

PROMOTING CONFIDENCE IN PRESSURE INJURY MANAGEMENT IN RURAL  
LONG-TERM CARE

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**Title**

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**DOCTOR OF NURSING PRACTICE**

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## ABSTRACT

Despite prevention efforts, pressure injuries (PIs) remain prevalent across care settings and impose significant burden on affected individuals and the entire healthcare system. Many individuals, including those who live rurally and in long-term care (LTC) facilities, face challenges when accessing specialty care, leaving PI management to primary care providers (PCPs) and nursing staff. Minimal training and the myriad of commercially available wound care products contribute to lack of confidence in PI management.

This quality improvement project aimed to promote confidence in management of PIs in LTC residents, through development of a product selection guide, example orders, and separate education for PCPs and nursing staff. The product selection guide and educational presentations were customized according to facility product formularies. Confidence in PI management was evaluated with a qualitative post-education survey.

Evaluation of participant survey responses determined the impact of project interventions. PCPs reported low levels of confidence in PI management, citing lack of education and frequent changes in available products as barriers. PCPs perceived the education and resources as beneficial and anticipated making practice changes as a result, including selecting appropriate products and writing appropriate instructions. Nursing staff cited lack of exposure to PIs, workload, and concerns about product selection and unclear orders as barriers to their confidence. Nursing staff reported notably higher levels of confidence than PCPs and agreed education was helpful, with 63.2% anticipating probable practice change. Nursing staff planned to make changes in specific product use and wound care techniques. Lack of depth and structure in facility product formularies was noted during development of project materials and limited customization of the product selection guide and education.

Results suggest small-scale, facility-specific education, along with customized decision support tools, are effective in promoting PCP confidence in PI management. Nursing staff may benefit more from technical, skills-based education, focused on specific product use and wound care techniques. Additional efforts to create efficient, comprehensive product formularies within facilities are needed to streamline education and further promote confidence in PI management.



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## **DEDICATION**

I dedicate this dissertation to my three wonderful children, of whom I am so proud. I hope they always know their potential and have the courage to do difficult things.

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## LIST OF ABBREVIATIONS

DTPI.....Deep Tissue Pressure Injury.

LTC.....Long-term Care.

PCP.....Primary Care Provider.

PI.....Pressure Injury.

## CHAPTER 1: INTRODUCTION

### Background and Significance

Pressure injuries (PIs) are a global health concern (European Pressure Ulcer Advisory Panel [EPUAP] et al., 2019). While often regarded as complications of other disease processes or injuries, PIs have their own sequelae including prolonged and repeat hospitalization and death. Infection is one of the most significant complications of PIs, with PI-associated bacteremia carrying a 41.4% mortality rate (Espejo et al., 2018). In a retrospective study of the U.S. Nationwide Inpatient Sample, Bauer et al. (2016) found hospitalized individuals with one or more PI(s) had a median length of stay four days longer and a three-year mortality rate more than four times higher than hospitalized individuals without a PI. Similarly, a retrospective study of elderly individuals with chronic diseases showed median survival time reduced by 40% in the presence of a PI (Jaul & Rosenzweig, 2017).

Accounting for \$32 billion in annual Medicare spending, the treatment of chronic wounds places an enormous economic burden on the healthcare system (Nussbaum et al., 2018). While PI treatment costs vary according to stage (Padula & Delarmente, 2019), PIs are among the most expensive chronic wound types to treat and cost Medicare an average of \$21,060 per beneficiary (Nussbaum et al., 2018). Padula and Delarmente (2019) found, while representing only a small portion of PIs, full-thickness injuries account for over half of PI-related spending. The presence of PIs in a hospitalized individual increases the mean total cost of the stay by \$19,300 (Bauer et al., 2016). While hospital care represents a large portion of spending, the chronicity and slow healing of PIs mean most PI care is provided in post-acute settings.

PI prevalence remains somewhat unclear due to reporting inconsistencies and data collection methods heterogeneity (EPUAP et al., 2019). Medicare claims data suggests a PI

prevalence rate of 1.8% among beneficiaries, with an increase to 3.6% in those over age 75 (Nussbaum et al., 2018). Analysis of International Pressure Ulcer Prevalence (IPUP) Survey data collected on over 900,000 patients between 2006 and 2015, showed declining overall PI prevalence (VanGilder et al., 2017). However, when separated by care setting, long-term care (LTC) prevalence rates were approximately 11% and did not follow the same downward trend seen in acute care. Current data from the Minimum Data Set (MDS) 3.0 Public Reports indicate unhealed PIs in 8.47% of U.S. LTC residents (Centers for Medicare and Medicaid Services [CMS], 2020). PI prevalence in individuals residing in LTC is not surprising, given the many PI risk factors inherently more common in this population (EPUAP et al., 2019). Additionally, hospitalized individuals with PIs are more likely to discharge to LTC facilities than to home, further adding to the number of PIs in this setting (Bauer et al., 2016).

CMS' (2021b) Quality Reporting Program requires LTC facilities to report the percentage of individuals with new or worsened stage 2 or greater PIs. With PI incidence regarded as a nurse-sensitive indicator of quality, PI efforts focus largely on prevention. Even so, PIs remain a concern across care settings (The Joint Commission, 2021). CMS (2017) and the NPIAP now recognize that, even with comprehensive prevention programs, not all PIs are avoidable (Black et al., 2020). Thus, mitigation of PI burden, morbidity, and mortality requires appropriate and prompt PI treatment in addition to prevention measures.

Access to specialty care in the U. S. is lacking (Cyr et al., 2019). Rural LTC residents are often required to travel to urban facilities to receive care from wound specialists, adding inconvenience and cost (J. Miller, personal communication, October 10, 2021). Additionally, patient positioning during wheelchair or stretcher transport may negatively impact PI healing. Due to these barriers, primary care providers (PCPs) providing services in LTC facilities are

often tasked with PI management. However, studies show wound care training for healthcare providers is inadequate, particularly in the settings of primary care and LTC (White-Chu et al., 2019; Yim et al., 2014). Walker et al. (2019) found 90% of hospitalists reported little to no confidence in PI management, citing unfamiliarity with evidence-based wound care options and available products. Similarly, a substantial body of literature establishes a deficit in PI-related knowledge and inconsistencies in nurses' wound care practices (Ayello et al., 2017; Stolt et al., 2019).

The wide array of wound care products on the market, as well as variability in product availability, make proficiency in local PI treatment and product selection difficult to attain (Niezgoda et al., 2020; Williams & Deering, 2016). References and guidelines provide general recommendations for appropriate product use based on wound characteristics and product categories (EPUAP et al., 2019; Gould et al., 2016; Wound, Ostomy, and Continence Nurses Society [WOCN], 2016). However, with over 900 wound care products on the market, providers and nurses must become familiar with the product formularies at each facility served (Levine et al., 2021; Niezgoda et al., 2020).

### **Problem Statement**

PIs are a humanistic and economic burden. Despite years of national attention and prevention efforts, PIs remain prevalent across care settings and frequently occur in LTC residents. Residents of rural LTC facilities often face barriers when accessing wound specialists, leaving PI-management to PCPs. Lack of specialized training and unfamiliarity with local wound treatment products contribute to low PCP and nurse confidence in PI management. While evidence-based PI guidelines exist, appropriate product selection and use remain a challenge due

to an abundance of wound care products on the market and variability in product availability among facilities.

### **Purpose**

The purpose of this project was to promote PCP confidence and satisfaction in product selection and ordering when managing PIs in LTC residents. A secondary purpose was to promote nursing staff confidence in local wound care of PIs in LTC residents.

### **Objectives**

The objectives of this project were to:

- I. Develop a PI product selection guide, customized with facility-specific product formularies, for use by PCPs to promote confidence in local wound management of PIs.
- II. Develop example local wound care orders for use by PCPs to promote confidence and satisfaction when managing PIs.
- III. Educate PCPs on appropriate product selection to promote confidence in local wound management of PIs.
- IV. Educate nursing staff on appropriate product use to promote confidence in local wound care of PIs.

## CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

PIs are a significant health concern (EPUAP et al., 2019). Malcolm Knowles' adult learning theory and its application to the promotion of confidence in PI management is discussed in Chapter Two. A review of literature addressing PI terminology, etiology, contributing factors, burden, classification, healing, management, and barriers to optimal PI management in LTC is also provided.

### List of Definitions

*Friction.* Force at the interface of two surfaces sliding against each other.

*Pressure.* Force perpendicular to the skin surface causing compression of tissue.

*Long-term care.* Services that meet an individual's health or personal needs and contribute to safe living on a day-to-day basis. Includes assisted-living and skilled nursing facilities, among other non-acute care services.

*Nursing staff.* Registered nurses, licensed practical nurses, or certified nursing assistants who provide direct patient care.

*Primary care provider.* Physician, physician associate, or nurse practitioner who specializes in internal or adult medicine, family medicine, or pediatrics.

*Pressure injury.* Localized tissue damage resulting from pressure or the combination of pressure and shear.

*Shear.* Force parallel to the skin surface causing tissue layers and underlying structures to shift laterally in relation to one another.

## **Theoretical Framework**

### **The Adult Learning Theory-Andragogy**

Malcolm Knowles popularized the term andragogy in the 1970s, defining it as the art and science of adult learning (Loeng, 2018). His adult learning theory includes five assumptions about the adult learner: self-concept, experiences, readiness to learn, orientation to learning, and motivation to learn. Self-concept refers to adults being self-directed, rather than dependent on others, and their desire to participate in the planning and evaluation of their own education. According to Malcolm Knowles, experiences are accumulated throughout the lifespan and serve as a backdrop for learning in adulthood. The adult learners' readiness to learn depends on relevance of the information to their social roles and the potential for learning to assist with attainment of individualized goals. Similarly, orientation to learning in adulthood is problem-centered, rather than subject-centered, thereby compelling adult learners to seek information of immediate use. Finally, Knowles assumes the adult is internally driven to learn as opposed to being motivated by external forces.

### ***Andragogy in the Promotion of Confidence in PI Management***

Malcolm Knowles' Adult Learning Theory (Loeng, 2018) was useful in the promotion of confidence in PI management. The impetus for this project, a PCP-identified need for PI education, demonstrates self-concept. Participation was voluntary and the result of self-directedness. Ample opportunity for questions and evaluation further fostered self-concept. All participants had previous experiences caring for individuals with PIs, which served as a backdrop for education and real-world application of learned information. In accordance with adults' prioritization of problem-focused learning, immediate application of new knowledge was facilitated by providing resources for reference in clinical practice. Because educational

preparation and roles differ between PCPs and nursing staff, each educational presentation was focused according to audience. PCP education focused on product selection and ordering, and nursing staff education focused on local wound care and product use. The internal motivation to learn was respected as participation remained voluntary.

## **Literature Review**

### **Overview of Literature**

PIs carry a high mortality rate, with one study finding risk of death in elderly individuals doubled in the presence of a PI (Song et al., 2019). PIs are also associated with risk of serious infection and repeat hospitalizations with prolonged lengths of stay (Bauer et al., 2016; Espejo et al., 2018). With only an estimated 65% ever progressing to resolution, PIs often require many months of care (Guest et al., 2018; Horn et al., 2015). Not surprisingly, PI-related economic burden is staggering with more spending allocated to higher stage injuries (Padula & Delarmente, 2019). EPUAP et al. (2019) identify stage 1 PIs to be predictive of subsequent stage 2 or higher PIs. This illustrates the importance of effective management of lower-stage PIs to prevent costs and complications associated with higher-stage injuries.

Despite years of prevention efforts, PIs remain prevalent across care settings (VanGilder et al., 2017). Recent MDS 3.0 Public Reports indicate unhealed PIs in 8.47% of LTC residents in the U.S. (CMS, 2020). Factors increasing PI risk, including immobility, advanced age, comorbid conditions, increased skin moisture, and malnutrition, are common in individuals residing in LTC (EPUAP et al., 2019). An aging population and increased prevalence of chronic diseases means rising acuity and PI risk. Additionally, hospitalized individuals with PIs are more likely to discharge to LTC, thus adding to PI prevalence in this setting (Bauer et al., 2016). CMS (2017)



and the NPIAP recognize some PIs as unavoidable, even with good quality care (Black et al., 2020). Therefore, PIs will continue to develop and remain prevalent in LTC in the future.

The wound bed preparation model is effectively applied to PI management (Sibbald et al., 2021). Appropriate product selection is based on the principles of tissue management through cleansing and debridement, control of inflammation and infection with antimicrobial products, maintenance of moisture balance, and moving to advanced treatment modalities in the absence of epithelial edge advancement. Additionally, product selection must consider PI characteristics, care setting, product availability, ease of use, and cost-effectiveness (EPUAP et al., 2019).

LTC residents with PIs face challenges in accessing appropriate specialty care (Cyr et al., 2019), often leaving PI management to PCPs. Healthy People 2030 includes the following research objective: “Increase the ability of primary care and behavioral health professionals to provide more high-quality care to patients who need it” (Office of Disease Prevention and Health Promotion, n.d., para. 1). Achievement of this objective, when considering PI management, will demand confidence in product selection and local wound care among PCPs and nursing staff. Currently, however, confidence in these areas is lacking (Ayello et al., 2017; Suva et al., 2018). In a needs assessment of hospitalists, 90% reported little or no confidence in PI management (Walker et al., 2019). With an exorbitant number of wound products on the market and variable availability of products among facilities, appropriate product selection requires healthcare providers to become familiar with specific product formularies at each facility served (Levine et al., 2021; Williams & Deering, 2016).

## **Terminology**

Areas of tissue damage due to pressure have historically been referred to as pressure ulcers, pressure sores, bedsores, and decubitus ulcers (Ayello et al., 2020). In 2016, the National

Pressure Ulcer Advisory Panel (NPUAP), which later became the NPIAP, introduced the term PI to encompass all presentations of pressure-induced tissue damage (Edsberg et al., 2016). In the most current joint clinical practice guideline, the EPUAP, NPIAP, and Pan Pacific Pressure Injury Alliance (PPPIA) (2019) states:

A pressure injury is defined as localized damage to the skin and/or underlying tissue, as a result of pressure or pressure in combination with shear. Pressure injuries usually occur over a bony prominence but may also be related to a medical device or other object. (p. 16)

While debate regarding terminology continues, PI is now widely used both in the U.S. and internationally (Ayello et al., 2020). CMS (2017) accepts use of a range of terminology for wounds primarily caused by pressure. CMS has adapted NPIAP terminology and uses PI to describe tissue damage caused by pressure when the skin remains intact and pressure ulcer to describe tissue damage caused by pressure presenting as an open wound. In alignment with the most current and commonly used terminology, the term PI is used in this project and refers to all presentations of pressure-induced tissue damage.

## **Etiology**

Knowledge of the complex process leading to PI development has grown exponentially over the past 20 years due to advances in mechanobiology (EPUAP et al., 2019). PIs are primarily caused by sustained tissue deformation due to intense or prolonged compressive and/or shear forces produced by an individual's body weight or an external medical device. Deformed cells can suffer cytoskeleton and plasma membrane degradation after only minutes of a sustained mechanical load. This damage causes disruption of biomolecular transport processes and the cell's ability to maintain homeostasis. Subsequent cell death leads to inflammatory edema. If

compression is not relieved by repositioning or removing offending devices, edematous tissue is unable to expand, interstitial pressure increases, and additional mechanical load, deformation, and damage to adjacent cells result. When cell damage and death occur faster than cell regeneration, a PI develops.

Ischemic injury is also an important etiological factor in PI development (EPUAP et al., 2019). Ischemia is thought to occur within hours of onset of a sustained mechanical load. Inflammation results in edema, increasing interstitial pressure, and subsequent blood vessel occlusion which, along with direct deformation of capillary networks, causes ischemia. Because muscle tissue is more susceptible to deformation-related damage than skin tissue and compressive forces are often higher in areas adjacent to internal bony prominences, damage may occur in deeper tissue before superficial tissue. Injury of deep tissue disrupts blood vessels originating in muscle and adipose tissue, leading to reduced blood supply to the skin. Therefore, the first visible sign of a deep tissue pressure injury (DTPI) is often skin ischemia.

### ***Contributing Factors***

PI development and severity are not easily predicted and depend on complex interactions among several factors (Ayello et al., 2020). The EPUAP et al. (2019) divide relevant contributing factors into either mechanical boundary conditions or conditions affecting tissue tolerance. Mechanical boundary conditions include the type, magnitude, and duration of mechanical load. Tolerance to mechanical load is widely variable among individuals and is affected by unique bone anatomy and tissue properties. A PI develops when forces produce strain and stress severe enough to overcome the damage threshold of the tissue.

Immobility is the most significant mechanical boundary risk factor for PI development (Ayello et al., 2020). The EPUAP et al. (2019) identify mobility and activity limitation as a

necessary condition for PI development. In a prospective cohort study, Woo et al. (2015) confirmed the association of limited bed mobility, difficulty ambulating, and requiring assistance of two people for transferring with high PI prevalence. In addition to being a direct cause of increased pressure, immobility also increases the potential for tissue damage, due to friction and shear, and the risk of developing additional comorbidities.

Individual tissue tolerance and susceptibility to PIs are multifactorial (EPUAP et al., 2019). The process of aging results in intrinsic changes, such as decreased subcutaneous tissue, lean muscle mass, skin elasticity, peripheral circulation, and sensation, which affect tissue tolerance (CMS, 2017). In a large prospective correlational study conducted in Australia, Latimer et al. (2019) found a 5% increased chance of having a PI with each year over the age of 65. Bauer et al. (2016) reported the mean age of individuals with a PI to be 71.2 years.

Older adults are increasingly likely to develop multiple interacting comorbidities, compounding PI risk (Jaul et al., 2018). Eighty-one percent of Americans over the age of 65 report one or more chronic illnesses, and those with more comorbidities are more likely to reside in LTC facilities (Buttorff et al., 2017). Latimer et al. (2019) reported, among older adults with impaired mobility, individuals with multiple comorbidities and those who resided in LTC were more likely to have a community-acquired PI upon hospital admission or develop a hospital-acquired PI within the first 36 hours of a hospital stay. EPUAP et al. (2019) recommend considering comorbidities affecting perfusion, circulation, and oxygenation when evaluating risk. The presence of diabetes is rated as a strong confounding factor in PI development. In a literature review of studies addressing comorbidities and PI risk in older adults, Jaul et al. (2018) found the strongest association with PIs in individuals with diabetes, stroke, and advanced dementia. While supporting evidence for other comorbidities as independent risk factors is unsubstantial, a good-

practice statement by the EPUAP et al. (2019) recommend considering general poor health status a potential contributing factor.

When considering skin status over bony prominences, the presence of a stage 1 PI is a significant risk factor for the development of a higher stage PI (EPUAP et al., 2019). In one multicenter prospective cohort study, Smith et al. (2017) evaluated 602 acutely ill adults for skin changes, localized pain, and PI development over 30 days. Individuals with a pre-existing or new stage 1 PI had a more than three-fold increase in odds of developing a stage 2 or greater PI. This illustrates the importance of early identification and appropriate management of lower-stage PIs.

Increased skin moisture from wound exudate, perspiration, or incontinence also negatively impacts tissue tolerance and increases PI risk. A higher friction coefficient over moist skin, versus dry skin, affects the type and intensity of load placed on the tissue. Thus, increased skin moisture can be classified as both a tissue tolerance factor and a mechanical boundary condition. Incontinence is common across care settings. An analysis of IPUP data revealed incontinence affecting over half of surveyed individuals in acute care, LTC, and rehabilitation facilities (Lachenbruch et al., 2016). PIs were significantly more common in incontinent than continent individuals, with an overall prevalence of 16.3% versus 4.1%. Additionally, incontinence was associated with higher PI severity. Those with urinary incontinence alone were three to four times more likely to develop a stage 1 or 2 PI, but 9-20 times more likely to develop a stage 3 or 4 PI. Up to 70% of individuals residing in LTC facilities are affected by incontinence (Stefanacci et al., 2021), making moisture a significant PI risk factor in the LTC population.

Poor nutrition increases PI risk and impairs healing potential (EPUAP et al., 2019). While nutrition has long been recognized as an important factor in PI prevention and management, heterogeneity in studies limits the statistical significance of evidence and consensus on the most

meaningful nutritional indicators related to PI risk. According to Munoz et al. (2020), weight loss and refusal of food and fluids are independently associated with PI development. Evidence supporting additional nutritional indicators of PI risk, however, is limited (EPUAP et al., 2019). Still, current guidelines strongly suggest comprehensive nutrition assessments and care plans for individuals with other PI risk factors. Because malnutrition is prevalent in older adults and individuals residing in LTC (Cereda et al., 2016), PI risk is compounded in these populations.

### ***Unavoidable PIs***

PI incidence is considered an indicator of quality in health care facilities with full-thickness PIs classified as sentinel events, or never events, by the National Quality Forum (Agency for Healthcare Research and Quality [AHRQ], 2019). Consequently, healthcare facilities strive for an incidence rate of zero. Comprehensive PI prevention programs undoubtedly lessen preventable harm (EPUAP et al., 2019). However, the prevention of all PIs is an unattainable goal. The aging population, increasing prevalence of chronic conditions, and a subsequent rise in patient acuity in post-acute care settings (Sloane et al., 2019) increase the risk of PIs in LTC residents. Baker et al. (2016) identified 20 LTC residents who developed stage 3, 4, or unstageable PIs, despite evidence of receiving consistently good quality care. All 20 residents had significant PI risk factors including a history of a prior PI, reliance on mobility aids, and cardiovascular disease.

