Southern California CSU DNP Consortium

California State University, Fullerton
California State University, Long Beach
California State University, Los Angeles

IMPLEMENTING STRATEGIES TO REDUCE HOSPITAL-ACQUIRED PRESSURE ULCERS

A DOCTORAL PROJECT
Submitted in Partial Fulfillment of the Requirements
For the degree of
DOCTOR OF NURSING PRACTICE

By
Martha Gina Mitchell

Doctoral Project Committee Approval:

Stephanie Vaughn, PhD, RN, CRRN, Project Chair
Dana N. Rutledge, PhD, RN, Committee Member

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ABSTRACT

According to the National Database of Nursing Quality, the prevalence rate of hospital-acquired pressure ulcers (HAPUs) for intensive care units (ICUs) ranges between 7.14% and 14.35%. In the United States, prevalence of pressure ulcers (PUs) among patients, according to the National Pressure Ulcer Advisory Panel, ranges from 1.3 to 3 million; the costs are projected to be $2.2-$3.6 billion a year. The purpose of this quality improvement project was to implement and evaluate the effects of intervention strategies on the incidence of HAPUs. As part of this project, the organizational policy for the prevention of HAPUs was revised and a pressure ulcer prevention (PUP) pilot program for the ICU was implemented. The setting was a 22-bed ICU located in Orange County, California. Implementation of the PUP strategies began at the end of January 2015; strategies were based on available literature. These included synchronized turning every 2 hours, photographing at-risk areas, and application of silicone dressings as moisture barriers to the sacrococcyx and heels. For 7 months in 2015, after implementation of the PUP strategies, there were no reported HAPUs. However, at month 8, a number of staffing changes, including loss of the wound care nurses and PUP champions, causing a loss of institutional knowledge, was intensified by the practice of rotating experienced ICU nurses familiar with the PUP strategies out of the unit. A follow-up audit revealed that the PUP strategies were only sporadically implemented. Nurses are normally the first to discover the emergence of PUs and the decline of the skin
condition. Recommendations for the ongoing quality improvement process include maintenance of key champions, institutionalization/publication of PUP strategies, regular audits of performance with reports to staff, and academic detailing to improve performance as necessary. Optimum implementation of PUP quality improvement requires an inclusive preventive program with evidence-based practice, consistent managerial support, and accountability. Nurses are in a position to contribute to the collaborative effort to reduce HAPUs.
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BACKGROUND

According to the Agency for Healthcare Research and Quality (2014), 2.5 million patients develop pressure ulcers (PUs) each year. In 2007, Medicare estimated that each PU added $42,180 to the cost of a hospital stay (Agency for Healthcare Research and Quality, 2014). Facilities have tried to reduce the incidence of hospital-acquired pressure ulcers (HAPUs) in acute care settings by following standard guidelines. Despite the use of established guidelines, patients continue to develop HAPUs, especially in intensive care units (ICUs). In the United States, prevalence of PUs among patients, according to the National Pressure Ulcer Advisory Panel (NPUAP), ranges from 1.3 to 3 million; the costs are projected to be $2.2-$3.6 billion a year (Mallah, Nassar, & Badr, 2015).

According to the National Database of Nursing Quality, the prevalence rate of HAPUs for ICUs ranges between 7.14% and 14.35% (Racco & Phillips, 2010).

The actual cost of PUs is unclear. There are only estimations that include nursing care costs, material costs, and the added acute care days related to the development of a HAPU (Cooper, 2013). Costs that accrue for a stage III or IV HAPU are estimated to be between $5,000 and $70,000 per incident (Cooper, 2013; Pokorny et al., 2014). There is also the potential expense of litigation. From 1977 to 1987, the median settlement to treat a PU was found to be $250,000 (Plawecki, Amrhein, & Zortman, 2010).

According to research conducted by VanGilder, Amlung, Harrison, and Meyer (2009), one in 10 ICU patients developed a HAPU, with prevalence rates ranging from 16.6% to 20.7%. Of these HAPUs, 3.3% of ICU patients developed severe HAPUs, which were categorized as stage III or stage IV. These HAPUs involve eschar, are often unstageable, and involve deep tissue injury (VanGilder, Amlung, et al., 2009).
Risk Factors

Patients in the ICU have risk factors that contribute to the development of PUs (Cooper, 2013; Shahin, Dassen, & Halfens, 2009). The risk factors extend from being physically compromised with varying disease processes to multisystem organ failure. In addition, critical care patients (CCPs) often have other contributing factors related to the severity of their medical condition. They require the assistance of medical devices (respiratory equipment, urinary catheters, sequential compression devices, and multiple intravenous catheters), which can contribute to the incidence of PUs when not monitored for possible injury. CCPs often require vasoactive agents for hypotension, which leads to decreased perfusion of extremities (Cooper, 2013). All these factors add to the enhanced risk of development of HAPUs in critically ill patients.

Body mass index (BMI) is another influencing factor on the risk of developing PUs. Obese patients, whose BMI is greater than 30, have a higher risk for developing PUs due to their increased body mass, which exerts greater loads on overlying soft tissue. They tend to be more acutely ill and immobile when they come into the acute care setting. The decreased blood supply to their adipose tissue increases their risk for PUs (Lyder et al., 2012; VanGilder, MacFarlane, & Lachenbruch, 2009). In addition, difficulty with mobility, altered body shape (e.g., folds of fat that trap moisture), and increased pressure when body parts touch other body parts (e.g., when a leg rests on another leg) increase the potential for a HAPU.

Patients who are obese can have multiple comorbidities. These comorbidities may be heart disease, diabetes mellitus, high blood pressure, stroke, sepsis, sleep apnea, respiratory problems, and some cancers, all of which are risk factors for PU formation
(Cox, 2011; VanGilder, MacFarlane, & Lachenbruch, 2009). According to the World Health Organization, the number of adults who are obese will increase to 700 million by 2015, making it more likely that critically ill patients will be obese (Lowe, 2009).

Another subgroup of persons at risk for developing PUs in the ICU is the group who is underweight or thin, such as those with a BMI of 18.5 or less. The prevalence of HAPUs in this group is 25.6% (Knottner, Gefen, & Lahmann, 2011; VanGilder, MacFarlane, & Lachenbruch, 2009).

