retrospectively from the facility's wound reports and from the Medicare Nursing Home Compare Quality Measures (MNHQM) report and compared to national standards. The QI project was implemented over five months, from October 2022 to March 2023.

This QI project aimed to improve PIP knowledge and PICGs adherence, explore the feasibility of implementing PICGs into practice, and prevent new occurrences of FAPIs in an LTCF. The project involved a pre and post-test of nurses' and CNAs' PI knowledge, an educational PIP workshop, and the implementation of a PIPB flow chart.

Setting

The QI project took place in a 98-bed LTCF in Southern California. The daily census was typically 85% to 90% of bed capacity. The patient population consisted primarily of patients aged 65 or older. The most common medical conditions reported were chronic diseases such as Heart Failure, Hypertension, Diabetes Mellitus Type Two, and Dementia. Most residents were admitted for skilled nursing care following hospitalization for acute or chronic illnesses. The average length of stay was 65 days. In the PF, the rate of a successful return home or to the community was 36.6%, which is lower than the national average of 52.9% (CMS, 2022). The primary reasons for not returning home or to the community were declining mobility and declining cognitive function. The clinical staffing schedule was in eight-hour shifts, but some reported working double shifts and overtime. The facility was comprised of two stations, with

assignments split between two treatment nurses. Two LVNs were responsible for wound management and dressing changes. A Board-Certified Wound specialist consultant from an outside organization provided weekly evaluation and management of wound patients at the PF. The PL is an Adult Geriatric Nurse Practitioner (AGNP) wound specialist who provided ongoing clinical and educational support during the implementation of the project.

Ethical Considerations

The Institutional Review Board (IRB) of the California State University (Appendix I) and the LTCF gave their approval for this QI project (Appendix J). Patient and participant data were de-identified to ensure anonymity.

Participants

This QI project sample consisted of a single group of LVNs, RNs, and CNAs working at the LTC facility (n = 36 nurses and CNAs). The sample demographics included 24 CNAs (66.7%), 10 LVNs (27.8%), and 2 RNs (5.5%). The inclusion criteria for the QI project consisted of all nurses and CNAs working at the PF during project implementation. Other staff members who were not involved in patient care were excluded.

Measures

The primary outcome measures were the incidence of FAPIs, nursing and CNA knowledge, and adherence to PIPGs. The outcomes of this project were measured over five months following the implementation of the PIP workshop from October 2022 to March 2023.

The process measures identified: (a) the percentage of PI Braden Scale risk assessments completed on the same day of admission, (b) the percentage of comprehensive skin assessments completed on the same day of admission, (c) the total number of LAL mattresses placed on the

correct pressure setting for patient specifications, (d) the total number of LAL mattresses with one linen layer between the resident and support surface.

Data for each of these measures were collected and recorded on run charts before implementing the education to obtain baseline data and ended one week after implementation. Data were converted to control charts once sufficient data were available.

The Procedure for Implementation

Before project implementation, several meetings were held to establish project goals and determine support and resources. Two wound champions were identified in the planning phase. A needs assessment was conducted with stakeholders to identify areas of concern, and a fishbone diagram was developed based on brainstorming. Recruitment and consent occurred before project implementation. Four months before implementation, baseline data were collected on the timeliness of PI risk assessment and skin assessment by weekly reviews of the information reported in the EMR for all new patient admissions. A participant demographic survey and knowledge test were administered on day one of project implementation (Appendix K). The first outcome measured the baseline level of nursing and CNA knowledge of PIP. The baseline was established by administering a written PI knowledge test to nurses and CNAs. Participants completed a knowledge test immediately before attending the educational sessions and five months after completion of the PIP workshop and implementation of the PIPB. Point check observations of linen layers on the LAL mattress and LAL mattress pressure setting were collected randomly through visual inspection until twenty data points were obtained. In the first week of implementation, the LTCF received training on QI project goals, expectations, and role-specific responsibilities.

Knowledge Test Tools

The PZ-PUKT was administered to test the nurses' level of PI knowledge. The PZ-PUKT (Appendix K) is a valid and reliable PI knowledge assessment test with a reported internal consistency coefficient of 0.80 (Pieper & Zulkowski, 2014). The PZ-PUKT was updated in 2019 to reflect current PI guidelines. The PL obtained permission to use the PZ-PUKT for the project. The PZ-PUKT was developed based on literature and PICGs on PI assessment and PIP. The 72-item test has three possible answers "true," "false," and "I don't know." CNAs were administered a different knowledge test tailored to the CNA role. The CNA knowledge test included 30 multiple-choice and true or false questions on risk factors and PIP (Appendix L). The CNA instrument was developed specifically for the project and piloted on 80 CNAs before use. The face validity for the instrument was evaluated by three board-certified wound expert Nurse Practitioners and CNAs provided feedback on the test content.

Both knowledge tests were administered immediately before the PIP workshop and were provided in person, using paper-pencil, or offered through an online survey tool, *Qualtrics*. All participants preferred to take the paper-pencil test; no one used the *Qualtrics* online survey tool. The participants did not include any identifying information on their tests. Instead, they were given a numerical identifier so that pre- and post-data could be compared. Five months after implementing the PIP workshop and PIPB, identical PI knowledge post-tests were administered in person using a paper-pencil survey.

Educational Pressure Injury Prevention Workshop

The PL developed an educational intervention based on the literature review, IPICPG, adult learning principles, and LTC culture. Two different one-hour sessions were created and tailored to the specific care tasks of nurses and CNAs. The title of the program was *The*

Frontline of PIP Workshop (For Nurses; For CNAs). The educational content was derived from IPICPGs and supplemented by current research, PZ-PUKT knowledge test questions, and facility knowledge gaps. The educational content and PowerPoint presentation covered essential PIP guideline recommendations: PI risk and skin assessment, routine repositioning and mobility, nutritional support or supplementation, skincare and microclimate control, support surfaces, and pressure redistribution devices (Appendix M). A positive learning environment and using various teaching strategies are more effective for adult learners (NPIAP, 2019). Therefore, a combination of teaching strategies was employed, such as hands-on activities, interactive case studies, competency verifications, and visual and auditory teaching.

The next component of the QI project involved conducting an evidence-based PIP workshop to educate the clinical staff. One-hour workshops were conducted multiple times over two weeks to capture all work shifts. Different workshops were conducted for nurses and CNAs that were tailored to their role and responsibility in PIP. The workshop was hosted in the dining room or rehab room. Workshop sessions for each group (Nurses/CNAs) were identical in content, and participants were required to attend one session. The workshop occurred during the workday; thus, Nurses and CNAs were not impacted by the loss of work time. The workshop consisted of hands-on practice, case studies, and a PowerPoint presentation.

Pressure Injury Prevention Bundle Flow Chart

The next step in the QI project was implementing a three-component PIPB flow chart. The implementation and monitoring of the PIPB flow chart adherence began in week two. The first component of the PIPB was completing a Braden Scale PI risk assessment by RNs for all patients promptly after admission, the second was to conduct a comprehensive skin assessment on admission, and the third component was to initiate evidence-based PIP interventions based on

the patient's PI risk level guided by the PIPB flow chart. The PIPB flow chart was created by the PL and implemented to guide nurses in instituting PICGs based on the risk level identified from the Braden Score and clinical judgment (Appendix N). For more information on Braden Scale, see the literature review and Appendix H.

The PIPB flow chart was created based on the literature review and 2019 IPICPGs. The first step in the PIPB flow chart began with RNs completing a Braden Scale risk assessment and comprehensive skin assessment on the same day of admission. Based on the risk score or presence of a PI, the flow chart guided subsequent care plans and evidence-based PI interventions. The interventions were categorized in columns based on the presence of PI and or at-risk, high-risk, and very high-risk factors. All residents identified with a score of 18 or less on the Braden Scale were considered at-risk and triggered PI care plan interventions. Residents with a Braden Scale score of 12 or less (moderate to high risk) or identified as clinically at risk were potential candidates to have a prophylactic silicone dressing placed. As per the PIPB flow chart, residents with a Braden score of nine (very high risk) or less were considered for an Alternating Pressure Pad (APP) mattress overlay or LAL mattress and repositioning every two-three hours. Nurses were responsible for carrying out and documenting the related interventions, including completing the Braden PI risk and skin assessment, selecting the correct support surface, and setting the LAL mattress pressure settings. CNAs were responsible for carrying out and ensuring the placement of the proper linen on LAL support surfaces. The PIPB flowchart assisted nurses and CNAs with implementing evidence-based PI interventions based on PICGs.

As part of the QI process, the PL created a flyer to post throughout the PF to encourage "Zero FAPIs." The flyer promoted staff engagement and created a sense of pride when staff saw the number of days without a PI increase. To encourage staff, a reward was offered to the entire

clinical staff when the goal of 100 days without a FAPI was achieved. The PL created a PI binder with PI resources and project tools. The PL was available for wound consultations and support throughout the QI project.

Data Collection

Data were tracked and stored in Excel and accessible to the PL only. A demographic survey was administered and collected from nursing staff. Pre- and post-knowledge surveys were scored and evaluated. At five months post-educational intervention, the same post-knowledge test was administered to participants by paper pencil. Although a *Qualtrics* survey was an available option, no one took the online survey.

Pressure Injury Prevalence and Incidence – Quality Measures

Nine months of baseline PI prevalence data were collected monthly from retrospective facility wound reports, as well as from quarterly prevalence data from Medicare Nursing Home Compare Quality Measures (MNHCQM). The MNHCQM is conducted four times per year and aids in collecting and analyzing data for quality indicators. MNCCQM publicly reports PI prevalence data on short-stay residents (< 90 days) with new or worsening PIs and the percentage of high-risk long-stay residents with PIs. After the educational and PIPB intervention, PI prevalence and FAPI incidence were collected from monthly facility wound reports in Excel format for five months. The 2023 quarter one MNHCQM data were not available by project completion; therefore, facility prevalence data was used post-implementation.

The PL conducted weekly EMR chart audits to collect data on the adherence to the implementation of PIPB interventions. Braden Scale scores were evaluated for accuracy. All data were transferred onto a secure Excel spreadsheet and kept on a password-protected laptop. All data checks were conducted manually by the PL.

Data Analysis

Pre- and post-nursing and CNA knowledge scores were compared and analyzed using Intellectus Statistics™. Pre and post-test knowledge scores were analyzed using paired sample *t*-tests. The data were displayed on a bar chart with a score goal of 80% to be considered knowledgeable in PIP.

Process measure data were collected weekly for twenty weeks pre-and five months post-intervention. The data were organized using Excel and displayed on run charts using QI Macros. The following measures were reviewed manually from the EMR – Point Click Care, transferred to Excel and displayed and analyzed on P charts: (a) rate of new admissions receiving a timely PI Braden Scale risk assessment (b) rate of new admissions who received a comprehensive skin assessment on the same day of admission. These measures were counted in “all or none” format. Therefore, if a Braden Scale risk assessment or skin assessment was not completed on the same day as admission, it was counted as “not met.” If the Braden Risk and skin assessment were conducted and documented on the same day of admission, this was counted as a “met.” The total number of patients with timely assessments was divided by the total number of admissions and displayed in percentages. Nurses were considered adherent to PICGs if they completed both process measures within the same day of admission.

The percentage of at-risk residents receiving PIPB interventions was collected by conducting weekly visual spot checks. The PL did weekly random spot checks to visually audit adherence to the PICGs and PIPB flowchart interventions. The following process measures were displayed and analyzed on C charts using QI Macros: (a) the total number of residents on a LAL mattress with one linen layer, (b) the total number of residents on LAL mattresses on the correct pressure settings, and (c) baseline and post-intervention PI incidence and prevalence data

collected monthly. Run and control chart rules were applied to evaluate trends, shifts, and special cause variations.

