

Pressure ulcer prevention: A quality improvement project

By

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### **Abstract**

**Background:** A quality improvement project was conducted in the southeast United States. The hospital had a pressure ulcer prevalence rate of 0.11 for stage III, stage IV and unstable pressure ulcers reported in 2018 to government agencies. An evidence-based education program was developed to provide instruction to nurses who provide bedside care.

**Aims:** The project sought to determine the effectiveness of an educational intervention directed at teaching bedside nurses about the etiology and management of pressure ulcers.

**Methods:** A review of quality improvement studies regarding pressure ulcers was used to formulate an educational presentation tailored to bedside nurses. Piper's Pressure Ulcer Knowledge Test was used to determine the level of pressure ulcer knowledge by the nursing staff. A chart review was conducted for the 60-day period prior to, and following the education, to determine the effectiveness of the pressure ulcer education intervention.

**Results:** A comparison of the education, pre and post, showed a statistically significant improvement of the mean test scores and there was a reduction of pressure ulcer prevalence during the post-education period beginning April 28, 2019 until June 28, 2019.

**Conclusion:** The evidence-based educational program designed for nurses showed a reduction in the occurrence of pressure ulcers. Due to the small sample size for the educational program and the limited (120-day) timespan, further investigation should be conducted.

**Linked Evidence into Action:** The data demonstrated benefits in the reduction of pressure ulcers after evidence-based strategies were shared with nurses.

## **Table of Contents (including appendices)**

### **Chapter I: Introduction**

- a. Background and Significance
- b. Needs Assessment
- c. Problem Statement
- d. Project Aims/Purpose
- e. Clinical Question
- f. Congruence with Organizational Strategic Plan
- g. Synthesis of Evidence
- h. Conceptual or Theoretical Framework

### **Chapter II: Methodology**

- a. Project Design
- b. Setting
- c. Population
- d. Data Collection Tools or Instruments
- e. Project Plan
- f. Data Analysis
- g. Institutional Review Board and or Ethical Issues

### **Chapter III: Organizational Assessment and Cost Effectiveness Analysis**

- a. Organizational Assessment

- b. Cost Factors

#### **Chapter IV: Results**

- a. Analysis of Implementation Process: Results Linked to Project Objectives
- b. Analysis of Project Outcome Data

#### **Chapter V: Discussion**

- a. Findings
- b. Limitations or Deviations from Project Plan
- c. Implications & Impact to Practice

#### **Chapter VI: Conclusion**

- a. Value of the Project
- b. DNP Essentials
- c. Plan for Dissemination
- d. Attainment of Personal and Professional Goals

#### **References**

#### **Appendices**

Appendix A: Education Intervention: Power Point Outline

Appendix B: Consent Form for Nursing Staff

Appendix C: Pretest and posttest

Appendix D: Test results for Peiper pressure ulcer knowledge test, table 1

Appendix E: Pressure ulcer prevalence rate

## Chapter 1

Patients may develop pressure ulcers while under the care of nurses at acute care, long term care, and rehabilitation facilities. Patients that develop pressure ulcers have extended periods of pain, healing, hospitalization, and treatment time. After ulceration, patients are prone to infection and experience decreased quality of life. Quality improvement articles and studies were examined to assess the current evidence-based practices in pressure ulcer prevention and treatment. In the preliminary investigative findings, prevention and treatment strategies were identified. An intervention was developed to educate nurses and was implemented. The intervention was an educational program geared towards educating bedside nurses on the complexities of pressure ulcer development, prevention and the procedures identified to best promote healing. Patients with specific illnesses such as altered nutritional status, elevated body mass indices, nutritional deficits and excesses, and persons using medical devices have increased likelihood of pressure ulcers development.

### **Background and Significance**

Pressure ulcers that patients developed while in acute care, long term care, and rehabilitation facilities can be averted by early identification of at-risk patients and implementing prevention strategies. Patients that are malnourished can develop pressure ulcers over bony prominences such as hips, shoulder blades, coccyx, and spine (Ostadi, Saghaleini, Dehghan, Shadvar, Sanaie & Mahmoodpoor, 2018). Patients in respiratory distress are at greater risk of developing pressure ulcers on the bridge of their nose and cheeks due to bi-pap masks (Brill, et.al, 2018). Mucosal pressure ulcers develop due to intubation with endotracheal tubes (Kayser,



Vangilder, Ayello, & Lachenbruch, 2018). Incontinent patients have an increased risk of developing pressure ulcers due to maceration of the skin on the buttocks and coccyx (Lachenbruch, Rabble, Emmons, & Vangilder, 2016). Patients with low blood pressure are at an increased risk of developing pressure ulcers due to poor tissue perfusion (Pickenbrock, Ludwig, & Zapf, 2017). There are over 2.5 million people that develop pressure ulcers in healthcare facilities yearly, and over 60,000 of these patients will die from complications of these ulcers (Li, 2016). This puts a burden on the healthcare system with an annual cost of 3.6 million dollars to treat pressure ulcers (Li, 2016). Although the incidence of pressure ulcers has decreased in the last 10 years, there is still more that can be done to lessen this preventable complication.

Techniques that can be used to prevent ulcer occurrence include: correctly positioning patients, aggressive blood pressure management, and identifying patients at risk of developing pressure ulcers (Li, 2016).

### **Needs Assessment**

The existing skin care policy at the facility directed nurses when to assess the patient's skin, where to document findings, and how to monitor pressure ulcers. There were no policies identified for the use of monitoring at-risk patients or specific interventions to prevent the development of pressure ulcers. The education required by the facility included a biennial pressure ulcer staging examination. This lack of education led to knowledge deficits on the factors that contributed to the development of pressure ulcers and made the prevention of the ulcers difficult. Knowledge deficits included identification of at-risk patients by their nutritional status, incontinence, and use of specific medical equipment. Incorrect positioning of patients by the nurses also increased the risk of pressure ulcer development by putting too much pressure on certain areas of the body (National Pressure Ulcer Advisory Panel, 2014). Another knowledge

deficit was the effect of vasopressor agents used to manage patients experiencing shock, hypovolemia, and dehydration. These medications influence tissue perfusion which directly affects tissue integrity (Etafa, Argaw, Gemechu, & Melese, 2018).

### **Problem Statement**

Lack of knowledge about the etiology, risk factors, and treatment of pressure ulcers and the incorrect management of medical devices can lead to preventable pressure ulcer development. Pressure ulcers cause an undue burden on both the patients and the healthcare system.