Sustained moisture on tissue, specifically urinary or fecal incontinence, has been identified as another predisposing factor for PUs. Persistent moisture alters the resiliency of the skin to withstand applied pressure due to the ongoing weakening of the lipid layer of the stratum corneum and collagen (Beeckman, Schoonhoven, Verhaeghe, Heyneman, & Defloor, 2009). This moisture weakens the tissue and predisposes skin to PUs. The higher moisture environment created by urinary or fecal incontinence impacts the skin by the skin’s pH, which changes normal flora (Cooper, 2013; Shahin et al., 2009; Stephen-Haynes, 2013). Patients with uncontrolled bowel movements are 22 times more likely to develop a PU than patients in control of their bowels (Bryant & Nix, 2012). Fecal incontinence can contribute to skin breakdown. Enzymes in the fecal matter as well as the pH levels contribute to the formation of PUs. The moisture in fecal matter may act in conjunction with the pH to promote skin maceration and epidermal erosion.

**Prevention**

An international coalition between the NPUAP, the European Pressure Ulcer Advisory Panel (EPUAP), and the Pan Pacific Pressure Injury Alliance (PPPIA; 2014) developed evidence-based recommendations for the prevention of PUs. The intent of the
recommendations was use by healthcare professionals throughout the world. The recommendations consisted of strategies that included a risk assessment; a skin assessment; skin care strategies; adequate nutrition; frequent and careful repositioning; and, when appropriate, use of specialized mattresses, special medical devices, pressure reduction devices, and moisture barrier products (NPUAP et al., 2014). Indwelling fecal devices and moisture barrier creams can also be used to assist in reducing irritation or damage to the skin (Cooper, 2013; Padmanabhan et al., 2007).

The first step in preventing PUs is early intervention through the protection of vulnerable skin areas that are prone to injury. Establishing consistent nursing processes for PU prevention is key. However, cutbacks in healthcare, which resulted in increased workloads and responsibilities, have made it more difficult for nurses to be 100% consistent in caring for their patients (Ostadabbas, Yousefi, Faezipour, & Nourani, 2011).

In 2008, the Centers for Medicare and Medicaid Services announced that as a penalty for causing patient injury, they would no longer pay for any costs resulting from HAPUs (Lyder et al., 2012). HAPUs were viewed as preventable and should never occur during hospitalization (Agency for Healthcare Research and Quality, 2014; Lyder et al., 2012). The term never event was first introduced in 2001 to identify medical errors that could cause death or significant disability. In 2003, never events included stage III and IV HAPUs or unstageable wounds that progressed to a stage III or IV (Cooper, 2013; Lyder et al., 2012; Pokorny et al., 2014). Never events are reportable by hospitals to the Department of Health.
Problem Statement

In a 223-bed hospital in Southern California, there was a documented increase in the number of HAPUs hospital wide in the fall of 2014. The baseline data revealed that for the period of September to December 2014, there were 31 HAPUs hospital wide. Of the 31 HAPUs, 10 were patients in the ICU and five were in the direct observational unit (DOU; see Figure 1). The ICU and DOU departments, where 48% of the hospital-wide HAPUs occurred in 2014, are under the ICU director’s supervision.

Figure 1. HAPUs by hospital department, September to December 2014. ICU = intensive care unit; DOU = direct observational unit; CVU = cardiovascular unit; CVOU = cardiovascular observational unit; TELE = telemetry unit; MS = medical surgical unit.

The administration and the ICU director acknowledged a problem and proposed that the author develop a solution and focus on ways to decrease the number of HAPUs, specifically in the ICU. The author commenced the project by conducting a literature review in the fall of 2014.
Concurrently, the HAPU data were evaluated to determine the location on the body in which the HAPUs occurred. The HAPUs (hospital wide) were noted on various locations on the body, with the majority occurring on the coccyx, sacrococcyx, gluteal, heels, and sacrogluteal areas; a similar determination was made for HAPUs occurring in the ICU (see Tables 1 and 2).

Table 1

*Number of HAPUs (Hospital Wide) 2014 by Body Location*

<table>
<thead>
<tr>
<th>HAPU location</th>
<th>9/14</th>
<th>10/14</th>
<th>11/14</th>
<th>12/14</th>
<th>Total</th>
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<tbody>
<tr>
<td>Nose/Cheek</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>Coccyx/Sacrum/Sacroccocyx</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Buttock</td>
<td>1</td>
<td>3</td>
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<td>4</td>
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<tr>
<td>Sacrogluteal</td>
<td>2</td>
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<tr>
<td>Ischium</td>
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<td>Ear</td>
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<tr>
<td>Mid Back</td>
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<tr>
<td>Lateral Malleolus</td>
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<tr>
<td>Heel</td>
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<td>4</td>
<td>4</td>
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<tr>
<td>Peg Site</td>
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<tr>
<td><strong>Total</strong></td>
<td>6</td>
<td>2</td>
<td>15</td>
<td>7</td>
<td>31</td>
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Table 2

*Number of HAPUs (ICU) 2014 by Body Location*

<table>
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<tr>
<th>HAPU location</th>
<th>9/14</th>
<th>10/14</th>
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<td>Coccyx/Sacrum/Sacroccocyx</td>
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<tr>
<td><strong>Total</strong></td>
<td>4</td>
<td>4</td>
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<td></td>
<td>10</td>
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</tbody>
</table>

The locations associated with the 10 HAPUs that occurred in the ICU during the last quarter of 2014 were similar to the locations found in patients in other hospital areas, except there were no heel ulcers in the ICU patients. In the ICU, eight HAPUs were located on the coccyx, sacrococcyx, gluteal, and sacrogluteal areas and two were located on the Achilles and mid-back area (see Table 2). Because these locations accounted for 74% of the hospital-wide HAPUs and 80% of the ICU HAPUs, these body locations were selected as the intervention sites in the pilot project.
The author along with the lead wound care nurse specialist (WCNS) gained approval to begin a pilot project in mid-January 2015 to identify and implement strategies to decrease the number of HAPUs in a unit. The ICU was selected as the location for intervention because almost all critically ill patients are at risk for HAPUs.