In 2011, the NPIAP released a white paper supporting the position that not all PIs are avoidable (Black et al., 2011). The authors cited factors making PIs unavoidable, such as impaired perfusion, refusal to eat or be fed, the presence of non-removable medical devices, and hemodynamic instability preventing repositioning. In a second consensus statement, the NPIAP expanded further on situations and comorbidities contributing to unavoidable PIs, stating risk

factors can overwhelm preventive measures if either the magnitude of risk is high or preventative measures are contraindicated (Edsberg et al., 2014). In 2020, the NPIAP identified additional intrinsic and extrinsic factors, relevant to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, contributing to unavoidable PIs (Black et al., 2020). Cited factors included microvascular occlusion, multiorgan dysfunction, and necessary changes to healthcare functioning and prioritization during crises. The NPIAP asserts, if all reasonable efforts at preventative measures are taken, PIs can be deemed unavoidable. CMS (2017) considers PIs in LTC residents unavoidable if evidence shows the facility has “evaluated the resident’s clinical condition and risk factors; defined and implemented interventions that are consistent with resident needs, goals, and professional standards of practice; monitored and evaluated the impact of the interventions; and revised the approaches as appropriate” (p. 278). While the majority of PIs are avoidable and fierce prevention measures must certainly continue, the growing recognition of unavoidable PIs highlights the need to also work toward optimization of prompt and effective PI management processes.

## **Burden**

PIs cause repeat hospitalizations with longer lengths of stay, serious infections, and an increased risk of death. In an analysis of the U.S. Nationwide Inpatient Sample database, Bauer et al. (2016) found median hospital length of stay to be seven days in those with either a present on admission or hospital-acquired PI versus three days in those without PIs. PIs are frequently complicated by infection, ranging in severity from local wound infection to bacteremia and sepsis (Espejo et al., 2018). PI-related bacteremia carries a 41.4% fatality rate. The correlation between having a PI and mortality is well established in the literature (EPUAP et al., 2019) with one study finding a death rate of 9.1% in hospitalized patients with PIs versus a rate of 1.8% in

those without PIs (Bauer et al., 2016). When Jaul and Rosenzweig (2017) studied the effect of comorbidities on mortality rates in a retrospective study of 192 bed-bound patients admitted to a skilled nursing unit, median survival time was reduced by 40% in those with a PI compared to overall survival time. Similarly, Song et al. (2019) found 3-year mortality rates doubled in elderly individuals with PIs compared to those without PIs. (Espejo et al., 2018).

PIs are an economic burden to the entire healthcare system. While estimates vary, recent studies indicate higher PI-related costs than previously believed. Nussbaum et al. (2018) reported \$32 billion in annual Medicare spending on chronic wound care. At an average of \$21,060 per beneficiary, PIs are among the most expensive wound types to treat. The presence of a PI increases the mean total cost of a hospital stay by an estimated \$19,300 (Bauer et al., 2016). While hospital care represents a large portion of spending, outpatient PI costs are more than two times inpatient PI costs (Nussbaum et al., 2018). Cost to treat varies according to PI severity. Despite being significantly less prevalent than stages 1 and 2, full-thickness PIs account for 59% of treatment-related spending (Padula & Delarmente, 2019).

While PI burden is widely recognized, true prevalence remains ambiguous due to reporting inconsistencies and data collection methods heterogeneity (Ayello et al., 2020). Medicare claims data suggests a PI prevalence rate of 1.8% among beneficiaries across all care settings with an increase to 3.6% in those over age 75 (Nussbaum et al., 2018). Analysis of IPUP Survey data, collected on over 900,000 patients between 2006 and 2015, showed a decline in overall prevalence with a low of 9.3% (VanGilder et al., 2017). Although survey participation is open to all, acute care facilities contribute the majority of IPUP data. When separated by care setting, LTC prevalence rates were approximately 11% and did not follow the same downward trend. Latimer et al. (2019) found older adults admitted to the hospital from LTC were 75% more



likely to have a PI than older adults admitted from home. According to the most current MDS 3.0 Public Reports from the second quarter of 2021, the national percentage of LTC residents with an unhealed PI is 8.47% (CMS, 2020). North Dakota and Minnesota LTC residents have slightly lower, but still significant, prevalence rates at 6.36% and 6.11% respectively. Even with discrepancies among reported rates and trends, the literature clearly shows the pervasiveness of PIs in LTC. This is not surprising, given the overlap of common LTC resident characteristics with known PI risk factors (EPUAP et al., 2019).

PIs have drawn increasing national attention over the past two decades. In 2004, CMS (2017) included PI prevention, management, and reporting in its guidance to surveyors of LTC. The Joint Commission (2021) added the prevention of healthcare-associated PIs as a national patient safety goal in 2006. Around the same time, AHRQ began to collect PI data from healthcare facilities (Russo et al., 2008), and CMS (2006) announced cessation of payment for treatment of hospital-acquired PIs.

Despite years of intensified prevention efforts, The Joint Commission (2021) recognizes PIs as a significant concern across all healthcare settings. Healthy People 2030 seeks to “Reduce the rate of pressure ulcer-related hospital admissions among older adults” (Office of Disease Prevention and Health Promotion, n.d., para. 4) by finding and treating PIs early. Current CMS (2017) guidance requires long-term care facilities to take all necessary steps to prevent PIs. Additionally, residents with PIs must receive “necessary treatment and services, consistent with professional standards of practice, to promote healing, prevent infection and prevent new ulcers from developing” (pp. 276–277). As part of the Quality Reporting Program, skilled nursing facilities must report the percentage of residents with new or worsened PIs (CMS, 2021b). With

anticipated CMS expansion of value-based purchasing in LTC, performing well on quality measures will become increasingly important to facility reimbursement rates (CMS, 2021a).

### **Classification**

The most widely used PI classification system in the U.S. was put forth by the NPIAP, formerly the NPUAP, in 1989 and last updated in 2016 (Edsberg et al., 2016). PI classification involves inspection and palpation of the injury and surrounding skin to determine the extent of damage and the type of tissue lost (EPUAP et al., 2019). Because tissue thickness varies by anatomic location, depth is not a reliable indicator of PI severity. The current PI classification system includes six stages. Importantly, mucosal PIs are not included in the scope of the NPIAP classification system due to differences in tissue characteristics and the inability to accurately determine the extent of tissue loss with the naked eye (Edsberg et al., 2016). Although research is ongoing, there is currently no validated tool available for classification of mucosal PIs (Reaper et al., 2017).

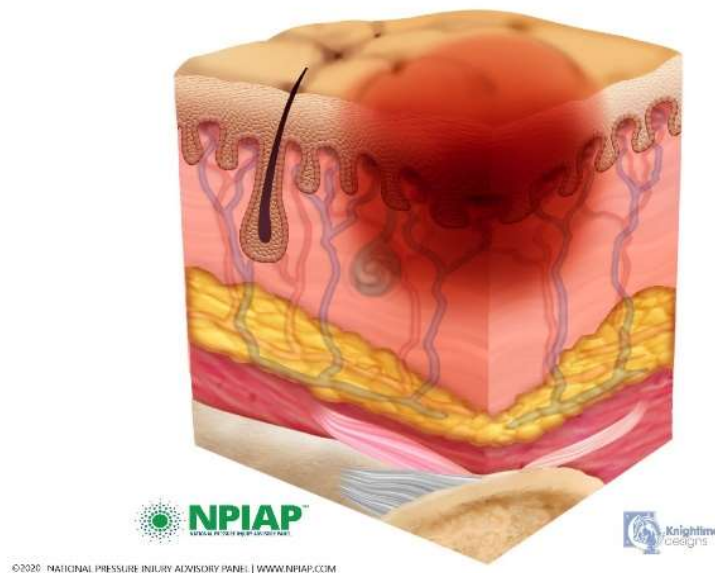
## ***Stage 1***

Stage 1 PIs (depicted in Figure 1) present as intact skin with localized non-blanchable erythema (Edsberg et al., 2016). While blanchable erythema is indicative of normal reactive hyperemia, non-blanchable erythema indicates structural damage to the capillary bed (EPUAP et al., 2019). Figure 2 illustrates blanchable versus non-blanchable erythema. Visual color changes may be difficult to identify in darkly pigmented skin, contributing to an underdiagnosis of Stage 1 PIs. Changes in temperature, sensation, and tissue consistency upon palpation may precede visual evidence of a PI.

### **Figure 1**

#### ***Stage 1 PI***

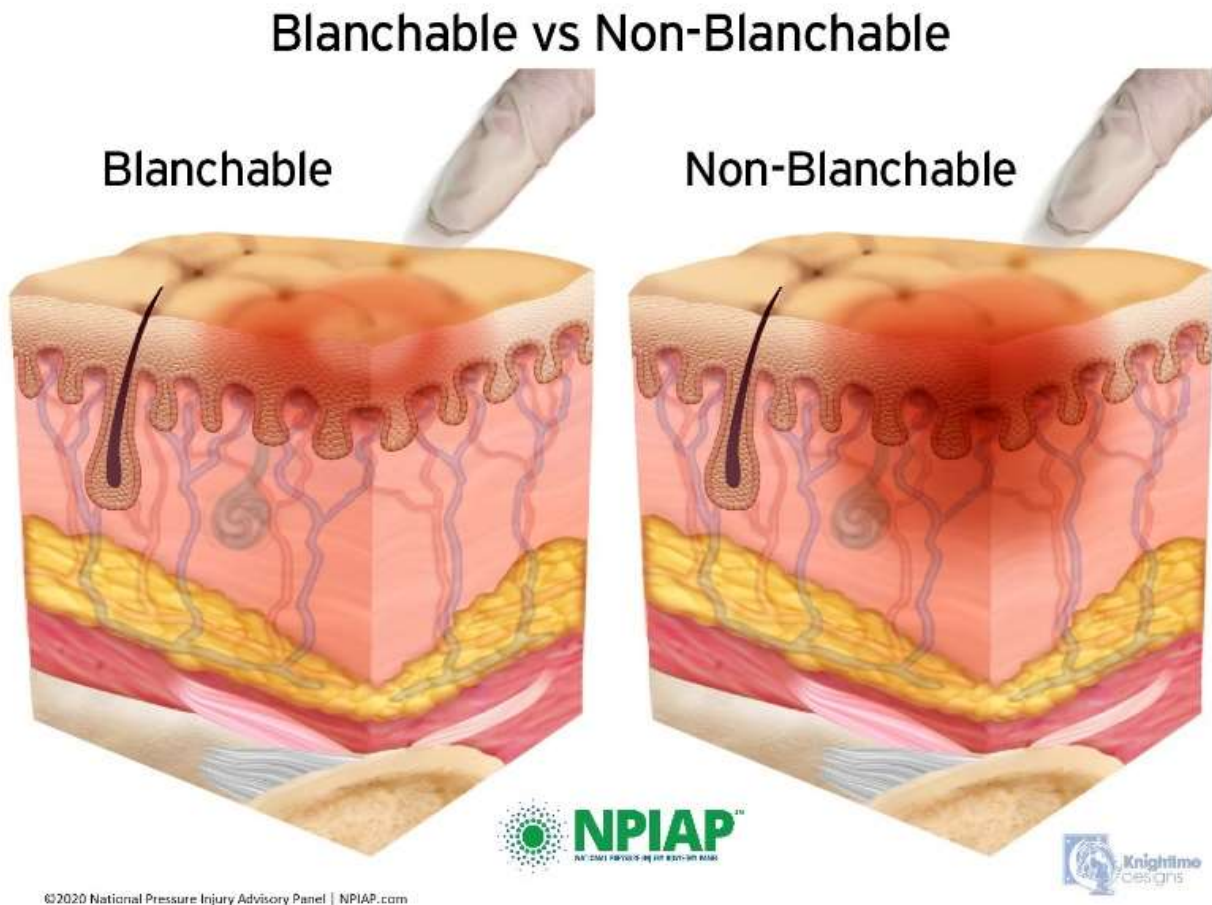
#### **Stage 1 Pressure Injury - Lightly Pigmented**



*Note.* From *Pressure Injury Stages*, by NPIAP, n.d. (<https://npiap.com/page/PressureInjuryStages>). Copyright 2020 by NPIAP. Reprinted with permission (see Appendix A).

**Figure 2**

*Blanchable Versus Non-blanchable Erythema*



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*Note.* From *Pressure Injury Stages*, by NPIAP, n.d. (<https://npiap.com/page/PressureInjuryStages>). Copyright 2020 by NPIAP. Reprinted with permission.

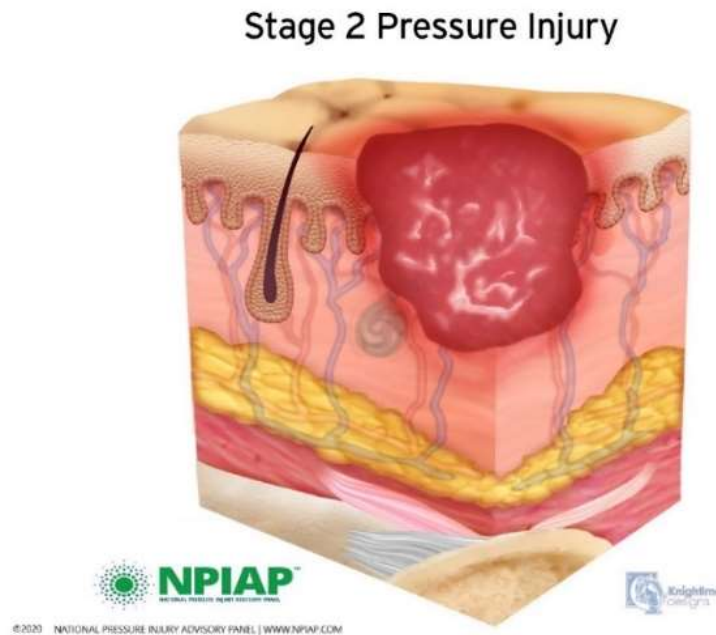
### ***Stage 2***

Stage 2 PIs (depicted in Figure 3) are areas of partial thickness skin loss, meaning damage extends through the epidermis but not the dermis (Edsberg et al., 2016). Subcutaneous tissue, muscle, or deeper structures are not exposed. A Stage 2 PI may present as an intact, serum-filled blister or a superficial ulcer with a viable, pink or red wound bed. Shear force is

predominant in the development of stage 2 PIs. As partial-thickness wounds, stage 2 PIs heal by re-epithelialization and without granulation or scar tissue formation.

### Figure 3

#### *Stage 2 PI*



*Note.* From *Pressure Injury Stages*, by NPIAP, n.d. (<https://npiap.com/page/PressureInjuryStages>). Copyright 2020 by NPIAP. Reprinted with permission.

#### ***Full-thickness PIs***

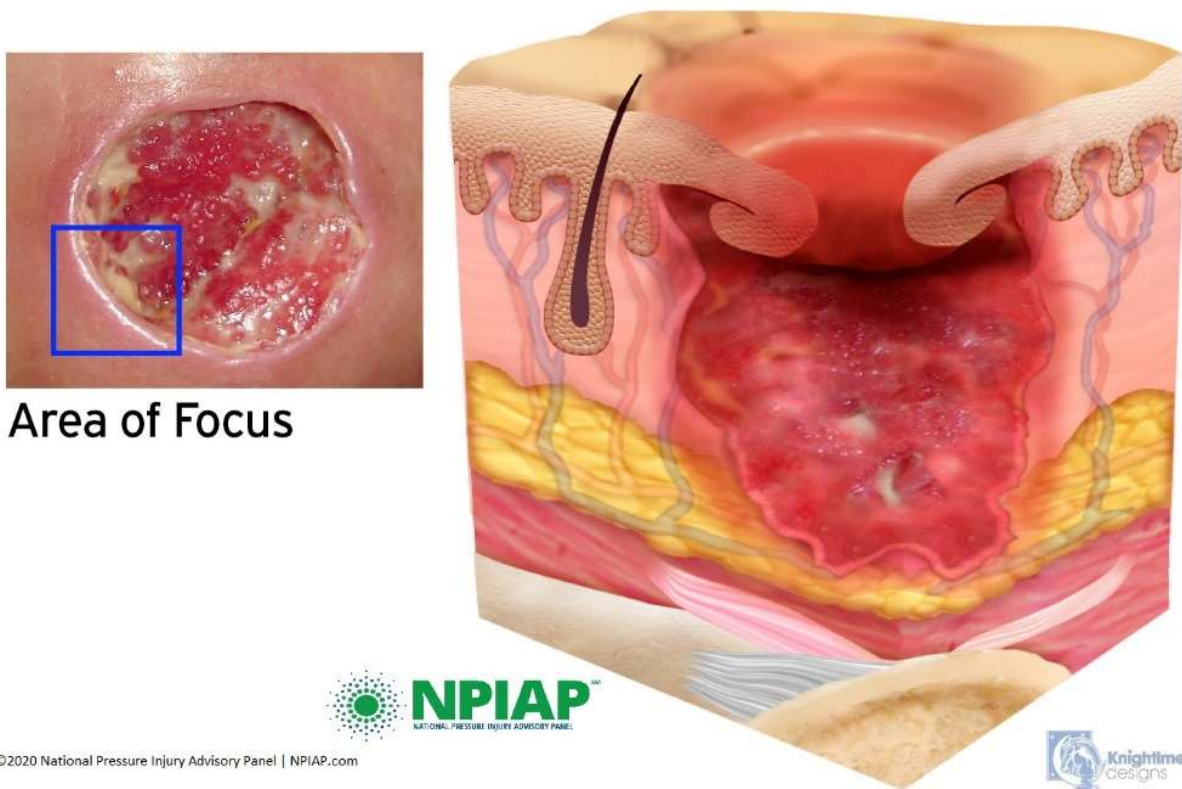
Stages 3, 4, and unstageable PIs (depicted in Figures 4, 5, and 6 respectively) are full thickness, meaning damage extends through the epidermis and dermis and into underlying tissue (Edsberg et al., 2016). Nonviable tissue, not obscuring the depth of the ulcer, may be present. Additionally, epibole, tunneling, and undermining are common in full-thickness PIs. As full-thickness wounds heal, granulation tissue and scar tissue form. Stage 3 PIs extend only into subcutaneous and adipose tissues. Alternately, stage 4 PIs may involve fascia, muscle, tendon, cartilage, bone, and joint capsule. The depth of full-thickness PIs varies significantly depending

on the anatomical location and thickness of adipose tissue. When nonviable tissue obscures the depth of the wound, the PI is unstageable. Only when the necrotic tissue is removed, can the stage be accurately determined. Because slough and eschar are only seen in full-thickness injuries, unstageable PIs will either be stage 3 or 4 once debrided. CMS' (2017) definition of unstageable PIs differs from NPIAP staging, as it also includes DTPIs and PIs unable to be assessed due to the presence of non-removable medical devices.

#### Figure 4

*Stage 3 PI*

### Stage 3 Pressure Injury with Epibole



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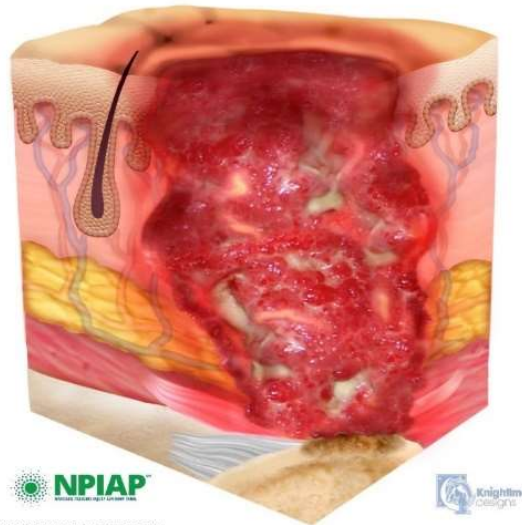
*Note.* From *Pressure Injury Stages*, by NPIAP, n.d. (<https://npiap.com/page/PressureInjuryStages>). Copyright 2020 by NPIAP. Reprinted with permission.



**Figure 5**

*Stage 4 PI*

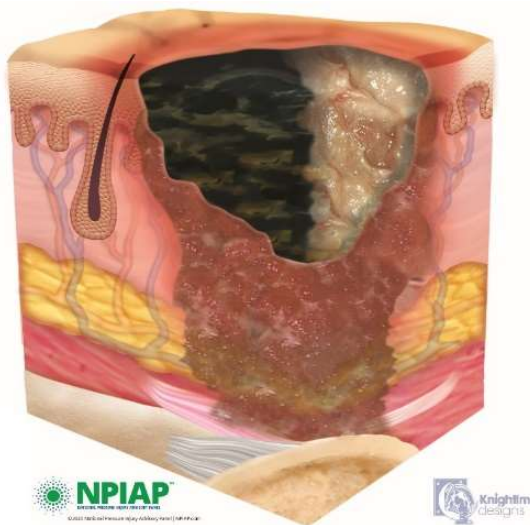
**Stage 4 Pressure Injury**



*Note.* From *Pressure Injury Stages*, by NPIAP, n.d. (<https://npiap.com/page/PressureInjuryStages>). Copyright 2020 by NPIAP. Reprinted with permission.

**Figure 6**

*Unstageable PI*



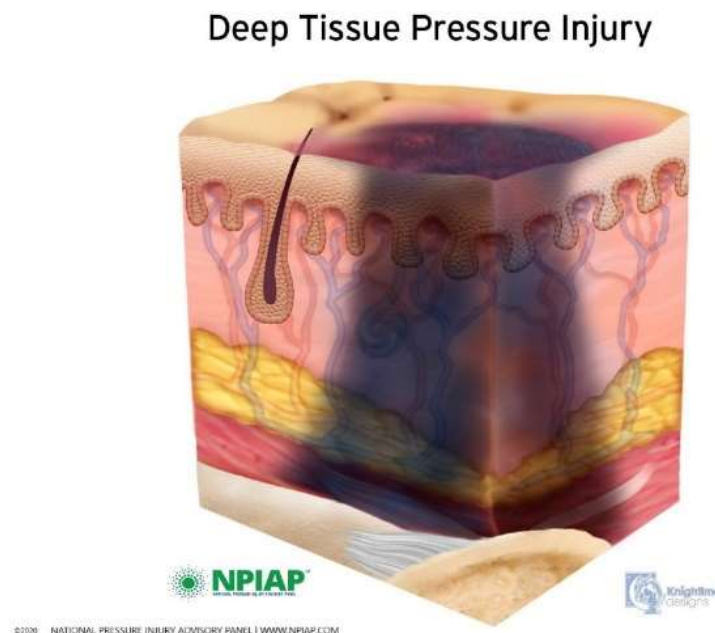
*Note.* From *Pressure Injury Stages*, by NPIAP, n.d. (<https://npiap.com/page/PressureInjuryStages>). Copyright 2020 by NPIAP. Reprinted with permission.