### **Project aim or purpose**

The project aim was to educate bedside nurses on pressure ulcers with the intention of decreasing the pressure ulcer incidence rate. Education included information on: mechanical loads, tissue response, mechanisms that led to tissue damage, how factors influenced susceptibility to pressure ulcers, staging of pressure ulcers, risk factors, skin assessment, preventative skin care, management of pressure ulcers, and pain associated with ulceration. The pressure ulcer incidence rate was examined for 60 days prior to and following the education period to evaluate the effectiveness of the education provided to the bedside nurses. The educational window was between April 15, 2019 to April 28, 2019 which included an educational skills fair on April 17, 18, and 19. The pressure ulcer incidence rate was examined for a 60-day period prior to education, from February 13, 2019 to April 14, 2019 and a 60-day period post education from April 29, 2019 to June 28, 2019.

**Clinical Question**

How will educating the bedside nurses on the progression, treatment, stages, risk factors and common medical devices that contribute to the development of pressure ulcers, affect patient skincare given by bedside nurses with the education?

**Congruence with organizational strategic plan**

The facility's skin care policy states that patients' skin should be assessed upon admission, at every shift, and as needed. Hereafter, the facility's Skin Care Policy will be referred to as the "the policy". The policy is limited to addressing skin assessment and documentation and offered no direction on identification of patients at risk for skin breakdown or what interventions to implement. The strengths of this policy are that the facility has provided cameras, printers, and wound assessment tools for each nursing department, making adherence to this policy very convenient. The policy does provide a guideline to monitor pressure ulcers by photographing them on admission, or once developed, then every Wednesday thereafter, and at discharge. The policy does not include an assessment of patients' nutritional or hydration status as a risk factor for skin breakdown. The policy does not identify medical devices that may lead to pressure ulcer development, nor does it address how to prevent the ulcer by properly positioning the patient. According to Alison Doeing, the Quality Director, there is no current skin care policy to prevent and promote healing of pressure ulcers. Preventing pressure ulcers is important to the facility because it is a quality measure of the care provided. Nurses and nursing staff want the patients to have the best outcomes and to provide the best care; therefore, preventing pressure ulcers is an important part of their nursing care. The current practice varies

from nurse to nurse, but as a general rule, patients are turned every 2 hours. Pressure ulcers prevention is important to patients because ulcers can also be a source of infection.

### **Synthesis of Evidence: Search Strategy**

Articles were searched using PubMed. Keywords included pressure ulcers, pressure ulcers due to medical devices, pressure ulcers and incontinence, pressure ulcers and nutrition, pressure ulcers and positioning. Information from these articles were critiqued, synthesized and utilized for the quality improvement project.

A pressure ulcer is an open ulceration in the skin caused by pressure (NPUAP, 2014). This pressure is a mechanical load which is the force that is applied to the soft tissue and skin as a result of contact between a solid surface and the patient's skin (Agawal & Chauhan, 2012). The skin and tissue will ulcerate because the pressure cuts off the flow of blood to the area causing the tissue to die. This typically occurs over a bony prominence (Agawal & Chauhan, 2012). The skin will initially appear reddened or discolored. This initial stage of breakdown may not be visible in patients with darker skin tones (NPUAP, 2014). If the pressure is not relieved, the wound will progress due to more tissue dying. The tissue damage can be caused by a high load for a short period of time or a low load for a long period of time. Damage from pressure or shear can result in the deformation of the tissue and damage to the cells (NPUAP 2014). Mucous membranes are susceptible to injuries from medical devices, and mucosal pressure ulcers are not stageable (Agrawal & Chauhan, 2012).

There are many factors that contribute to the development of pressure ulcers. Two of these factors are ischemia and duration of load. Ischemia results from the buildup of waste

products, lack of nutrients and hypoxia (Agrawal & Chauhan, 2012). The increased waste, lack of nutrients and lowered oxygen perfusion changes the tissue's PH and results in tissue damage. (NPUAP, 2014). The duration of load is how long the tissue was without nutrients, blood flow, or oxygen due to pressure. Lack of perfusion from pressure cause the buildup of waste products and denies the tissue needed nutrients. There are several kinds of loading, such as shear, pressure and friction. Skin and tissue that has previously suffered damage will breakdown faster than healthy skin and tissue (NPUAP, 2014).

There are several medical conditions that increase a patient's risk of developing a pressure ulcer. Incontinence of bowel or bladder leads to an increased level of moisture that can decrease the patient's skin temperature which weakens the barrier function and makes the skin more susceptible to friction or shear injury (Lachenbruch, Rabble, Emmons, Vangilder, 2016). Therefore, patients who are incontinent should be checked frequently. Hypotension is classified as a mean arterial pressure (MAP) less than 60 mmHg (Rios et.al., 2016). When hypotension occurs, the tissue is not able to perfuse, and waste products build up causing necrosis. Malnutrition, low albumin, high urea, electrolyte imbalances, low protein, and low hemoglobin can make patients more susceptible to skin breakdown. Lack of building materials to form collagen, regenerate skin, form skin cells and maintain skin tissue can also lead to skin breakdown. Vascular disease can cause skin breakdown due to the impaired ability to provide nutrients to the tissue and remove waste products. Diabetes is another risk factor because it impairs the body's ability to heal. Edema causes an increase in the pressure in tissue which makes it susceptible to breakdown. If a patient experience altered sensory perception, they have a decreased ability to sense pressure or pain increasing their risk of developing a pressure ulcer. Patients with a high body mass index (BMI), are at risk for pressure ulcers under skin folds,

under the pannus, thighs, perineal area, buttocks, calves, heels, ankles, and behind neck. Patients with a low BMI have an increased risk of developing pressure ulcers over bony prominences due to their lack of tissue on these areas. Patients with fevers or hypothermia are at increased risk because their skin becomes stressed due to the abnormal temperature. Patients with a spinal cord injury are also at increased risk of pressure ulcer development due to their inability to sense pain or pressure. Other medical conditions that increase a patient risk of developing a pressure ulcer are advanced age, altered cognitive status, and fragile skin (Rios, et.al., 2016).