The project's overall success was measured by improving nurses' and CNAs' knowledge with a score goal of 80% and a minimum 80% adherence to PICGs. Adherence to PIPGs and PIPB interventions were demonstrated by PI Braden Scale completion and documentation within the same day of admission, comprehensive skin assessment completion and documentation on the same day as admission, 80% rate of one linen layer on LAL mattresses, and 80% rate for correct pressure setting on LAL mattresses. Maintaining a zero incidence of FAPIs was the ultimate long-term goal of the project.

Results

Demographics

There was a total of 36 participants, the majority of whom were CNAs. Participants (N=36) were RNs (5%, n=2), LVNs (27%, n=10), and CNAs (66%, n=24) with various educational backgrounds, PI experience, and years of practice. (Appendix O). Most participants were females (83%) aged between 25 and 66 years old (M=40 yr.). The majority (72%) of participants have a diploma as the highest level of education. Sixteen percent held an associate degree, and 2% held a Baccalaureates degree. Almost half of the participants (N=17) had been practicing for 10 to 20 years. No participants had read PI clinical guidelines, and over three-quarters (n=28) had not sought information on the web about PIs in the last year. Almost half (n=17) of the participants attended a lecture on PIs within the last year and reported reading a book or article on PIs. No participants were certified in wound care. Pre-implementation data indicated that clinical staff knowledge of PIP was poor, skin and PI risk assessments were incomplete or delayed, pressure redistribution devices were not appropriately used, and an overall lack of awareness of PICGs was evident.

Facility Acquired Pressure Injury Incidence and Pressure Injury Prevalence

Throughout the five months of this project, no FAPIs developed, and the FAPI incidence remained at zero. The initial goal of “No FAPIs for 100 days” was met. No PIs worsened or developed, and this remains below the MNHCQM benchmark of 2.9% (CMS, 2022). The baseline PI prevalence data was 8.9% in January 2022, and PI prevalence decreased to 5.5% by project completion in March 2023 (Appendix P). PI prevalence remained below the national average (8.1%). The 2023 quarter-one data from the MNHCQM was not available at the time of

project completion. Therefore, monthly PI prevalence data from facility monthly wound reports were used for the post-implementation comparison.

Pre/Post Knowledge Test Results

Of the 36 total participants (RN, LVN, CNAs), 30 completed the post-test (n=30). Participants were scored on correct responses on the PZ-PUKT and CNA PIP knowledge tests. Scores on the PZ-PUKT and CNA knowledge tests can range from zero (lowest score) to 100 (highest score). For all participants combined (RN, LVN, CNA), the mean scores demonstrated an increase of 21.6 points from the mean pre-test (M=53) to the mean post-test (M=74.6). A paired sample *t*-test of pre-(M=53, SD =13.82) and post-knowledge scores (M=74.6, SD=9.36) for all participants showed a statistically significant increase in knowledge scores ($t= 8.16, p < .001$). (Appendix P, Table 2). Knowledge scores were then analyzed into two subgroups based on profession (Nurses, CNAs).

PZ- PUKT Knowledge Test – RNs and LVNs

Of the 12 nurses who took the pre-test, a total of 8 nurses completed the PZ- PUKT knowledge post-test (11 LVNs, and one RN). PZ- PUKT Pretest mean score (M= 65.3, SD=13.22) and post-test mean score were significantly improved (M=80.13, SD=9.36). The results of the two-tailed paired sample *t*-test were significant ($t =2.6, p=0.035$) (Appendix P, Table 3).

CNA PIP Knowledge Test

Of the 24 CNAs who took the CNA PIP knowledge pre-test, 22 CNAs completed the post-knowledge test. CNAs' mean pre-test score was 50 (SD=11.52), and the post-test mean score was 73 (SD=15.03). The result of the two-tailed paired *t*-test was statistically significant ($t=8.38, p <0.001$) (Appendix P, Table 4). The most improved score was observed within the

CNA profession, with an average improvement of 25.6 points. The result of the two-tailed paired *t*-test indicates that the educational workshop increased both nurses' and CNAs knowledge regarding PIs and PIP.

PIPB and International Clinical Pressure Injury Practice Guideline Adherence

PI Risk Assessment: The first critical action in PIP was to identify PI risk factors. Based on data mining of weekly nursing documentation, nurses correctly assessed and completed a Braden Scale PI risk assessment on 96% of newly admitted residents within the same day of admission compared to 73% pre-intervention (Appendix P).

Comprehensive Skin Assessment: Nurses' completion and documentation of skin assessments performed on the same day of admission notably improved from approximately 70% to 96% post-intervention. These interventions were the duty and responsibility of the RNs. (Appendix P)

LAL support surfaces - Linen Layers: Based on random structured visual spot checks, there was a significant improvement in limiting linen to one layer on LAL support surfaces. The total percentage of LAL mattresses with only one linen layer placed between the resident and the device improved from 58% pre-intervention to 94% post-intervention (Appendix P). These interventions were the primary responsibility of the CNAs.

LAL support surface - pressure setting: LAL mattresses placed on the correct pressure setting improved from 57% pre to 92% post-intervention (Appendix P).

Discussion

This project aimed to evaluate the effectiveness of a PIP educational workshop and PIPB to increase nurses' and CNAs' knowledge, improve adherence to PICGs, and prevent FAPIs. Before the implementation of this project, PIP was a priority and selected area of QI for this organization. However, clinical staff and leadership needed help finding the most effective process and workflow to prevent PIs amid COVID-19 outbreaks and staffing shortages. In this QI project, the author examined the impact of an educational workshop and PIPB flowchart on knowledge, PIP practices, and adherence to IPICPG among nurses and CNAs. The results of this QI project validate the importance of facility-wide PI education, implementation of standardized PICGs, and an easy-to-follow PIPB flowchart facilitating evidence-based PIP and treatment into practice. The introduction of the PIPB flow chart and the educational session helped nurses and CNAs to take actions based on risk level to prevent FAPIs. Combined, these measures created a more knowledgeable, engaged, and competent staff. The project results showed an overall increase in nurse and CNA PI knowledge, and FAPIs were prevented. All the process measures evaluating PICG adherence showed improvement and met the goal of 80% adherence.

Facility-Acquired Pressure Injuries

During the five-month project, no FAPIs developed, and no PIs deteriorated, which was a success. It is assumed that the knowledge and skills the clinical staff gained from the evidence-based educational workshops and the PIPB bundle facilitated this outcome. Many of the nurses and CNAs at the PF indicated an overall need for knowledge of PI assessment, management, and PIP practices before the education sessions. Numerous studies show that evidence-based PIP education improves staff knowledge and can reduce the risk and incidence of FAPIs (Rummel et al., 2021; Wogamon, 2016; Young et al., 2015; Zubkoff et al., 2021). At the initial time when the

project was proposed (June 2022 to August 2022) the average FAPI incidence ranged from 2 to 3.5 percent. However, during the months of August - October 2022 and upon project start, FAPI incidence was at zero due to the death or discharge of residents who had FAPIs, this falsely showed incidence reduction right before project implementation began. Nonetheless, maintaining a zero incidence of FAPIs in this high-risk population for the five months during the project implementation was remarkable, given the high level of risk and challenges in LTCF. The reduction in PI prevalence (3.4%) can be attributed to newly healed PIs, which is an improvement. However, PI prevalence can also be affected due to a resident's discharge to home or another healthcare facility or death. Therefore, this reduction should be interpreted cautiously. The continued rate of zero FAPIs due to educational workshops on PI identification, PIP, and implementation of EBP practices shows that nurse and CNA knowledge can improve care and prevent FAPIs.

Knowledge Test Scores

Knowledge scores improved in all groups (RNs, LVNs, CNAs). Paired *t*-test results ($p < .001$) demonstrate that the educational workshop was effective at increasing knowledge ($t = 8.16$, $SD = 14.00$) for all participants. The PL assumes the knowledge and skill gained from the educational workshop, alongside the implementation of the PIPB protocol, supported sustainability for the five months of the project. The pre-test results of the PZ- PUKT knowledge test for nurses were poor (Mean score= 53%). These low PI knowledge scores are consistent with the findings in the literature review, which revealed that nurses' knowledge of PIs and PIP is deficient (Dalvand et al., 2018; Gillespie et al., 2020; Gunningberg et al., 2015; Lavalee et al., 2018). Although the goal score of 80% was not met for CNA group, they demonstrated the greatest knowledge improvement overall ($t=8.38$, $p < 0.001$). The CNA knowledge test scores

were extremely low prior to the workshop (Mean score=44%). Several CNAs spoke English as a second language and may have had trouble understanding all the questions. This may have affected their low performance due to poor comprehension of test questions. Only two RNs participated in the project, and only one completed the post-knowledge test; this is not surprising and reflects the typical LTCF nursing workforce. LVNs and CNAs are typically the primary drivers of care in LTC, and only a few RNs are staffed per shift. The CNAs group represented most of the participants (66%). CNAs are the frontline caregivers involved in PIP and are paramount in PIP and overall resident quality of care.

The knowledge retention rate for educational interventions was described as variable in the literature; thus, the PL was uncertain if the nurses and CNAs would retain their obtained knowledge after five months. In a systematic review and meta-analysis, three RCTs showed that knowledge scores increased after PI training, with knowledge sustained over a six to 12-month period (Kim et al., 2020). However, other studies showed that knowledge was not sustained beyond three to six months (Kim et al., 2020; Sinclair et al., 2004). A one-time educational in-service is less effective in sustaining knowledge than recurrent and routine educational in-services (Kim et al., 2020). Based on the literature and the results of this QI project, it can be suggested that standardized PI education should be conducted on a routine basis. It is possible that if the post-knowledge test and follow-up educational session had been administered three months later, knowledge scores could have improved further. Therefore, the PL recommended providing staff-wide PI education upon hire and quarterly to maintain sustainability and encourage ongoing best practices. The PF requested PI education to be provided on a quarterly basis to factor in the high turnover rate of CNAs and nurses in LTC.

The long-term sustainability of this project would be best assessed by extending process measures to ensure PIP practices beyond five months. The PL has advised the leadership team and wound champions to continue auditing and conducting weekly spot checks to verify that PIP practices are maintained. The PI educational materials were added to the PF educational content and shared with the staff developer. A train-the-trainer session will be conducted, and the wound champions will continue to monitor sustainability.

International Clinical Pressure Injury Practice Guidelines Adherence

ICPIPG adherence was shown to be successful based on meeting an 80% adherence rate to the PIPB. Prior to the project's start, no participants were aware of the PICGs. Almost a quarter of the participants had not attended or listened to a lecture on PIs in two years or greater. The PF Pressure Injury (titled Pressure Sore) policies were dated and not grounded in current research, and no one in the facility was an expert in wound care or certified in wound care. These factors may have contributed to the nurse's and CNAs' need for education about PIs and more awareness of their role in PIP. Literature revealed that RNs and LVNs did not access relevant research, such as Cochrane reviews or clinical guidelines, to guide their PI practices (Gillespie et al., 2020). Nurses in this PF and those working in LTCFs typically lack a medical library; therefore, it is not feasible to expect them to stay up to date with current EBPs on PIs. It would not be an expectation for a CNA to read EBP literature or guidelines, therefore, it is important to evaluate the literature and implement education that is translatable to the learner's level of education. This project emphasizes the importance of utilizing a wound specialist consultant or expert to evaluate staff baseline knowledge, review EBP, and share expertise on PICGs with the staff. Many nurses and CNAs participating in this project self-reported that they had adequate knowledge of PI and the organization's PIP protocols. The baseline knowledge scores showed

otherwise. This is consistent with another study analyzing self-perceptions of PI knowledge. CNAs and nurses who perceived themselves to have adequate knowledge of PIP could not elaborate on their organization's specific PIP protocols (Lavallée et al., 2018). The PIPB flow chart was based on ICPIPG and tailored to the LTC setting. Its purpose was to guide nurses in user-friendly approach to proper care planning, decision-making processes, and evidence-based PIP interventions.