## ***DTPI***

DTPIs (depicted in Figure 7) develop due to pressure and shear forces at the bone-muscle interface and may present as either intact or non-intact skin (Edsberg et al., 2016). DTPIs are characterized by persistent, non-blanchable deep red, maroon, or purple discoloration and may present as epidermal separation with a dark wound bed or blood-filled blister. Pain and skin temperature alterations may precede color change. DTPIs may evolve rapidly to partial or full-thickness skin loss or resolve without loss of tissue. DTPIs are often confused with ecchymosis or vascular events and can be difficult to distinguish from stage 1 PIs when presenting as dark red discoloration.

### **Figure 7**

#### ***DTPI***



*Note.* From *Pressure Injury Stages*, by NPIAP, n.d. (<https://npiap.com/page/PressureInjuryStages>). Copyright 2020 by NPIAP. Reprinted with permission.



## **PI Healing**

PIs are chronic, often requiring several months of treatment (EPUAP et al., 2019). Some PIs never resolve. Partial-thickness PIs heal by re-epithelialization when epidermal cells migrate across the extracellular matrix (Holloway et al., 2020). Full-thickness PIs must undergo proliferation of extracellular matrix proteins and angiogenesis before re-epithelialization may occur. Like other chronic wound types, PIs do not progress through the phases of wound healing in a timely and orderly fashion. Damaged extracellular matrices, high levels of proteases and inflammatory cytokines, and senescent cells may contribute to slow healing. In a large-scale retrospective analysis of U.S. Wound Registry data, Horn et al. (2015) found an overall PI healing rate of 65%. In a smaller cohort study conducted in the United Kingdom, Guest et al. (2018) analyzed the medical records of 209 patients with PIs managed in the community. Only 50% had healed within 12 months of initial presentation, with a mean time to resolution of 5.4 months. Healing rates and times varied significantly according to stage: All stage 1 PIs healed by 12 months with a mean healing time of 1.1 months; 69% of stage 2 PIs healed by 12 months with a mean healing time of five months; 41% of stage 3 and 21% of stage 4 PIs healed by 12 months with a combined mean healing time of 7.7 months; and 36% of unstageable PIs healed by 12 months with a mean healing time of 10 months. A prolonged inflammatory phase is commonly theorized as the most significant factor in delayed healing (Holloway et al., 2020). Biofilm formation and infection contribute to ongoing inflammation in chronic wounds

## **PI Management**

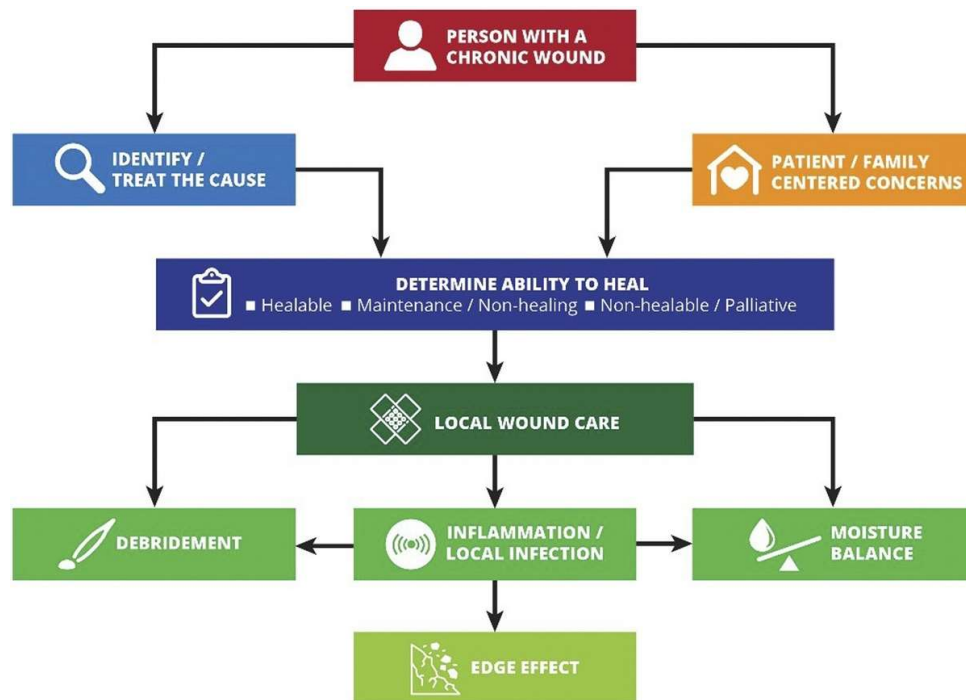
First published in 2000 and last updated in 2021, the Wound Bed Preparation paradigm (depicted in Figure 8) serves as a holistic framework for chronic wound care (Sibbald et al., 2021) and is effectively applied to PI management (Ayello et al., 2020). Sibbald et al. (2021)

identify accurate diagnosis and treatment of etiologic and contributing factors as the most important aspects of chronic wound care. Therefore, PI healing is unlikely if pressure and shear forces are not adequately reduced and contributing factors effectively managed (Ayello et al., 2020). Providing systemic support by managing comorbidities (i.e., diabetes, heart failure, renal disease, cognitive impairment, nicotine and other substance use, and malnutrition) optimizes healing potential (Sibbald et al., 2021). Additionally, addressing patient and family-specific factors such as pain, mental illness, inadequate support systems, and financial constraints improves the individual's ability to adhere to a treatment plan.

After treatment of etiologic, systemic, and patient-centered factors, the next step in Sibbald et al.'s (2021) Wound Bed Preparation paradigm is determining whether or not the injury is healable and setting goals. Goal setting depends largely on tissue perfusion and patient factors. In the case of PIs on an extremity, vascular status is initially evaluated through assessment of skin temperature, color, presence of dependent rubor and elevational pallor, peripheral pulses, ankle-brachial index, and additional imaging if necessary. Elsewhere on the body, temperature and color of the surrounding skin are often the best indicators of perfusion. According to Sibbald et al. (2021), lower extremity wounds are healable in the presence of palpable dorsalis pedis or posterior tibial pulses, ankle-brachial index between 0.6 and 1.4, and audible biphasic or triphasic pulses with a handheld doppler. If wounds are deemed un-healable due to inadequate blood supply or patient-specific factors (i.e., inability or unwillingness to offload pressure), the goal shifts from healing to preventing infection, preventing wound deterioration, and promoting comfort.

**Figure 8**

*Wound Bed Preparation Paradigm*



*Note:* From “Wound Bed Preparation 2021,” by R.G. Sibbald, J.A. Elliott, R. Persaud-Jaimangal, L. Goodman, D.G. Armstrong, C. Harley, S. Coelho, N. Xi, R. Evans, D.O. Mayer, X. Zhao, J. Heil, B. Kotru, B. Delmore, K. LeBlanc, E.A. Ayello, H. Smart, G. Tariq, A. Alavi, R. Somayaji, 2021, *Advances in Skin & Wound Care* 34(4):183-195, (<https://doi.org/10.1097/01.ASW.0000733724.87630.d6>). Copyright 2021, the Authors. Reprinted with permission (see Appendix B). The Creative Commons license does not apply to this content. Use of the material in any format is prohibited without written permission from the publisher, Wolters Kluwer Health, Inc. Please contact [permissions@lww.com](mailto:permissions@lww.com) for further information.

***Local Wound Care***

The Wound Bed Preparation paradigm divides local wound treatment for healable wounds into four main principles (Sibbald et al., 2021). The same general principles are represented by the widely used acronym, TIME: tissue, inflammation and infection, moisture imbalance, and epithelial edge advancement (Ermer-Seltun & Rolstad, 2022). EPUAP et al. (2019) promote use of the TIME framework to guide local wound care of PIs.

**Tissue Management.** Tissue management aims to decrease microbial burden in the wound bed, thereby promoting proliferation of healthy tissue (EPUAP et al., 2019). This is accomplished through cleansing and debridement. The goal of cleansing is to remove surface debris, microorganisms, and dressing remnants without damaging viable tissue. While cleansing is well established as an important first step in local wound care, few studies address its benefit specific to PIs. A Cochrane Review completed in 2013 included only three small studies addressing cleansing versus no cleansing, cleansing technique, or cleansing solution in relation to PI healing (Moore & Cowman, 2013). Due to small sample sizes, poor reporting, and potential bias, authors cited insufficient evidence and refrained from making recommendations for PI cleansing. A review of current literature yielded no additional high-quality, PI-specific evidence. Still, EPUPAP et al. (2019) make recommendations for cleansing based on expert consensus and literature involving other wound types.

Gentle wound cleansing with non-cytotoxic solutions, such as normal saline or potable water, is common practice in PI management. Although small with only 22 participants, one recent double-blind RCT reiterated the safety of cleansing with potable water (Chan et al., 2016). The sample of 22 participants included 30 wounds, 10 of which were stage 2 PIs. Sixteen wounds were cleansed with tap water and 14 with sterile saline. No significant difference in infection rates or healing was found. Most commercially available wound cleansers contain surfactants, which facilitate separation of debris and nonviable tissue from the wound bed. In a single-blind study of 289 individuals with chronic wounds, Bellinger et al. (2016) found wounds cleansed with a surfactant had less inflammation, greater reduction in wound size, and increased granulation tissue formation, when compared to those cleansed with normal saline. EPUAP et al. (2019) support the use of gentle cleansers including normal saline, potable water, and surfactant

cleansers. An irrigation pressure between four and 15 pounds per square inch is considered optimal to adequately remove surface debris, while avoiding introduction of microbes into deeper tissue and preserving viability of fibroblasts and new epithelium. EPUAP et al. (2019) and Sibbald et al. (2021) recommend against the use of antiseptic cleansers in clean, non-infected PIs due to concern for cytotoxicity, but state antiseptics should be considered for PIs with suspected or confirmed infection.

The presence of devitalized tissue or biofilm necessitates debridement (EPUAP et al., 2019). Necrotic tissue harbors microorganisms, thereby prolonging inflammation and increasing risk of infection. Its presence also physically impedes wound contraction and epithelial advancement. Debridement of devitalized tissue is an important step in wound bed preparation (Sibbald et al., 2021). However, guidelines strongly recommend against debridement of stable, dry eschar located on heels and ischemic limbs, as healing in such wounds is unlikely and removing stable eschar only increases infection risk (EPUAP et al., 2019; WOCN, 2016).

There is little statistically significant evidence addressing outcomes to support one method of debridement over another (EPUAP et al., 2019). Therefore, individual factors, PI presentation, and clinical setting determine the best debridement plan. Surgical referral is indicated when extensive debridement is needed and when there is advancing cellulitis or unexplored undermining or sinus tracts. Conservative sharp debridement involves removal of only devitalized tissue, is effective in reducing bacterial burden and senescent cells, and may be done at the bedside by trained practitioners. Mechanical debridement is often nonselective, meaning viable tissue may be harmed. For this reason, the historically common practice of using wet-to-dry dressings as a form of mechanical debridement is no longer deemed acceptable (WOCN, 2015). Other, more advanced, forms of mechanical debridement include low-frequency

ultrasound and hydrosurgery (EPUAP et al., 2019). While biological debridement with sterile fly larvae is selective for devitalized tissue and effective, its many contraindications, cost, availability, and logistical challenges limit its use (EPUAP et al., 2019; WOCN, 2015).

Autolytic and enzymatic debridement methods may be best suited for PCPs working outside the acute care setting due to their simplicity and availability (Ramundo, 2022). Autolytic debridement depends on the individual's own proteolytic enzymes and macrophages to separate devitalized from viable tissue. Therefore, immunocompromise and perfusion impairment are contraindications to its use. Facilitation of autolytic debridement involves maintenance of a moist wound environment with moisture-retentive and moisture-donating products, such as hydrocolloids, transparent films, hydrogels, and medicinal honey (EPUAP et al., 2019; Ramundo, 2022). While infection or extensive necrosis often make faster, more aggressive methods necessary, autolysis remains an effective debridement adjunct.

The only enzymatic debriding agent available in the United States, collagenase, works by selectively degrading collagen, thereby separating devitalized tissue from the viable wound bed (EPUAP et al., 2019). Enzymatic debridement can be used alone or in conjunction with sharp debridement (Ramundo, 2022). In a database review by Carter et al. (2016), stage 4 PIs treated with collagenase, along with sharp debridement, healed faster than those treated with sharp debridement alone (456 days versus 589 days respectively). Gilligan et al. (2017) compared the efficacy of enzymatic debridement with collagenase to autolytic debridement with medicinal honey. PI patients treated with collagenase (n=446) had fewer wound care visits, less sharp debridements, and less chance of receiving negative pressure wound therapy, when compared to patients treated with medicinal honey (n=341). While the relatively high initial cost of collagenase can be a limiting factor, it has been shown to be cost-effective. In an economic

analysis, Mearns et al. (2017) found enzymatic debridement with collagenase to be overall less costly than autolytic debridement with medicinal honey when treating PIs. Importantly, the studies by Carter et al. (2016), Gilligan et al. (2017), and Mearns et al. (2017) were funded by the manufacturer of the only commercially available collagenase ointment and, therefore, carry a high risk of bias.

**Inflammation and Infection Control.** PIs are highly susceptible to infection due to their chronicity and etiological element of ischemia (EPUAP et al., 2019). Microorganisms are present on all skin surfaces. When the skin barrier is broken, normal flora, along with other exogenous microorganisms introduced by environmental exposures, contaminate and colonize the wound bed (International Wound Infection Institute [IWII], 2016). Tissue ischemia in PIs limits the delivery of oxygen, nutrients, antibodies, and immune cells to the wound, thereby decreasing the host's ability to clear bacteria and other microbes (EPUAP et al., 2019). Additionally, several PI risk factors contribute to an impaired immune response. When host defenses are overwhelmed by microbial numbers and virulence, infection occurs (IWII, 2016).

According to the IWII (2016), wound infection occurs on a continuum. Contamination with non-proliferating microorganisms and colonization with minimally proliferating microorganisms occur in all chronic wounds, without evoking an immune response or impacting healing potential. Local infection, previously termed critical colonization, occurs when microbes move deeper into wound tissue and proliferate at a rate great enough to cause classic signs (i.e. erythema, warmth, swelling, increasing pain, purulence, odor, and delayed wound healing) or more subtle signs (i.e. hypergranulation tissue, bleeding, friability, pocketing, epithelial bridging, and wound enlargement) of infection. In spreading infection, surrounding tissue is affected by microorganism invasion and proliferation. It is characterized by signs and symptoms (i.e.,

malaise, lymphangitis, and extending induration) expanding beyond wound margins. Sepsis, shock, organ failure, and death may result from systemic infection invading and spreading through the vascular and lymphatic systems.

As understanding of chronic wound infection has expanded, biofilms have been increasingly implicated in delayed healing and treatment-resistant infections. Biofilms are polymicrobial communities attached to a surface (IWII, 2016). The protective matrix secreted by biofilms makes them difficult to eradicate. Additionally, central biofilm bacteria become metabolically inactive and, therefore, highly tolerant to antibiotics. In a 2008 seminal study, James et al. (2008) identified the presence of biofilms in 60% of chronic wounds versus 6% of acute wounds. Understanding of the role of biofilms in ongoing inflammation and delayed healing has continued to expand, leading to changes in PI management (IWII, 2016). In a global consensus statement, Schultz et al. (2017) provide broad guidelines for biofilm management in chronic wounds. The consensus statement includes wound debridement and topical antiseptic use as first-line interventions in the presence of biofilms but, citing a paucity of supporting evidence, fails to guide the use of any specific antimicrobial products.

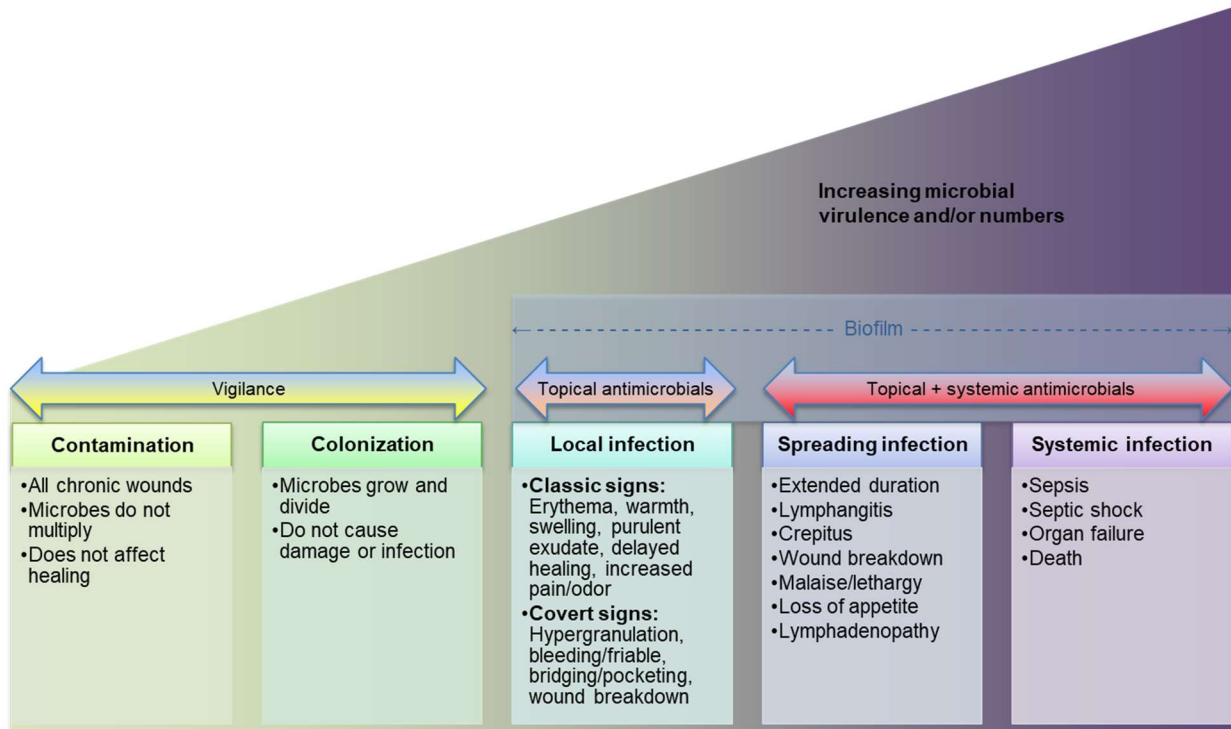
Topical antiseptics exert a multifaceted antimicrobial effect and carry low risk of bacterial resistance (IWII, 2016). While many antiseptics are known to be cytotoxic in high concentrations, their benefits may outweigh risk in the presence of stalled healing due to infection or biofilm. IWII recommends topical antiseptics for local infections and a combination of systemic antimicrobial agents and topical antiseptics for spreading and systemic infections. Similarly, EPUAP et al. (2019) recommend topical antimicrobials when delayed healing raises suspicion for local infection. Many commercially available dressings incorporate sustained-release agents, which maintain low levels of antimicrobial activity in a wound bed for long time



periods. Thus, the risk of harm to viable tissue is minimized. A representation of the wound infection continuum and recommended antimicrobial therapy according to wound characteristics is provided in Figure 9.

**Figure 9**

*Representation of Wound Infection Continuum*



*Note.* Representation of wound infection continuum. Adapted from “Wound infection in clinical practice,” by IWII, 2016, *Wounds International*.

<https://www.woundsinternational.com/resources/details/iwii-wound-infection-clinical-practice>

**Moisture Balance.** The benefits of moist wound healing are well established in the literature (Ermer-Seltun & Rolstad, 2022). In what is credited as the seminal study in moist wound healing, Winter (1962) compared porcine wounds treated with moisture-retentive dressings to those left open to air and found faster regeneration of underlying connective tissue and epithelialization in the moist wound group. When wounds are kept dry, tissue desiccation and cell death occur (Ermer-Seltun & Rolstad, 2022). Maintaining a moist wound environment

promotes fibroblast proliferation, angiogenesis, and epithelial cell migration; decreases trauma to newly formed blood vessels and connective tissue; and inhibits infection by maintaining a neutral pH, optimizing immune cell phagocytosis, and creating a barrier to microbes (Ermer-Seltun & Rolstad, 2022; Kruse et al., 2017).

Selection of appropriate dressings for the treatment of healable PIs depends largely on the principle of moist wound healing (EPUAP et al., 2019). Exudate from acute wounds is thought to enhance healing due to the presence of growth factors (Ermer-Seltun & Rolstad, 2022). Excessive chronic wound exudate, however, contains cytokines and proteases that promote inflammation and damage surrounding tissue. Selection of moisture-retentive, moisture-donating, or absorptive products according to exudate level promotes healing by preventing tissue desiccation, while still removing excess proinflammatory fluid. Common product categories, listed according to moisture maintenance properties, are provided in Table 1.

**Table 1**

*Product Categories for Moist Wound Healing*

Moisture donating	Moisture retentive	Absorptive
Hydrogel	Transparent film	Foam
Saline	Hydrocolloid	Alginate/Hydrofiber
Ointments	Contact layer	Superabsorbant

**Epithelial Edge Advancement.** The fourth principle of local wound care in Sibbald et al.’s (2021) wound bed preparation paradigm, and the “E” in TIME, refers to assessment of wound dimensions and advancement of epithelial tissue across the wound bed. When healable PIs are stalled, the paradigm calls for re-evaluation of the treatment plan and consideration of advanced treatment modalities. EPUAP et al. (2019) strongly recommend a comprehensive reassessment of the individual if there are no signs of PI healing within two weeks of initiating

local wound care. Accordingly, CMS (2017) requires re-evaluation of the PI treatment plan, as well as documentation of rationale if opting to continue the same regimen, when there is no progress toward healing within two to four weeks of treatment.

### ***Product Selection***

The authors of a Cochrane review, addressing the efficacy of specific dressings and topical agents for treating PIs, found insufficient evidence to suggest benefit of one product over another when considering an outcome of complete healing (Westby et al., 2017). Nevertheless, common principles of dressing selection are well established in current references and guidelines (EPUAP et al., 2019; Gould et al., 2016; Jaszarowski & Murphree, 2022). According to CMS (2017), product selection for the management of PIs “should be based upon the relevance of the specific product to the identified PU/PI(s) characteristics, the treatment goals, and the manufacturer’s recommendations for use” (p. 294). In addition to the general principles of wound bed preparation represented by the TIME acronym, EPUAP et al. (2019) recommend considering PI location, diameter, shape, depth, and the presence of tunneling and undermining when selecting dressings. Impairments of peri-wound skin and pain may also impact product and regimen choice. Additionally, care setting, product availability, ease of use, and cost-effectiveness are key considerations.