**Purpose Statement**

The purpose of this quality improvement project was to implement and evaluate the effects of intervention strategies on the incidence of HAPUs in a 22-bed ICU of a 223-bed hospital in Southern California. As part of this project, the lead WCNS and the author revised and implemented the organizational policy for the prevention of HAPUs and developed an order set for pressure ulcer prevention (PUP) that included dietary consultation and protective dressings.

**The Knowledge-to-Action Framework: A Model for the Practice of Knowledge Translation**

Healthcare providers spend millions of dollars on programs to reduce the occurrence of HAPUs each year. Despite this monetary outlay, healthcare systems and professionals have been unsuccessful in eliminating HAPUs (Grimshaw, Eccles, Lavis, Hill, & Squires, 2012). There is a need to close the gap between the evidence and nursing knowledge, practice, and process. According to the Canadian Institutes of Health Research, knowledge translation process is the synthesis, dissemination, exchange, and ethically sound application of knowledge to improve both patient health and the healthcare system (Gagnon, 2011; Straus, Tetroe, & Graham, 2011). It appears that the knowledge translation process is applicable for helping to improve patient outcomes such as preventing HAPUs.
In the knowledge translation model, the knowledge-to-action process or cycle is complex. Knowledge creation includes the following phases: knowledge inquiry, knowledge synthesis, and the creation of a knowledge tool (Graham et al., 2006).

This process funnels down and refines knowledge, making it more useful for the *end users* or targeted user audience. Knowledge creation and knowledge application (action cycle), with boundaries between the creation and action components, are fluid. One of the major benefits of this model is that it includes end users throughout the entire process, which ensures that knowledge and implementation are critical for patient needs (Straus et al., 2011). Use of the model includes a plan to evaluate the impact and success of the knowledge-to-action model (Gagnon, 2011). Following synthesis of current evidence-based practices and clear procedural safeguards, this evidence was used to develop the interventions and strategies for the prevention of HAPUs in a critical care unit.

The knowledge-to-action model identifies seven action phases that can occur sequentially or simultaneously (see Figure 2). The knowledge phase influences the action phase at any point of the cycle. The action phase addresses the following: (a) identify the problem, review evidence-based practices, and select the determinants of knowledge; (b) customize the knowledge use; (c) assess barriers; (d) select and tailor implementation; (e) monitor knowledge translation interventions and knowledge uptake; (f) evaluate the intervention; and (g) evaluate the sustainability of the project. This model includes strategies that will ensure sustained knowledge use (Straus et al., 2011).
Figure 2. Knowledge-to-action process model adapted for this PUP project.

The Knowledge Creation:

- Knowledge Inquiry: Determine probable solutions to a specific problem.
- Knowledge Synthesis: Synthesize and use information retrieved to develop a solution.
- Knowledge Tools/Products: Develop evidence-based order set to assist in the change process.

The Action Creation:

- Identifying the Problem: Identify the specific problem to be addressed.
- Adapt Knowledge to Local Context: Adapt information from the literature and modify it to implement a solution for a specific environment.
• Access Barriers to Knowledge Use: Identify possible barriers and resistance to the change process.

• Select, Tailor, and Implement Evidence-Based Interventions: Identify evidence-based practices tailored to a specific environment and implement the change process.

• Monitor Knowledge Use: Review compliance with change process through observations and audits to ensure fidelity to the project.

• Evaluate Outcome: Evaluate efficacy to practice changes.

• Sustain Knowledge Use: Evaluate retention of information and nursing process.
LITERATURE REVIEW

A review of the literature was conducted to assist in developing this quality improvement project. The following electronic databases were searched for relevant publications to the prevention of HAPUs: CINAHL, PubMed, and Google Scholar. The terms used were as follows: hospital-acquired pressure ulcers, pressure ulcer prevention, predictors of PU, PU and ICU patient, barrier protection, clinical practice and PU, systematic review, obesity, positioning schedule, quality care monitoring and PU, silicone foam dressing, multidisciplinary team and PU, body mass index, PU etiology, risk assessment, risk factors, underweight patient and PU, and nutrition and PUs. Further searches included clinical practice guidelines relevant to PU prevention. Articles sought were from peer-reviewed journal publications. The knowledge-to-action model guided the literature review. Information found in this review determined the evidence-based intervention for the knowledge creation component of the framework model used in this project.

Factors Contributing to HAPUs

Many factors contribute to the development of HAPUs. PU development is very consistent across individuals. Pressure is a major factor in PU formation. There are pathophysiologic explanations for PUs: (a) ischemia caused by capillary occlusion; (b) reperfusion injury; (c) impaired lymphatic function that results in accumulation of metabolic waste products, proteins, and enzymes; and (d) prolonged mechanical deformation of tissue cells. “Prolonged mechanical deformation of tissue cells refers to unrelieved pressure to an area” (Bryant & Nix, 2012, p. 130).
The ulcer begins with pressure that compresses the capillaries, reducing blood flow and leading to tissue ischemia. Capillary thrombosis, which causes occlusion of the lymphatic vessels, begins to increase capillary permeability. This is an indication that fluid has escaped into the extra vascular space, causing interstitial edema and eventually cell and tissue death (Riordan & Voegell, 2009). PUs are described as localized tissue damage causing ischemia over a bony prominence because of pressure or in combination with pressure and shearing or friction (Chou et al., 2013; Mallah et al., 2015; Qaseem, Mir, Starkey, & Denberg, 2015). Shearing force can be defined as trauma occurring during sliding or repositioning in the bed. Exposure to shearing forces results in the disruption or angulation of blood vessels where pressure is being applied (Bryant & Nix, 2012). Also important, “Friction involves surface damage caused by the skin rubbing against another surface such as heels against sheets when repositioning” (Bryant & Nix, 2012, p. 609).