PI Braden Scale Risk Assessment

After project completion, the PL found that 96% of participants had a PI Braden Scale Risk assessment performed by RNs within eight hours of admission, which is consistent with the PICG recommendations. During the planning phase, Nurses indicated they needed help understanding how to complete the Braden Scale or assess PI risk properly. This demonstrated that nurses self-identified a need for education. Thus, it was anticipated that assessing PI risk and accurate completion of the Braden Scale would be areas improved once the nurses received the educational workshop. Delayed completion of a residents Braden Scale (73% pre-intervention) could have been attributed to the nurses' lack of understanding and knowledge prior to their completion of the educational workshop. The Braden Scale risk score is critical to understand, as it is the foundation of PIP interventions. As such, much effort was spent in the workshop teaching the Braden Scale to the nurses since it was a key component for how PI interventions were prompted on the PIPB flow chart. Nurses must be knowledgeable, skilled, and competent regarding the Braden Scale. The reliability and validity in predicting PIs depend on the nurse's knowledge and experience in completing the PI Braden Risk Scale (EPUAP, NPIAP, PPPIA, 2019). The nursing team reported a better understanding of how to interpret and complete the Braden Scale correctly after the educational workshop.

The educational workshop incorporated case studies, interactive quizzes, and group activities to encourage clinical judgment and critical thinking. By the workshop's end, most participants (90%) selected the correct PI risk score in the scenario-based activities. Kim et al. (2020) found that educational programs, including clinical judgment, were more effective than knowledge only. A statistically significant finding from a systematic review of RCTs by Kim et al. (2020) showed that PI training could improve clinical judgment, which was also seen in this project. Further data collection is needed to validate whether the PI Braden Scale completion is occurring at the recommended intervals (weekly for one month, quarterly, and upon change of condition).

Comprehensive Skin Assessment

Almost all residents (96%) had a skin assessment performed and documented by a RN within the same day of admission, much improved from the 69% pre-project. The IPICPG recommend that a resident receive a head-to-toe skin assessment as soon as possible after admission to a healthcare facility (EPUAP, NPIAP, PPIA, 2019). Eighty percent of PIs occur within the first two weeks of admission, and 96% occur within the first three weeks (Ayello & Lyder, 2008). If a PI is not captured on admission, the LTCF may erroneously be held accountable for a FAPI, affecting their overall quality measures and PI incidence. Most nurses in LTCF are not trained on how to conduct a comprehensive wound assessment. At the PF and in many LTCFs, the charge nurses or supervisors, who are less experienced in skin assessments and PI identification, typically conduct these admission skin assessments upon a resident's admission. Treatment nurses are the most experienced but are not always available to perform these assessments. As a result, skin assessments have been missed and/or inaccurately reported on admission, leading to delayed interventions and care. The treatment nurse at the PF voiced

concerns about nurses who often wait and leave the assessment to be conducted when the treatment nurse is available. During the educational session, all nurse participants were trained on the proper assessment and identification of PIs and the importance of a timely assessment. A special cause variation was discovered during data analysis on the C charts that showed a trend of delayed skin assessments on the weekends. The weekend shift had the lowest workshop attendance rate, which could explain their low performance. Interactive PI assessment activities were incorporated into the workshop to build skills in skin assessment and PI staging.

Support Surfaces

At study completion, a significant improvement was observed regarding the use of one linen layer on LAL mattresses between the resident's skin and the device. At the educational workshop, staff voiced limited knowledge of support surfaces and pressure redistribution devices and needed help understanding the risks involved with improper use. Statistically significant findings from a level five study showed increased sacral pressure for all combinations of additional bed linens compared to one fitted sheet (Williamson et al., 2013b). CNAs at the PF would frequently fold a sheet, not realizing that each fold is considered a layer. All residents on LAL mattresses were incontinent of bowel and bladder, so some CNAs and nurses complained about beds getting soiled and raised legitimate hygiene concerns. No plastic-backed incontinent pads were used, consistent with clinical PICGs recommendations.

Ninety percent of LAL mattresses were observed to be placed on the correct pressure setting and on alternating pressure. There were three different mattress brands with minor to significant variations in functionality and manufacturer recommendations, thus, making it difficult to master one product. Standardizing support surfaces within the PF would be vital to reduce user variability and encourage proper use. Midway through the project, only two residents

were on LAL mattresses. One resident preferred to be in a higher setting than recommended and would request nurses to change the pressure setting to his preference, which lowered the results from reaching 100% compliance. Due to budget constraints, all high-risk residents were not placed on LAL mattresses per the PIPB bundle flow chart recommendations.

The leadership team voiced organizational and supply barriers to implementing a few evidence-based guideline recommendations on the PIPB Flow chart. The two PIPB bundle interventions that could not be carried out were placing very high-risk residents on a LAL support surface and applying prophylactic silicone dressings for high PI-risk residents. The Director of Nursing reported that the LTCF could not provide the support surfaces or dressings because they “would not be covered by insurance and it is outside of the facility budget” (personal communication from DON, June 2022). This is a common theme in the LTC setting.

Limitations

The current initiative has several limitations and areas for improvement. First, the QI initiative was short in length and conducted over 20 weeks, limiting the amount of data collection and sustainability evaluation. All residents with FAPIs were discharged or expired before the project started; thus, the relationship between education and PI incidence could not be examined. The Hawthorne effect could have resulted in better adherence to this project and overall results. The presence of the PL at the facility may have caused nursing staff to be vigilant about their practices, which increased adherence. Data collected was exclusive to personnel from one LTCF, limiting generalizability. To use a validated psychometrically tested survey, the PZ-PUKT was selected for the nurse’s knowledge test. The long survey length (72 True/False questions) could have discouraged participation. Clinical staff had multiple residents under their care, and time constraints were a significant barrier in completing the Pre-Test and the hour-long

workshop. These time constraints inhibited all the staff from attending the PI educational workshop. Of the 36 participants who took the pre-test, only 30 completed the post-test. No participants utilized the *Qualtrics* online survey beforehand, so paper tests were distributed on the same day of the educational workshop. The pilot survey completion time was 15 to 20 minutes; however, during the project, it took some participants up to 25 minutes to complete. The late arrivals and longer test-taking delayed the start of the educational session.

A resident's compliance interfered with the nurses' PIPB intervention results, specifically regarding the proper use of the LAL mattress. One resident did not allow the staff to change the setting and requested to be placed on a higher-than-recommended setting. Overall, not all elements of the PIPB bundle were reviewed across all residents, so it cannot be ascertained that adherence to all PIP interventions was implemented.

It should be noted that patient confounding variables exist in the geriatric population in LTCFs based on their numerous risk factors and co-morbid conditions. Not all PIs are preventable or a reflection of the quality of care a resident receives, which should be considered when evaluating FAPI incidence and PI unavailability. Further research is needed to evaluate how these confounding factors impact the unavailability of PIs.

Recommendations

Routine and evidenced-based PI education and training must be targeted to all healthcare professionals and tailored to represent the needs of the clinical care staff working in LTC settings. Inviting nurses and CNAs to participate as key team members in this QI actively fostered teamwork and accountability. Both groups embraced and understood their role and responsibility in PIP, but also understood that the team approach was vital to achieving true success and ongoing improvement. For staff unable to attend the educational workshop in

person, supplemental education should be provided through virtual education sessions or engaging learning modules. For in-person training, live hands-on educational sessions integrating practical, real-life scenarios should continue to be utilized to build and reinforce competency and skills. An integrative teaching approach is essential to creating a knowledgeable, skilled, and competent LTCF workforce. Hosting educational sessions separately for nurses and CNAs facilitated a more engaged audience and made the curriculum more relatable. For example, during the nursing educational session, identification of PIs, skin assessment, and Braden Scale risk assessment were reviewed specific to the nurses' role and responsibilities. The CNA session reviewed key elements of PICGs specific to their roles, such as proper hygiene and skin care, repositioning, offloading, and proper linen layers on support surfaces.

To maintain the positive changes from this project, continued education and training are necessary to encourage ongoing improvement, feasibility, and sustainability of clinical guideline implementation in LTC. This can be accomplished by disseminating the findings, raising awareness, and simplifying PICGs while tackling the barriers to implementation in LTCFs. Developing and using a user-friendly clinical guideline protocol, like the PIPB bundle flow chart created for this project, helped make the over 400 pages of IPICPG more accessible and easier to implement. It was recommended that the PIPB flow chart be adapted into the EMR to automate and prompt clinicians to deliver the evidence-based recommended care. Due to the short study length, the PL did not evaluate all aspects of PIPB interventions, such as repositioning or offloading. Future projects should evaluate other practical elements of PICGs, such as repositioning practices, head-of-bed elevation, nutritional support, and skin care.

To address the common problem of improper use of support surfaces and pressure redistribution devices, it is recommended to standardize support surface brands, create linen

layer protocols, and decision guide flowcharts to facilitate improved compliance. It would be worthwhile to conduct a root cause analysis to identify the deterrents to implementing LAL support surface for very high-risk residents, such as cost.

There was an overall lack of high-quality literature regarding PI education and clinical guideline implementation in the LTC setting. PIP is a key area of discussion for LTCF providers and should be grounded in evidence-based practices, which is missing in the literature. Future studies should focus on educational interventions to bridge the gap between PICGs and the consistent use of PIP in LTC. Studies involving a larger sample size under rigorous control in the LTC setting are needed. Our findings also shed light on the need for more governmental support and funding for PIP in LTCFs. There is an urgent need to improve PIP, reduce turnover and support adequate training and highly skilled staff.

Implications

Findings from the nurse and CNA knowledge tests provided valuable insight about PI knowledge of LTC staff. Based on the literature review findings and the project results, most nurses in LTCF lack knowledge of basic wound care and have substandard PI knowledge. The QI project allowed for a better understanding of strengths and opportunities for improvement in PIP in the LTC setting. The findings of this project can be used to understand the positive impact of PI training and PIP in LTCFs and understand the feasibility and challenges of clinical guideline implementation. Training must be based on current guidelines to apply the latest evidence-based practices.

This QI project relied on direct observations and weekly rounds by a Wound Specialist Nurse Practitioner/PL, Wound Consultant Medical Doctor, and Certified Wound Nurse/LVN, who were vital in collecting data, educating, and monitoring project implementation. Employing

and training skilled wound care nurses are essential criteria in overseeing a quality PIP program, versus overwhelming charge nurses requested to take on the additional load of wound care responsibilities. A Certified Wound Specialist provider in the PF reinforced weekly education and provided staff with immediate feedback on PI clinical care, which was key to enhancing the staff knowledge base and fostering best wound care practices. LTCFs should consider partnering with a wound specialist consultant to optimize the integration of evidence-based practices and support continued education. The sustainability of this project will necessitate ongoing leadership support, wound nurse engagement, regular audits and spot checks, continued staff education, and ongoing use of the PIPB flow chart. This QI project provided an opportunity for further PI education to be developed based on the knowledge deficits identified on the knowledge tests and from clinical staff feedback. The long-term goal for the project is to expand it beyond the current LTCF.

Barriers to Pressure Injury Clinical Guideline Implementation in Long-Term Care Facilities

Numerous challenges exist in the LTC setting that may inhibit PICG practices from being implemented routinely. While analyzing the barriers throughout this project, a system-wide issue regarding PIP in LTCFs was apparent. The PI problem in LTCFs starts at the healthcare system and policy level. Risk factors are extensively documented in the literature, especially among geriatric residents, who are a vulnerable population. The number of Americans over age 65 will double by 2050 (United States Census Bureau, 2019), and many will be patients in nursing homes that need more resources to care for this growing population. There are many opportunities for improvement in PIP and treatment from a policy, organization, and bedside perspective.