Nutrition is an important factor in skin health and breakdown because it provides nutrients to the cells. Nutrients that are specific to prevent pressure ulcer development and promote healing are protein, iron, zinc, and vitamins C, B12 and E. (Taylor, 2016). Signs of malnutrition include decreased muscle mass, subcutaneous fat, and functional status, generalized fluid accumulation, and unintended weight loss (Taylor, 2016). Juven is a nutritional supplement that can help heal pressure ulcers and wounds. This supplement can be administered orally, through a percutaneous gastric tube or nasogastric tube, and contains nutrients that are specific to promote healing and optimize nutrition (Juven, 2019). Three important amino acids used to promote healing are found in Juven (Juven, 2019).

Adequate hydration is important in the prevention and treatment of pressure ulcers by ensuring perfusion of the skin and tissues (Agrawal & Chauhan, 2012). Intravascular fluid is responsible for the transportation of nutrients to cells and the waste away from the cells (Carter & Lecko, 2018). In order to ensure adequate hydration of a patient, a formula of 30 ml of fluid per kilogram of body weight is needed daily (Agrawal & Chauhan, 2012). Using this equation, a 75 kg patient, should consume 2,250 ml of fluids in a 24-hour period. The exception to this rule is patients with CHF or renal disease. Patients conditions that place them at risk for dehydration

include: fever, sweating, draining wounds, use of diuretics, altered mental status, diarrhea, high respiratory rate, and vomiting (Carter & Lecko, 2018).

There are many medical devices, which may contribute to the risk of developing pressure ulcers. These risks can be mitigated by proper positioning of devices and thorough skin assessment. Foley catheters can cause breakdown and should always be positioned over the leg (Delmore & Ayello, 2017). Oral gastric and nasal gastric tubes can cause mucosal injuries and should be monitored carefully. Compression hose and sequential compression devices should be removed every shift and the skin assessed under the devices (Delmore & Ayello, 2017). Devices that should be used with caution include donut devices or ring cushions (Kayser, Vanglider, Ayello & Lachenbruch, 2018). Other devices that should be monitored regularly for skin breakdown includes blood pressure cuffs, pulse oxygen monitors, orthopedic devices, surgical drains, fecal containment devices, central or hemodialysis catheters. Intravenous tubing should be checked to ensure it has minimal contact with the patient's skin (Kayser, Vanglider, Ayello & Lachenbruch, 2018). Respiratory devices can be the most damaging to the skin and one of the more complicated pressure ulcers to prevent. Oxygen tubing is responsible for more pressure injuries than any other medical device (Brill et.al., 2018). Oxygen tubing causes breakdown on the cheeks, ears and nasal membranes. Endotracheal tubes can cause mucosal injuries and should be repositioned every 2 hours. Bi-pap and C-pap's devices can put pressure on the bridge of the nose and cheeks and patients' skin should be assessed frequently (Brill et.al., 2018).

Proper positioning can prevent pressure ulcers and patients should be turned regularly to ensure comfort. Patients should be turned at a 30-degree angle from horizontal. This applies the least amount of pressure and allows adequate blood flow to the tissues (Moore & Etten, 2014). The obese patient is an exception to this rule. They need to be turned at a 45-degree angle to

ensure offloading of the sacral area (Moore & Etten, 2014). Patients should be turned every 2 hours because tissue starts to break down in as little as 2-4 hours (Tayyib & Coyer, 2016). Caregivers should ensure the offloaded side is fully supported and stable (Moore & Etten, 2014). Nurses should ensure the patient's skin is not stretched because this can cause discomfort and lead to shearing and tearing. The patient's bed should be free of foreign objects and lines. Tubes and drains should be monitored to ensure they have the least amount of pressure on the skin. Patients who are chair bound should be fitted for a chair cushion to ensure minimal pressure (Moore & Etten, 2014).

Preventative skin care can also help reduce the occurrence of pressure ulcers. Skin should be kept clean and dry. Patient's should be bathed in warm water, using soap to help prevent drying of the skin (Chapman, 2017). Skin should be moisturized but not massaged over bony prominences because this can cause trauma to the tissue (Ackerman, 2011). The head of the bed should be kept in the lowest position to relieve the pressure on tissues. Patients should not be positioned on erythema areas or edematous areas that are non-blanchable. All patients are at risk for shear injuries and should be lifted and not dragged up in bed (Ackerman, 2011).

There are factors that influence the healing of pressure ulcers. These factors include location of the pressure ulcers, size, stage, depth, exudate, necrotic tissue, erythema, edema, fragility of skin, pain, dryness, and biofilms (NPUAP, 2014). The presence or absence of granulation tissue or epithelization is an important factor in assessing wound healing. Granulation occurs where new connective tissue and tiny blood vessels are formed on the surface of the wound during the healing process. Epithelization is where the new growth is formed from cells replicating and migrate across the skin edges (NPUAP, 2014).



Treatment for pressure ulcers can be complicated. Pressure ulcers are not sterile wounds and should be cleaned using a clean technique with normal saline, unless the wound was recently debrided; then the wound should be cleaned using a sterile technique (NPUAP, 2014). Wounds should be cleansed, along with the surrounding skin, at each dressing change. They should be cleaned from the inside out to avoid contamination of the ulcer. If the wound is infected with high bacterial colonization or a lot of debris, it should be cleaned with a cleansing solution containing surfactants or antimicrobials. When cleaning the wound, use gently irrigate in order not to damage the wound bed. Tunneled pressure ulcers should not be irrigated. Dressings should be chosen to keep the wound bed moist and the peri wound dry to prevent maceration. This can be accomplished by applying a “non-stinging” skin barrier to the area surrounding the wound to help protect it from moisture. For dressing large wounds changes the number of dressing should be counted to ensure all of them are removed at the next dressing change (NPUAP, 2014).

There are special populations that are at greater risk of developing pressure ulcers including bariatric, spinal cord injury and palliative care patients (McNichol et.al., 2015; NPUAP, 2014). Bariatric patients should be assessed, and the appropriate size equipment should be used to minimize the pressure on the skin (McNichol et.al., 2015). Patients with spinal cord injuries should be evaluated for sitting and taught to check their skin regularly, because pressure ulcers are a life-long concern for this population. (McNichol et.al., 2015). The goals for patients in palliative care are comfort and limiting the impact of the ulcers (NPUAP, 2014).