The skin protects patients from external assaults. Skin that is functioning properly maintains proper moisture balance, is not dry, and is a waterproof barrier. The normal pH of the skin is approximately 5.5, which inhibits the proliferation of bacteria (Stephen-Haynes, 2013). Once this balance is compromised, when moisture builds up, skin damage occurs, facilitating the formation of an ulcer. PUs vary in size and severity based on the tissue layer that has been damaged. Tissue damage occurs when the integrity of the skin is compromised, which can lead to muscle damage and progress to the underlying bone (Coleman et al., 2013).
Risk Assessment

The clinical practice guideline from the NPUAP et al. (2014) contains information regarding the elements that lead to HAPU risk and identifies contributing risk factors associated with HAPUs. In hospitalized patients, a risk assessment should be completed within 8 hours of arriving to the facility. By identifying patients who are at risk for HAPUs, staff are able to initiate preventive measures as soon as possible. A systematic review found the Braden Risk Assessment Tool to have a high predictive value and to be the most widely used instrument for risk assessment (Pancorbo-Hidalgo, Garcia-Fernandez, Lopez-Medina, & Alvarez-Nieto, 2006). The Braden scale has documented sensitivities of 38%-100% and specificities of 44%-100% in predicting a PU formation (Mallah et al., 2015).

Skin assessment is important in the prevention of PUs. A comprehensive skin assessment involves an examination of the patient’s skin from head to toe, including boney prominences. Practice guidelines indicate that nurses require comprehensive skin assessment knowledge in order to be able to identify blanching response, localized heat, edema, and induration (abnormal firmness of tissue with a definite margin; Bryant & Nix, 2012; NPUAP et al., 2014). Each time a patient is repositioned, a visual inspection of the skin can be done. This will allow early detection of pressure damage to the skin (NPUAP et al., 2014).

Skin Care

The NPUAP et al. guideline (2014) recommends keeping skin both clean and dry. Excess moisture and dryness can cause the skin to break down. This becomes especially important when the skin is exposed to pressure and shear forces, which cause the patient
to become more susceptible to a PU. Also, the NPUAP et al. guideline does not recommend massaging or vigorously rubbing the areas that are prone to PUs. This added friction can cause tissue damage or an inflammatory response, which can lead to a HAPU.

**Photographing**

Photographic imaging was one of the PUP strategies identified to document the condition of the skin on specific parts of the body that are prone to PUs, such as the sacrococcyx and heel areas. It is considered to be an acceptable method of verification and displays baseline evidence of the skin’s integrity upon admission to the ICU (Russell, 1999). It also provides evidence of the progression of a wound when it is present. Photographs provide a clear, detailed image of the skin and become part of the patient’s permanent electronic medical record (EMR). In the project, photographs of specific areas of the body allowed the WCNSs to determine the presence of early evidence of tissue injury, such as discoloration. The WCNSs were able to examine the photographs after admission because they were part of the EMR. This was significant because the WCNSs were not always on the unit, but the photographic images could be examined anytime.

**Nutrition**

Good nutrition has been identified as a preventive measure in decreasing PU formation (NPUAP et al., 2014). In a systematic review of 34 studies, Coleman et al. (2013) found that poor nutrition prior to or during hospitalization emerged as a significant predictor of later HAPU development. Bank, Graves, Bauer, and Ash (2013) found that implementing an intensive nutrition support intervention in high-risk patients
reduced the number of HAPUs. Results indicated that protein supplements resulted in the prevention of PUs as well as improved healing of existing PUs (Allen, 2012).

Another part of risk assessment for HAPUs is the identification of patients who may be malnourished. This can be accomplished by assessing a patient’s albumin/prealbumin levels. Low levels will signal nurses to request a consultation with a dietitian (Cooper, 2013). One systematic review indicated that low albumin and anemia emerged as a significant factor for PUs (Coleman et al., 2013).

While albumin and prealbumin have been traditionally viewed as indicators for nutritional status, albumin, a visceral protein, has proven to be a poor indicator. This is due to albumin’s long half-life in the bloodstream (12-21 days) and other factors that lead to decreased albumin levels, such as infection, acute stress, surgery, cortisone excess, or hydration status. In actuality, it reflects inflammatory processes rather than nutritional status. The half-life of prealbumin (2-3 days) is believed to be a better indicator of nutritional status; however, it also decreases with extreme stressors and the inflammatory process (Dorner, Posthauer, Thomas, & NPUAP, 2009). “Studies suggest monitoring for low levels of several serum hepatic proteins (albumin, transthyretin, and transferrin) in order to determine the severity of the underlying disease and inflammatory processes and the risk for undernutrition” (Dorner et al., 2009). Other indicators of potential malnutrition would be monitoring of weight, oral intake, and nutritional interventions (Dorner et al., 2009; NPUAP et al., 2014).

Repositioning

In addition to good nutrition, another PU preventive measure for typically immobile CCPs that should be undertaken is routine repositioning. It is recommended
that a patient be repositioned several times over the course of a 24-hour period. Repositioning reduces the duration and magnitude of pressure over vulnerable areas of the body. Even small amounts and short durations of pressure can have damaging effects regardless of where the pressure is on the body. High pressure over bony prominences, for a short period of time, and/or low pressure over bony prominences, for a long period of time, can have equally damaging effects. In order to lessen the risk of PU development, it is important to reduce the time and the amount of pressure patients are exposed to throughout the day (NPUAP et al., 2014). The current practice is to turn a patient every 2 hours (Hagisawa & Ferguson-Pell, 2008). This turning schedule has also been recommended in nursing texts and is a widely accepted clinical practice. However, this practice appears to be based on tradition rather than consistent empirical evidence (Palfreyman & Stone, 2015). Currently, the repositioning of a patient occurs based upon the nurse’s clinical judgment with no true evidence (Samuriwo & Dowding, 2014).

The available data regarding the preventive benefits of repositioning is extensive. However, most studies have utilized a 2- to 3-hour repositioning schedule, with varying results in preventing PUs. According to Sprigle and Sonenblum (2011), there is no evidence to support the practice of repositioning a patient every 2 hours as preventing PUs. However, several studies suggest that the interval in which patients are turned as it relates to mattress type was significant. According to Defloor, De Bacquer, and Grypdonck (2005), PUs developed in patients despite repositioning every 2 to 3 hours. However, according to Chou et al. (2013), repositioning at a 30-degree tilt resulted in decreased PU formation when repositioning occurred every 3 hours. In studies in which PUs were decreased, an additional layer of prevention was added, such as mattress type
or the degree angle to which a patient was positioned. In the studies in which no effect was found with regard to repositioning, the patient was merely repositioned from his or her previous position over a timed interval. Overall, these studies demonstrate the importance of the role of multiple interventions in the prevention of PUs.