Literature shows advanced wound care products promoting moist wound healing are more cost-effective than dry gauze dressings, despite the higher per product cost (Jaszarowski & Murphree, 2022). Souliotis et al. (2016) compared the treatment costs of individuals with full-thickness PIs treated at home with advanced products to those treated with gauze dressings. Average time to complete healing was 85.56 days in the advanced wound product group versus 121.4 days in the gauze group. Dressing change frequency was also significantly less in the

advanced wound product group than the gauze group, resulting in significant overall cost savings. While evidence does not support its efficacy or cost-effectiveness over advanced products, gauze remains widely used in clinical practice due to widespread availability (Jaszarowski & Murphree, 2022). EPUAP et al. (2019) recommend the use of moist gauze dressings for PI management if other advanced dressings are unavailable.

Contemporary foam dressings are versatile and widely used in PI management and prevention (Jaszarowski & Murphree, 2022; J. Miller, personal communication, October 10, 2021). While foams are indicated for exudative wounds and are generally covered by insurance companies only for treatment of full-thickness injuries, bordered foam dressings are also frequently used for PI prophylaxis and protection of PIs with intact skin or partial thickness skin loss. EPUAP et al. (2019) support and recommend the prophylactic use of foam dressings over bony prominences and under medical devices in high-risk individuals.

### **Barriers to PI Management in LTC**

Access to specialty care in the United States is lacking (Cyr et al., 2019). Because LTC facilities often do not employ certified wound care staff (WOCN, n.d.), residents are required to travel outside the facility to receive specialized wound care. While both rural and urban residents identify medical problems and the financial burden of travel as barriers to receiving care from specialists (Cyr et al., 2019), disparity is noted especially in rural areas where residents have more chronic diseases and are further away from large medical centers (Centers for Disease Control [CDC], 2020). In patients facing mobility issues, wheelchair or stretcher transportation adds inconvenience, cost, and prolonged time sitting or lying, further compromising at-risk and damaged tissue (J. Miller, personal communication, October 10, 2021). Recently, infection

control measures and restrictions on outside travel related to the SARS-CoV2 pandemic created additional access-related challenges for LTC residents (AHRQ, 2021).

With specialty care access lacking, increasing the ability of PCPs to provide more high-quality care is a Healthy People 2030 research objective (Office of Disease Prevention and Health Promotion, n.d.). PCPs often are the initial point of contact for patients with PIs (Guest et al., 2018). However, wound care training in medical school and internal medicine residencies is lacking (White-Chu et al., 2019; Yim et al., 2014). Suva et al. (2018) found particularly limited wound care knowledge in the primary care and LTC settings. In a survey of 29 hospitalists, including nurse practitioners, physician assistants, and physicians, 72% reported no formal wound care training (Walker et al., 2019). Despite PIs being the most encountered wound type, 90% reported little or no confidence in PI management. In a follow-up focus group, participants reported being unfamiliar with evidence-based wound care options and available products. In addition to lack of knowledge and confidence, hospitalists identified communication issues with nurses as a significant barrier to effective wound care.

The wide array of wound care products and lack of a generic reference make becoming proficient in wound management and dressing selection a challenge (Williams & Deering, 2016). The number of wound care products on the market is estimated to be in the 900s and growing (Niezgoda et al., 2020). Wound care references and PI guidelines provide general recommendations for appropriate dressings based on wound characteristics (EPUAP et al., 2019; Gould et al., 2016; WOCN, 2016). However, the wound care industry is incessantly changing with many manufacturers and composite products, making it difficult for providers to know which specific products to order (J. Miller, personal communication, October 10, 2021).

Additionally, product availability is variable among facilities, making it essential for providers to become familiar with the product formulary at each facility served (Levine et al., 2021).

Existing literature establishes a deficit in PI education in nursing school curricula and a subsequent lack of knowledge and confidence among nurses (Ayello et al., 2017). While more is known about nurse knowledge related to PIs than other wound etiologies (Kielo et al., 2020), validated knowledge assessment tools focus on PI risk assessment, prevention, and identification (Manderlier et al., 2017). Less is known about nurse knowledge and confidence related to management and local wound care of PIs. One correlational study conducted in LTC facilities in Finland evaluated the treatment of 158 PIs and determined local wound care practices by nurses were inconsistent (Stolt et al., 2019). In a review of literature focused on nursing practices in the care of all chronic wound etiologies, Welsh (2017) found common themes including inadequate knowledge among nurses, ritualistic practices lacking supporting evidence, and the recognition of the need for more structured education.

Current PI education efforts largely target nursing staff and focus on PI prevention measures (AHRQ, 2016). Small, facility-based, efforts have been made at improving provider confidence in PI and chronic wound management with positive results. White-Chu et al. (2019) implemented a 90-minute wound management workshop for internal medicine residents and provided them with pocket cards to assist with assessment and dressing selection. After three months, 52% of participants reported having updated their practices and dressing choices. Barriers to further improvement included continued lack of confidence and unavailability of resources. Williams and Deering (2016) implemented a month-long wound care curriculum, including didactic sessions, bedside rounding, and skills practice, for post-graduate family medicine residents in LTC. Participants also received a box of sample products from their

specific facility's formulary and a pre-made order set to use when placing wound care instructions. Participants demonstrated increased competence in wound management through thorough documentation of a clinical wound assessment, diagnosis, contributing risk factors, and proposed treatment plan. Participants also reported high levels of satisfaction with the training process. Because unfamiliarity with available wound care products is an identified barrier to confidence in PI management, customized education targeting facility-specific product formularies may be most effective in promoting confidence in the management of PIs.

## **CHAPTER 3: METHODS**

### **Overall Project Design**

This quality improvement project aimed to promote confidence in management of PIs in LTC residents and included the development of a product selection guide and example orders for use by PCPs and educational presentations for PCPs and nursing staff. The product selection guide was customized with products available in participating facilities. Education was multifaceted, including a session focused on the principles of local wound care and product selection for PCPs and sessions focused on local wound care and product use for nursing staff.

### **Implementation**

#### **Model for Improvement**

The Model for Improvement, depicted in Figure 10, provided the framework for this project. The first part of the model poses three questions fundamental to all improvement efforts (Langley et al., 2009):

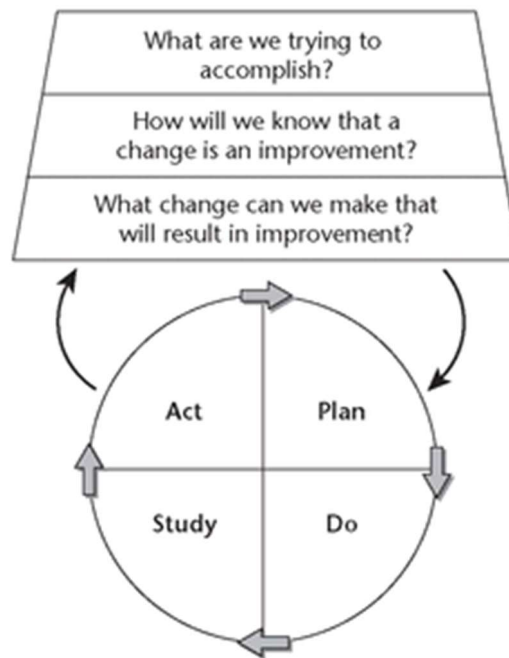
- What are we trying to accomplish?
- How will we know that a change is an improvement?
- What changes can we make that will result in improvement? (p. 24)

In the second part of the Model for Improvement, the Plan-Do-Study-Act (PDSA) Cycle guides users through four stages of testing change in “an efficient trial-and-learning methodology” (Langley et al., 2009, p. 24). The final step in improvement is making the change permanent (Langley et al., 2009).



**Figure 10**

*Model for Improvement*



*Note:* The Model for Improvement. From *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance* (2<sup>nd</sup> ed., p. 24), by G. L. Langley, R. D. Moen, K.M. Nolan, T.W. Nolan, C.L. Norman, L.P. Provost, 2009, Jossey-Bass Publishers. Copyright 2009 by John Wiley and Sons. Reprinted with permission (see Appendix C).

***Fundamental Questions***

According to Langley et al. (2009), the three fundamental questions can be answered in any order. When applying the Model for Improvement in the planning of this project, the co-investigator answered the questions as follows:

- What are we trying to accomplish? The goal of this project is to promote PCP and nursing staff confidence and satisfaction in management of PIs in LTC residents.
- What changes can we make that will result in improvement? Providing a product selection guide, example orders, and education to PCPs who provide services at

multiple LTC facilities, as well as education to nursing staff, will promote confidence in PI management.

- How will we know that a change is an improvement? Participants will report the educational sessions, product selection guide, and example orders positively impacted their confidence in PI management.

### ***Testing the Change***

The PDSA Cycle was used to develop and perform testing of the project interventions. Using this framework provided a foundation to organize, implement, and evaluate the practice improvement project in a well-organized manner. Each step in the cycle as it relates to this project is described below.

**Plan.** The co-investigator reviewed current literature and collaborated with the project sponsor and dissertation chair to form a plan for implementation best suited to the needs of participants. The project sponsor provided contact information of potential PCP participants and nurse leaders in area LTC facilities. She continued to facilitate planning by assisting in scheduling the PCP educational presentation. The co-investigator sent preliminary emails to LTC facility leaders to inform them about the project, gauge interest in participation, and solicit information about facility-specific product formularies. The co-investigator offered educational sessions for nursing staff to LTC facility nurse leaders and gave the option to schedule sessions in-person or virtually. The co-investigator developed post-presentation surveys to evaluate the effectiveness of project interventions using Qualtrics software. LTC facility nurse leaders were involved in planning by assisting the co-investigator with gathering information about product formularies, facilitating recruitment of nursing-staff participants, and facilitating implementation by scheduling educational sessions and securing appropriate rooms within their respective

facilities. Dissertation committee members assisted in planning by providing feedback on the project plan during the proposal meeting.

**Do.** The co-investigator developed the product selection guide, example orders, and educational presentations using facility-specific product formularies and information gathered during the review of literature. The co-investigator presented education to PCPs virtually and provided the product selection guide, example orders, and presentation slides via email. In-person educational sessions were provided to nursing staff LTC facility A and nurse leaders at LTC facility B. Education was presented virtually to nursing staff at LTC facility C. Paper copies of the presentation slides were provided to nursing staff and leadership at the time of the presentation.

**Study.** Post-presentation surveys were distributed to participants following each educational presentation. PCPs accessed the post-presentation survey via a Qualtrics link provided by the co-investigator. The co-investigator distributed paper copies of post-presentation surveys to nursing staff. The co-investigator compiled and analyzed participant survey responses using descriptive statistics when appropriate and grouping open-ended question responses by theme results are presented in Chapter Four.

**Act.** The co-investigator evaluated results and formulated recommendations for project modifications and future test cycles. Project strengths, limitations, and recommendations for the future are discussed in Chapter Five. Proposed strategies for making change permanent are also discussed in Chapter Five.

### **Logic Model**

A logic model representing this project is provided in Figure 11.

**Figure 11**

*Logic Model*

INPUTS	OUTPUTS		OUTCOMES
	ACTIVITIES	PARTICIPANTS	
<ul style="list-style-type: none"> <li>-Student and committee member time</li> <li>-Project sponsor commitment, time, and communication</li> <li>-EPUAP et al. (2019) guideline, Sibbald et al.'s (2021) wound bed preparation model, current wound care resources/textbooks</li> <li>-LTC facility leadership time and buy-in</li> <li>-LTC facility product formularies</li> <li>-Technology: Microsoft PowerPoint, Microsoft Word, email, Qualtrics, Zoom</li> </ul>	<ul style="list-style-type: none"> <li>-Obtain product formularies from LTC facility leaders</li> <li>-Develop customized product selection guide using principles from EPUAP et al. (2019) guideline, Sibbald et al.'s (2021) wound bed preparation model and provide to PCPs via email</li> <li>-Develop example order verbiage and provide to PCPs via email</li> <li>-Develop educational PowerPoint presentations</li> <li>-Present PowerPoint, product selection guide, and example orders to PCPs</li> <li>-Develop educational PowerPoint on local wound care and product use for nursing staff using manufacturer instructions and current wound care resources</li> <li>-Present educational PowerPoint to nursing staff</li> <li>-Develop and distribute post-implementation Qualtrics surveys to participants</li> </ul>	<ul style="list-style-type: none"> <li>-PCPs who provide care to LTC residents</li> <li>-Nursing staff employed by participating facilities who perform local wound care/ dressing changes of PIs in LTC residents</li> </ul>	<ul style="list-style-type: none"> <li>-Product selection guide successfully developed and provided to PCPs</li> <li>-Example orders successfully developed and provided to PCPs</li> <li>-Educational presentations successfully developed and presented to nursing staff and PCPs</li> <li>-Evaluation completed through post-presentation surveys and co-investigator reflection</li> <li>-Nursing staff and PCPs report positive impact of interventions on confidence in PI management</li> </ul>

## Setting

The rural healthcare clinic, which is the place of employment of the project sponsor and PCPs who initially expressed need for education, was the focus for this project. The rural healthcare clinic is located in a city of around 8,000 people (U.S. Census Bureau, n.d.) and provides primary care services and a variety of specialty services (Essentia Health, n.d.). The primary care team includes one nurse practitioner (NP) in pediatrics; three NPs and one physician in family medicine; one NP, one physician assistant (PA), and one physician in internal medicine. The three internal medicine providers provide primary care services to three area LTC facilities. The closest certified wound care provider within the health system is located approximately 60 miles away in an urban facility.

Three separate LTC facilities, who receive primary care services from the rural healthcare clinic, were also included in this project. LTC facility A is an 80-bed skilled nursing facility located in a city adjacent to the rural healthcare clinic (Minnesota Department of Health, n.d.). With 50 skilled nursing beds, LTC facility B is in the same city as the rural healthcare clinic and provides a continuum of care from assisted living and basic care to rehabilitation and skilled services (North Dakota Department of Health, n.d.). LTC facility C is a 37-bed skilled nursing facility, with an additional independent living wing, located in a small city of under 1,000 people. (North Dakota Department of Health, n.d.; U.S. Census Bureau, n.d.).

Educational sessions for PCPs and nursing staff at LTC facility C took place virtually. The co-investigator was located on the North Dakota State University (NDSU) campus in Fargo, North Dakota. PCP participants were located at a rural healthcare clinic in their respective offices. LTC facility C nursing staff were located together, in a meeting room at their facility. A virtual modality was chosen versus in-person for PCP education, at the request of the project

sponsor, due to the ongoing SARS-CoV2 pandemic and to remove barriers to participation if PCPs were unable to be onsite at the time of the session. LTC facility C nursing staff education was presented virtually, due to ease of scheduling, at a time most convenient for participants. The NDSU campus was used by the co-investigator because of its availability and reliable internet connection. Education for nursing staff at LTC facility A was provided in-person, in a meeting room within the facility. Education was presented at LTC facility B in an office setting.

### **Sample and Recruitment**

Participants in this project included PCPs who provide services to LTC residents and nursing staff who perform local wound care of PIs in LTC facilities. The co-investigator recruited participants primarily through email. The project sponsor facilitated participant recruitment by providing the contact information of potential PCP participants and nurse leaders at area LTC facilities. Nurse leaders then recruited the nursing staff participants, employed by their respective facilities, by email and word of mouth.

The co-investigator recruited seven PCPs at the rural healthcare clinic, via their company email addresses, one week before the educational session. The recruitment email (Appendix D) outlined the project and provided the date, time, and Zoom link for the educational session, along with an attached project information sheet. The project sponsor assisted in PCP recruitment through word of mouth within the clinic. The co-investigator sent a follow-up reminder email to the potential PCP participants the morning of the educational session, which again contained the date, time, and Zoom link. Attachments to the reminder email included the project information sheet, presentation slides handout, product selection guide, and example orders. PCP participation was encouraged by advertising a drawing for a ten-dollar Amazon gift card within the recruitment and reminder emails. The co-investigator delivered the Amazon gift card

electronically post-presentation to the prize winner. The co-investigator collaborated with the project sponsor to schedule the educational presentation at a time anticipated to be less busy for PCPs in the rural healthcare clinic. To further minimize barriers to participation, the co-investigator limited the presentation to 30-minutes and delivered it virtually.

LTC nurse leaders at LTC facilities A and C recruited nursing staff participants by scheduling educational sessions at the beginning of staff meetings, assuring most staff would already be present. Nurse leaders at LTC facility B opted to schedule an educational session for the select individuals, including the director of nursing and the resident care coordinator, who intended to pass on pertinent information to additional nursing staff. The co-investigator encouraged nursing staff participation and completion of the post-presentation survey by advertising drawings for two bandage scissors at the beginning of each educational presentation. Drawings were completed post-presentation. The co-investigator distributed the bandage scissors to drawing winners at the conclusion of in-person sessions and to LTC facility C two days after the virtual presentation. The co-investigator maintained flexibility by adapting educational session delivery times and modalities to accommodate each group's needs, thus facilitating participation.

Criteria for inclusion in this project were a) working as a PCP in internal or family medicine or b) working as a nurse who provides care to LTC residents. PCPs and nursing staff who worked exclusively in an acute care setting were excluded from participation. Of note, the co-investigator sent an email invitation to the pediatric NP at the rural healthcare clinic as she expressed interest in attending the educational session. She was not, however, considered a participant for the purposes of this project, or asked to complete the post-presentation survey, as she does not provide care to LTC residents.

## **Protection of Human Subjects**

The quality improvement project aimed to promote confidence in PCPs and nursing staff by developing and providing education and resources. No patients, patient families, or patient information, were involved in implementation or evaluation. The project was reviewed by appropriate parties from the health system associated with the rural healthcare clinic and NDSU and was determined exempt from further review or oversight (see Appendices E and F). The co-investigator provided information sheets addressing the risks and benefits of participation, participant rights, and contact information of the investigator and co-investigator to all participants. PCP information sheets (Appendix G) were provided in PDF format via the recruitment and reminder emails. Nursing staff information sheets (Appendix H) were provided in paper format at the beginning of each educational session.

## **Project Interventions**

### ***Product Selection Guide***

Objective one was to develop a product selection guide, customized with facility-specific product formularies, for use by PCPs to promote confidence in local wound management of PIs. The co-investigator used the most current clinical practice guideline (EPUAP et al., 2019), Sibbald et al.'s (2021) wound bed preparation model, and current wound management resources to develop the guide. The first page of the guide identifies appropriate, commonly used, product categories according to PI characteristics. Page two of the product selection guide identifies products in each category anticipated to be available at each of the four included facilities. The co-investigator initially solicited product information from LTC facility nurse leaders via email. The co-investigator was invited for in-person visits to LTC facility A and the rural health clinic to visualize available products. A nurse leader and staff member in charge of product ordering at



LTC facility C provided formulary information via email. A nurse leader at LTC facility B provided information about preferred product brands via email. During the development of the product selection guide and education, the project sponsor notified the co-investigator of plans to incorporate wound care outreach to the rural healthcare clinic. This service will be provided by a wound care NP from an urban facility within the clinic's healthcare system. The co-investigator reached out to the wound care NP to determine which products would be added to the rural healthcare clinic formulary when outreach begins. These products were included in the product selection guide and PCP educational presentation. The co-investigator provided the product selection guide to PCPs via the reminder email sent the morning of the presentation as an attached Microsoft Word document. The PI product selection guide is provided in Appendix I.

### ***Example Orders***

Objective two was to develop example local wound care orders for use by PCPs to promote confidence and satisfaction when managing PIs. The co-investigator used the principles of local wound care to develop clear and comprehensive verbiage outlining each step of local wound care of various stages of PIs. The co-investigator provided the example orders to PCPs via the reminder email sent the morning of the presentation as an attached Microsoft Word document. Example orders are provided in Appendix J.

### ***PCP Education***

Objective three was to educate PCPs on appropriate product selection to promote confidence in local wound management of PIs. The co-investigator developed an educational PowerPoint and presented it in a 30-minute educational session to PCPs. Topics covered included a review of PI definitions, terminology, staging, and contributing factors; the significance of PIs in LTC; the principles of local wound care and product selection; examples of

common and available products in each category; and introduction of the product selection guide and example orders. A handout of the slides (See Appendix K) was provided to PCPs as an attachment to the reminder email sent the morning of the presentation. To facilitate sharing of education with new PCPs and those who could not attend the original presentation, the co-investigator recorded PCP education using Zoom and provided the link to the project sponsor via email. To eliminate excess time from the recording, the co-investigator recorded a version separate from the original presentation.

### ***Nursing Staff Education***

Objective four was to educate nursing staff on appropriate product use to promote confidence in local wound care of PIs. The co-investigator developed an educational PowerPoint and presented it in a 30-minute educational session to nursing staff at the three separate LTC facilities. Topics covered included a review of PI definitions, terminology, appearance, and contributing factors; the significance of PIs in LTC; the principles of local wound care; examples of products in each category (customized with brand names available at each specific facility); and manufacturer instructions and product use tips. The co-investigator collaborated with nurse leaders at each facility to plan each session's date, time, and modality according to needs and preferences. Paper handouts of presentation slides (see Appendix L), the project information sheet, and post-presentation surveys were provided to participants at the beginning of each in-person session. Because education was presented to LTC facility C virtually, the co-investigator delivered paper copies of the project information sheet and post-presentation survey the week before the educational session. Since participants from LTC facility C were located together in a conference room, not at individual computers, the co-investigator opted to use paper surveys for this virtual session to facilitate completion. The handout of slides was provided electronically to

the nurse leader prior to the day of the educational session for printing. The nurse leader then distributed the project information sheet, post-presentation survey, and handout of slides to the nursing staff participants at the beginning of the educational session.