### **Conceptual or Theoretical Framework**

Dorothea E. Orem’s Self Care Deficit Theory was the theoretical framework for this quality improvement project (Orem, 1991). In preparation for the project the facility’s current

policy was examined to determine its strengths and weakness. Nurses' knowledge on pressure ulcers was assessed with a test prior to education. An online presentation was given to the nursing staff with information on the etiology of pressure ulcers, classification, risk factors, skin assessments, preventive skin care, pain, and treatment of pressure ulcers. The nurses were given the same test post education, the Pieper pressure ulcer knowledge test, which contains 74 questions. It tests caregiver knowledge on pressure ulcers, prevention, treatment, and stages. The Pressure Ulcer Prevention Committee and the Quality Improvement Committee have been updated on the results of the quality improvement project, resulting in a review of the current skin care policy.

## **Chapter II: Methodology**

### **Project Design**

The quality of patient care provided by nurses can be measured by certain indicators. One quality indicator is good skin care without the development of a pressure ulcer. By educating nurses on recognition of risk factors and identification of patients at risk, pressure ulcers can be prevented. The start of this process was a needs assessment that found nurses lack knowledge associated with pressure ulcer prevention. Then a problem statement was developed stating that knowledge deficits can lead to patients developing preventable pressure ulcers. Alternative solutions were examined to see if they were cost effective and to identify an optimal solution. The directors of ICU, Medical West, Medical East, Medical North, physical therapy, quality and, the dietician and myself, will hereafter be known as the quality improvement team. Through meetings we determined the educational format that best suited the project was an

online format. The online format was chosen for its convenience and ease of access, and so the nurses could comply with the education window of two weeks.

A PowerPoint was created that incorporated information from guidelines, research articles, and journal articles. The PowerPoint education presentation included 44 slides including references (see Appendix A for outline). The Education Nurse and the Director of Quality Control reviewed the presentation and approved it for use in the facility, (see Appendix B). The next step in the process was to meet with the Pressure Ulcer Prevention Committee, individual directors, Chief Nursing Officer and the Quality Improvement Committee to get the final approval to initiate the project. After meeting with all the committees, directors and officers, the project was approved and a booth for pressure ulcer prevention was added to the skill's fair agenda. The skills fair was an educational program that every nurse at the facility must attend to ensure their skills or knowledge of patient care is current. The PowerPoint was presented using HealthStream, an online format, for all bedside nurses to complete within the agreed upon 14-day time period. The facility sent out an email explaining the project, the importance of pressure ulcer prevention and an invitation to participate.

### **Setting**

The facility is an acute care hospital located in a rural Florida county. It is a 99-bed medical facility, with a 10-bed intensive care unit (ICU), a 10-bed stepdown unit, a 26-bed medical west floor, a 17-bed medical east floor, a 27-bed medical north floor, 6 birthing rooms, 10 postpartum beds, a 20-bed emergency room, 4 operating rooms and 2 heart catheterization laboratories. Areas of specialization include: ICU Intensivist, Cardiology, Pulmonary, Nephrology, General Surgery, Anesthesiology, Emergency Medicine, Infectious Disease,

Internal Medicine, Hematology/Oncology, Occupational and Physical Therapy, Speech Therapy and Obstetrician/Gynecologist. This facility was chosen because its management team has a proactive approach concerning improvement of patient experiences. The culture of this facility recently changed when Hospital Corporation of America (HCA) purchased it. HCA promotes evidence-based practice and provides the best patient experience. HCA ensures that the nursing staff has all the resources needed to care for patients, including adequate staffing and supplies.

### **Population**

Putnam Community Medical Center is the only hospital in Putnam County, Florida. The county is home to almost 74,000 people with the median age of 44.5 and a median household income of \$33,000 dollars a year (US Census Bureau, n.d.). 27 percent of the population lives below the poverty level and 75 percent of the households in the county make less than 50,000 dollars a year (US Census Bureau, n.d.). With the county being so poor, some residents are unable to afford health insurance. Subsequently, they do not have a primary care provider and they are not always able to afford their medications. With a lack of primary care these patients often present to the Emergency Department in severe distress. The residents' health outcomes are often worse due to their poor nutritional status, comorbidities, and lack of treatment prior to presenting to the emergency department (ED). These sick patients are often admitted to the hospital for management of their illnesses and are at increased risk of pressure ulcer development. For this study all patients admitted to the facility as an inpatient were included. Patients with existing pressure ulcers were excluded unless they developed a new pressure ulcer during their admission to the hospital. Data collected included the presence of pressure ulcers, the date of admission versus the date of pressure ulcer development, and stages of pressure ulcers.

**Data Collection Tools or Instruments**

Tools used in the project were pretest, posttest, and daily skin assessments completed by the bedside nurses on patients and charted in a computerized charting system. The Pieper Pressure Ulcer Knowledge test was utilized to assess the nurse's knowledge prior to and post education. These tests were collected anonymously. The nurses put no identifying information on the test and placed them in a sealed box that was located on their unit. After completion of the educational period, the tests were administered, collected, scored and the information was entered into an Excel spreadsheet for statistical analysis. The facility uses Meditech for the nurse's charting and the daily assessment includes documentation on skin which includes bruises, cuts, alterations and pressure ulcers. The reports were run in Meditech utilizing the Evidence Based Clinical Documentation (EBCD) menu. Reports on skin assessment were run by the Director of Quality and the Director of ICU for pressure ulcers using the EBCD menu for the 60-day pre and 60-day post educational period. The on the Excel Spreadsheet was de-identified to protect patient identity and data. These spreadsheets were compared, and no discrepancies were found. The information was then entered into a separate Excel Spreadsheet to do a statistical analysis of the information. Daily admission reports were run utilizing the EBCD menu and the results were tallied for the total admission during the project's course.

**Project Plan**

The first step in implementing the pressure ulcer prevention project was to establish baseline nursing staff knowledge of pressure ulcers. This was accomplished with a written test. The second step was to educate the nursing staff. The education was important because there are numerous variables associated with pressure ulcer development. This education was presented

in an online format. Written information was also given to the nurses to read at their own convenience or to use as a reference. A copy of the presentation is kept in a notebook at each nursing station as a reference. By presenting the education in an online and written format, nurses were able to review the information conveniently. The third step was to test the nurse's knowledge, post education, with the same test as the pre-education. The fourth step was to look at the pressure ulcer incidence rate for a period of 60 days prior to the education and 60 post-education to determine the effect of education on pressure ulcers prevention. The final step was to present the findings to the Pressure Ulcer Prevention Committee and the Quality Improvement Committee to help facilitate a change in the skin care policy at the facility. The current skin care policy was continued throughout the project. When patients developed a pressure ulcer or had an existing ulcer, the area was photographed, re-photographed weekly on Wednesday and then on discharge.