Previous studies have used a repositioning schedule per individual patient. There is an assumption based upon the literature review that repositioning schedules are implemented with fidelity and occur as intended according to the guidelines. Given the inconsistent findings regarding the use of individual repositioning schedules, it is important that patient repositioning is monitored. The use of synchronized turning schedules can help to address the assumption that a patient has been repositioned and thus increase oversight. Presently, there is no evidence-based data to support the use of synchronized turning schedules as a preventive method of intervention. However, the lack of oversight with regard to the monitoring of consistently turning patients has been well-documented in litigation cases. Synchronized turning schedules for CCPs would allow for staff accountability for the practice and offer opportunities for consistent skin monitoring.

**Specialized Mattress**

In multiple clinical trial studies, low-air-loss mattresses used with critically ill patients were associated with lower incidence of PUs than standard hospital mattresses (Chou et al., 2013; McInnes, Jammali-Blasi, Bell-Syer, Dumville, & Cullum, 2012; Shahin et al., 2009). Low-air-loss mattresses are used as a therapeutic intervention in most hospitals due to their positive benefit to decreasing PUs. “Low-air-loss mattresses consist of inflatable upright sacs of semipermeable fabric. Inflation of the sacs increases
the area of contact between the individual and the support surface and reduces the pressure on the skin” (Cullum & Petherick, 2008, p. 18). “Low-air-loss mattress replacement surfaces are useful in patients with exudate or excessive moisture as the air loss through the mattress surface acts to dry skin surfaces” (Cooper, 2013, p. 61). It is important that when using the low-air-loss mattress, a breathable pad should be in place under the patient as added prevention to keep the skin dry. The pad reduces moisture to the patient’s skin and allows air flow between the patient and the mattress.

**Special Medical Devices**

Special medical devices have been designed to decrease the incidence of PUs. Intubated patients are at greater risk for nontraditional PUs due the pressure subjected by the endotracheal tube (ETT) on tissues in the oral cavity and the method used to secure the ETT in place (Cooper, 2013). Traditionally, the ETT was secured with cloth tape, which could lead to lip and skin breakdown. The tape and the tube made visual examination of the areas around the mouth difficult to assess. The development of an anchor-fast oral ETT fastener alleviated this problem for patients with oral ETTs, as reported in *Politics and Government Week* (“Hollister Incorporated,” 2014). With a track configured to fit above the lip on a patient’s face, this product allows ETTs to be fastened to the patient. A tube holder is connected to the track and is able to slide from side to side in a patient’s mouth. There is a mechanism that locks the ETT to the tube holder. The bite block is carried by the tube holder and is able to slide with the tube holder. The device has an adjustable head strap to secure the device to a patient’s head and the track on the patient’s face. Cheek pads are connected to the opposite ends of the track to protect from skin breakdown (“Hollister Incorporated,” 2014). The tube holder and the bite block are
adjustable and are able to be moved from side to side in the oral cavity without being displaced. The device position can be changed every 2 hours. Oral care and full assessment can be given without obstruction of the ETT.

**Moisture Barrier Products**

Products that decrease moisture have proven effective at decreasing PUs. Coleman et al. (2013) reported that high moisture levels on a patient’s skin were contributory in 48% of patients developing PUs. Silicone foam dressings have been associated with decreasing skin moisture as well as adding a protective layer to the skin (Mallah et al., 2015; Santamaria et al., 2013). Chou et al. (2013) and Santamaria et al. (2013) reported the use of silicone border foam dressings on the sacral area and heels was associated with fewer patients developing PUs than the use of standard methods of care such as cream barriers. Santamaria et al. (2013) concluded that a silicone foam dressing as part of PUP may help reduce PU incidence among high-risk, immobile ICU patients.

Fecal incontinence is a risk factor for PU development (Bryant & Nix, 2012; Padmanabhan et al., 2007). In a study involving 608 acute care patients, 17.6% had fecal incontinence and, of those, 37.4% had liquid or semiliquid stool (Garcia et al., 2012; Junkin & Selekonf, 2007). Of the 608 patients, 84 were from the ICU (Junkin & Selekonf, 2007). For patients with liquid or semiliquid stool, a fecal incontinence management system (FIMS) can reduce irritation and skin breakdown by diverting fecal matter to a collection bag (Padmanabhan et al., 2007). The FIMS is a rectal catheter and uses a low-pressure retention balloon that holds the catheter in the rectum and drains feces into a bag (Padmanabhan et al., 2007; Whiteley & Sinclair, 2014).
Topical skin barriers prevent moisture from making skin contact; this serves to protect the skin from further skin damage. In addition, topical skin barriers also help to protect and repair skin damage and applies a durable protective barrier (Stephen-Haynes, 2013). According Chou et al. (2013), fatty acid cream barriers were linked with reducing the risk of developing PUs versus a placebo. The topical skin barrier is an effective way to prevent skin damage (Cooper, 2013).

The use of prophylactic dressings to protect the skin from friction and shearing forces is an emerging therapy for preventing PUs. According to Santamaria et al. (2013), there are clinical benefits to applying multilayer soft silicone foam dressings for the prevention of sacral and heel PUs. Prophylactic dressings, risk assessment, and other evidence-based PU prevention strategies resulted in a 10% reduction in PU incidence (Santamaria et al., 2013).
METHODS

The purpose of this quality improvement project was to implement an evidence-based intervention program utilizing PUP strategies as well as evaluate the efficacy of the strategies to decrease the number of HAPUs in an ICU. This PUP pilot project represented the action creation component of the knowledge-to-action model. It was designed to reduce the incidence of HAPUs in an ICU setting by developing, implementing, and monitoring the use of an action plan. As a result of the findings, the PUP strategies were integrated into hospital practice in the ICU in which the pilot project took place.