One of the primary barriers to PICG adherence was due to a severe lack of supplies and resources, such as heel suspension devices, wedge cushions, and pillows for offloading. Many nurses indicated they did not have enough pillows to reposition properly, and LAL mattresses could not be provided for very high risk residents. Policymakers must recognize the challenges of the LTC setting and allocate more resources and budget to support enhanced PIP programs. Policymakers, California Law, Medicare, and stakeholders create guidelines and Local Coverage Determination (LCD), which define the coverage and criteria of healthcare services or devices. LTCF reimbursement is driven based on the treatment of PIs, not prevention. Therefore, any PI preventative care measure becomes an out-of-pocket expense for the LTCF, interfering with their ability to adhere to guidelines. Medicare encourages compliance with quality guidelines but does not provide adequate prevention funding. For example, for a resident to be eligible for Medicare coverage for a LAL mattress support surface, they must have a current PI on the trunk or multiple PIs. Therefore, very high-risk geriatric residents with numerous risk factors may only be eligible for a support surface once they have a PI present. In addition to the resource constraints, the nursing-to-patient ratio is exceptionally high in LTCF. The average nurse-to-patient ratio at the LTCF was around one nurse to fifteen patients, much higher than the acute care. CNAs, who provide the most direct care, can care for up to twenty-five residents per shift. Albeit these residents tend to be more stable in LTC, this requires nurses and CNAs to have extraordinary time management skills and contributes to challenges in PIP.

Looking at the PI problem from an organizational perspective, LTCF leadership must recognize organizational challenges contributing to PI development, such as poor staffing, poor staff morale, burnout, a heavy patient-nurse ratio, or allocation of resources. These conditions should prompt leadership to review staffing levels, plan and distribute fair resident assignments

based on resident PI risk, and allocate PI budget and resources to high-risk residents. The nationwide nursing staffing crisis has been an unexpected and a significant variable in numerous aspects of care delivery. Since the COVID-19 pandemic, agency staff has been utilized more frequently, contributing to inconsistencies in care. Agency staff is often not familiar with the policies and practices of the organization, changes in residents' conditions, or resident preferences. From a bedside staff perspective, it is essential for floor nurses and CNAs to recognize the common characteristics of these high PI-risk residents, such as multiple comorbidities, immobility, and incontinence. Until these system-wide issues and staffing crises are under control, challenges with implementing PIP are likely to continue in LTC.

Conclusions

Inadequate PIP can result in poor outcomes for residents in LTCFs, such as death, FAPIs, pain, increased hospitalizations, and decreased quality of life. This QI project used EBP to close the gap between knowledge and practices. The educational workshop and PIPB demonstrated an evidence-based approach to increasing knowledge of PIs and PIP, which resulted in no FAPIs in the PF for five months. At project completion, support surface LAL mattresses were being used properly, which was a significant area of improvement. The delivery of care in LTCFs falls on the unlicensed CNAs or LVNs, who demonstrated poor PI knowledge and needed more education and training on PIP. The issues that this project highlighted demonstrated the need to engage CNAs and nurses in PIP by providing continued education and training based on clinical guidelines. PIP education should be provided upon hire and at least quarterly for staff to stay up to date. Further studies are needed to focus additional attention and funding to ensure highly skilled LVNs, RNs, and CNAs are prepared to care for the vulnerable geriatric population.

The results of this QI project are consistent with the literature reporting that implementing a pre/post-educational intervention and an evidence-based PIPB can prevent FAPIs. The PF nurses successfully conducted a timely PI Braden risk assessment and comprehensive skin assessment on newly admitted residents upon admission and initiated PIPB interventions. The CNA team demonstrated positive outcomes regarding the proper use of support surfaces and linen layers. The nurses and CNAs reported gaining a sense of empowerment and confidence in identifying PIs and PIP after participating in the educational workshop. This self-report made them feel more comfortable and likely to carry out the PIP interventions. The collaboration of the CNAs, nurses, certified wound specialists, and leadership promoted a positive morale and facility culture. The consistent use of PIP EBPs was possible with enhanced clinical judgment, knowledge, and skills, which facilitated the prevention of FAPIs. The educational program combined with the PIPB flow chart produced an even more significant synergistic effect. Findings from this project suggest FAPIs can be prevented by promoting clinical staff's awareness and knowledge of PICGs, which results in increased assessment skills and competent care delivery. PICG implementation ensures that PIP practices are grounded in current evidence and research, which bridges the gap between PI research and practice in LTCFs.

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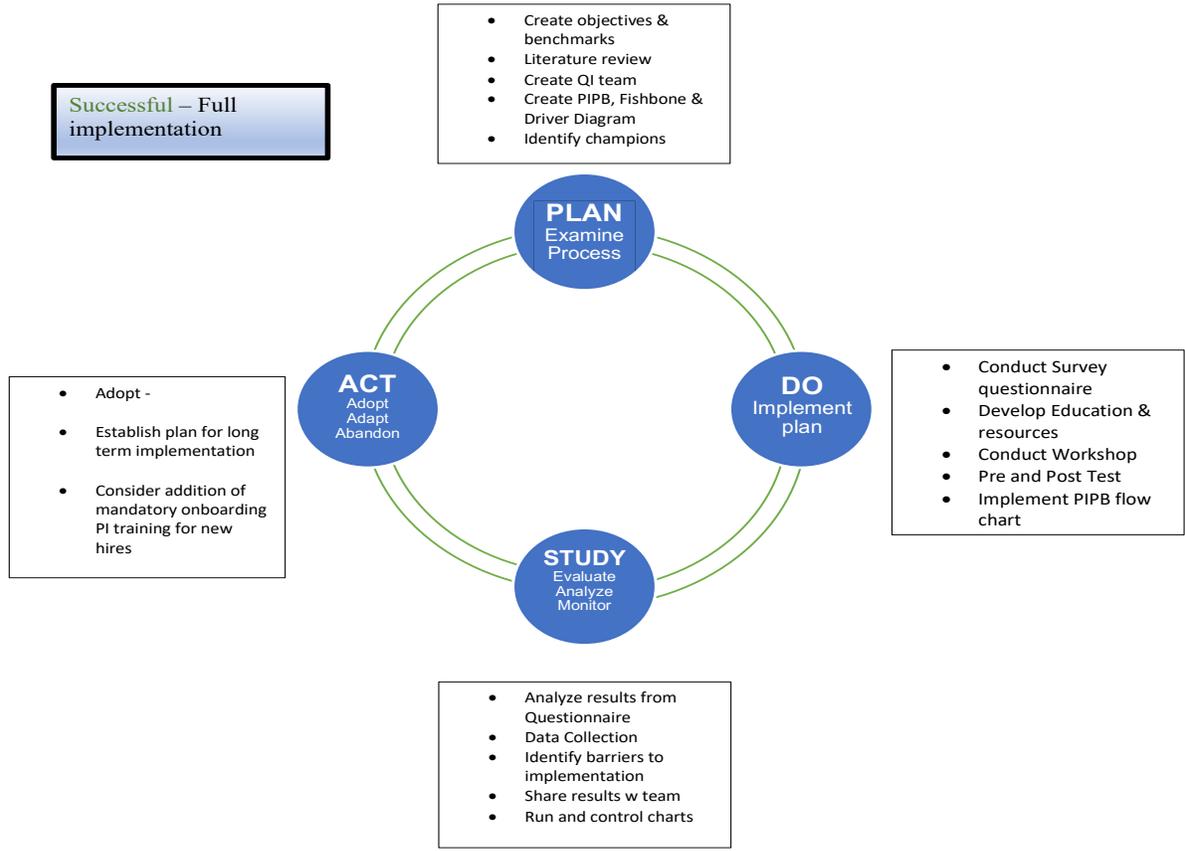
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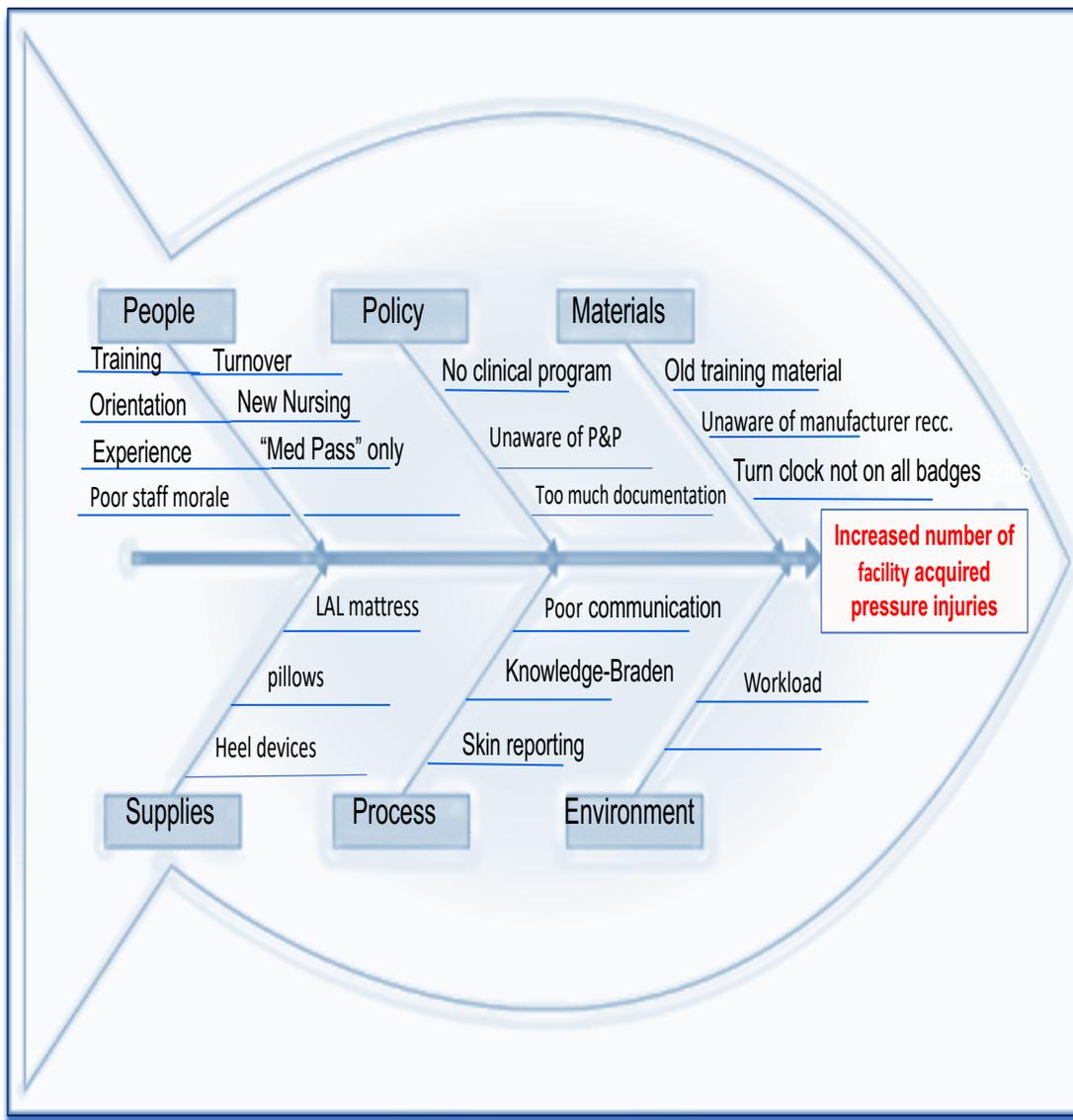
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Appendix A