## **Evaluation**

### ***Post-presentation Survey***

The co-investigator developed separate post-presentation surveys for PCP participants and nursing staff participants using Qualtrics software. Each survey is comprised of questions about demographics (role, work setting, and years of experience), confidence, perceived benefit of the project activities, perceived barriers to confidence, recommendations to promote confidence, and additional feedback or comments. The PCP survey addressed confidence regarding PI management and product selection in LTC. The nursing staff survey addressed confidence regarding performing local wound care and product use. Demographic questions were multiple choice. Questions about confidence levels and perceived benefit of the project activities were primarily in Likert scale format, with one open-ended question. Questions about perceived barriers to confidence, recommendations for strategies to promote confidence, and additional feedback and comments were also open-ended. PCP and nursing staff survey questions are provided in Appendices M and N.

PCP participants were asked to complete the survey electronically. The co-investigator embedded the Qualtrics survey link into the educational PowerPoint presentation and provided it via the chat feature of Zoom at the beginning of the presentation. The co-investigator gave verbal prompts to complete the survey at the end of the presentation. The co-investigator provided a paper version of the nursing staff Qualtrics survey, which was attached to the project information sheet, at the beginning of each in-person presentation. Verbal prompts to complete the survey

were given at the end of the presentation. The co-investigator collected the surveys from participants post-education. The nurse leader at LTC facility C distributed the pre-delivered paper surveys to participants at the beginning of the Zoom presentation and collected them after completion. The co-investigator collected the completed surveys from the facility two days after the presentation.

### ***Data Analysis***

Data gathered through post-presentation surveys were compiled and analyzed using appropriate descriptive statistics. Analysis included calculation of Likert scale response frequencies, percentages, and mean values. To calculate means, the co-investigator assigned values to each Likert scale response. The sum of values for all responses was then divided by the total number of responses to each question. The co-investigator analyzed responses to open-ended survey questions by grouping them according to theme. The co-investigator reflected on the implementation process to identify facilitators and barriers. Table 2 summarizes evaluation of each objective. Results are presented in table and text format in Chapter Four.

**Table 2***Evaluation*

Objective	Outcome	Measure
I. Develop a PI product selection guide, customized with facility-specific product formularies, for use by PCPs to promote confidence in local wound management of PIs.	Guide successfully developed, customized, and provided to PCPs	Reflection on project activities
	PCPs report benefit	PCP post-presentation survey question 3.2
II. Develop example local wound care orders for use by PCPs to promote confidence and satisfaction when managing PIs.	Example orders successfully developed and provided to PCPs	Reflection on project activities
	PCPs report benefit	PCP post-presentation survey question 3.3
III. Educate PCPs on appropriate product selection to promote confidence in local wound management of PIs.	Educational presentation successfully developed and implemented	Reflection on project activities
	PCPs report benefit	PCP post-presentation survey questions 2.1, 3.1, 3.4, and 3.5
IV. Educate nursing staff on appropriate product use to promote confidence in local wound care of PIs.	Educational presentation successfully developed and implemented	Reflection on project activities
	Nursing staff report benefit	Nursing staff post-presentation survey questions 2.1, 3.1, 3.2, and 3.3

## Timeline

The project timeline is provided in Table 3.

**Table 3**

### *Project Timeline*

Project Activity	Completion Date
Project proposal	December 16, 2021
IRB approval	December 30, 2021
Development of project materials	January 2022
LTC nurse educational presentation site #1	January 17, 2022
LTC nurse educational presentation site #2	January 17, 2022
PCP educational presentation	January 25, 2022
LTC nurse educational presentation site #3	January 25, 2022
Outcome evaluation	February 2022
Final defense of dissertation	April 1, 2022
Final submission to graduate school	April 15, 2022

*Note:* Project materials include product selection guide, example orders, PowerPoint presentations, and post-presentation surveys.

## Conclusion

This project, designed as quality improvement, aimed to promote confidence in PI management in rural LTC. The co-investigator addressed objectives one and two through the development of project materials and objectives three and four through development and presentation of education to PCPs and nursing staff. Outcomes were measured by co-investigator reflection on project activities and post-presentation survey results. The Model for Improvement and Malcolm Knowles' Adult Learning Theory-Andragogy guided this project. Application of the PDSA Cycle to the project objectives is summarized in Table 4. Andragogy is discussed in relation to this project in Chapter Two and revisited in Table 5.

**Table 4***Application of PDSA Cycle to Project Objectives*

Objective	Plan	Do	Study	Act
I. Develop a PI product selection guide, customized with facility-specific product formularies, for use by PCPs to promote confidence in local wound management of PIs.	Review literature and current guidelines/texts, gather information about product formularies at each facility	Develop guide, provide/present to PCPs	Reflect on guide development, compile and analyze post-presentation survey results	Make recommendations for future
II. Develop example local wound care orders for use by PCPs to promote confidence and satisfaction when managing PIs.	Review literature and current guidelines/texts	Develop example orders and provide/present to PCPs	Reflect on order development, compile and analyze post-presentation survey results	Make recommendations for future
III. Educate PCPs on appropriate product selection to promote confidence in local wound management of PIs.	Review literature and current guidelines/texts, determine product formularies at each facility	Develop and present education to PCPs	Compile and analyze post-presentation survey results	Make recommendations for future
IV. Educate nursing staff on appropriate product use to promote confidence in local wound care of PIs.	Review literature and current guidelines/texts, determine product formularies at each facility, develop education	Develop and present education to nursing staff	Compile and analyze post-presentation survey results	Make recommendations for future

**Table 5**

*Application of Knowles' Adult Learning Theory-Andragogy*

Assumptions	Project Activities/Characteristics
Self-concept	Collaboration with project sponsor and PCP in planning, participant feedback via survey, voluntary participation
Experiences	Draw on participant experience treating PIs to set backdrop for further learning
Readiness to learn	Educational sessions focused according to participants' role and scope of practice
Orientation to learning	Product selection guide and example orders to facilitate immediate application of learning
Motivation to learn	Voluntary participation

*Note:* Knowles' Adult Learning Theory, Andragogy is discussed in Chapter Two.



## CHAPTER 4: RESULTS

### Presentation of Findings

Of the seven PCPs recruited, two participated in education and completed post-presentation surveys. A total of 19 nursing staff participants attended educational presentations at their respective facilities and completed post-presentation surveys. The total includes 11 individuals from LTC facility A, one from LTC facility B, and seven from LTC facility C.

### Participant Demographics

The two PCP participants included one physician and one NP. Both worked in internal medicine and had been in their current roles for more than 5 years. Both reported providing care to LTC residents in the LTC setting. One reported also providing care to LTC residents in the clinic setting. Nursing staff demographics are reported in Table 6.

**Table 6**

*Nursing Staff Participant Demographics*

Demographic	n	%
Role		
Registered nurse	12	63.2
Licensed practical nurse	7	36.8
Nursing assistant	0	0
Other	0	0
Years in current role		
Less than 1	3	15.8
1-2	3	15.8
3-5	6	31.6
More than 5	7	36.8
Setting		
Clinic	0	0
LTC facility	19	100
Other	0	0

*Note:* N = 19. Percentages rounded to nearest tenth.

## Objectives One and Two

Objective one was to develop a PI product selection guide, customized with facility-specific product formularies, for use by PCPs to promote confidence in local wound management of PIs. Objective two was to develop example local wound care orders for use by PCPs to promote confidence and satisfaction when managing PIs. Both the product selection guide and example orders were developed, provided to PCPs via email, and discussed with PCPs during the educational presentation. The product selection guide included specific products already available and anticipated to be added to the stock at the rural healthcare clinic, specific products currently available at LTC facility A, product brands preferred by LTC facility B, and specific products currently available at LTC facility C. Example orders included verbiage for local wound care of PIs with intact skin, bulla, or blister; shallow PIs; deep PIs; and PIs with dry, stable eschar on heels or ischemic limbs. Questions 3.2 and 3.3 on the PCP post-presentation survey asked about anticipated helpfulness of the resources. Responses are provided in Table 7.

**Table 7**

*PCP Questions 3.2 and 3.3: Anticipated Helpfulness of Resources*

Resource	Not helpful	Somewhat helpful	Not sure	Helpful	Very helpful	Mean
Product selection guide	0	0	0	0	2 (100%)	5
Example orders	0	0	0	1 (50%)	1 (50%)	4.5

*Note:* N = 2. Values assigned to each response as follows: not helpful (1), somewhat helpful (2), not sure (3), helpful (4), very helpful (5). Mean calculated by dividing sum of all values by total number of responses.

### ***Implementation Barriers and Facilitators***

Limited product availability at sites and nurse leader unfamiliarity with product formularies were barriers to customization of the PI product selection guide with facility-specific product formularies. When visiting the rural healthcare clinic, the co-investigator visualized

products from two of the seven main product categories included in the product selection guide. When visiting LTC facility A, the co-investigator visualized products from five of the seven product categories. LTC facility C formulary information, provided by staff who is responsible for product ordering, had products from two of the seven dressing categories. LTC facility A did not carry a commercial wound cleanser. The rural healthcare clinic did not carry a skin protectant product. Iodine swabs at the rural healthcare clinic and LTC facility A and acetic acid at the rural healthcare clinic were visualized. No other antimicrobial products were included in any product formulary. Nurse leaders at LTC facility B did not provide information about specific product availability.

Co-investigator in-person visits to the rural healthcare clinic and LTC facility A, along with direct communication with the individual in charge of product ordering at LTC facility C, facilitated accurate collection of product formulary data. Co-investigator communication with the wound care NP, who is planning to begin outreach at the rural healthcare clinic, facilitated information gathering on specific products anticipated to be available in the clinic in the near future.

### **Objective Three**

Objective three was to educate PCPs on appropriate product selection to promote confidence in local wound management of PIs. The co-investigator educated PCPs on product selection during a 30-minute Zoom presentation on January 25<sup>th</sup>, 2022, at 12:30 p.m. The co-investigator also provided a recording of the educational presentation to the project sponsor for future reference and sharing with other PCPs. Post-presentation survey questions 2.1 and 2.2 asked PCPs about their confidence when managing PIs in LTC residents and the effect of the educational session on confidence. Results are provided in Tables 8 and 9, respectively.

**Table 8***PCP Question 2.1: Confidence When Managing PIs in LTC*

Category	Not confident	Somewhat confident	Confident	Very confident	Mean
Overall management	1 (50%)	1 (50%)	0	0	1.5
Overall local wound treatment	0	2 (100%)	0	0	2
Product selection for PIs with intact skin	0	2 (100%)	0	0	2
Product selection for partial thickness PIs	0	2 (100%)	0	0	2
Product selection for full-thickness PIs	2 (100%)	0	0	0	1
Selection of wound cleanser	1 (50%)	1 (50%)	0	0	1.5
Selection of products for debridement of necrotic tissue	1 (50%)	1 (50%)	0	0	1.5
Selection of products for inflammation/infection control	0	1 (50%)	1 (50%)	0	2.5
Selection of products for maintenance of appropriate moisture balance	1 (50%)	1 (50%)	0	0	1.5
Selection of products for peri-wound skin protection	1 (50%)	1 (50%)	0	0	1.5
Effective communication of orders/instructions to nursing staff	1 (50%)	1 (50%)	0	0	1.5

*Note:* N = 2. Values assigned to each response as follows: not confident (1), somewhat confident (2), confident (3), very confident (4). Mean calculated by dividing sum of all values by total number of responses.

**Table 9***PCP Question 3.1: Effect of Education on Confidence*

Category	Not helpful	Somewhat helpful	Helpful	Very helpful	Mean
Overall management	0	0	1 (50%)	1 (50%)	3.5
Overall local wound treatment	0	0	1 (50%)	1 (50%)	3.5
Product selection for PIs with intact skin	0	0	0	2 (100%)	4
Product selection for partial thickness PIs	0	0	1 (50%)	1 (50%)	3.5
Product selection for full-thickness PIs	0	0	1 (50%)	1 (50%)	3.5
Selection of wound cleanser	0	0	0	2 (100%)	4
Selection of products for debridement of necrotic tissue	0	0	0	2 (100%)	4
Selection of products for inflammation/infection control	0	0	1 (50%)	1 (50%)	3.5
Selection of products for maintenance of appropriate moisture balance	0	0	1 (50%)	1 (50%)	3.5
Selection of products for peri-wound skin protection	0	0	1 (50%)	1 (50%)	3.5
Effective communication of orders/instructions to nursing staff	0	0	1 (50%)	1 (50%)	3.5

*Note:* N = 2. Values assigned to each response as follows: not helpful (1), somewhat helpful (2), helpful (3), very helpful (4). Mean calculated by dividing sum of all values by total number of responses.

PCP post-presentation survey questions 3.4 and 3.5 asked about anticipated practice changes because of the education. Both PCP participants reported they would “definitely yes” make changes to their practice as a result of the educational presentation. When asked to describe anticipated practice changes, the responses were “using appropriate products instead of just guessing” and “more appropriate wound care instructions as well as orders for specific dressings.” Additional comments provided by PCP participants in response to question 4.2 of the survey indicate positive feelings about the presentation and provided resources. Example quotations include “excellent presentation thank you!” and “fantastic presentation and pressure injury product selection guide!!!”

### ***Implementation Barriers and Facilitators***

A barrier to implementation of PCP education was the full schedules of the PCPs. Both participants logged into Zoom approximately 15 minutes late because of unforeseen patient needs. An additional barrier to PCP education was the broadness of the topic and complexity of product selection to be covered in one thirty-minute session. PCP participants asked questions on content throughout the presentation, demonstrating desire for more in-depth discussion. Involvement from the project sponsor in scheduling and recruitment within the rural healthcare clinic facilitated PCP education. The use of technology allowed for a more flexible, virtual modality and for recording a version of the presentation for future reference and information sharing.

### **Objective Four**

Objective four was to educate nursing staff on appropriate product use to promote confidence in local wound care of PIs. Education was provided to nursing staff in a 30-minute presentation at each of the three LTC facilities. In-person education for LTC facilities A and B was completed on January 17<sup>th</sup> at 1:00 p.m. and 2:30 p.m. respectively. Virtual education for LTC facility three was completed on January 25<sup>th</sup> at 1:30 p.m. Nursing staff post-presentation survey questions 2.1 and 3.1 asked participants about confidence when performing wound care of PIs in LTC residents and the effect of the educational session on their confidence. Results are provided in Tables 10 and 11.

**Table 10***Nursing Staff Question 2.1: Confidence When Performing Wound Care of PIs*

Category	Not confident	Somewhat confident	Confident	Very confident	Mean
Atraumatic dressing removal	0	2 (10.5%)	10 (52.6%)	7 (36.8%)	3.3
Cleansing	0	1 (5.3%)	7 (36.8%)	11 (57.9%)	3.5
Measuring	0	2 (10.5%)	10 (52.6%)	7 (36.8%)	3.3
Packing deep wounds	1 (5.3%)	3 (15.8%)	9 (47.4%)	6 (31.6%)	3.1
Identifying appropriate products based on orders	0	6 (31.6%)	8 (42.1%)	5 (26.3%)	3.0
Proper use of products	0	3 (15.8%)	11 (57.9%)	5 (26.3%)	3.1
Identifying when dressings should be changed	0	1 (5.3%)	12 (63.2%)	6 (31.6%)	3.3

*Note:* N = 19. Percentages rounded to the nearest tenth. Values assigned to each response as follows: not confident (1), somewhat confident (2), confident (3), very confident (4). Mean calculated by dividing sum of all values by total number of responses.

**Table 11***Nursing Staff Question 3.1: Effect of Education on Confidence*

Category	Not helpful	Somewhat helpful	Helpful	Very helpful	Mean
Atraumatic dressing removal	0	0	11 (57.9%)	8 (42.1%)	3.42
Cleansing	0	0	10 (52.6%)	9 (47.4%)	3.47
Measuring	0	0	11 (57.9%)	8 (42.1%)	3.47
Packing deep wounds	0	0	10 (52.6%)	9 (47.4%)	3.47
Identifying appropriate products based on orders	0	0	9 (47.4%)	10 (52.6%)	3.52
Proper use of products	0	0	8 (42.1%)	11 (57.9%)	3.58
Identifying when dressings should be changed	0	0	9 (47.4%)	10 (52.6%)	3.52

*Note:* N = 19. Percentages rounded to the nearest tenth. Values assigned to each response as follows: not helpful (1), somewhat helpful (2), helpful (3), very helpful (4). Mean calculated by dividing sum of all values by total number of responses.

Nursing staff post-presentation survey question 3.2 asked participants if they anticipated making any changes to their practice because of the educational session. Responses are displayed in Table 12. Open-ended question 3.3 asked participants to describe any anticipated practice changes. Responses were compiled and grouped by theme and are presented in Table 13.

Additional feedback regarding the educational sessions provided in response to question 4.2 was positive and described the presentation with words such as informational, educational, great, excellent, and awesome.

**Table 12**

*Nursing Staff Question 3.2: Anticipate Change in Practice*

Response	n	%
Definitely not	0	0
Probably not	1	5.3
Might or might not	4	21.1
Probably yes	12	63.2
Definitely yes	2	10.5

*Note:* N = 19. Percentages rounded to the nearest tenth. Values assigned to each response as follows: definitely not (1), probably not (2), might or might not (3), probably yes (4), definitely yes (5). Mean rating = 3.79. Mean calculated by dividing the sum of all values by the total number of responses.

**Table 13**

*Nursing Staff Question 3.3: Anticipated Practice Changes*

Theme	Example quotes
Appropriate product use	“Learned how to dress the coccyx area” “Will let skin protectant dry 30-90 seconds” “Proper use of dressings”
Wound care principles	“Will do a better job packing” “Proper way to pack wounds” “Measuring correctly” “Measuring in the same position every week”
Product categories	“Dressing choices” “Learned a lot about different types of dressings” “When to use what in regards to type of dressing/wound product”



### ***Implementation Barriers and Facilitators***

Barriers to providing PI product use education to nursing staff included difficulty coordinating schedules with multiple facilities and challenges related to timely email communication with LTC facility nurse leaders. Facilitators included the project sponsor's prior relationships and ongoing communication with LTC facility nurse. LTC facility A and C nurse leaders' plan to schedule the educational session just prior to staff meetings facilitated participation. While completing education for LTC facility C virtually helped to coordinate schedules, the camera at the LTC facility site was not operational so the co-investigator was unable to see participants during the educational session. This made it difficult for the co-investigator to gauge responsiveness of the audience.

### **Perceived Barriers to Confidence**

Question 3.6 on the PCP post-presentation survey asked participants what they perceive as barriers to PCP confidence in the management of PIs. The two responses were "frequent changes in various types of dressings without adequate information on how to use them" and "lack of education." Nursing staff participants were asked about barriers to nursing staff confidence in local wound care of PIs in LTC. Responses were grouped by theme and are presented in Table 14.

**Table 14***Nursing Staff Question 3.4: Perceived Barriers to Confidence*

Theme	Example quotes
Lack of exposure	<p>“Not a lot of wounds”</p> <p>“Not an everyday occurrence”</p> <p>“New nurses lack experience”</p> <p>“Patience with those who don’t do it often”</p> <p>“Lack of education”</p>
Workload	<p>“Staffing”</p> <p>“Staffing is an issue”</p> <p>“Time constraints”</p> <p>“Frequent cares required”</p>
Product selection/unclear orders	<p>“Not knowing what dressing to use”</p> <p>“Choosing the right dressing”</p> <p>“Everyone not being on the same page”</p> <p>“Inability to remember what is what”</p> <p>“Every wound requires different cares”</p> <p>“Doctors don’t know what to prescribe”</p> <p>“Doctors not knowing what dressing to use”</p>

**Recommendations to Promote Confidence**

PCP and nursing staff participants were asked for recommendations on strategies to promote confidence in PI management in question 4.1 on both surveys. PCPs responded with “get adequate information on the products that are available” and “improve education in both university/college studies as well as CME opportunities outside of certification courses.” Nursing staff responses were grouped into the two main themes of education and hands-on skills. These themes, along with example quotes from the survey, are reported in Table 15.

**Table 15**

*Nursing Staff Question 4.1: Recommended Strategies to Promote Confidence*

Theme	Example quotes
Education	“Continuing education” “Continuing ed” “Additional education” “More education like this presentation today”
Hands-on skills	“Practice applying dressings and cleansing” “More hands-on experience with wounds” “Practice sessions to keep up on it when there are not a lot of wounds”

## CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

### Summary

PIs cause pain, suffering, and economic burden (EPUAP et al., 2019; Padula & Delarmente, 2019) and remain prevalent across all care settings despite valiant prevention efforts (CMS, 2020; The Joint Commission, 2021; VanGilder et al., 2017). Increasing age and prevalence of chronic disease, along with other intrinsic risk factors, contribute to continued PI pervasiveness in LTC (EPUAP et al., 2019; Jaul et al., 2018; Latimer et al., 2019). Individuals residing in rural LTC facilities face challenges in accessing wound specialists (Cyr et al., 2019; WOCN, n.d.), leaving PI management to PCPs and LTC nurses. Minimal training in PI management and local wound care is provided in nursing and medical school curricula (Ayello et al., 2017; Yim et al., 2019). Consistent with previous research involving healthcare providers (Walker et al., 2019), PCP participants in this quality improvement project reported being either not confident (n=1) or only somewhat confident (n=1) in PI management. PCP-identified barriers to confidence included a lack of education and frequent changes in product formularies. Nursing staff rated their confidence in local wound care of PIs higher with nearly all ratings falling between somewhat confident and very confident. The difference in roles between PCPs and nursing staff may account for the difference in confidence levels between the two groups. Nursing staff is responsible for appropriate product use when providing local wound cares, while PCPs are responsible for more complex decision making involved in product selection. Nursing staff-reported barriers to confidence included lack of exposure to PIs, workload, and concerns about product selection or unclear orders from PCPs.

With an incessantly growing number of commercially available wound care products (Niezgoda et al., 2020), healthcare providers are not able to be familiar with them all. Therefore,

proficiency in product selection and use requires knowledge of the products available in each individual's place of employment, in addition to knowledge of the principles of product selection and general product categories (Levine et al., 2021; McNichol et al., 2022). The rural healthcare clinic included in this quality improvement project is part of a larger health system. Therefore, decisions about changes in vendor contracts and product formularies are made with input from wound care experts throughout the system. PCPs, especially rural PCPs, may not be thoroughly educated on new products. The PCPs participating in this project serve multiple LTC facilities (all with different system affiliations), in addition to the rural healthcare clinic, further complicating product selection.