Organizational Setting

The setting in which this project took place was a 22-bed ICU in an Orange County, California, hospital. The hospital has 223 beds and over 600 physicians and 1,300 employees. The hospital accepts a variety of health insurance plans ranging from private insurance to Covered California.

Sample Selection

Inclusion and Exclusion Criteria

The inclusion criterion was admission to the ICU. There were no exclusion criteria.

Intervention Group

All patients admitted to the ICU were included. Each patient was to have photographs taken of the sacrococcyx and heel areas, receive a dietary consult upon arriving to the ICU, receive synchronized patient turning every 2 hours, and have silicone dressings applied to the sacrococcyx and heels.
Comparison Group

All patients admitted to the hospital who developed a HAPU during their stay. The comparison group included patients from the DOU, cardiovascular unit, cardiovascular observational unit, telemetry unit, and medical-surgical unit.

Patients

All patients entering the ICU were provided with PUP strategies as well as a skin assessment as part of the pilot project. No patient was excluded from receiving the PUP strategies. Those patients with existing PUs (nonhospital acquired) were documented in order to monitor the development of new PUs during their stay. Patients with existing PUs were classified as having existing PUs. Patients who were admitted without any evidence of an existing PU were classified as having no PU (nonexisting PU) and were documented in the EMR. Any patient who developed a PU while in the hospital was identified as having a HAPU.

Stakeholders

The stakeholders at the administrative level have been engaged in PUP efforts. They were part of the development of the PUP project, as these individuals identified that HAPUs have a negative fiscal impact on the hospital. Stakeholders at the administrative level provided support to ensure that the nursing staff implemented the PUP project. Both administration and nursing had a vested interest in decreasing the number of HAPUs within the hospital. Administrative stakeholders included the chief nursing officer, director of the ICU, and four ICU managers. The chief nursing officer was responsible for the approval of the PUP project, as the project was a nursing practice change within the hospital. The director of the ICU provided final approval for the implementation of
the PUP project. The managers of the ICU were the stakeholders who ensured that the PUP project was implemented with fidelity.

The stakeholders at the committee level participated in the ongoing quality improvement project as a hospital-wide quality assurance team. These individuals included policy committee (PC) members, wound care committee (WCC) members, and the author of this project. The PC members ensured that the PUP project was an evidence-based practice that was aligned with the NPUAP, the EPUAP, and the PPPIA guideline and practices of the hospital. They also ensured patient safety by reviewing skin practices that were implemented in the PUP project. They compiled the data regarding the number of HAPUs and examined the locations of HAPUs. The wound care team also monitored the methods used to prevent HAPUs. The author facilitated the quality improvement pilot project in the ICU as well as analyzed the data to determine the effectiveness of the PUP in preventing HAPUs.

The stakeholders at the departmental level were individuals within each department who facilitated the implementation of the PUP. These departmental level stakeholders included ICU nursing staff, PUP champions, dieticians, and medical doctors. The ICU nursing staff was at the forefront of preventing HAPUs. They kept the hospital in compliance with the PUP project as mandated by the PC. The critical care managers became the PUP champions who worked with the ICU nursing staff to follow the PUP strategies. The dieticians were part of the PUP plan given the importance of nutrition in the prevention of PUs. Physicians were part of the collaborating team and consulted with the policy and procedure committee.
Activities

Identifying the Problem

One of the first steps in a quality improvement project is identifying the problem or issue that requires intervention. In the fall of 2014, the ICU director identified HAPUs in the hospital as a problem. The author was given the opportunity to lead the quality improvement project.

Review and Select Evidence for Intervention

The author began the project by conducting a literature review in the beginning of the fall of 2014. Literature was searched to determine the best practices for the prevention of HAPUs in order to develop intervention strategies. In the knowledge-to-action model, knowledge is adapted to the local context. This required an adaption of information from the literature and modifications to implement solutions for the specific environment (critical care). The author compiled a list of HAPU prevention strategies for the ICU from several research articles and disseminated the information to the WCC. The WCC approved the recommendations regarding the PUP strategies. These strategies included photographing the sacrococcyx and heel areas for each admitted ICU patient, applying silicon dressings to the sacrococcyx and heel areas, using synchronized turning on the unit for patients, and requesting dietary consult upon patient admission to the unit.

Access Barriers to Knowledge Use

There was much resistance from veteran nurses to change their practice. The ICU nurses found taking photographs of the sacrococcyx and heel areas and applying silicone dressings to these areas increased their work flow. Part of the knowledge-to-action model
addresses the possibility of barriers. The concerns of the staff required immediate attention by the author, ICU managers, and finally the ICU director.

**Adapt Knowledge to Local Context**

Approval was received in the winter of 2014 from the administration and ICU director to proceed with the quality improvement project. The next step was to examine the hospital’s skin policy. In November 2014 through January 2015, a review of the existing skin care policy was conducted by the lead WCNS and the author to determine alignment with current guideline (NPUAP et al., 2014) and whether the PUP strategies designed for the ICU pilot project should be included in hospital policy.

The literature review showed that early dietary consultation helped the healing process. In addition, the application of silicone dressings to the sacrococcyx and heel areas assisted in PU prevention by protecting the skin from shearing forces (NPUAP et al., 2014; Santamaria et al., 2013). The existing hospital policy was modified to include the evidence-based strategies—dietary consult, silicon dressings, synchronized turning, and photographs—as part of the preventive measures for ICU patients. This was then sent for approval by the hospital policy and procedure committee. After review by the hospital policy and procedure committee, on January 14, 2015, dietary consults and silicone dressings were added to hospital policy as part of the prevention strategies for all hospitalized patients (see Appendix A). The synchronized turning and photographing of a patient’s sacrococcyx and heels areas were not included in the formal policy. Because the hospital committee was interested in determining whether photographing and synchronized turning were effective strategies in decreasing HAPUs, these two strategies were included in the PUP pilot project protocol.
Select, Tailor, and Implement Evidence-Based Interventions

The following step was to create a partnership with departments and employees involved with the change process. Many meetings were conducted with staff and key personnel to facilitate the PUP strategies prior to the implementation of the program. In mid-January 2015 the PUP pilot project received administrative support to proceed forward with the project. The PUP pilot project utilized a prevention program for nurses to follow as patients were admitted to the ICU setting.