PDSA

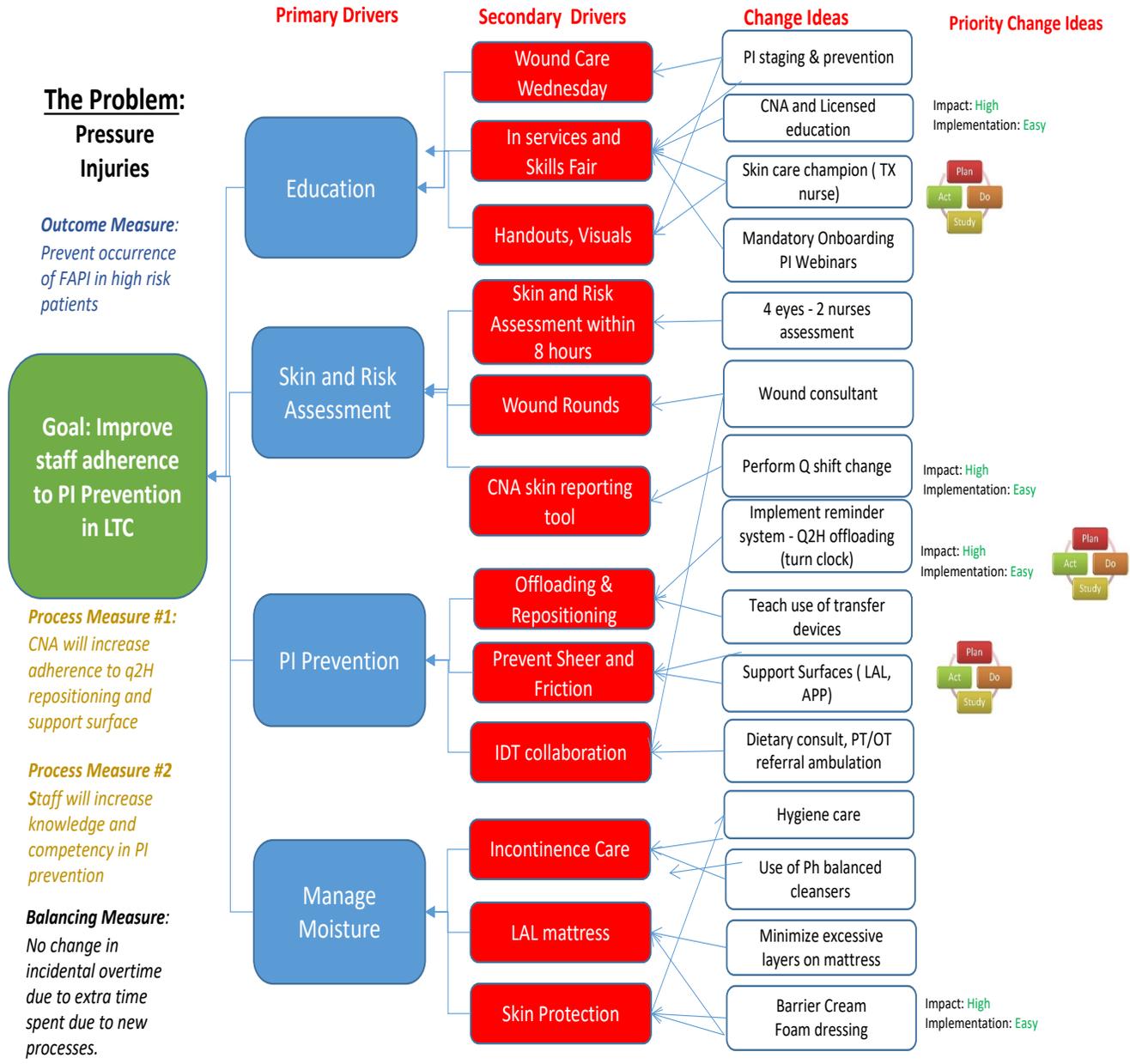


Appendix B Fishbone Diagram



Appendix C

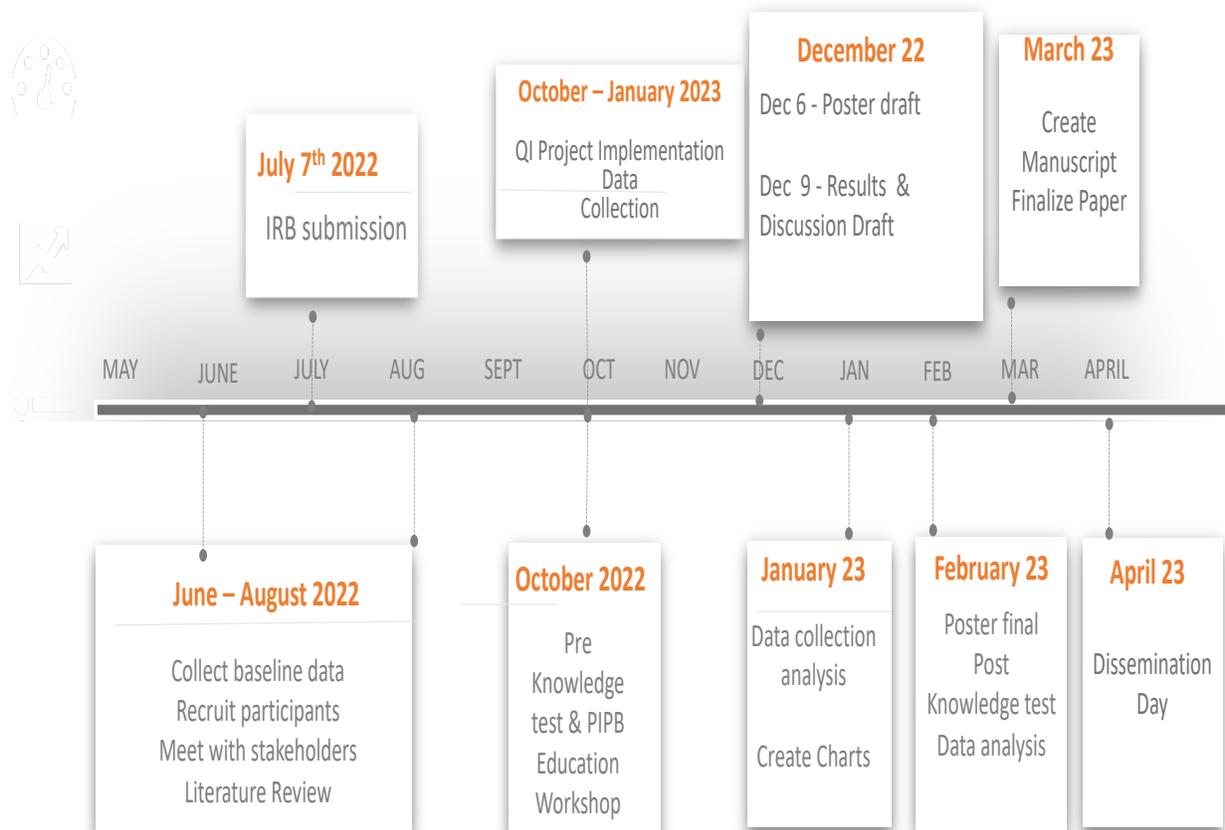
Driver Diagram



Appendix D

Project Timeline

PROJECT TIMELINE



Appendix E

Table of Methods and Planned Variables

Table of Methods and Planned Variables

Summary of planned Variables/Measurements/Assessments & Analyses							
Variable Name (Definition)	Pre-implementation (Baseline)	Post Implementation	Follow Up	Source	How it will be measured? Level of measurement	Why used in project	How it will be analyzed/used in analysis?
PI Prevalence and incidence	9 months PI prevalence incidence data	5 months QI implementation	5 months post-implementation	CMS QM and MDS report Monthly wound report	PI/total patients	Outcome measure	Rate of FAPIs C -chart Rate of PI prevalence - Run
% of pts. with Braden risk assessment completed same day as admission	20 weeks data prior	Weekly x 20 weeks	Six months	EMR	Count frequency (no/yes 0/1) Total risk assessments done in 8 hours/total admissions	Process measure	% of patients chart
% of new admissions receiving a same day comprehensive skin assessment	20 weeks data prior	Weekly x 20 weeks	six months	EMR	Count frequency (no/yes 0/1) same day assessments/total admissions	Process measure	% of patients P chart
Nurses and CNA PI knowledge tests	Day one – immediately before education	Post knowledge test at five months post QI implementation	Six months	Pre and post knowledge questionnaire PZ PUKT (72 items) and CNA PI Test(30 items) Paper pencil & Qualtrics	Count number of correct answers/total number of questionnaire items.	Outcome measure	Total score Percent change Display on Bar chart Use <i>t</i> test

Adherence to one linen layer on LAL mattress	Random Spot check x 20	Random spot check x 20	Six months	Visual spot check	Count/Frequency two layers or less = (no, yes; 0/1) # of patients with one linen layers or less/total # pts on LAL	Process measure	# of patients with one linen layers or less P chart
LAL mattress on correct pressure setting	Random spot check x 20	Random spot check x 20	Six months	Visual audit spot check	Count/Frequency two layers or less = (no, yes; 0/1) # of patients on LAL on correct setting/total # pts on LAL	Process measure	# of patient on the correct pressure setting P chart
Nurse and CNA demographics	On day of education	n/a		Qualtrics or pencil paper	Categorical	Descripti on of sample	table

Appendix F

Braden Scale II Permissions



Two Year Non-Exclusive License Agreement Academic, Clinical Study and Research

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PAYMENT: Payment has been received in the amount of \$50.00 USD.

DISCLAIMER OF CERTAIN DAMAGES. LICENSOR SHALL NOT BE LIABLE TO LICENSEE FOR ANY INCIDENTAL, INDIRECT, SPECIAL, EXEMPLARY OR CONSEQUENTIAL DAMAGES AS A RESULT OF USING THE BRADEN SCALE II[®], BRADEN GLOSSARY.

NOTICES. Any notice required hereunder by either party must be in writing and shall be deemed given when: (i) hand delivered; (ii) mailed by registered mail or overnight courier, upon the date of mailing; or (iii) by electronic mail or facsimile, when received (with verification of transmission sent properly to the receiving party along with a hard copy of the communication). Notice shall be sent to the addresses set forth below each party's signature, or such other addresses as changed by either party through written notice to the other party.

GOVERNING LAW. This Agreement shall be governed and interpreted according to the laws of the State of Nevada, without regard to its conflict of law principles. The parties hereto irrevocably and uncontestedly submit to the exclusive jurisdiction of a court of competent jurisdiction located in Clark County, Nevada and waive any objection that such court is an inconvenient forum.

REMEDIES. Licensee acknowledges and agrees that the remedies at law for Licensee's breach of any term in this Agreement may be inadequate and that Licensor will be entitled to seek injunctive relief for any breach or threatened breach of this Agreement.

ASSIGNMENT. Neither party may assign this Agreement without the express written consent of the other party; provided, however, that either party may assign this Agreement to a party acquiring all or substantially all of the assets of the assigning party by merger or otherwise.

AMENDMENT. This Agreement may not be amended or modified except in writing signed by both parties.

RELATIONSHIP OF THE PARTIES. This Agreement shall not constitute or be considered a partnership, employer, employee relationship, joint venture or agency relationship between the parties.

NO THIRD-PARTY RIGHTS. This Agreement is intended for the sole benefit of the parties and their successors and permitted assigns. It is not intended to create any rights in favor of any other person or entity.

ENTIRE AGREEMENT. This Agreement constitutes the entire Agreement between the parties and supersedes all oral or written proposals, agreements and all other communications between the parties relating to the subject matter of this Agreement.

Agreed to the terms set forth above,

Appendix G

Copyright Permissions PZ-PUKT

The **Pieper-Zulkowski Pressure Ulcers/Injuries Knowledge Test** is available at no charge to professionals who agree not to resell it or to profit from its use. Please use this form to request permission to use test. Permission is readily given to those using this product in research, scholarly publications or programs of prevention in clinical agencies.