This quality improvement project sought to promote confidence in PI management through the development of a PI product selection guide and example orders for use by PCPs, education for PCPs on product selection, and education for nursing staff on local wound care. To encourage the appropriate selection and use of readily available products, the PI product selection guide and educational sessions were customized with facility-specific product formularies. However, customization was less robust than expected due to a lack of structure and depth in the product formularies of facilities. Nurse leader unfamiliarity with the product formularies also affected the quantity of information available for inclusion in the product selection guide.

While less than 30% of recruited PCPs attended the provided educational session, both reported the session was helpful and would affect change in their practices. PCPs also anticipated the PI product selection guide and example orders would be helpful or very helpful. The small PCP sample size limits the ability of project results to be added to the wider body of literature. However, PCP feedback of positive effect on confidence in PI management aligns with previous

small-scale educational interventions (White-Chu et al., 2019; Williams & Deering, 2019), suggesting effectiveness of facility-based initiatives and customized decision-support resources in promoting PCP confidence in PI management.

A total of 19 nurses participated in educational sessions at each of the three LTC facilities, all of whom rated the presentation as either helpful or very helpful. The majority (63.2%) reported they would “probably yes” make changes to their wound care practices as a result of the education. Most described changes were related to tips on specific product use or wound care techniques provided throughout the presentation. Most available evidence on PI management knowledge in nurses revolves around prevention and assessment (Ayello et al., 2017; Kielo et al., 2020). Upon review of literature, a paucity of evidence specifically addressing nurse education in local wound care of PIs was found. Although again limited by the small sample size, survey responses in this quality improvement project suggest education focused on technical skills and specific product use tips may be most beneficial to promoting nursing staff confidence in local wound care of PIs.

## **Discussion**

The purpose of the quality improvement project was to promote PCP confidence and satisfaction in product selection and ordering when managing PIs in LTC residents. A secondary purpose was to promote nursing staff confidence in local wound care of PIs in LTC residents. All project objectives were met.

### **Objectives One and Two**

The first objective was to develop a PI product selection guide, customized with facility-specific product formularies, for use by PCPs to promote confidence in local wound management of PIs. The second objective was to develop example local wound care orders for use by PCPs to

promote confidence and satisfaction when managing PIs. Perceived benefit of the PI product selection guide and example orders was measured with the PCP post-presentation survey.

### ***Development of PI Product Selection Guide***

The co-investigator met objective one by creating a user-friendly document, in table format, to guide product selection based on PI depth, exudate level, need for debridement, and infection status. Through the review of literature, the co-investigator found consistency in recommendations when considering the general principles of local wound care, principles of product selection, and commonly used product categories. While wound care decision support documents exist, the review of literature did not yield any comprehensive local wound care product selection guides specific to PIs. Several current wound care and PI resources (Baranoski & Ayello, 2020; EPUAP et al., 2019; McNichol et al., 2022), along with the widely used Wound Bed Preparation Paradigm (Sibbald et al., 2021), provided the information used by the co-investigator to create the PI product selection guide.

As Williams and Deering (2016) highlighted, the breadth of wound care products on the market makes proficiency in their use difficult to attain. Variability in product availability among facilities further complicates product selection. Levine et al. (2021) stated the importance of providers becoming familiar with the product formularies at each facility they serve. Thus, fulfillment of objective one also included customization of the product selection guide with facility-specific product formularies.

To customize the PI product selection guide, the co-investigator gathered information about the products available at each of the three LTC facilities served by PCP participants from the rural healthcare clinic. While this information was included in the guide and the objective was ultimately met, customization was less robust than expected due to limited structure and

depth of facility product formularies. None of the facilities carried products from all the commonly used categories. Additionally, LTC facilities were noted to carry equivalent products from multiple manufacturers. Nurse leaders at one LTC facility were unable to provide information on any specific products carried, just manufacturers preferred by the facility's parent organization. However, a nurse leader at this same facility stated any products outside of those manufacturers are ordered if prescribed for LTC residents by PCPs or wound care providers. Few LTC facilities employ certified wound care staff (WOCN, n.d.) who often assist with determining appropriate products to be ordered within facilities. Without this expert guidance, facilities may find it more difficult to develop effective product formularies. Duplication with similar products from multiple manufacturers is likely a consequence of the sheer number of wound care products on the market (Niezgoda et al., 2020) and variability in PCP product exposure (Walker et al., 2019). PCPs, as well as other healthcare providers, often write orders using familiar brand names rather than the general product category and may not indicate whether substitutions are acceptable. LTC facility staff must then order specific branded products for each resident, potentially duplicating a product category already available within the facility. When residents leave or treatment plans change, excess products remain in the facility.

The rural healthcare clinic initially carried fewer wound care products than the LTC facilities. However, during the quality improvement project, a plan to incorporate twice-weekly outreach services by a wound care NP from an urban facility was developed. When considering the products being added to the product formulary as requested by the wound care NP, every category was covered by at least one product. Additionally, there was less overlap of products by multiple manufacturers. The resulting, more streamlined, product formulary is likely due to the



wound care NP and rural healthcare clinic being part of the same larger health system and ordering from the same contracted manufacturers.

### ***Development of Example Orders***

Objective two was met by developing example local wound care orders for use by PCPs. In Walker et al.'s (2019) study of hospitalists, communication with nurses, along with lack of provider knowledge and confidence, was ranked as one of the top barriers to effective wound care. Similar barriers were identified by participants in this project. Provider instructions for local wound care are communicated to nursing staff through orders. Clear, comprehensive orders are therefore necessary for the provision of quality wound care. Because PCP comfort with PI management and product selection is often limited (Suva et al., 2018; Walker et al. 2019), example orders were developed to aid PCPs in choosing appropriate treatment plans and efficiently communicating instructions to nursing staff.

### ***PCP Survey***

The co-investigator measured PCP perception of the PI product selection guide and example orders with questions on the post-presentation survey. While only two PCPs participated, both reported the product selection guide would be “very helpful” in the management of PIs in LTC residents. When considering example orders, responses were split between “helpful” and “very helpful”. Other small-scale wound-care educational efforts for providers have also been successful when incorporating decision support tools and pre-made orders (White-Chu et al., 2019; Williams & Deering, 2016).

### **Objective Three**

The third objective was to educate PCPs on appropriate product selection to promote confidence in local wound management of PIs. To meet this objective, the co-investigator

developed a 30-minute educational presentation and delivered it to PCPs in a synchronous, virtual format. PCP confidence and perceived effect of the education were measured via the post-presentation survey.

### ***PCP Education***

A review of literature did not yield any available educational programs targeting PCPs and product selection for local wound care. At the request of PCPs from the rural healthcare clinic, education focused on product selection and PI management. Product examples from the rural healthcare clinic's formulary were used, along with product use tips, throughout the educational session. Objectives of the PCP educational session were to:

- Provide an overview of the significance of PIs and barriers to PI management in LTC.
- Discuss the principles of product selection for local wound care of PIs.
- Provide example local wound care orders.

While the topic of local wound care of PIs is broad and required an extensive review of literature to develop an effective evidence-based educational presentation, PCP time for education is limited. Therefore, the co-investigator condensed what could have easily been a multi-session educational program into one 30-minute presentation.

Because the impetus for the quality improvement project was a PCP-identified need for education, and efforts were made to accommodate PCP schedules, the co-investigator anticipated the educational session would be well attended. Of the seven recruited PCPs from the rural healthcare clinic, only two attended. The educational session was started 15 minutes late due to both participants being delayed by unforeseen patient needs. Both participants asked questions throughout the presentation, were actively engaged in learning, and indicated information was

applicable to their roles and immediate needs. In an effort to make information accessible, the co-investigator provided a handout of presentation slides, the PI product selection guide, and the example orders to all PCPs at the rural healthcare clinic via the reminder email prior to the educational session. Additionally, a recording of the virtual presentation was provided to the project sponsor for distribution. Having access to these project materials, without attending the session, may have contributed to the low attendance rate. The two PCPs who participated indicated it had been an unexpectedly busy morning in the clinic. Patient needs may have superseded PCP desire to attend the educational session, leading to low attendance. The PCPs who participated included two of the three internal medicine providers who serve the surrounding LTC facilities. According to Malcolm Knowles, adults use accumulated experiences as a backdrop for learning (Loeng, 2018). Additionally, adults are problem-centered learners and seek information of immediate use. The two PCP participants may have felt more compelled to attend because they see more patients with PIs and encounter more challenges with product selection in the LTC setting. The advertised gift card drawing did not appear to have any effect on participation.

### ***PCP Survey***

PCP survey responses regarding confidence in PI management mirrored what was found in the review of literature. PCP participants rated their confidence in overall PI management as either not confident or somewhat confident. Similarly, in Walker et al.'s (2019) needs assessment of hospitalists, 90% reported little or no confidence when managing PIs. The lowest rated category on the PCP survey was product selection for full-thickness PIs, with both PCP participants reporting being "not confident." The highest-rated category was product selection

for inflammation and infection control with one PCP reporting being “somewhat confident” and one reporting being “confident.”

All responses were positive when PCPs were asked about the effect of the educational presentation on confidence in PI management, with participants rating education as either “helpful” or “very helpful” in all categories. Both PCPs anticipated making changes in their practices because of the educational session. Anticipated changes included the use of more appropriate product selection and more appropriate instructions for nursing staff.

While the sample size was small and long-term results were not assessed, the positive feedback indicates small-scale education, targeting facility-specific needs and specific product formularies, can have a positive impact on provider confidence. Other facility-specific provider-focused initiatives have shown similar results. White-Chu et al. (2019) implemented a 90-minute wound care workshop for internal medicine residents and provided dressing selection support in the form of pocket-cards. After three months, 52% reported having made changes in their wound care practices. Williams and Deering (2016) provided a one-month wound care curriculum with sample products and premade order sets for residents working in LTC. In addition to the satisfaction of participants, competence in assessment, diagnosis, and treatment was also improved.

#### **Objective Four**

The fourth objective, to educate nursing staff on appropriate product use to promote confidence in local wound care of PIs, was met through the development and delivery of a 30-minute educational presentation to nursing staff at three separate LTC facilities. Nurse leaders at two of the LTC facilities chose an in-person format for education. Due to nurse leader preference of time and ease of scheduling, education was presented in a synchronous, virtual format to the

third LTC facility. Nursing staff confidence and perceived effect of education were measured by post-presentation survey questions.

### ***Nursing Staff Education***

Facility-acquired PI incidence is considered a nurse-sensitive indicator of quality. (CMS, 2021b). Thus, PI educational programs largely focus on prevention (AHRQ, 2016). While prevention efforts remain vital in reducing preventable harm to LTC residents, significant PI risk factors inherent to LTC (EPUAP et al., 2019), along with and the growing consensus that some PIs are unavoidable (Black et al., 2020), makes PI management just as important.

Nursing staff education focused on appropriate product use. Product examples from each LTC facility's formulary were used, along with product use tips throughout the educational session. Objectives of the educational session were to:

- Provide an overview of the significance of PIs in LTC.
- Discuss the principles of local wound care of PIs.
- Discuss characteristics and use of common dressing categories.

A total of 19 nurses participated in educational sessions. Nurse leaders at two of the LTC facilities elected to plan education at the beginning of routine staff meetings to facilitate participation. Nurse leaders at the third LTC facility elected to have only leaders (including the director of nursing and resident care coordinator) attend education, which limited the number of participants. Nursing staff participants asked notably fewer questions during each of the three presentations than PCP participants. When considering the assumptions of self-concept and orientation to learning in Knowles' adult learning theory (Loeng, 2018), nursing staff participants may have felt less invested in the educational process because they did not personally request the education, unlike PCP participants who had. Nursing staff did not

unanimously express a lack of training in PI management and may have viewed education as less problem focused. While participation and completion of the survey remained voluntary, the timing of education prior to a regular staff meeting may have made nursing staff feel obligated to attend, rather than feeling like they were choosing participation. While the incentive of bandage scissor giveaway may have made participants feel more positively about education, it likely did not affect participation rates, as nursing staff were already compelled to be present for their respective staff meetings. In the facility opting to include only nurse leaders in education, participation was limited to only one individual due to other unexpected leadership obligations at the time of the scheduled session.

### ***Nursing Staff Survey***

Nursing staff participant ratings of confidence when performing wound care of PIs was higher than PCP confidence in PI management. The four-point Likert scale questions were scored as follows: not confident (1), somewhat confident (2), confident (3), and very confident (4). Mean confidence scores in all categories ranged from 3.0 to 3.5. Only one participant response of “not confident” was given. This was in the category of confidence in packing deep wounds. While several previous studies have established a general deficit in PI knowledge among nurses, validated knowledge assessment tools focus more on preventative measures and risk assessment than on local wound care (Ayello et al., 2017; Kielo et al., 2020). PI education is often designed to target nursing staff over PCPs, which may account for the higher confidence ratings in nurses. Additionally, nursing staff survey questions addressed confidence in performing wound care as ordered, rather than selecting appropriate products, which decreases the complexity of decision-making. All nursing staff participants rated the educational session as either “helpful” or “very helpful” to their confidence in performing wound care of PIs.

The majority (63.2%) of nursing staff stated they would “probably yes” make a change in practice as a result of the education. Described changes included product-specific tips discussed during the presentation, such as proper ways to apply specific dressings over difficult to dress areas. Participants also listed proper packing and measuring techniques, along with identifying which general categories products belong to, as anticipated practice changes. The specific nature of these comments suggests practical tips, tricks, and product use pearls may be more appealing to nursing staff when compared to general wound care principles.

### **Perceived Barriers**

On the post-presentation survey, PCP participants reported lack of education and frequent changes in wound product formularies were barriers to their confidence in PI management. Wound care education within medical schools and internal medicine residencies is known to be lacking (White-Chu et al., 2019; Yim et al., 2014). In a needs assessment of hospitalists, 72% reported having little or no formal wound care training (Walker et al., 2019). Additionally, on-the-job training and wound exposure is variable depending on setting and patient population. When facility or health system product formularies are changed, decision-making, education, and communication by manufacturer representatives primarily involve wound care specialists, not PCPs (J. Miller, personal communication, October 10, 2021). This deficit in education and communication is especially problematic in rural areas, where access to specialist care is limited (Cyr et al., 2019).

Barriers to confidence in local wound care of PIs reported by nursing staff were similar to PCP-identified barriers in some instances. Responses were grouped into three main categories: lack of exposure to PIs, workload, and concerns about product selection/unclear orders. Similar to PCPs, nursing staff reported a lack of education and on-the-job wound care experience.

Nursing staff also reported not knowing which products to choose. Multiple nursing staff participants perceived that PCPs are often unsure of what products to order, and the care team does not always agree on a treatment plan. Workload issues, including staffing, time constraints, and frequency of required care, were identified by nursing staff as additional barriers to confidence. PCPs did not report any workload concerns.

### **Recommendations to Promote Confidence**

Both PCP and nursing staff participants were asked to recommend strategies to promote confidence in PI management. Both groups recommended more educational opportunities. PCPs wanted more information on the products available to them and thought wound care education should be incorporated into program curricula. Both groups thought continuing education would be helpful, with nursing staff wanting more hands-on practice to keep their skills up when not actively caring for individuals with PIs.

## **Recommendations**

### **Making the Change Permanent**

The last step in the Model for Improvement is making the change permanent (Loeng, 2018). While the small sample size makes it impossible to make broad assumptions based on the results of the quality improvement project, results are consistent with other small-scale, facility-based wound care educational efforts (White-Chu et al., 2019; Williams & Deering, 2016) after which participants reported a positive effect on confidence. To promote lasting PCP confidence in PI management, the rural healthcare clinic should integrate PI decision support into everyday practice. The current process for placing orders when rounding in LTC facilities requires PCPs to enter orders into the rural healthcare clinic electronic medical record (EMR). Orders are then sent back to the LTC facilities. While making changes to the rural healthcare clinic's EMR was



not allowed within the scope of this student-driven quality improvement project, developing an electronic order set would streamline decision-making, efficiency, and communication with nursing staff. The example orders and PI product selection guide provide the necessary framework for creation of a comprehensive electronic order set. A request for building the order set should be submitted to the health system EMR support personnel by PCP participants or the project sponsor.

Additional and recurrent PI and wound management education would help ensure continued development of PCP confidence. The co-investigator provided a recording of the educational session, along with presentation handouts, the PI product selection guide, and example orders in electronic format. The project sponsor intends to share these resources with PCPs unable to attend the educational session and new PCPs. Because a wound-certified nurse practitioner is set to begin outreach to the rural healthcare clinic, additional continuing education and development of PCP confidence in PI management can be facilitated through her. This project provided an overview of the broad topic of local wound care of PIs. A series of more in-depth discussions of specific topics (i.e. selection of topical antimicrobial products, appropriate debridement, etc.) would provide PCPs with opportunity to continue to advance their skills and confidence in PI management. With the addition of specialty wound services to the rural healthcare clinic and subsequent attraction of additional wound care patients to the clinic, PCP exposure to PIs and various products will likely increase, further expanding knowledge and confidence.

The first page of the PI product selection guide and example orders were developed using generic product category terminology, ensuring relevance for at least the near future. The second page, however, is customized with manufacturer names. Thus, periodic review and updating of

resources will be necessary when there are changes in facility product formularies or advancements in literature and best practice recommendations. For the immediate term, the wound NP, who plans to do outreach at the rural healthcare clinic, can assist with making such updates. In the future, the health system's wound care council should be charged with periodic review of the PI product selection guide and example orders. The system-wide wound council currently completes routine review of inpatient PI prevention policies and is involved in decisions relating to product formulary changes. The wound council would be the appropriate body to also own updates of outpatient PI-decision support tools. This would also prompt sharing of resources throughout the health system, so PCPs in other rural settings may also benefit from PI resources.

When changes are made to the health system's product formulary, the health system wound council and other involved decision-makers should direct manufacturer representatives to contact and offer product education to PCPs, especially those in rural settings. Contracts between vendors and health systems typically include product support and educational offerings by vendor representatives for nurses and providers within the health system. Thus, it is of no additional cost to the health system to request new product education for PCPs. Including rural PCPs in communications with product representatives will increase their exposure to any new products and their indications. Establishing relationships between PCPs and vendor representatives will also lead to a channel of communication for future PCP questions.

Making permanent changes within the LTC facilities may prove to be more challenging. During the development of the PI product selection guide, the co-investigator noted product formularies limited in depth, with duplication of products in some categories. The co-investigator also noted a lack of familiarity with product formularies by LTC facility nurse leaders.

Participant survey responses, along with previous literature, indicates the large number of wound care products on the market make proficiency in product selection and use difficult to attain (Niezgoda et al., 2020). The countless number of commercially available products also complicates the development of adequate, cost-efficient product formularies. Certified wound care providers are often involved in development of appropriate and cost-efficient product formularies within health systems but are rarely employed by LTC facilities (WOCN, n.d.). While nursing staff participants reported more confidence in local wound care than PCPs in product selection, many still recommended more PI education and exposure to promote continued confidence. Appointing wound care or PI champions within each LTC facility and charging them with coordinating formulary development and educational offerings, may result in a more organized approach to PI management and education. Research shows improved quality outcomes and lower wound product costs in organizations employing wound-certified individuals (Boyle et al., 2017; Ramundo et al., 2020). LTC facilities should consider consulting with or hiring a wound-certified nurse to offer expertise in formulary development and educational services. This may prove to be cost-neutral, or even result in cost-savings, due to more efficient product use.

### **Implications for Practice**

A Healthy People 2030 objective is to “reduce the rate of pressure ulcer-related hospital admissions among older adults” (Office of Disease Prevention and Health Promotion, n.d., para 4). Promoting confidence in PI management in PCPs, who serve LTC patients, and LTC nursing staff will help reduce hospital admissions by expanding the range and quality of services provided in the LTC setting. Costly complications may also be reduced when individuals with PIs receive appropriate care without being required to travel to see wound care specialists.

Choosing product categories based on the principles of product selection versus specific brand names allows for the use of appropriate, readily available products, eliminating the delay in care and increased cost associated with special product orders. For this reason, both PCPs and nurses must have a basic understanding of general product categories. Education should be supplemented with practical resources, such as the product selection guide and example orders, which amplify the effect of education by providing on-the-spot decision support.

### **Implications for Policy**

PI incidence is considered a nurse-sensitive indicator of quality within healthcare facilities (CMS, 2021b). Therefore, current efforts are nurse-focused and emphasize prevention measures over management. While preventing PIs remains paramount, excellent PI management should also be emphasized to promote healing and minimize personal and healthcare system burden. In addition to incidence rates, quality measures and any related CMS reimbursement consequences should also consider PI outcomes (i.e. infections, hospitalizations, amputations, etc.). This would encourage a greater emphasis on promoting confidence in PI management among PCPs and nursing staff.

### **Implications for Future Quality Improvement**

The overall effect of a single educational session, PI product selection guide, and example orders was positive. Customization of the education and the PI product selection guide, with products readily available to participants, allowed for more practical education. Even though PCPs expressed desire for PI management education and required time commitment was minimal, PCP participation was low with less than 30% of recruited PCPs attending. This suggests additional, asynchronous modalities are required to accommodate busy, unpredictable

PCP schedules. Future research to determine the optimal method, or combination of methods, for delivery of education to PCPs is needed.

The project setting included multiple facilities. The design was intended to be flexible with education delivery times and modalities to best suite each separate facility and remove barriers to participation. To design a standardized data collection method feasible in all facilities, a single survey was distributed after the educational presentation. In future projects, the addition of a pre-education survey would allow for more definitive assessment of confidence levels before versus after education. Focusing on a single facility may allow for more robust project design and data collection methods.

An unexpected barrier to the development of a customized PI product selection guide was the lack of depth and efficiency in facility product formularies. This was compounded by lack of product formulary knowledge among nurse leaders. Further quality improvement is needed in LTC facilities and rural healthcare clinics alike to develop clear, comprehensive, cost-effective PI and local wound care product formularies. This will require collaboration among a clinician experienced in wound care, nursing leadership and staff, and facility personnel who are versed in product ordering, value analysis, and the health system's vendor contracts. Educational efforts could then be further streamlined according to the product formulary.