### **Data analysis**

The data was cleaned of patient identifiers by the Director of Quality and the Director of the ICU and entered into an Excel spreadsheet. The information was entered into the computer using an Excel Spreadsheet from Microsoft Office 365 and the data was analyzed referencing Introduction to Statistics (Lane, 2016). The information was entered from the pretest, posttest, 60-day pre-education and post-education pressure ulcer incidence rate, length between admission and development of pressure ulcers, and pressure ulcer stage into a spreadsheet. Categorical variables were computed and compiled for frequency, percentages, mean, median, mode, and standard deviation (Lane, 2016). The ANOVA test was used to determine whether there was any statistically significant difference between the pre-education and post-educational period concerning nursing knowledge and pressure ulcer prevalence (Lane, 2016). The p-value for

both the pre and post-test and pressure ulcer prevalence were less than 0.001, which means that statistically the test was highly significant, the test scores improved, and the prevalence rate decreased. We believe the education may have had a role in the results obtained (Lane, 2016). See Appendix E.

### **Institutional Review Board and/or Ethical Issues**

Ethical issues were addressed to ensure participants' privacy. The step taken to ensure patient's privacy was to de-identify the patient data by removal of all of the patient's personal information. This was accomplished by two directors entering patient data into an Excel spreadsheet without any identifying information. Another issue was nurse's privacy. The nursing staff was instructed not to identify themselves on the pre-test and post-test. The tests were then placed in sealed boxes that were available on each unit. By taking these measures the quality improvement project complied with both HIPPA and Institutional Review Board regulations.

## **Chapter III: Organizational Assessment and Cost Effectiveness Analysis**

### **Organizational Assessment**

Facilities are required to report the incidence of pressure ulcer development by patients under their care to the Agency for Healthcare Research and Quality because it is a quality measurement of the care provided (Putnam Community Medical Center – FL – Hospital Safety Grade, 2019). In 2018 Putnam Community Medical Center reported stage III and IV pressure ulcer development for its inpatient population with a prevalence rate of 0.11%, which is below the average hospital score of 0.38% (Putnam Community Medical Center – FL – Hospital Safety Grade, 2019). The facility does not keep track of how many inpatients develop stage I, II, and

mucosal pressure ulcers or deep tissue injuries. After receiving the results for the project, the Quality Improvement Committee plans on tracking all pressure ulcer development for patients under their care starting in 2020.

### **Cost Factors**

This project cost very little to implement because the intervention was educational. Total education hours completed by nurses during the project was 98. The average nurse salary at the facility was \$25.00 an hour for a cost of \$2,450. Four posters were made at a cost of \$20.00 each, for a total of \$80.00. Sealed boxes were made from recycled boxes that the facility provided that were covered with paper stock, displayed photos of pressure ulcers, and instructions for use. They cost a total of \$10.00 for each box, for a total cost of \$40.00. Pretest and posttest were 8 pages long, which took a total of 4 reams of paper to print. The educational materials required took another 4 reams of paper, for a total paper cost of \$35.99. The ink used to print the pre/posttest and educational materials was \$100.00. Four folders needed to keep the educational materials at the nursing stations was \$5.50 each, for a total cost of \$22.00. The Prevention and Treatment of Pressure Ulcers: Clinical Practice Guidelines cost \$50.00, plus \$10.00 for a large folder to keep it in, for a total of \$60.00. The total cost of the quality improvement project was \$2,787.99.

## **Chapter IV: Results**

### **Analysis of Implementation Process**

The goal of the project was to educate nurses on the risk factors associated with skin breakdown, and identification and prevention of pressure ulcers. The education provided to the nursing staff improved the mean test scores on the Pieper Pressure ulcer test from 76.4, pre-



education to 89.7 post-education. The pressure ulcer incidence rate improved with the education intervention also. The pressure ulcer incidence rate was 3.5 percent pre-education, and 2.2 percent post-education.

### **Analysis of Project Outcome Data**

During the project the facility employed 102 bedside nurses. 98 of these nurses completed the HealthStream and signed the consent, (see Appendix B) which was a 96% participation rate. 68 bedside nurses completed the pretest which was a 67% participation rate, with a mean test score of 76.4%. 59 bedside nurses completed the posttest which was a 58% participation rate with a mean test score of 89.7%. The test was broken down into sections; knowledge of wounds, treatment, prevention and staging. For the pretest nurses had a mean score for wound knowledge of 72%, treatment 75%, prevention 78% and staging 86%. For the posttest nurses had a mean score for wound knowledge of 90%, treatment 88%, prevention 89% and staging 93%. The pressure ulcer prevalence rate was reported for the 60 days prior to the education and 60 days post education. In the 60 days prior to education 528 patients were admitted to the facility. 49 of these patients had preexisting pressure ulcers upon admission and did not develop any additional pressure ulcers during their admission to the facility. 19 patients developed pressure ulcers while receiving care at the facility with a mean length of stay of 4.8 days till ulceration. For these 19 patients who developed pressure ulcers, 9 ulcers progressed to stage 1 and 10 ulcers progressed to stage 2 prior to discharge. In the 60 days post education 635 patients were admitted to the facility. 63 of these patients had preexisting pressure ulcers upon admission and did not develop any additional pressure ulcers during their admission to the facility. 14 patients did develop pressure ulcers while receiving care at the facility with a mean length of stay 5.6 days till ulceration. Of these 14 patients that developed pressure ulcers, 8

ulcers progressed to stage 1 and 6 ulcers progressed to stage 2 prior to discharge (see Appendix E).

## **Chapter V: Discussion**

### **Findings**

Bedside nurses who provide direct patient care can reduce the incidence of pressure ulcers by early identification of at-risk patients and implementation of interventions. These nurses need regular education because the prevention of pressure ulcers is complex. The complexity of pressure ulcers includes nutrition, hydration, use of medical devices, duration of load, friction and shear.

### **Limitations or Deviations from Project Plan**

Three were limitations on this quality improvement project. The limitations included the length of the study (restricted to 120 days), a small study population of just 1163 patients, and a small nursing population of 102 nurses. Another limitation to the study was that it was conducted at only one facility. The strength of this project was that the facility does not have a nurse that specializes in wound care and the primary nurse is responsible for preventing, treating and management of wounds; therefore, the project had a direct impact on the quality of patient care.