Please fill out the following personal information.

Name: Tara Frazier

Title: AGNP- C, MSN, WCC

Organization California State University Fullerton

Address: 800 N State College Blvd, Fullerton, CA 92831

City: Fullerton

Country: US

Email: Tara.wcu@gmail.com

Intended Use: CSUF DNP Quality Improvement project

I agree to the following:

1. The Pieper- Zulkowski Pressure Ulcer Knowledge Test (PZ PUKT) will be used as written without changing the wording or scoring of the document without written permission.
2. The full name of the tool, Pieper Zulkowski Pressure Ulcer Knowledge Test, or PZ PUKT will be used on any reproduction of the tool.
3. Results of the testing and citations using PZ PUKT will be emailed to Drs. Pieper (bapieper@comcast.net) and Zulkowski at drkarenz@aol.com in a form that will be sent to you.

Signature _____

Date _____

5/5/22

Appendix H

Braden Scale II

BRADEN SCALE II® For Predicting Pressure Injury Risk

SENSORY PERCEPTION	1. Completely Limited	2. Very Limited	3. Slightly Limited	4. No Impairment	SCORE
Ability to respond meaningfully to pressure related discomfort	Is unresponsive (does not moan, flinch, or grasp) to painful stimuli due to diminished level of consciousness or sedation. OR Has limited ability to feel pain over most of the body.	Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness. OR Has a sensory impairment which limits the ability to feel pain or discomfort over ½ of the body.	Responds to verbal commands but cannot always communicate discomfort or the need to be turned. OR Has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.	
MOISTURE	1. Constantly Moist	2. Very Moist	3. Occasionally Moist	4. Rarely Moist	
Degree to which skin is exposed to moisture	Skin is kept moist almost constantly by perspiration, urine, or other body fluids. Dampness is detected every time patient is moved or turned.	Skin is often, but not constantly moist. Linen must be changed at least 3x a day.	Skin is occasionally moist. Linen must be changed at least 2x a day.	Skin is usually dry. Linen only requires changing at routine intervals.	
OUT OF BED ACTIVITY	1. Bedfast	2. Chairfast	3. Walks Occasionally	4. Walks Frequently	
Degree of physical activity out of bed	Confined to bed.	Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	Walks occasionally each shift, but for very short distances with or without assistance.	Walks outside of room at least twice a day and inside room at least once every two hours during waking hours.	
IN BED MOBILITY	1. Constantly Immobile	2. Very Limited	3. Slightly Limited	4. No Limitations	
Ability to change and control body position while in the bed or chair	Does not make even slight changes in body or extremity position without assistance.	Makes occasional slight changes in body or extremity position, but unable to make frequent or significant changes independently.	Makes frequent, though slight, changes in body or extremity position independently.	Makes major and frequent changes in position without assistance.	
NUTRITION	1. Very Poor	2. Probably Inadequate	3. Adequate	4. Excellent	
Food intake pattern	Never eats a complete meal. Rarely eats more than 1/3 of any food offered. Eats 2 servings or less of protein per day. Takes fluids poorly. Does not take a liquid dietary supplement. OR Is NPO and/or maintained on clear liquids or IVs for more than 5 days.	Rarely eats a complete meal and generally eats only about ½ of any food offered. Protein intake includes only 3 servings per day. Occasionally will take a dietary supplement. OR Receives less than optimum amount of liquid diet or tube feeding.	Eats over ½ of most meals. Eats a total of 4 servings of protein per day. Occasionally will refuse a meal but will usually take a supplement when offered. OR Is on a tube feeding or TPN regimen which meets nutrition needs.	Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of protein per day. Occasionally eats between meals. Does not require supplementation.	
FRICTION & SHEAR	1. Problem	2. Potential Problem	3. No Apparent Problem		
Ability to move without rubbing on other surfaces or creating opposing forces to the skin and underlying tissues	Requires moderate to maximum assistance in moving. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures, or agitation leads to almost constant friction.	Moves feebly or requires minimum assistance. During a move, skin probably slides to some extent against sheets, chair, restraints, or other devices. Maintains relatively good position in chair or bed most of the time, but occasionally slides down.	Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move.		
TOTAL SCORE					

A total score of ≤ 18 indicates the patient is at risk for developing pressure injuries.

Clinician Signature _____ Date _____

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Table 1

Braden Risk Levels

Braden Score	Risk Category
23 to 19	Not at risk
18 to 15	Mild risk
14 to 10	Moderate to high risk
9 or less	Very high Risk

Appendix I

IRB Certificate of Approval



CALIFORNIA STATE UNIVERSITY, LONG BEACH OFFICE OF RESEARCH & ECONOMIC DEVELOPMENT

DATE: September 30, 2022

TO: [REDACTED]

FROM: California State University, Long Beach Institutional Review Board

PROJECT TITLE: [REDACTED] lementation of a pressure injury prevention bundle in a long-term care facility.

REFERENCE #: [REDACTED]

SUBMISSION TYPE: New Project

REVIEW TYPE: Exempt Review

ACTION: [REDACTED]

APPROVAL DATE: September 30, 2022

This is to advise you that the Institutional Review Board for the Protection of Human Subjects (IRB) of California State University, Long Beach, has reviewed your protocol application.

Approval is effective beginning September 30, 2022 and is conditional upon your willingness to carry out your continuing responsibilities under University policy. This project must adhere to the following conditions:

1. You must clearly indicate in the header or footer of each page of your approved Informed Consent Form and recruitment material as follows: **"Approved September 30, 2022 by the CSULB IRB."**
2. **If you need to make changes/revision to this approved project, you must submit a Request for Amendment to an Approved Protocol in addition to any documents affected by the requested change. Submit these documents as a subsequent package to this approved project via IRBNet. You are not allowed to implement any changes to your research activities prior to obtaining final approval of you requested amendment from the CSULB IRB.**
3. You are required to inform the Director of Research Integrity and Compliance, Office of Research & Economic Development, via email at ORED-Compliance@csulb.edu within twenty-four hours of any adverse event in the conduct of research involving human subjects. The report shall include the nature of the adverse event, the names of the persons affected, the extent of the injury or breach of confidentiality or data security, if any, and any other information material to the situation.
4. Maintain your research records as detailed in the protocol.

Should you have any questions about the conduct of your research under this protocol, particularly about providing informed consent and unexpected contingencies, please do not hesitate to contact the IRB Office via email, IRB@csulb.edu, or call (562) 985-8147. Please specify your project title and reference number in all correspondence with this committee. We wish you the best of success in your research.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within California State University, Long Beach Institutional Review Board's records.

Appendix J

Institutional Letter of Approval

Date: 5/16/2022

This letter is to show that [REDACTED] give permission to Tara Frazier, AGNP to conduct the project titled: Implementation of a Pressure Injury Prevention Bundle in a Long Term Care. The Pressure Injury Quality Improvement project will be conducted in the third and fourth quarter of 2022 (exact dates to be determined).

Upon obtaining all necessary IRB determination/approval, the above-named project lead is allowed to:

- (1) Collect data
 - a. Pressure injury incidence
 - b. Pressure injury risk Braden scores
 - c. Admission skin Assessment
 - d. Support Surfaces and layers on support surfaces
 - e. Repositioning
 - f. Nurse and CNA PI knowledge scores
- (2) Access necessary documents/data
 - a. PCC EMR access
 - b. Admission Assessments
 - c. Care Plans
 - d. Orders
- (3) Conduct necessary interactions with staff/patients relevant to their project
 - a. Conduct Pressure Injury Prevention Workshop for Licensed and CNAs
 - i. 2-hour- Licensed Vocational Nurses (LVN) and Registered nurses (RN)
 - ii. 1-hour CNAs
 - b. Provide virtual PI training webinar for new hire nurse and CNAs.
 - c. Implement Pressure Injury Prevention Bundle
- (4) Distribute
 - a. Demographic survey
 - b. Pressure Injury Knowledge Test
 - c. PI tool kit
 - d. Pressure injury prevention bundle

The project lead is responsible for ensuring that all activities related to conducting the project are in compliance with the policies that govern practice, HIPPA, and research and research-related

Appendix K

Demographic Survey and PZ- PUKT Knowledge Test

Pieper-Zulkowski Pressure Ulcers/Injuries Knowledge Test (Revised 2021)

DEMOGRAPHIC SHEET:

DIRECTIONS: Please answer each of the following questions about your background by checking the appropriate boxes).

1. **Where do you primarily work?** Hospital Long term Care Home Care Private Practice Education Other (specify)_____

2. **Age:**_____

3. **Gender:** Male Female Other

4. **Job Category:** Physician (MD/DO) Registered Nurse (RN) Licensed Practical Nurse (LPN)
 Certified Nurse Assistant (CNA) Administrator Nurse Practitioner (NP) Physician Assistant (PA)
 Other (specify)_____

5. **Number of years in practice:**
 < 1 year 1 year - 5 years > 5 years - <10 years
 10 years - < 15 years 15 years - < 20 years 20 years or more

6. **Highest degree held (check one):** Diploma Associate Baccalaureate Masters
 Doctorate MD/DO

7. **Are you certified in any clinical specialty?** Yes No Certification type_____

8. **Are you certified as Wound Specialist?** Yes No Certifying Organization_____

9. **When was the last time you listened to a lecture on pressure ulcers/injuries? (Check one)**
 One year or less Greater than 1 year but less than 2 years
 2-3 years 4 years or greater Never

10. **When was the last time you read an article, book, or guideline about pressure ulcers/injuries? (Check one)**
 One year or less Greater than 1 year but less than 2 years
 2-3 years 4 years or greater Never

11. **Have you sought information about pressure ulcers/injuries on the web within the past year?** Yes No

PZ-PUKT KNOWLEDGE TEST - NURSES

1. Slough is yellow or cream-colored necrotic /devitalized tissue on a wound bed.	TRUE	FALSE	DO NOT KNOW
2. A pressure ulcer/injury is a sterile wound.	TRUE	FALSE	DO NOT KNOW
3. Foam dressings may increase wound pain.	TRUE	FALSE	DO NOT KNOW
4. Alkaline soap products should be used to cleanse soiled skin.	TRUE	FALSE	DO NOT KNOW
5. Seating should be for short periods in an appropriate chair/wheelchair with a pressure redistribution cushion for persons at risk for pressure ulcers/injuries.	TRUE	FALSE	DO NOT KNOW
6. A Stage 3 pressure ulcer/injury is a partial thickness skin loss involving the epidermis and/or dermis.	TRUE	FALSE	DO NOT KNOW
7. Hydrogel dressings should not be used on pressure ulcers/injuries with granulation tissue.	TRUE	FALSE	DO NOT KNOW
8. Reposition individuals with or at risk of pressure ulcer/injury on an individualized schedule regardless of mobility level unless contraindicated.	TRUE	FALSE	DO NOT KNOW
9. A pressure ulcer/injury scar will break down faster than unwounded skin.	TRUE	FALSE	DO NOT KNOW
10. Pressure ulcers/injuries progress in a linear fashion from Stage 1 to 2 to 3 to 4.	TRUE	FALSE	DO NOT KNOW
11. Eschar is healthy tissue.	TRUE	FALSE	DO NOT KNOW
12. Non-blanchable erythema anywhere in the body is a stage 1 pressure ulcer/injury.	TRUE	FALSE	DO NOT KNOW
13. The goal of palliative care is wound healing.	TRUE	FALSE	DO NOT KNOW
14. A Stage 2 pressure ulcer/injury is a full thickness skin loss.	TRUE	FALSE	DO NOT KNOW
15. Dragging the patient up in bed increases friction.	TRUE	FALSE	P DO NOT KNOW
16. Increased body temperature is a risk factor for pressure ulcer/injury.	TRUE	FALSE	DO NOT KNOW
17. Diabetes mellitus does not increase a person's risk for pressure ulcer/injury.	TRUE	FALSE	DO NOT KNOW