### **Dissemination**

The project plan was disseminated to area healthcare providers via poster presentation at a regional pharmacology conference. Results will be disseminated at a College of Health Professions poster presentation on the NDSU campus. An infographic (see Appendix O) of the project findings will be shared with the project sponsor, who is a representative of the rural healthcare clinic, and LTC facility nurse leaders. The final project, along with a three-minute

video summary, will be submitted to the NDSU graduate school and published on the Proquest database to be accessible to healthcare professionals and future NP students.

### **Strengths and Limitations**

Strengths of the quality improvement project included PCP buy-in and co-investigator prior experience in PI management. PCPs at the rural healthcare clinic were the initial requestors of education and decision support resources. Their perceived need for knowledge kept them engaged in the process and the educational presentation. The co-investigator drew on a wealth of previous wound care experience to develop project materials, establish credibility with participants, and include real-life examples and product use tips throughout educational sessions.

Including multiple facilities in the project settings was both a strength and limitation. The ability to reach nursing staff at each facility served by PCP participants allowed for customization of the PI product selection guide, a more comprehensive approach to education, and insight into both the PCP and nurse perspectives. Working across facilities also presented communication and logistical challenges. The project was designed to be flexible in education delivery times and modalities according to the needs of each separate facility. While this flexibility removed barriers to participation, it presented logistical challenges when planning standardized data collections methods and limited survey distribution to a single post-presentation survey. Questions on confidence in PI management and local wound care of PIs on the PCP survey and nursing staff surveys respectively were intended to address general confidence levels prior to the educational session. Completing the survey after the education, however, made ascertaining how each individual interpreted the question difficult. Therefore, the data may represent a mixture of confidence levels both pre and post education.

Additional limitations included low PCP participation, which is postulated to be due to unforeseen patient needs at the time of education. The co-investigator also had difficulty finding high-quality PI images, with copyrights allowing for unrestricted use in educational presentations and received delayed or no response from product manufacturers regarding image permission requests. The lack of comprehensive, organized product formularies within each of the facilities, with limited knowledge of product formularies by facility leaders, significantly limited customization of education and the PI product selection guide.

### **Conclusion**

The quality improvement project promoted confidence in PI management through development of decision-support resources and presentation of PI management education for PCPs and LTC nursing staff. The plethora of commercially available wound care products make appropriate product selection and use challenging. Therefore, resources and education were customized according to each facility's product formulary and included both manufacturer-specific products and general product categories. While participant survey responses indicated the project was successful in promoting confidence in participants, the process of developing project materials revealed opportunity for optimization of facility product formularies.

The quality improvement project has implications for Doctors of Nursing Practice (DNPs). Over 75% of NPs in the U.S. work as PCPs (American Association of Nurse Practitioners, n.d.). Additionally, NPs are more likely than their physician or PA colleagues to work in rural settings. DNPs continue to develop and promote the profession through their commitment to high-quality care. Attaining confidence in PI management requires DNPs to continue to seek out learning opportunities and decision support resources. Becoming familiar

with the principles of product selection, product categories, and specific product formularies at the facilities served is essential for DNPs when caring for individuals with PIs.

Available literature suggests a deficit in PI and wound care education in nursing and medical education (Ayello et al., 2017; Suva et al., 2018; Walker et al., 2019; White-Chu et al., 2019; Yim et al., 2014). DNPs working in academia should advocate for inclusion of formal wound care education in LPN, RN, and advanced practice/DNP curricula. PIs are prevalent across care settings. DNPs will undoubtedly encounter individuals with PIs throughout their careers and should be prepared accordingly.



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North Dakota State University  
leah.radke@ndsu.edu



## APPENDIX E: HEALTH SYSTEM IRB APPROVAL



**Essentia Health**

December 1, 2021

Re: Promoting Confidence in Pressure Injury Management in Rural Long-term Care

To Whom It May Concern:

Thank you for submitting the Determination of Human Subject Research Form and information for the project named above. Based on a review of the documentation you provided, this project does not meet the definition of research with human subjects, according to the Office of Human Research Protections (OHRP) [guidance](#): "Research means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge."

Because the project does not meet the federal definition of human subjects research, it will not require further review by the Essentia Health Institutional Review Board or a scientific review committee. If, during the process of data collection or analysis, it becomes clear that findings could be generalizable or benefit others, please submit your project for IRB review at that time.

If you have any questions concerning this letter, please contact me at [IRB@EssentiaHealth.org](mailto:IRB@EssentiaHealth.org).

I wish you success with your project.

Sincerely,

*/s/ Cathy Murray*

Cathy Murray, MBA, CHC, CHRC  
Compliance Specialist/IRB Administration

## APPENDIX F: NDSU IRB APPROVAL



12/30/2021

Dr. Emily Jean Kalina  
Nursing

Re: IRB Determination of Exempt Human Subjects Research:  
Protocol #IRB0004061, "PROMOTING CONFIDENCE IN PRESSURE INJURY MANAGEMENT IN RURAL LONG-TERM CARE"

NDSU Co-investigator(s) and research team:

- Emily Jean Kalina
- Leah Rose Radke

Approval Date: 12/30/2021

Expiration Date: 12/29/2024

Study site(s): -Virtually via Zoom for primary care providers at the Essentia Health

Participants may join the educational session from the clinic or remotely from another location. -In-person or virtually (choice will be given to facility leaders) for nursing staff at three long-term care facilities

Funding Agency:

The above referenced human subjects research project has been determined exempt (category 1,2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*).

Please also note the following:

- The study must be conducted as described in the approved protocol.
- Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Promptly report adverse events, unanticipated problems involving risks to subjects or others, or protocol deviations related to this project.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

*NDSU has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.*

### RESEARCH INTEGRITY AND COMPLIANCE

NDSU Dept 4000 | PO Box 6050 | Fargo ND 58108-6050 | [ndsu.research@ndsu.edu](mailto:ndsu.research@ndsu.edu)

Shipping Address: Research 1, 1735 NDSU Research Park Drive, Fargo ND 58102

NDSU is an EOUA university.

## APPENDIX G: PCP PROJECT INFORMATION SHEET

**NDSU**      **North Dakota State University**  
School of Nursing  
PO Box 6050  
Fargo, ND 58108-6050  
701.231.7395

**Title of Research Study:**  
PROMOTING CONFIDENCE IN PRESSURE INJURY MANAGEMENT IN RURAL  
LONG-TERM CARE

My name is Leah Radke. I am a graduate student in the Doctor of Nursing Practice program at North Dakota State University, and I am conducting a research project to promote confidence in pressure injury management in long-term care. It is my hope, that with this research, we will learn more about primary care provider and nursing staff confidence in local wound care of pressure injuries and the perceived benefit of education and a customized product selection guide.

Because you provide services to care residents, you are invited to take part in this research project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you.

It is not possible to identify all potential risks in research procedures, but we have taken reasonable safeguards to minimize any known risks. Risks may include loss of confidentiality of survey answers.

By taking part in this research, you may benefit by building on education and skills in pressure injury management. However, you may not get any benefit from being in this study. Benefits to others may include faster healing and reduced incidence of complications related to pressure injuries in long-term care residents.

It should take ten minutes to complete the questions about your confidence in pressure injury management and perceived benefit of the education and provided materials. You will be entered to win a \$10 Amazon gift card after completion of the survey. Probability of winning the gift card will depend on the number of participants and is anticipated to be approximately one in ten.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

If you have any questions about this project, please contact me at \_\_\_\_\_ or  
leah.radke@ndsu.edu or contact my advisor at Emily.Kalina@ndsu.edu.

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1-855-800-6717, by email at [ndsu.irb@ndsu.edu](mailto:ndsu.irb@ndsu.edu).

Thank you for your taking part in this research. If you wish to receive a copy of the results, please email me at leah.radke@ndsu.edu.

## APPENDIX H: NURSING STAFF PROJECT INFORMATION SHEET

**NDSU**      **North Dakota State University**  
School of Nursing  
PO Box 6050  
Fargo, ND 58108-6050  
701.231.7395

### **Title of Research Study:**

PROMOTING CONFIDENCE IN PRESSURE INJURY MANAGEMENT IN RURAL  
LONG-TERM CARE

My name is Leah Radke. I am a graduate student in the Doctor of Nursing Practice program at North Dakota State University, and I am conducting a research project to promote confidence in pressure injury management in long-term care. It is my hope, that with this research, we will learn more about primary care provider and nursing staff confidence in local wound care of pressure injuries and the perceived benefit of education and a customized product selection guide.

Because you perform wound care in long-term care residents, you are invited to take part in this research project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you.

It is not possible to identify all potential risks in research procedures, but we have taken reasonable safeguards to minimize any known risks. Risks may include loss of confidentiality of survey answers.

By taking part in this research, you may benefit by building on education and skills in pressure injury management. However, you may not get any benefit from being in this study. Benefits to others may include improved management and healing of pressure injuries in long-term care residents.

It should take ten minutes to complete the questions about your confidence in pressure injury management and perceived benefit of the education and provided materials. You will be entered to win a bandage scissor after completion of the survey. Probability of winning a scissor will depend on the number of participants and is predicted to be approximately one in ten.

This study is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

If you have any questions about this project, please contact me at \_\_\_\_\_ or  
leah.radke@ndsu.edu or contact my advisor at Emily.Kalina@ndsu.edu.

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8995, toll-free at 1-855-800-6717, by email at [ndsu.irb@ndsu.edu](mailto:ndsu.irb@ndsu.edu).

Thank you for your taking part in this research. If you wish to receive a copy of the results, please email me at leah.radke@ndsu.edu.

## APPENDIX I: PI PRODUCT SELECTION GUIDE

### PRESSURE INJURY (PI) PRODUCT SELECTION GUIDE [Rural Healthcare Clinic]

PI Characteristics		Goal	Dressing(s)	Debriding agent(s)*	Topical Antimicrobial(s)
<b>Intact skin</b> (i.e. stage 1, DTPI)	Protect from:				
		<i>Pressure/shear</i>	Bordered foam		
	<b>Intact blister/bulla</b> (i.e. stage 2, DTPI)		<i>Friction</i>		
		<i>Moisture</i>	Bordered foam, moisture barrier		
<b>Shallow wounds</b> (i.e. stage 2, 3, 4, unstageable)	Wet	Absorb exudate	Foam, superabsorbant, alginate/hydrofiber + foam, alginate/hydrofiber + gauze, alginate/hydrofiber + hydrocolloid, alginate/hydrofiber + superabsorbant	NaCl impregnated dressings	Antimicrobial impregnated foam, alginate/ hydrofiber, contact layer; antiseptic moistened gauze
	Moist	Maintain moisture	contact layer + gauze, contact layer + foam, hydrogel/ointment + contact layer, hydrocolloid, transparent dressings	Hydrocolloid, transparent film, collagenase + contact layer	Antimicrobial impregnated foam, alginate/ hydrofiber, contact layer; antiseptic moistened gauze
	Dry	Donate moisture	hydrogel + contact layer, hydrogel + contact layer + foam, hydrogel-soaked gauze, ointment + contact layer, saline moistened gauze	Hydrogel + hydrocolloid, hydrogel + contact layer, collagenase + contact layer + saline moistened gauze	Antiseptic moistened gauze; antimicrobial impregnated contact layer
<i>Dry stable eschar on heels or on limb with poor perfusion: Keep dry and intact, may paint with iodine daily, trim edges as they loosen.</i>					
<b>Deep, tunneling, or undermining</b> (i.e. stage 3, 4, unstageable)	Wet	Fill dead space, absorb exudate	Alginate/hydrofiber + foam, Alginate/hydrofiber + gauze, Alginate/hydrofiber + superabsorbant, dry roll gauze + gauze/ABD pad	NaCl impregnated dressings	Antimicrobial impregnated alginate/ hydrofiber; antiseptic moistened gauze; iodoform packing
	Moist	Fill dead space, maintain moisture	Alginate/hydrofiber + Foam Alginate/hydrofiber + Gauze/ABD pad, saline or hydrogel moistened roll gauze + Gauze/ABD pad	Saline or hydrogel moistened gauze	Antimicrobial impregnated alginate/ hydrofiber; antiseptic moistened gauze; iodoform packing
	Dry	Fill dead space, donate moisture	Saline or hydrogel moistened roll gauze + Gauze/ABD pad	Saline or hydrogel moistened gauze	Antiseptic moistened roll gauze

\*PIs with unexplored tunnels should be referred for surgical debridement.

\*\*PIs with signs of spreading infection should be treated with systemic antimicrobials, antimicrobials should not be used with collagenase with exception of methylene blue/gentian violet impregnated dressings.

### PERIWOUND SKIN PROTECTION

Goal	Product
Protect from adhesive related injury	alcohol-free adhesive releaser, barrier film, silicone adhesives
Protect from moisture	barrier film, moisture barrier cream/ ointment/ paste
Treat denuded skin	ostomy powder + barrier film, zinc oxide barrier products

Note: Not comprehensive of all product options or instructions. Please see specific product instructions for additional details.

Revised 1/25/22

Source: McNichol, L. L., Ratliff, C. R., & Yates, S. S. (Eds.). (2022). *Wound, Ostomy, and Continence Nurses Society core curriculum: Wound management* (2nd ed.). Wolters Kluwer.



**PRESSURE INJURY (PI) PRODUCT SELECTION GUIDE**  
**[Rural Healthcare Clinic]**

Product category	Wear time	Comments	Preferred/formulary products		
			[Rural Healthcare Clinic]	[LTC Facility A]	[LTC Facility C]
Hydrocolloid					
Foam					
Contact layer					
Alginate/hydrofiber					
Superabsorbant					
Sodium chloride impregnated dressings					
Hydrogel					
Moisture barrier/skin protectant					
Cleansers					
Antiseptics					
Tape					
Adhesive releaser					

Note. [LTC Facility B] prefers [Manufacturer Name] products.

Note: Not comprehensive of all product options or instructions. Please see specific product instructions for additional details.

Revised 1/25/22

Source: McNichol, L. L., Ratliff, C. R., & Yates, S. S. (Eds.). (2022). *Wound, Ostomy, and Continence Nurses Society core curriculum: Wound management* (2nd ed.). Wolters Kluwer.

## APPENDIX J: EXAMPLE ORDERS

### Example Pressure Injury Orders

#### **Intact skin/bulla/blister:**

*[Anatomic location]* pressure injury:

Gently cleanse the skin and dry well. Apply *{silicone bordered foam dressing; hydrocolloid; transparent film; moisture barrier ointment}*. *{Change; Repeat}* every *{wear time}*.

#### **Common Example:**

**Sacral pressure injury:**

**Gently cleanse skin and dry well. Apply silicone bordered foam dressing (Mepilex Border Sacrum or similar). Change every 3 days.**

#### **Shallow pressure injuries:**

*[Anatomic location]* pressure injury:

Carefully remove dressing *{using alcohol-free adhesive remover}*. If dressings are adherent to wound bed, moisten with saline to loosen. Irrigate wound with *{saline; wound cleanser}*. Apply *{hydrogel; ointment; contact layer; alginate/hydrofiber; hydrocolloid; foam; bordered foam; transparent dressing; saline moistened gauze; hydrogel-soaked gauze; superabsorbant}*. Cover with *{gauze; foam; bordered foam; transparent dressing; hydrocolloid}*. Secure with *{paper tape; porous tape}*. Change every *{wear time}*.

#### **Deep pressure injuries:**

*[Anatomic location]* pressure injury:

Carefully remove dressing *{using alcohol-free adhesive remover}*. If dressings are adherent to wound bed, moisten with saline to loosen. Irrigate wound with *{saline; wound cleanser}*.

Loosely pack with *{roll gauze; gauze packing strips; iodoform gauze packing; sodium chloride impregnated gauze; hydrofiber; saline moistened gauze; hydrogel-soaked gauze; antiseptic moistened gauze}* to base of wound. Be sure to fill all tunnels and undermined areas. Apply *{barrier film spray; moisture barrier ointment/cream/paste}* to surrounding skin. Cover with *{secondary dressing}*. Secure with *{paper tape; porous tape}*. Change every *{wear time}*.

#### **Dry stable eschar on heels/ischemic limbs:**

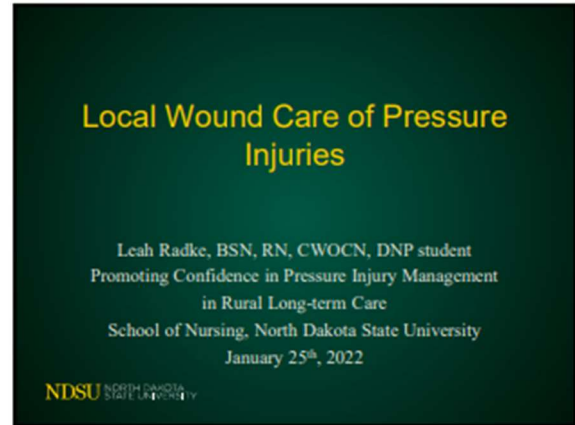
*[Anatomic location]* pressure injury:

Paint eschar with povidone-iodine. Allow to air dry completely. Cover with dry gauze dressing. Wrap with roll gauze to secure. Change daily.

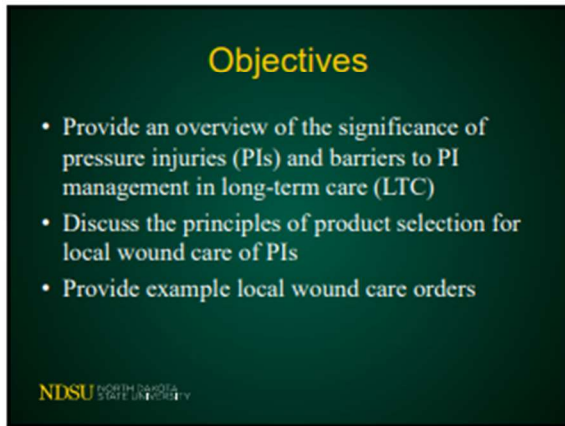
# APPENDIX K: PCP HANDOUT



1



2



3



4



5



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### Clinical Presentation

#### Intact skin

Blanchable vs Non-Blanchable

Stage 1 Pressure Injury - Lightly Pigmented

Deep Tissue Pressure Injury

NPIAP

From: From Pressure Injury Stages, by NPIAP. n.d. <https://npiap.org/page/PressureInjuryStages>. Copyright 2020 by NPIAP. Reprinted with permission.

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### Clinical Presentation

#### Intact bulla

Stage 2 Pressure Injury

Deep Tissue Pressure Injury

NPIAP

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### Clinical Presentation

#### Partial Thickness Skin Loss

Stage 2 Pressure Injury

NPIAP

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### Clinical Presentation

#### Full Thickness Skin Loss

Stage 3 Pressure Injury

Stage 4 Pressure Injury

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### Significance

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From: Med EdNet, by From. 2017. Retrieved from: <http://www.medednet.org/for-press/med-ed-net-photos/PI-2>. Public domain image.

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### Significance

- 3-year mortality rates in elderly individuals with a PI double that of elderly without a PI (Song et al., 2019)
- 8.47% of U.S. LTC residents have an unhealed PI (Journal for Medicare & Medicaid Services (CMS), 2020)
- \$32 billion in annual Medicare spending on chronic wounds (Nashidze et al., 2018)
  - Average of \$21,060 per beneficiary for PI treatment

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## Significance

- The Joint Commission (2021)
  - PIs remain a significant concern across all healthcare settings.
- Healthy People 2030
  - Seeks to “reduce the rate of pressure ulcer-related hospital admissions among older adults” (Office of Disease Prevention and Health Promotion, n.d., para. 4).
- CMS (2017)
  - LTC facilities must ensure that “a resident with pressure ulcers receives necessary treatment and services, consistent with professional standards of practice, to promote healing, prevent infection and prevent new ulcers from developing” (pp. 276–277).