At the beginning of the quality improvement project, the PUP project was to enhance strategies already in place at the hospital. Existing strategies included using low-air-loss mattresses for patients with a Braden scale score less than 18, offloading the heels, and turning every 2 hours (see Appendices B and C). The new strategies were integrated with the previous standard of practice in the hospital. These included synchronized patient turning every 2 hours and the application of silicone dressings to the sacrococcyx and heel areas to protect the skin against shearing forces. Photographic images were taken of the skin condition of the sacrococcyx and heels upon a patient’s admission to the unit. These images became part of the patient’s EMR. These interventions were required to be done on admission. A comprehensive dietary assessment was conducted within a 24-hour timeframe after patient admission to the unit.

Evaluate Nurses’ Knowledge

The following step undertaken was to assess the ICU nurses’ knowledge of HAPU development, patient risk factors, PU staging and treatment, and HAPU prevention strategies. As part of the monitoring, in mid-January 2015, nurses’ knowledge was assessed using a newly developed 31-item multiple-choice test by the lead WCNS
The test was given to all ICU nurses to assess their knowledge for skin care management in prevention, staging, and treatment and their knowledge on scoring the Braden scale.

The lead WCNS developed the questions using resources from the National Database of Nursing Quality Indicators. This is a database used by nurses to help improve quality of care. The test revealed knowledge gaps among the ICU nurses. The performance of the ICU nurses on the test determined if further one-to-one nurse-centered education was required. The author addressed questions regarding PUP strategies through education boards and information sessions. The ICU managers addressed staging, treatment, and Braden scoring as required in the ICU. The managers individually reviewed questions missed with each ICU nurse. The managers completed these individual sessions by the end of February.

Tests were considered private information. However, the author was able to audit the tests with no identifiers on them. The tests identified the areas of knowledge deficit. The author addressed preventive measures of HAPUs through information sessions and educational boards from mid-January to the end of February (see Appendix E). The few questions missed on the HAPU tests were highlighted on the educational boards and in informational sessions conducted by the author. Due to the standard procedures established in the unit, department managers who were PUP champions were responsible for reeducating ICU staff individually on staging and treatment of wounds.

**Evaluate PUP Strategies**

The author extracted information regarding the implementation of PUP interventions from the hospital’s EMR. The following variables were audited:
photographs of the sacrococcyx and heels taken on admission, dietary consult for ICU patients upon arrival to the unit, patient turned every 2 hours, and silicone dressings to the sacrococcyx and heel areas upon arrival to the ICU (see Appendices F and G). Ten percent of the ICU EMR charts were audited for July and November 2015. The months of July and November were selected based on the number of HAPUs that occurred. There were zero HAPUs in July and five HAPUs in November. This was done to demonstrate if there was an impact on the occurrence of HAPUs and compliance with the PUP strategies. Every fourth patient was selected for audit. Compliance to the PUP strategies was coded as a 1 for yes and a 0 for no.

**Evaluate Patient Outcomes**

The knowledge-to-action model requires an evaluation of the impact of the changes to patients’ outcomes. The author tracked the occurrence of HAPUs in the ICU throughout the year, from January through December 2015. In addition, the author conducted a retrospective chart audit for July and November 2015 for compliance and documentation of the PUP interventions. The author reviewed the EMR and assessed if PUP strategies were in place prior to HAPU development.

**Sustain Knowledge Use**

PUP sustainability was assessed throughout the year by the ICU director. She conducted random visual audits to assure the synchronized turning was being complied with and the silicone dressings were on patients. Collaboration between the author, the ICU staff, and the lead WCNS was ongoing during the course of the year. The author and WCC met monthly until September 2015. The WCC did not meet September through December 2015 since the WCNSs left the organization. However, two of the WCNSs
returned to employment in January 2016 and monthly meetings with the WCC resumed March 2016. The emergence of HAPUs after an initial period of success highlighted the need for ongoing audit and education. Staffing changes interrupted the practice of random audits by the ICU director and the reinforcement of PUP strategies by the ICU managers; both of these practices had heightened the staff’s awareness of the importance of prevention. In addition, the audits for July and November demonstrated that prevention strategies had eroded without the reinforcement of the ICU director and managers. A timeline of activities for the PUP project is located in Appendix H.

**Evaluation**

**Trend Analysis**

The author assessed the PUP strategies and occurrence of HAPUs in the ICU. The evaluation plan, which aligns with the latter component of the knowledge-to-action process model, consisted of an appraisal of the monthly incidence of HAPUs in the ICU. These reports were generated by the lead WCNS. The data included information regarding the number, stage, and body location of reported HAPUs by departments. Data were collected throughout 2015. Two monthly audits and individual patient case reviews were conducted to determine compliance to the PUP intervention strategies.

**Prevention Strategies**

Fidelity with PUP compliance was evaluated through audits on compliance with the four PUP strategies. A systematic sampling was collected on 10% of the patients in the ICU for July and again in November. The audit components consisted of the following:
1. Adherence to the 2-hour turning schedule audited by the author (Yes = documentation every 2 hours; No = indicates no documentation of patient being turned every 2 hours).

2. Dietician consulted in adherence to evaluation procedure (Yes = the dietician consulted within 24 hours of patient arrival to ICU; No = the dietician did not consult within 24 hours or no documentation found in the EMR).

3. Silicone dressings in place at the heels and the sacrococcyx (Yes = documentation of silicone dressings on the sacrococcyx area and heels; No = no documentation of silicone dressings in place to designated areas).

4. Photographs taken of the heels and the sacrococcyx area (Yes = photographs taken upon ICU arrival to both areas and documented in the EMR; No = photographs of any one of the two areas is not documented in the EMR).