18. A comprehensive pain assessment should be done on persons with pressure ulcer/injury.	TRUE	FALSE	DO NOT KNOW
19. High absorbency incontinence products should be used for individuals with pressure ulcers/injuries when incontinence is present	TRUE	FALSE	DO NOT KNOW
20. A pressure redistribution surface manages tissue load and the microclimate against the skin.	TRUE	FALSE	DO NOT KNOW
21. A Stage 2 pressure ulcer/injury may have slough in its base.	TRUE	FALSE	DO NOT KNOW
22. If necrotic tissue is present and if bone can be seen or palpated, the ulcer is a Stage 4.	TRUE	FALSE	DO NOT KNOW
23. Oral nutritional supplements should be used in addition to usual diet for individuals at high risk for pressure ulcers/injuries.	TRUE	FALSE	DO NOT KNOW
24. To prevent heel pressure ulcer/injury, the weight of the leg should be distributed along the calf during heel elevation.	TRUE	FALSE	DO NOT KNOW
25. When necrotic tissue is removed, an unstageable pressure ulcer/injury will be classified as a Stage 2 ulcer/injury.	TRUE	FALSE	DO NOT KNOW
26. Donut devices/ring cushions help to prevent pressure ulcers/injuries.	TRUE	FALSE	DO NOT KNOW
27. It is the nurse's responsibility to be sure a specialty bed is working properly and document its use.	TRUE	FALSE	DO NOT KNOW
28. ABD pads may be used to protect the skin.	TRUE	FALSE	DO NOT KNOW
29. Persons at risk for pressure ulcers/injuries should be nutritionally assessed (i.e., weight, nutrition intake, blood work, etc.).	TRUE	FALSE	DO NOT KNOW
30. Biofilms may develop in any type of wound.	TRUE	FALSE	DO NOT KNOW
31. Critical care patients may need slow, gradual turning because of being hemodynamically unstable.	TRUE	FALSE	DO NOT KNOW
32. Blanching refers to whiteness when pressure is applied to a reddened area.	TRUE	FALSE	DO NOT KNOW

33. A blister on the heel is nothing to worry about.	TRUE	FALSE	DO NOT KNOW
34. Staff education alone may reduce the incidence of pressure ulcers/injuries.	TRUE	FALSE	DO NOT KNOW
35. Early changes associated with pressure ulcer/injury development may be missed in persons with darker skin tones.	TRUE	FALSE	DO NOT KNOW
36. A footrest should not be used for an immobile patient whose feet do not reach the floor.	TRUE	FALSE	DO NOT KNOW
37. Bone, tendon, or muscle may be exposed in a Stage 3 pressure ulcer/injury.	TRUE	FALSE	DO NOT KNOW
38. A topical opioid may help manage acute pressure ulcer/injury pain.	TRUE	FALSE	DO NOT KNOW
39. Wound biofilm is associated with decreased wound drainage.	TRUE	FALSE	DO NOT KNOW
40. It may be difficult to distinguish between moisture associated skin damage and a pressure ulcer/injury.	TRUE	FALSE	DO NOT KNOW
41. Wounds that become chronic are frequently stalled in the proliferative phase of healing.	TRUE	FALSE	DO NOT KNOW
42. Dry, adherent eschar on the heels should be removed for the wound to heal.	TRUE	FALSE	DO NOT KNOW
43. Deep tissue injury is a localized area of purple or maroon discolored intact skin or a blood-filled blister.	TRUE	FALSE	DO NOT KNOW
44. Massage of bony prominences is essential for quality skin care.	TRUE	FALSE	DO NOT KNOW
45. Poor posture in a wheelchair may be the cause of a pressure ulcer/injury.	TRUE	FALSE	DO NOT KNOW
46. For persons who have incontinence, skin cleaning should occur at the time of soiling and at routine intervals.	TRUE	FALSE	DO NOT KNOW
47. Patients who are spinal cord injured need knowledge about pressure ulcers/injuries prevention and self-care.	TRUE	FALSE	DO NOT KNOW
48. A mucosal membrane pressure ulcer/injury as the result of medical equipment is a Stage 3.	TRUE	FALSE	DO NOT KNOW

49. Pressure ulcers/injuries can occur around the ears in a person using oxygen by nasal cannula.	TRUE	FALSE	DO NOT KNOW
50. Persons, who are immobile and can be taught, should shift their weight every 30 minutes while sitting in a chair.	TRUE	FALSE	DO NOT KNOW
51. Stage 1 pressure ulcers/injuries are intact skin with non-blanchable erythema over a bony prominence.	TRUE	FALSE	DO NOT KNOW
52. When the ulcer/injury base is totally covered by slough, it cannot be staged.	TRUE	FALSE	DO NOT KNOW
53. Selection of a pressure redistribution surface only considers the person's level of pressure ulcer/injury risk.	TRUE	FALSE	DO NOT KNOW
54. Shear injury is not a concern for a patient using a pressure redistribution surface	TRUE	FALSE	DO NOT KNOW
55. It is not necessary to have the patient with a spinal cord injury evaluated for seating.	TRUE	FALSE	DO NOT KNOW
56. To help prevent pressure ulcers/injuries, the head of the bed should be elevated at more than a 45-degree angle.	TRUE	FALSE	DO NOT KNOW
57. Urinary catheter tubing should be positioned under the leg.	TRUE	FALSE	DO NOT KNOW
58. Properly sized equipment may help avoid pressure ulcers/injuries in bariatric patients.	TRUE	FALSE	DO NOT KNOW
59. A dressing should keep the wound bed moist, but the surrounding skin dry.	TRUE	FALSE	DO NOT KNOW
60. Hydrocolloid and film dressings should be removed quickly to decrease pain.	TRUE	FALSE	DO NOT KNOW
61. Nurses should avoid turning a patient onto a reddened area.	TRUE	FALSE	DO NOT KNOW
62. Skin tears are classified as Stage 2 pressure ulcers/injuries.	TRUE	FALSE	DO NOT KNOW
63. A Stage 3 pressure ulcers/injuries may appear shallow if located on the ear, malleolus/ankle, or heel.	TRUE	FALSE	DO NOT KNOW
64. Hydrocolloid dressings should be used on Stage 2 infected ulcer/injury.	TRUE	FALSE	DO NOT KNOW
65. Pressure ulcers/injuries are a lifelong concern for a person who is spinal cord injured.	TRUE	FALSE	DO NOT KNOW

66. Pressure ulcers/injuries are a lifelong concern for a person who is spinal cord injured.			
67. Pressure ulcers/injuries should not be cleansed with drinking water	TRUE	FALSE	DO NOT KNOW
68. Alginate dressings can be used for Stage 3 and 4 pressure ulcers/injuries with moderate exudate.	TRUE	FALSE	DO NOT KNOW
69. Deep tissue injury will not progress to another ulcer/injury stage.	TRUE	FALSE	DO NOT KNOW
70. Film dressings absorb a lot of drainage.	TRUE	FALSE	DO NOT KNOW
71. Non-sting skin prep should be used around a wound to protect surrounding tissue from moisture.	TRUE	FALSE	DO NOT KNOW
72. Stage 4 pressure ulcers/injuries always have undermining.	TRUE	FALSE	DO NOT KNOW

Appendix L

CNA Pressure Injury Prevention Test

Last four of cell phone # _____ Date: _____

1. The head of the bed should be elevated as high as possible.
 - a. True
 - b. False
 - c. I don't know

2. Which of the following is an appropriate skin care technique?
 - a. Extending intervals between turning and repositioning when a resident is noted to be developing an ulcer.
 - b. Massaging reddened areas on the skin to promote blood flow to the potentially damaged area.
 - c. Scrubbing the resident's skin after an incontinence episode.
 - d. Applying barrier cream to prevent damage to the skin from incontinence.

3. A resident is noted to have this fluid filled blister over the left heel. How would you correctly identify this injury?
 - a. Stage 1 pressure injury
 - b. Stage 2 pressure injury
 - c. Deep-Tissue Injury
 - d. Unstageable pressure injury



4. Which of the following skin conditions would be reported to nursing?
 - a. Bruise
 - b. Reddened area
 - c. Rash
 - d. All the above

5. A resident is noted to have a full water basin each shift but has not been observed drinking fluids. What actions should you take? (**Select all that apply**)
 - a. Fill the water basin to the top
 - b. Place water basin within arm's reach
 - c. Ask the resident if they have a preference on which side to place the water.
 - d. Offer fluids throughout the day
 - e. Report refusal to nursing
 - f. All of the above

6. Floating a resident's heels properly means resting the heels on a soft pillow so they do not touch the mattress.
 - a. True
 - b. False
 - c. I don't know

7. When should a low air loss mattress be set to "max inflate?"
 - a. If the resident appears to be sinking into the mattress
 - b. While lifting or turning a patient or during hygiene care
 - c. During mealtimes
 - d. This should be done at least once a shift

8. How often should residents change their position while up in the chair
 - a. Every 30 minutes
 - b. Every 15 minutes
 - c. Every 2 hours
 - d. Every 1 hour

9. What is the maximum degree the head of the bed should be elevated to reduce pressure and shearing?
 - a. 45 degrees
 - b. 90 degrees
 - c. 30 degrees
 - d. 35 degrees

10. This resident is repositioned properly.
 - a. True
 - b. False
 - c. I don't know.



11. This picture depicts correct offloading of heels.
- True
 - False
 - I don't know



12. This wound developed behind the ears from nasal cannula tubing, this is a traumatic wound.
- True
 - False
 - I don't know



13. Which of the following are important to reduce shearing when transferring or repositioning a resident? **Select all that apply:**
- Use a draw sheet to reposition.
 - Lift or roll
 - Use two-person assistance when possible.

- d. Use transfer devices, such as sliding boards.

14. Which of the following measures should be **avoided** in preventing skin breakdown?

- a. Apply a thick application of barrier cream
- b. Cleansing with Ph-balanced cleanser
- c. Peri care with each episode of incontinence
- d. Use moisturizers daily on dry skin

15. This is a stage one pressure injury.

- a. True
- b. False
- c. I don't know.



16. If a resident is wearing these, floating on pillows is not necessary.

- a. True
- b. False
- c. I don't know.



17. You are taking care of a resident on a low air loss mattress who is incontinent of bowel and bladder. When placing linens on a Low-Air-Loss (LAL) mattress, it is **best** to have no more than ___ layer(s) of linens.

- a. 2 – draw sheet, chux or brief
- b. 3 – draw sheet, chux, and brief.
- c. 4 – fitted sheet, draw sheet, chux, brief.
- d. 1 – chux or brief



18. A scar will break down faster than unwounded skin.
- True
 - False
 - I don't know.
19. Donut devices/ring cushions help prevent pressure injuries.
- True
 - False
 - I don't know.
20. What tool is used to evaluate a patient's risk of developing a pressure injury?
- Met Score
 - APGAR scale
 - Pressure Ulcer Scale
 - Braden Scale
21. A dark-skinned resident complains of tenderness to bilateral heels, but you don't see anything. What is the **next best step?**
- Elevate heels off bed and report to nursing.
 - Advise the resident it will go away if they offload.
 - Palpate for boggy, tenderness, and fluctuance.
 - Inform the patient that nothing is there.
22. Massaging bony prominences helps improve blood flow and is essential for skin care.
- True
 - False
 - I don't know.
23. It is best to let 'wounds breath' and leave them open to the air.
- True
 - False
 - I don't know.