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## Significance

- Contributing factors in LTC
  - Immobility, aging, comorbidities, moisture, poor nutrition (EPICAP et al., 2019)
- Older adults admitted to the hospital who resided in LTC more likely to have a PI on admission, or develop a PI within 36 hours (Latimer et al., 2019)

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## Significance

- Barriers to PI management in rural LTC
  - Lack of access to specialists (Cyr et al., 2019; Wound, Ostomy, and Continence Nurses Society, n.d.)
  - Myriad of wound care products on the market (Niangala et al., 2020)
  - Lack of specialized wound care training
    - Deficits in PI-knowledge among nurses (Agullo et al., 2017)
    - 90% of hospitalists report little to no confidence in PI management (Walker et al., 2019)

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## Principles of Local Wound Care

- Sibbald et al. (2021) Wound Bed Preparation paradigm and T.I.M.E.
  - Tissue management
  - Inflammation and infection control
  - Moisture maintenance
  - Epithelial edge advancement

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(McNichol et al., 2022)

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## Pressure Injury Management



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## Tissue Management

- Cleansing
  - No skin cleansers
  - 4-15 psi
    - 35 ml syringe/19-gauge needle
  - Clean/healing wounds
    - Isotonic saline
    - Potable water
  - Commercial wound cleansers
    - Gentle surfactant
    - Non-cytotoxic
  - [Example image of brand-name products available to PCPs with manufacturer instructions]



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(McNichol et al., 2022)

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## Tissue Management

- **Cleansing**
  - Wounds with infection or biofilm
    - Surfactant cleansers
    - Antiseptics
      - Hypochlorous acid (HOCL) and sodium hypochlorite (NaOCL)
        - May be cytotoxic in some concentrations


*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Tissue Management

- **Debridement**
  - Removal of devitalized tissue and biofilm
  - Little evidence to support one method over another
    - Individual factors
    - PI presentation
    - Clinical setting



Wound Care: Principles of Wound Care, 4th Edition, © 2019 Elsevier Inc. All rights reserved. https://doi.org/10.1016/j.wic.2019.05.001

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## Tissue Management

**Autolytic debridement:**

- Body's own WBCs and enzymes break down necrotic tissue
- Achieved by maintenance of moist wound bed and vascular environment
- Safe for non-infected wounds
- Liquifying necrotic tissue may appear similar to purulent exudate
- Moisture-retentive dressings (i.e., transparent film, hydrocolloid, bordered foam)
  - Consider moisture donating products if minimal exudate (i.e., hydrogel)
- Hypertonic sodium chloride impregnated gauze

Product image

Product image

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Tissue Management



**Enzymatic debridement:**

- Collagenase enzyme digests collagen anchors, loosening necrotic tissue from wound bed
- Safe for non-infected and infected wounds
- Apply at two mm thick, every 24 hours
- Keep within wound margins
- Cover with moisture donating or moisture retentive dressing
- Certain cleansers and antimicrobial products may deactivate

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Tissue Management

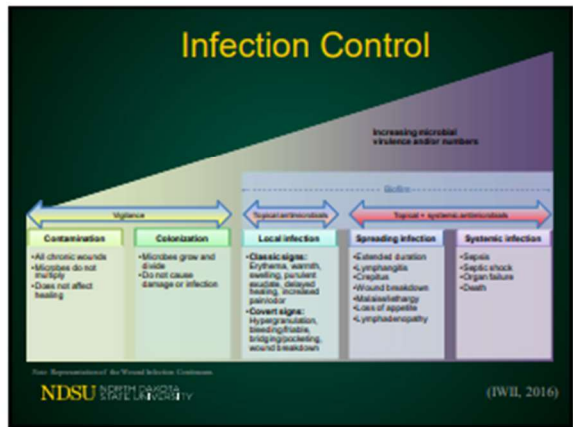
- **Debridement**
  - Dry stable eschar on heels or ischemic limbs
    - **Keep dry and intact!**
    - May paint with iodine to reduce bacterial burden



Wound Care: Principles of Wound Care, 4th Edition, © 2019 Elsevier Inc. All rights reserved. https://doi.org/10.1016/j.wic.2019.05.001

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## Topical Antimicrobials

- Acetic Acid
  - Especially effective against *Pseudomonas aeruginosa*
  - 0.25% acetic acid moistened gauze
  - Acidic environment unfavorable for bacterial growth
- Sodium hypochlorite
  - 0.125% sodium hypochlorite moistened gauze
  - Cytotoxic
- Iodine
  - Povidone-iodine solution
  - Iodiform packing strips
  - Cadexomer iodine
  - Cytotoxicity depends on concentration/delivery
  - Contraindicated in allergy to iodine, shellfish, contrast dye, and in thyroid/renal disorders

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## Topical Antimicrobials

- Silver sulfadiazine
  - Contraindicated in sulfs allergy
  - Not water soluble, creates pseudo eschar
- Sustained release impregnated dressings
  - Silver
    - Low level cytotoxicity
    - Limit in pediatric, avoid in neonates
  - Methylene blue/gentian violet
    - Compatible with collagenase

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## Maintain Moisture

Dry wound bed → Donate moisture  
 Moist wound bed → Maintain moisture  
 Wet wound bed → Absorb exudate

★ Dry stable eschar on heels or ischemic limbs:

- Keep dry and intact
- May paint with betadine as ordered



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## Moisture Management

Moisture donating	Moisture retentive	Absorptive
Hydrogel Saline Ointments	Transparent film Hydrocolloid Contact layer	Foam Alginate/hydrofiber Superabsorbant

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## Hydrogel

Product image

- Glycerin or water based
- Sheets or amorphous gel
  - Apply directly to wound bed or apply gel-soaked gauze
- Wear time: 1-3 days

[Example/image of brand-name products available to PCPs with manufacturer instructions]

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## Hydrocolloids

- Contraindicated in presence of infection and heavy exudate
- Occlusive
- Promotes moist environment and autolytic debridement
- Interacts with exudate to form a gel
  - Odor and appearance can be mistaken for infection
- Wear time 3-7 days
- Overlap intact skin by 1 inch
- Warm with hand after application
- Use atraumatic removal technique

Product image

[Example/image of brand-name products available to PCPs with manufacturer instructions]

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## Contact Layers

Product image

Product image

From: Example of contact layer      From: Example of contact layer

- Protects wound bed
- Maintains moisture
- Minimally adherent
- Porous to allow passage of exudate
- Polyamide net or silicone based
- Wear time: 1-7 days

*[Example image of brand-name products available to PCPs with manufacturer instructions]*

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## Foam

Product image

Product image

From: Example of foam dressing with adhesive silicone border      From: Example of foam dressing without border

- Can be used for pressure injury prevention or treatment
- Absorptive, may hold moisture against skin if saturated
- Silicone contact layer
- Wear time: up to 7 days

*[Example image of brand-name products available to PCPs with manufacturer instructions]*

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## Alginate/Hydrofiber

- Highly absorbent
- Interacts with exudate to form a gel
- Nonadherent
- Wear time: 1-3 days, depending on exudate level

Product image

From: Example of alginate/hydrofiber dressing

*[Example image of brand-name products available to PCPs with manufacturer instructions]*

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## Superabsorbent

- Moderate to high exudate
- Apply white side down
- Wear time: Up to several days, change before saturated

Product image

From: Example of superabsorbent dressing

*[Example image of brand-name products available to PCPs with manufacturer instructions]*

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## Fill Dead Space



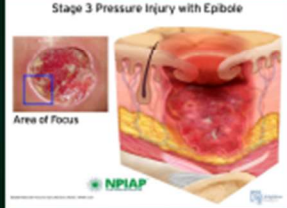
Pack entire depth of wound, tunnels, and undermining.

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## Edge Manage Epibole

Stage 3 Pressure Injury with Epibole



Area of Focus

NPIAP

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- Chemical cauterization
- Surgical excision

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## Edge Manage Peri-wound Skin

- Protect from:
  - Excess moisture
  - Adhesive-related damage
  - Hypersensitivity

Adhesive dressing removal:  
 - Gentle skin  
 - Remove from and clean  
 - Alcohol free adhesive  
 - Remove products

Alcohol free  
 skin protectants

Gentle adhesive  
 release

Product image

Product image

Product image

(McNichol et al., 2022)

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## Evaluation of Epithelial Edge Advancement

×
×

Re-evaluate stalled wounds  
and revise treatment plan

(Sibbald et al., 2021)

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## Product Selection Guide

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## Product Selection Guide

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## Orders

- Orders should address
  - Dressing removal
  - Cleansing
  - Primary dressing
  - Secondary dressing
  - Peri-wound skin protection
  - Securement
  - Wear time
  - Product category vs. brand (acceptable alternatives)

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## Orders

*[Anatomic location]* pressure injury:

Carefully remove dressing (*using alcohol free adhesive remover*). If dressings are adherent to wound bed, moisten with saline to loosen. Irrigate wound with (*solution*). Loosely pack with (*packing material*) to base of wound. (*Be sure to fill all tunnels and undermined areas*). Apply (*barrier*) to surrounding skin. Cover with (*secondary dressing*). Secure with (*tape*). Change every (*wear time*).

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## Product Selection Summary

- Depth
- Tissue type
- Presence of infection
- Exudate level
- Availability

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(McNichol et al., 2022)

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## Questions and Feedback...



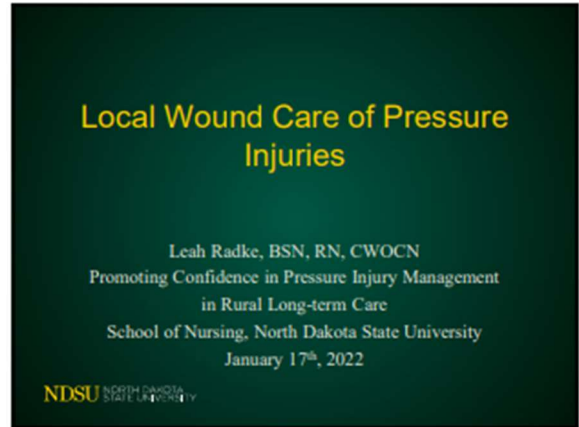
### Survey:

[https://ndstate.co1.qualtrics.com/jfe/form/SV\\_0pwXBhSL3NnzJZA](https://ndstate.co1.qualtrics.com/jfe/form/SV_0pwXBhSL3NnzJZA)

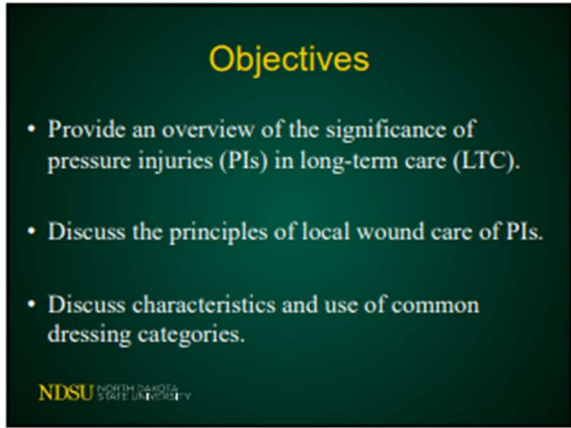
# APPENDIX L: NURSING STAFF HANDOUT



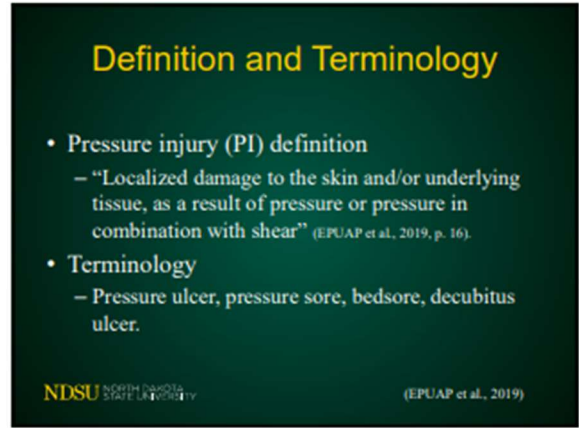
1



2



3



4



5



6



## What do pressure injuries look like?

**NPIAP STAGING FOR LIGHTLY PIGMENTED SKIN**

This slide shows a grid of 12 photographs illustrating the progression of pressure injuries on light skin. The stages are: 1. Non-blanchable redness, 2. Partial-thickness loss of dermis, 3. Full-thickness loss of dermis, 4. Full-thickness loss of skin with visible subcutaneous fat, 5. Full-thickness loss of skin with visible muscle, 6. Full-thickness loss of skin with visible bone, tendon, or cartilage.

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## What do pressure injuries look like?

**NPIAP STAGING FOR DARKLY PIGMENTED SKIN**

This slide shows a grid of 12 photographs illustrating the progression of pressure injuries on dark skin. The stages are: 1. Non-blanchable discoloration, 2. Partial-thickness loss of dermis, 3. Full-thickness loss of dermis, 4. Full-thickness loss of skin with visible subcutaneous fat, 5. Full-thickness loss of skin with visible muscle, 6. Full-thickness loss of skin with visible bone, tendon, or cartilage.

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## Significance

A close-up photograph of a severe pressure injury on a patient's back, showing a large, deep, open wound with exposed muscle and bone.

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## Significance

- Elderly with pressure injuries at increased risk of death.
- \$32 billion in annual Medicare spending on chronic wounds.
- Prevalence is increasing.

(Centers for Medicare & Medicaid Services [CMS], 2020)  
EPUAP et al., 2019; Nussbaum et al., 2018; Song et al., 2019)

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## Significance

- Contributing factors to prevalence in long-term care (LTC):
  - Immobility
  - Aging
  - Comorbidities
  - Moisture/incontinence
  - Poor nutrition
  - Hospital acquired PIs
  - Unavoidable PIs

(Bauer et al., 2016; EPUAP et al., 2019)

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## Pressure Injury Management

```


            graph TD
            A[PERSON WITH A CHRONIC WOUND] --> B[IDENTIFY / TREAT THE CAUSE]
            A --> C[PATIENT / FAMILY CENTERED CONCERNS]
            B --> D[DETERMINE ABILITY TO HEAL]
            C --> D
            D --> E[LOCAL WOUND CARE]
            D --> F[DEBRIDEMENT]
            D --> G[INFLAMMATION / LOCAL INFECTION]
            D --> H[MOISTURE BALANCE]
            E --> F
            E --> G
            E --> H
            F --> I[HEAL IMPACT]
            G --> I
            H --> I
            
```

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## Wound Measurement

- Measure in centimeters
- Length x width x depth



- Length = head to toe
- Width = perpendicular to length
- Longest x widest x deepest
- Measure weekly with patient in same position




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## Wound Measurement

- Describe tunneling and undermining using the face of a clock.
- Head = 12 o'clock
- Feet = 6 o'clock

"4.5 cm tunnel at 7 o'clock"



"Undermining from 11 o'clock to 1 o'clock up to 4.5 cm"



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## Principles of Local Wound Care


- Cleanse
- Debride
- Control infection
- Fill dead space
- Maintain moisture
- Manage peri-wound skin
- Manage pain

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## Cleansing

- Removes dead tissue, exudate, and bacteria without damaging healthy tissue.



- Cleanser options:
  - Saline
  - Commercial wound cleansers
  - Potable water
  - Antiseptics as ordered
    - Acetic acid, sodium hypochlorite, etc.
- Do not use skin cleansers in open wounds
- Irrigate with gentle pressure
  - 4-15 psi



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## Debridement



Product image



Note: Example of hydrocolloid dressing

Autolytic debridement:

- Body's own WBCs and enzymes break down dead tissue
- Achieved by maintenance of moist wound bed and vascular environment
- Moisture retentive dressings
- Safe for non-infected wounds
- Liquifying dead tissue may appear similar to purulent exudate

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## Debridement




Enzymatic debridement:

- Collagenase enzyme digests collagen anchors, loosening dead tissue from wound bed
- Safe for non-infected and infected wounds
- Apply at two mm thick, every 24 hours
- Keep within wound margins
- Cover with moisture donating or moisture retentive dressing
- Certain cleansers and antimicrobial products may deactivate

[Example image of brand-name products available to nursing staff with manufacturer instructions]

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## Infection Control

- Clean, no touch technique
- Cleanse
- Debride
- Antimicrobial dressings and antiseptics
  - Silver, honey, iodine, acetic acid, sodium hypochlorite, etc.
- ★ Dry stable eschar on heels or ischemic limbs:
  - Keep dry and intact
  - May paint with betadine as ordered



From: Best practices for Wound and Ostomy Management/Physical Therapy, Copyright 2012, Elsevier Health Sciences, the National Medical Technology Association website.

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## Fill Dead Space



Pack entire depth of wound, tunnels, and undermining.

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## Fill Dead Space

Leave a “tail” for easy removal of packing.



Fill space but avoid overpacking to facilitate contraction of wound edges.



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## Maintain Moisture

- Dry wound bed → Donate moisture
- Moist wound bed → Maintain moisture
- Wet wound bed → Absorb exudate
- Do not allow dressings to dry to wound bed.
- Increase or decrease dressing change frequency as needed to manage exudate.

★ Dry stable eschar on heels or ischemic limbs:

- Keep dry and intact
- May paint with betadine as ordered



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## Edge Manage Peri-wound Skin

- Protect from:
  - Excess moisture
  - Adhesive-related damage
  - Hypersensitivity



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## Pain Management

- Pre-medicate for dressing changes.
- Practice atraumatic dressing removal.
- Decrease frequency of dressing changes.
- Protect peri-wound skin.
- Moisten dressings prior to removal.

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## Foam

Product image

Product image

- Can be used for pressure injury prevention or treatment
- Absorptive, may hold moisture against skin if saturated
- Silicone contact layer
- Wear time: up to 7 days

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Contact Layers

Product image

Product image

- Protects wound bed
- Maintains moisture
- Minimally adherent
- Porous to allow passage of exudate
- Polyamide net or silicone based
- Wear time: 1-7 days

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Alginate/Hydrofiber

- Highly absorbent
- Interacts with exudate to form a gel
- Nonadherent
- Wear time: 1-3 days, depending on exudate level

Product image

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Hydrocolloids

- Contraindicated in presence of infection and heavy exudate
- Occlusive
- Promotes moist environment and autolytic debridement
- Interacts with exudate to form a gel
  - Odor and appearance can be mistaken for infection
- Wear time 3-7 days
- Overlap intact skin by 1 inch
- Warm with hand after application
- Use atraumatic removal technique

Product image

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Barrier Film/Skin Protectant

- For use on intact skin
- Dry skin prior to application
- Allow to dry completely before covering
- Separate skin folds until dry

Product image

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Superabsorbant

- Moderate to high exudate
- Apply white side down
- Wear time: Up to several days, change before saturated

Product image

*[Example/image of brand-name products available to PCPs with manufacturer instructions]*

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## Questions and Feedback...



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## APPENDIX M: PCP SURVEY QUESTIONS

Q1.1 What is your role?

- Physician
- Physician associate
- Nurse practitioner
- Other (please describe below): \_\_\_\_\_

Q1.2 How long have you been working in your current role?

- Less than 1 year
- 1-2 years
- 3-5 years
- More than 5 years

Q1.3 What department do you work in?

- Family medicine
- Internal medicine
- Other (please describe below): \_\_\_\_\_

Q1.4 In which setting(s) do you provide services to long-term care residents?

- Clinic
- Long-term care facility
- Other (please describe below): \_\_\_\_\_
- I do not provide care to long-term care residents

Q2.1 Please rate your confidence level in the following categories when managing pressure injuries in long-term care residents:

	Not confident	Somewhat confident	Confident	Very confident
Overall management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall local wound treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product selection for pressure injuries with intact skin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product selection for partial thickness pressure injuries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product selection for full-thickness pressure injuries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of wound cleanser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for debridement of necrotic tissue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for inflammation/infection control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for maintenance of appropriate moisture balance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for peri-wound skin protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effective communication of orders/instructions to nursing staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.1 Please rate the effect of the educational presentation on your confidence level in the following categories when managing pressure injuries in long-term care residents:

	Not helpful	Somewhat helpful	Helpful	Very Helpful
Overall management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall local wound treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product selection for pressure injuries with intact skin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product selection for partial thickness pressure injuries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product selection for full-thickness pressure injuries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of wound cleanser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for debridement of necrotic tissue	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for inflammation/infection control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for maintenance of appropriate moisture balance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selection of products for peri-wound skin protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effective communication of orders/instructions to nursing staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.2 Do you anticipate that the product selection guide discussed today will be helpful to you when managing pressure injuries in long-term care residents?

- Not at all
- Somewhat helpful
- Not sure
- Helpful
- Very helpful

Q3.3 Do you anticipate that the example wound care orders will be helpful to you when managing pressure injuries in long-term care residents?

- Not at all
- Somewhat helpful
- Not sure
- Helpful
- Very helpful

Q3.4 Do you anticipate making any changes to your practice as a result of the presentation today?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

Q3.5 If you anticipate making any changes to your practice as a result of today's presentation, please describe below.

---

Q3.6 In your opinion, what are the barriers to primary care provider confidence in the management of pressure injuries?

---

Q4.1 Please share any recommendations for strategies to promote primary care provider confidence in pressure injury management.

---

Q4.2 Please provide any additional feedback or comments.

---

## APPENDIX N: NURSING STAFF SURVEY QUESTIONS

Q1.1 What is your role?

- Registered nurse
- Licensed practical nurse
- Nursing assistant
- Other (please describe below): \_\_\_\_\_

Q1.2 How long have you been working in your current role?

- Less than 1 year
- 1-2 years
- 3-5 years
- More than 5 years

Q1.3 In which of the following settings do you provide care to long-term care residents?

- Clinic
- Long-term care facility
- Other (please describe below): \_\_\_\_\_
- I do not provide care to long-term care residents

Q2.1 Please rate your confidence in the following categories when performing wound care of pressure injuries in long-term care residents:

	Not confident at all	Somewhat confident	Confident	Very confident
Atraumatic dressing removal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cleansing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measuring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Packing deep wounds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identifying appropriate products/dressings based on orders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proper use of products/dressings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identifying when dressings should be changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.1 Please rate the effect of the educational presentation on your confidence level in the following categories when performing wound care of pressure injuries in long-term care residents:

	No effect at all	Somewhat helpful	Helpful	Very helpful
Atraumatic dressing removal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cleansing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Measuring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Packing deep wounds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identifying appropriate products/dressings based on orders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proper use of products/dressings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Identifying when dressings should be changed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q3.2 Do you anticipate making any changes to how you perform wound care of pressure injuries as a result of the educational presentation?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes

Q3.3 If you anticipate making changes as a result of today's presentation, please describe anticipated changes below.

---

Q3.4 In your opinion, what are the barriers to nursing staff confidence in local wound care of pressure injuries in long-term care?

---

Q4.1 Please recommend additional strategies to promote nursing staff confidence in pressure injury management in long-term care.

---

Q4.2 Please provide any additional feedback or comments.

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## APPENDIX O: INFOGRAPHIC



# Pressure Injury Management

*Promoting Confidence in Rural Long-term Care*

## Problem



Rural primary care providers report low levels of confidence in pressure injury management due to lack of education and frequent changes in product availability.

Rural long-term care nurses report barriers to confidence in local wound care of pressure injuries, including lack of education and exposure to wounds, workload, and unclear orders.



Availability of wound care products in rural Facilities is variable.



## Solution



*Primary care providers and long-term care nurses report benefit from 30 minute educational sessions, customized with products available in facilities they serve.*

*Primary care providers anticipate a customized product selection guide and example orders will be helpful in their practices.*

### Call to Action



#### Rural Primary Care Clinic Leaders



- Integrate pressure injury management order sets into the electronic medical record.
- Offer recurring pressure injury management education for primary care providers.
- Work with certified wound care clinicians to develop comprehensive, streamlined product formulary.

#### Rural Long-term Care Facility Leaders



- Offer recurring wound care education, focusing on hands-on skills and specific product use, for nursing staff.
- Consider hiring or consulting with a certified wound care nurse to assist with developing a comprehensive, streamlined product formulary.
- Appoint a pressure injury champion to coordinate education and formulary development.

#### Health System Wound Care Clinicians



- Offer ongoing pressure injury management education to primary care providers.
- Review and update pressure injury decision support tools in use throughout the system.
- Include rural primary care providers in new product education when vendor contracts are updated.

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