### **Implications & Impact to Practice**

Nurses are responsible for all aspects of patient care which is complicated and complex. Without regular education these nurses can lack sufficient knowledge of pressure ulcers which can lead to an increased risk of patients developing pressure ulcers. By educating

nurses to recognize patients at risk for skin breakdown, and implementing interventions, the incidence of pressure ulcers may be reduced.

## **Chapter VI: Conclusion**

### **Value of the Project**

There was a significant decrease in pressure ulcer prevalence in the post education period. This translates into less patients that would have experienced an increased source of infections, had a prolonged hospitalization, extended healing time or experienced pain associated with pressure ulcers. The cost of the project was \$2,787.99, most of which was nursing salaries. This is much less than the cost of one case of litigation against the facility. The quality of the nursing care given post education was an indicator of the value of continued education for skin care and pressure ulcer prevention. The average settlement for pressure ulcer development while receiving medical care is \$250,000. Plaintiffs win 87 percent of the time and it is the second most common lawsuit against medical facilities ("Pressure Ulcer Litigation: What is the Wound Center's Liability?", 2019).

### **DNP Essentials**

Essentials of the Doctor of Nursing practice was utilized in this quality improvement project. Essential #1, the scientific underpinnings of practice relate to the complexity of nursing practice (The Essentials of Doctoral Education for Advanced Nursing Practice, 2006). The nursing care was elevated by integrating knowledge on pressure ulcers and evidence-based practice in order to improve the health care delivery system at the facility. Essential #2 organizational and systems leadership for quality improvement and systems thinking as it relates

to the development and evaluation of current and future healthcare needs. The current care delivery system was evaluated by identifying the areas where scientific findings could improve patient outcomes. The nursing care was elevated by providing the nurses with the knowledge so they could be proactive and implement early interventions as needed for prevent pressure ulcer development. Essential #3 clinical scholarship and analytical methods for evidenced-based practice relates to knowledge to solve complex practice situations. By monitoring and evaluating outcomes of nursing care and communicating the critical elements it provided nursing staff with quality feedback on their patient centered care (The Essentials of Doctoral Education for Advanced Nursing Practice, 2006).

### **Plan for Dissemination**

Data collected has been presented to the Quality Improvement Committee and the Pressure Ulcer Prevention Committee at the facility. The final report is scheduled to be presented at the respective meetings in the month of September 2019. The current skin care policy is being examined with plans to include regular education on skin care, pressure ulcer prevention, early identification of at-risk patients and treatment of pressure ulcers. The quality improvement information including the educational PowerPoint presentation and new skin care policy will be submitted to the Corporate office of HCA for approval and use in other facilities

### **Attainment of Personal and Professional Goals**

This study highlighted education as a measure in the prevention of pressure ulcers. By implementing a regular education program, the nurses have the tools to reduce the incidence of pressure ulcer occurrences. Further investigation is needed to determine if education alone is the answer to preventing pressure ulcers in a medical setting. By implementing this quality

improvement at my facility, I gave my fellow co-workers the tools they need to elevate their nursing care and completed the requirement for my Doctor of Nursing Practice.

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**APPENDIX A****EDUCATION INTERVENTION: POWER POINT OUTLINE**

1. Etiology of pressure ulcers
  - a. Mechanical load
  - b. Tissue response
  - c. Mechanisms that lead to tissue damage
  - d. How factors influence susceptibility to pressure ulcers
    - i. Nutrition
    - ii. Hydration
    - iii. Duration of load
    - iv. Magnitude of load
    - v. Type of loading
    - vi. Skin condition
    - vii. Skin moisture
    - viii. Medical devices
    - ix. Perfusion
    - x. Oxygenation
2. Classification of pressure ulcers
  - a. Pre-stage 1
  - b. Stage 1
  - c. Stage 2
  - d. Stage 3
  - e. Stage 4
  - f. Deep tissue injury
  - g. Unstageable
  - h. Mucosa
3. Risk factors
  - a. Immobility
  - b. Critically ill
    - i. Intolerance to repositioning
    - ii. Poor perfusion
    - iii. Poor oxygenation
  - c. Incontinence
    - i. Bowel
    - ii. Bladder
  - d. Hypotension
  - e. Malnutrition
    - i. Albumin
    - ii. Urea
    - iii. Electrolyte
    - iv. Protein
    - v. Hemoglobin

- vi. Lymphopenia
  - f. Vascular disease
  - g. Diabetes
  - h. Edema
  - i. Hypotension
  - j. Hypertension
  - k. Low/high BMI
    - i. skin folds
      - 1. under pannus
      - 2. thighs
      - 3. perineal
      - 4. buttocks
      - 5. calves
      - 6. heels
      - 7. ankles
      - 8. behind neck
    - l. Hypothermic/hyperthermia
  - m. Advanced age
    - i. Cognitive status
    - ii. Decreased sensation
    - iii. Fragile skin
  - n. Sensory perception
  - o. Health status
4. Skin assessment
- a. Admission
  - b. Every shift
  - c. As needed
  - d. Change in status
  - e. Change in condition
5. Preventive skin care
- a. Correct positioning
  - b. Clean skin
  - c. Barrier products
    - i. Creams
    - ii. Silicone dressings
  - d. Moisturizers
  - e. Decrease interface pressures
    - i. Specialty beds
  - f. Off load heels
  - g. Assess tissue around medical devices
    - i. Catheters
    - ii. Oxygen tubing
    - iii. ET tubes

- iv. OG/NG tubes
  - v. Surgical drains
  - vi. Bi-pap/C-pap
  - vii. Blood pressure cuffs
  - viii. Oxygen monitors
  - ix. Compression hose/sequential compression devices
  - x. Intravenous tubing
  - xi. Orthopedic devices
  - xii. Tracheostomy
  - xiii. Oximeter probes
  - xiv. Fecal containment device
  - xv. Central/dialysis catheters
  - xvi. Restraints
  - xvii. Intra-aortic balloon pumps
6. Pain associated with pressure ulcers
- a. Inflammation
  - b. Infection
  - c. Excoriation from incontinence
  - d. Pressure
  - e. Friction
  - f. Shear
  - g. Procedures
  - h. Damaged nerve endings
7. Managing pressure ulcers
- a. Moisture balance
  - b. Infection prevention
  - c. Inflammation control
  - d. Tissue management
  - e. Cleaning
    - i. Each dressing changes
    - ii. Area becomes soiled
    - iii. Clean surrounding skin
    - iv. Do not clean tunneling ulcers
    - v. Clean from the inside out to avoid contamination
  - f. Epithelial edge advancement
  - g. Debridement
    - i. Autolytic
    - ii. Wet to dry
    - iii. Enzymatic
    - iv. Wound irrigation
  - h. Dressings
    - i. Size, depth, location
    - ii. Wound exudate

- iii. Tunneling/undermining
  - iv. Condition of ulcer bed
  - v. Condition of surrounding skin
8. Communication
- a. Patient
  - b. Physicians
  - c. Nurses
  - d. Care givers/family members
9. Document, document, document

**APPENDIX B****CONSENT DOCUMENT****BRADLEY UNIVERSITY****Pressure ulcer prevention: A quality improvement project****Introduction**

- You are being asked to participate in a quality improvement project on pressure ulcer prevention.
- You were selected as a possible participant because you are a member of the nursing staff at Putman Community Medical Center (PCMC).
- We ask that you read this form and ask any questions that you may have before agreeing to participate in the project.