24. Repositioning every 2-3 hours is important for residents with pressure injuries or at risk of pressure injuries.
- True
 - False
 - I don't know.
25. Certified nursing assistants are usually the first caretakers to notice skin breakdown.
- True
 - False
 - I don't know.
26. Dragging a resident up in bed causes shearing.
- True
 - False
 - I don't know.
27. A footrest should **not** be used for an immobile resident whose feet do not touch the floor.
- True
 - False
 - I don't know.
28. Signs and symptoms of dehydration include: **(Select all that apply)**
- Dry mouth and tongue
 - Poor skin turgor
 - Warm moist skin
 - Decrease in BP, elevated pulse.
 - Pale urine
 - All of the above
29. Reporting accurate food and fluid intake and outtake is important because:
- Nutrition is vital to wound healing.
 - Geriatric residents in long-term care are at risk for Malnutrition.
 - Dietary consultation may be necessary.
 - All the above
30. Alternating Pressure Pad overlays can become deflated.
- True
 - False
 - I don't know.

Appendix M

Pressure Injury Prevention Educational Workshop Course Curriculum

The Frontline of Pressure Injury Prevention Workshop

Presenter: Tara Frazier AGNP

Course Outline: 1 hour

Target Audience: Nurses and CNAs

COI Disclosure

Objectives

- Learners will be able to assess and identify pressure injuries and other skin-related conditions.
- Learners will show knowledge of pressure-relieving techniques and prevention strategies.
- Learners will understand their role in pressure injury prevention.

Curriculum Content:

Identifying high-risk patients

Braden Scale Case Study Activity - Nurses

Pressure Injury Assessment – Nurses

- Stage One Pressure injury
- Stage Two Pressure Injury
- Stage Three Pressure Injury
- Stage Four Pressure Injury
- Unstageable Pressure Injury
- Deep Tissue Pressure Injury

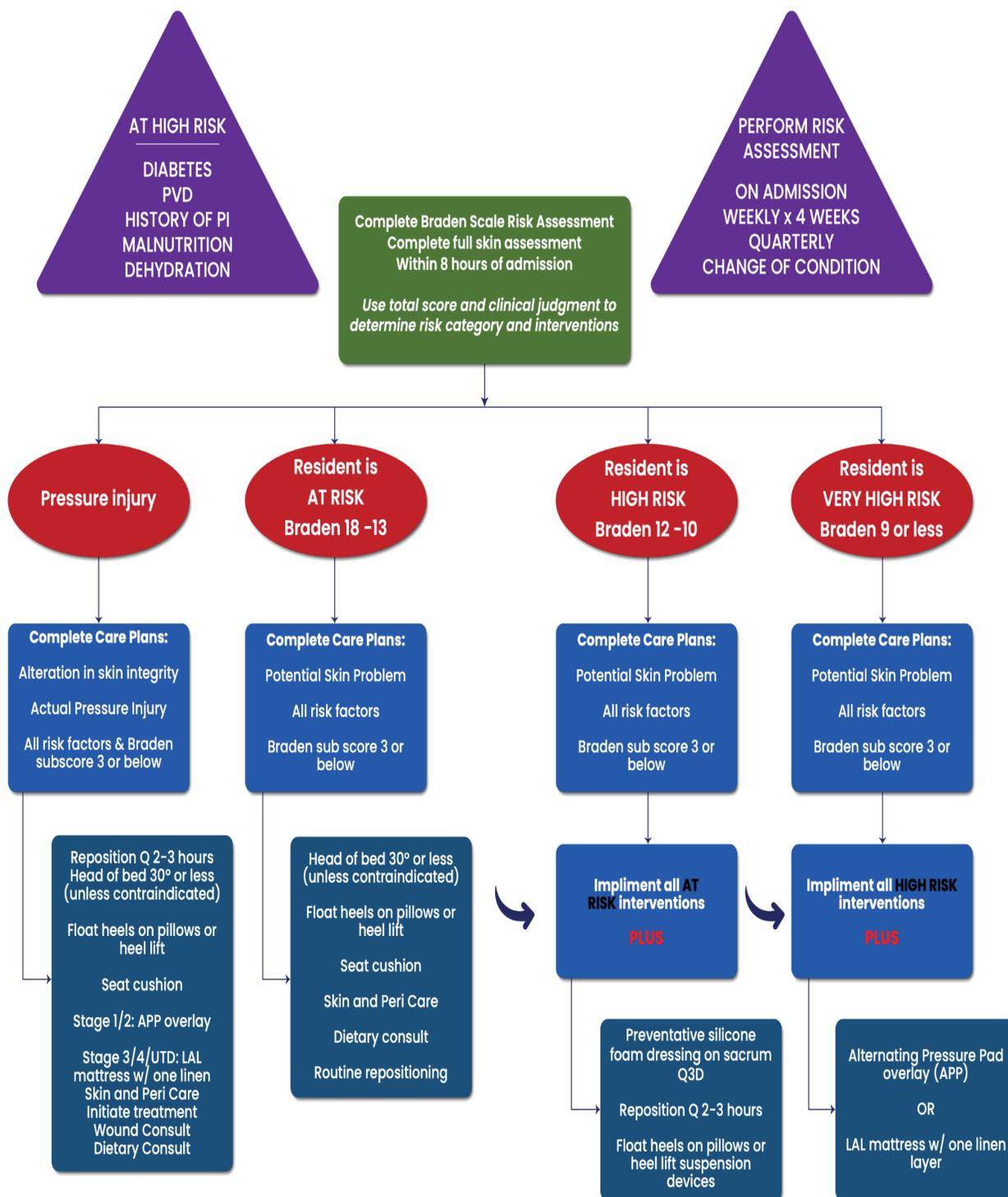
Pressure Injury Prevention – Nurses and CNAs

- **Skin**
- Reporting Skin Conditions
- Skin Care and Protection
- Skin breakdown: Incontinence and moisture
- **Repositioning:**
- Turning and Repositioning
- Pillow positioning
- Heel Suspension Devices
- Support Surfaces – Low Air Loss Mattress
- Mobility
- Special considerations patients with medical devices
- **Nutrition** and Hydration
- **Competency Check**

Appendix N

Pressure Injury Prevention Bundle Flow Chart

PRESSURE INJURY PREVENTION BUNDLE FLOW CHART



Appendix O

Participant Sociodemographic

Table 3

Sociodemographic Characteristics of Participants at Baseline

Baseline characteristics			Wound Care Certified		
	<i>N</i>	%	Yes	0	0%
	=36		No	3	33%
Gender			Most recent lecture attended on PIs		
Female	30	83%	1 year	17	47%
Male	2	5%	>1 but <2	8	22%
Unanswered	4	11%	2-3	3	8%
			4	1	2%
			Never	4	11%
Job Category			Most recent book or article read on PIS		
RN	2	5%	<1 year	16	44%
LVN	10	27%	>1 but <2	3	8%
CNA	24	66%	2-3	7	19%
Combined	36		4	2	5%
			Never	5	14%
Highest degree held			Have you sought PI info on the web in the last year?		
Diploma	26	72%	Yes	6	16%
Associates	6	16%	No	28	77%
Baccalaureate	1	2%			
			Have you read PI guidelines?		
Number of Years in practice			Yes	0	0%
>1-5	2	5%	No	33	100%
>5-10	3	8%			
>10-15	9	25%			
>15-20	8	22%			
Over 20	2	5%			

Note. N = 36 (12 Nurses; 24 CNAs). CNA = Certified Nursing Assistants; LVN= Licensed

Vocational Nurses; Registered Nurses = RN

Appendix P

Results – Charts

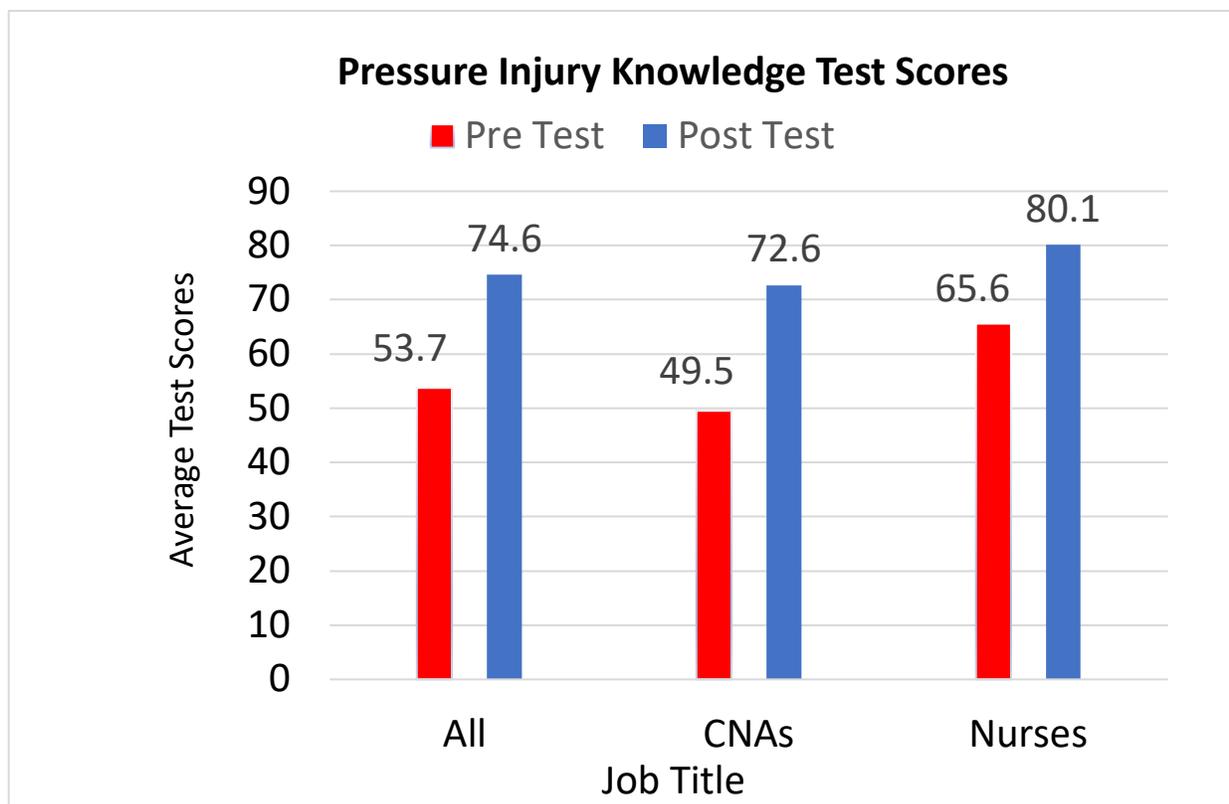


Table 2

Two-Tailed Paired Samples t-Test for the Difference Between Pre- Test and Post- Test – PZ- PUKT and CNA Knowledge Test- All participants combined (RN, LVN, CNAs)

Pre-Test (All groups)		Post-Test		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
53.73	13.82	74.67	14.00	8.16	< .001	1.49

Note. N = 30. Degrees of Freedom for the *t*-statistic = 29. *d* represents Cohen's *d*.

Table 3

Two-Tailed Paired Samples t-Test for the Difference Between Pre-Test and Post-Test – PZ-PUKT Knowledge Test - Nurses only (RN & LVN)

Pre- Test (RN&LVN)		Post-Test (RN&LVN)		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
65.63	13.22	80.13	9.36	2.6	.035	0.93

Note. N = 8. Degrees of Freedom for the *t*-statistic = 7. *d* represents Cohen's *d*.

Table 4

Two-Tailed Paired Samples t-Test for the Difference Between Pre - Test and Post Test CNA Pressure Injury Prevention Knowledge Test- CNAs only

Pre-Test		Post-Test		<i>t</i>	<i>p</i>	<i>d</i>
<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
49.50	11.52	72.68	15.03	8.38	< .001	1.79

Note. N = 22. Degrees of Freedom for the *t*-statistic = 21. *d* represents Cohen's *d*