**Purpose of Study**

- The purpose of the project is to improve patient care through education of nursing staff on the best practice in the prevention of pressure ulcers.
- Ultimately, the findings will be presented to Bradley University as part of the requirement for a Doctor of Nursing Practice degree.

**Description of the Study Procedures**

If you agree to participate, you will be asked to do the following things:

- Apply the knowledge that you learned to your nursing care.
- Complete a pre and post-test. Please do not put any identifying information on these tests. Pre-test should be completed prior to education and posttest should be completed within 72 hours after education. Please place completed tests into the locked collection box on your unit. The estimated time to take each test is between 15-45 minutes.

**Risks/Discomforts of Being a Participant in this Project**

- There are no reasonably foreseeable or expected risks.

**Benefits of Participating in the Project**

The benefits of participation are:

- Exposure to free education on pressure ulcer prevention and care
- Examination of factors that may influence patient skin integrity
- Presentation of skills that contribute to improving patient care
- Input into the development of an improved skin care policy.

**Confidentiality**

- All data collected will be de-identified and stored in a secured repository. This project will not collect or retain information about your identity.

**Payments**

- You will not receive payment or reimbursement for your participation in this project.

**Right to Refuse or Withdraw**

- The decision to participate in this project is voluntary. You may stop taking part at any time without affecting your relationship with the investigator of this project, Bradley University, or Putnam Community Medical Center. You have the right not to answer any question(s), as well as to withdraw completely at any time.

**Right to Ask Questions and Report Concerns**

- If you have any question or concerns, before, during and after the project please contact
  - Lead investigator Molly Hernandez at mherandez4@mail.bradley.edu or by telephone at 386-937-6650.
  - Project mentor Barbara Cox at cox.barbara@HCAhealthcare.com or by telephone at 904-521-6061

**Consent**

- By signing this form, you indicate that you are voluntarily participating in this project and that you have read and understand the information provided.
- If you have questions or concerns about your rights as a participant, or wish to obtain information, ask questions about this project with someone other than the investigator, please contact the following:

Committee on the Use of Human Subjects in Research (CUHSR)  
 Bradley University  
 1501 W. Bradley Avenue  
 Peoria, IL 61625 USA  
 1-309-677-3877

Subject's Name (print): \_\_\_\_\_

Subject's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Investigator's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**APPENDIX C**

**Pre and Post Test**

**INSTRUCTIONS: PLEASE DO NOT PLACE YOUR NAME OR IDENTIFYING INFORMATION ON THIS DOCUMENT**

**Pieper Pressure Ulcer Knowledge Test**

<b>Question</b>	<b>True</b>	<b>False</b>	<b>Don't Know</b>
1. Slough is yellow or cream-colored necrotic /devitalized tissue on a wound bed.			
2. A pressure injury/ulcer is a sterile wound.			
3. Foam dressings increase the pain in the wound.			
4. Hot water and soap may dry the skin and increase the risk for pressure injury/ulcers.			
5. Chair-bound persons should be fitted for a chair cushion.			
6. A Stage 3 pressure injury/ulcer is a partial thickness skin loss involving the epidermis and/or dermis.			



<p>7. Hydrogel dressings should not be used on pressure injury/ulcers with granulation tissue.</p>			
<p>8. A person confined to bed should be repositioned based on the individual's risk factors and the support surface's characteristics.</p>			
<p>9. A pressure injury/ulcer scar will break down faster than unwounded skin.</p>			
<p>10. Pressure injury/ulcers progress in a linear fashion from Stage 1 to 2 to 3 to 4.</p>			
<p>11. Eschar is healthy tissue.</p>			
<p>12. Skin that doesn't blanch when pressed is a Stage 1 pressure injury/ulcer.</p>			
<p>13. The goal of palliative care is wound healing.</p>			
<p>14. A Stage 2 pressure injury/ulcer is a full thickness skin loss.</p>			
<p>15. Dragging the patient up in bed increases friction.</p>			

<p>16. Small position changes may need to be used for patients who cannot tolerate major shifts in body positioning.</p>			
<p>17. Honey dressings can sting when initially placed in a wound.</p>			
<p>18. An incontinent patient should have a toileting care plan.</p>			
<p>19. A pressure redistribution surface manages tissue load and the climate against the skin.</p>			
<p>20. A Stage 2 pressure injury/ulcer may have slough in its base.</p>			
<p>21. If necrotic tissue is present and if bone can be seen or palpated, the ulcer is a Stage 4.</p>			
<p>22. When possible, high-protein oral nutritional supplements should be used in addition to usual diet for patients at high risk for pressure injury/ulcers.</p>			
<p>23. The home care setting has unique considerations for support surface selection.</p>			

<p>24. When necrotic tissue is removed, an unstageable pressure injury/ulcer will be classified as a Stage 2 injury/ulcer.</p>			
<p>25. Donut devices/ring cushions help to prevent pressure injury/ulcers.</p>			
<p>26. A specialty bed should be used for all patients at high risk for pressure injury/ulcers.</p>			
<p>27. Foam dressing may be used on areas at risk for shear injury.</p>			
<p>28. Persons at risk for pressure injury/ulcers should be nutritionally assessed (i.e., weight, nutrition intake, blood work).</p>			
<p>29. Biofilms may develop in any type of wound.</p>			
<p>30. Critical care patients may need slow, gradual turning because of being hemodynamically unstable.</p>			
<p>31. Blanching refers to whiteness when pressure is applied to a reddened area.</p>			
<p>32. A blister on the heel is nothing to worry about.</p>			

<p>33. Staff education alone may reduce the incidence of pressure injury/ulcers.</p>			
<p>34. Early changes associated with pressure injury/ulcer development may be missed in persons with darker skin tones.</p>			
<p>35. A footstool/footrest should not be used for an immobile patient whose feet do not reach the floor.</p>			
<p>36. Deep tissue injury (DTI) may be difficult to detect in individuals with dark skin tones.</p>			
<p>37. Bone, tendon, or muscle may be exposed in a Stage 3 pressure injury/ulcer.</p>			
<p>38. Eschar is good for wound healing.</p>			
<p>39. It may be difficult to distinguish between moisture associated skin damage and a pressure injury/ulcer.</p>			
<p>40. Wounds that become chronic are frequently stalled in the inflammatory phase of healing.</p>			

<p>41. Dry, adherent eschar on the heels should not be removed.</p>			
<p>42. Deep tissue injury is a localized area of purple or maroon discolored intact skin or a blood-filled blister.</p>			
<p>43. Massage of bony prominences is essential for quality skin care.</p>			
<p>44. Poor posture in a wheelchair may be the cause of a pressure injury/ulcer.</p>			
<p>45. For persons who have incontinence, skin cleaning should occur at the time of soiling and at routine intervals.</p>			
<p>46. Patients who are spinal cord injured need knowledge about pressure injury/ulcer prevention and self-care.</p>			
<p>47. In large and deep pressure injury/ulcers, the number of dressings used needs to be counted and documented so that all dressings are removed at the next dressing change.</p>			
<p>48. A mucosal membrane pressure injury/ulcer is found on mucous membrane as the result of medical equipment used at that time on that location; this pressure injury is not staged.</p>			

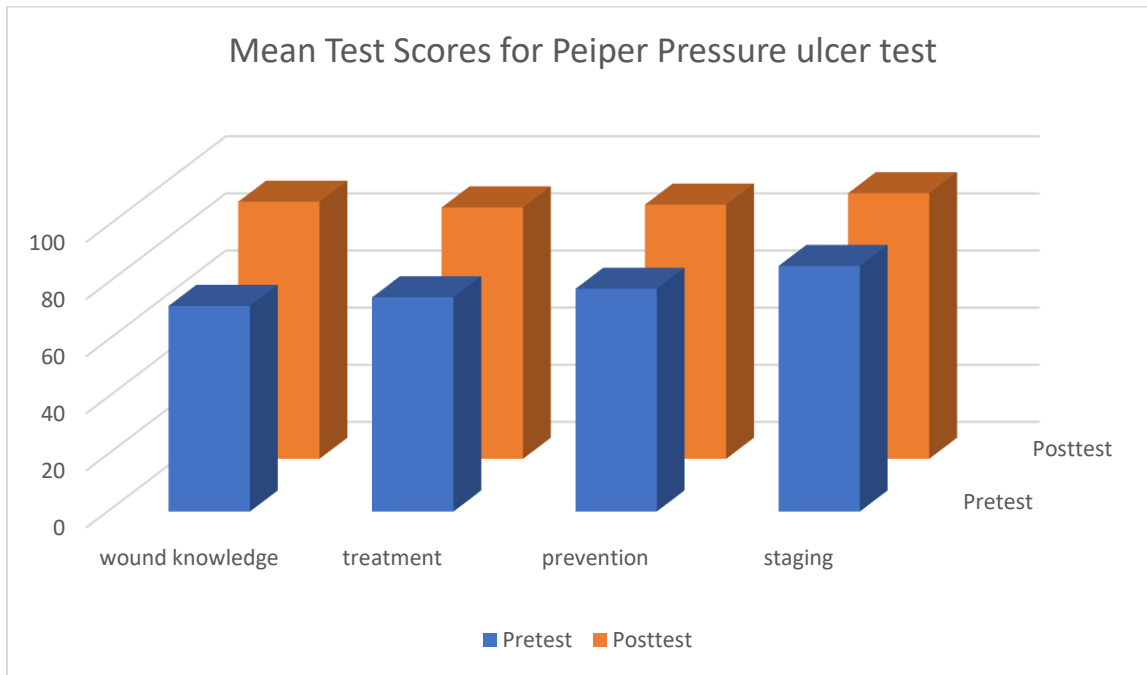
<p>49. Pressure injury/ulcers can occur around the ears in a person using oxygen by nasal cannula.</p>			
<p>50. Persons, who are immobile and can be taught, should shift their weight every 30 minutes while sitting in a chair.</p>			
<p>51. Stage 1 pressure injury/ulcers are intact skin with non-blanchable erythema over a bony prominence.</p>			
<p>52. When the ulcer base is totally covered by slough, it cannot be staged.</p>			
<p>53. Selection of a support surface should only consider the person's level of pressure injury/ulcer risk.</p>			
<p>54. Shear injury is not a concern for a patient using a lateral-rotation bed.</p>			
<p>55. It is not necessary to have the patient with a spinal cord injury evaluated for seating.</p>			
<p>56. To help prevent pressure injury/ulcers, the head of the bed should be elevated at a 45-degree angle or higher.</p>			

57. Urinary catheter tubing should be positioned under the leg.			
58. Pressure injury/ulcers may be avoided in patients who are obese with use of properly sized equipment.			
59. A dressing should keep the wound bed moist, but the surrounding skin dry.			
60. Hydrocolloid and film dressings must be carefully removed from fragile skin.			
61. Nurses should avoid turning a patient onto a reddened area.			
62. Skin tears are classified as Stage 2 pressure injury/ulcers.			
63. A Stage 3 pressure injury/ulcer may appear shallow if located on the ear, malleolus/ankle, or heel.			
64. Hydrocolloid dressings should be used on an infected wound.			
65. Pressure injury/ulcers are a lifelong concern for a person who is spinal cord injured.			

<p>66. Pressure injury/ulcers can be cleansed with water that is suitable for drinking.</p>			
<p>67. Alginate dressings can be used for heavily draining pressure injury/ulcers or those with clinical evidence of infection.</p>			
<p>68. Deep tissue injury will not progress to another injury/ulcer stage.</p>			
<p>69. Film dressings absorb a lot of drainage.</p>			
<p>70. Non-sting skin prep should be used around a wound to protect surrounding tissue from moisture.</p>			
<p>71. A Stage 4 pressure injury/ulcer never has undermining.</p>			
<p>72. Bacteria can develop permanent immunity to silver dressings.</p>			



**APPENDIX D**



**APPENDIX E**