The ICU director requested informal random audits of the PUP program during the months of February to December. The author, unit managers, or nursing students who were being mentored by the ICU director completed the audits. The informal audits consisted of walking rounds to observe the compliance of synchronized turning every 2 hours, visually see if silicone dressings were in place, and review if admitting photographs and dietary consultation were completed per pilot protocol. The director would convey the results to staff during staff meetings as well as give personal reminders. No formal records of these audits were kept.
RESULTS

From January through December 2015, 2,036 patients were cared for in the ICU. The ICU had additional focused PUP strategies compared to standard HAPU prevention in the rest of the hospital. In 2015, there were 70 HAPUs hospital wide, including the ICU, of which 28 HAPUs (40%) occurred in the ICU (see Figure 3); the percentage of HAPUs in the ICU remained the same as in 2014, but there was a decrease in the number of HAPUs occurring at the PUP intervention sites. There were 10 HAPUs from September to December 2014 (with eight at the PUP intervention sites) compared to 10 HAPUs that occurred from September to December 2015, with four at the coccyx/sacrum/sacrococcyx and buttock sites and none at the sacrogluteal site. Although there was no decrease in total HAPUs during the comparison period, there was a 50% decrease in HAPUs at the intervention sites (coccyx/sacrum/sacrococcyx, sacrum, buttock, and heel; see Table 3).

Figure 3. ICU and hospital-wide HAPU incidence, January to December 2015.
In 2015, 28 HAPUs occurred in patients treated in the ICU. Nine (32.1%) of the HAPUs occurred at the intervention sites and 19 (67.9%) were located at nontargeted sites (see Figure 4). The majority of HAPUs occurred at nontargeted sites.
Figure 4. 2015 comparison of ICU HAPUs at intervention and nontargeted sites.

The Occurrence of HAPUs at Nontargeted Sites

There were 18 HAPUs that occurred in ICU patients at nontargeted sites. Figure 5 shows that 15 (83.3%) were to the cranium area (nose, cheek, lips, or tongue) and four (22.2%) were to the helix area of the ear.

Figure 5. Development of HAPUs at nonintervention sites, 2015.
Adherence to PUP Strategies

Two months were selected for audits to identify adherence to PUP strategies. In July, no HAPUs occurred, while in November there were five HAPUs. Ten percent of patients’ EMRs were reviewed to determine if the PUP strategies were implemented. Documentation of the PUP strategies was used as the measure of adherence. The PUP strategies included photographs, silicon dressings, dietary consult, and synchronized turning. In addition, in-depth chart reviews were conducted for five patients who developed HAPUs at the intervention sites.

PUP Audit

The PUP audit revealed that in the month of July when there were no HAPUs, compliance to the PUP strategies was greater than 87% in four of the PUP strategies (see Table 4). However, compliance was only 63% for silicone dressings to the sacrum and 13% for silicone dressings to the heels. In November, compliance to the PUP strategies was less than 74% in four areas. Compliance to silicone dressings dropped to 45% for the sacrum and 8% for the heels. In November, compliance to turning every 2 hours dropped from the 96% observed in July to 58%. Only the PUP strategy of dietary assessment was maintained at over 90% in both months (see Table 5). The target for compliance was 90% or greater for all strategies.

Summary

The review of a 10% sample of patient charts in November 2015, a month with five HAPUs, revealed a lack of consistency in the implementation of PUP strategies. In comparison, in July, a month with no HAPUs, the audit found there was more consistent implementation of the PUP strategies.
Table 4

*July 2015 Compliance to the PUP Strategies*

<table>
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<tr>
<th></th>
<th>Photo heels</th>
<th>Photo sacrum</th>
<th>Dietary consult within 24 hours of admission</th>
<th>Turning every 2 hours</th>
<th>Silicone dressing on sacrum</th>
<th>Silicone dressing on heels</th>
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<td>96%</td>
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Table 5

*November 2015 Compliance to the PUP Strategies*

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<th>Photos sacrum</th>
<th>Dietary consult within 24 hours of admission</th>
<th>Turning every 2 hours</th>
<th>Silicone dressing on sacrum</th>
<th>Silicone dressing on heels</th>
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</table>
DISCUSSION

This section will compare the literature to project observations using the knowledge-to-action framework.

Adaption of Evidence to ICU

The first step in the quality improvement process was to design an effective intervention program for the identification of risk factors linked to the development of a HAPU. It also involved outlining preventive measurements required to avoid the development of a PU along with actively involving stakeholders. It is important to identify the focus of a quality improvement project; however, it would be impossible to implement and sustain any project without human resources. Human resources are key as they become knowledge brokers, lead efforts to change, and support the practice of excellence in practice (Berlowitz & Frantz, 2007; Virani, Lemieux-Charles, Davis, & Berta, 2009). Other key components were identified for implementation and continued sustainability of the PUP strategies. They involved development of a protocol that included a program for continuous staff education to support knowledge translation, structured mentoring for clinical support, routine audits for compliance of best practice, and feedback on performance to both the team and individual nurses (Berlowitz & Frantz, 2007; Mackie, Baldie, McKenna, & O’Connor, 2014; Mangino et al., 2011; Virani et al., 2009). As discussed later, changes in the ICU leadership and staffing interrupted the education and mentoring practices initially adopted. The emphasis that quality improvement evidence places on audits and reports to staff was not fully institutionalized.
Barriers

During the early stages of implementation of the PUP strategies, there were challenges that required consideration. The knowledge-to-action model establishes the necessity to identify barriers and address the resistance of individuals to engage in the change process. In the beginning of the PUP program, the ICU nurses resisted photographing patients and applying the silicone dressings on admission to the ICU. Montani, Courcy, Giorgi, and Boilard’s (2015) study indicated nurses seek routine environments and feel stressed in regard to imposed changes and fear negative consequences in relation to errors during the transitional phase. Studies have indicated leadership is crucial for any project to succeed. Leaders must provide support and guidance for the vision of the project (Berlowitz & Frantz, 2007; Chelluri, 2008; Montani et al., 2015). It was paramount to have staff acceptance in order to have full compliance to the PUP program. The ICU director, PUP champions, and the author acknowledged staff concerns about increased duties and educated the nurses on the rationale for taking the photographs of the sacrococcyx and heel areas. Although there was initial resistance to photographing and applying silicone dressings, the ICU nurses initially complied with these strategies. The unit managers gave individual verbal correction for instances of noncompliance. The director randomly audited the EMRs to assure fidelity to the PUP program and noncompliance instances were discussed during staff meetings.

Implementation

The implementation of the PUP strategies was a team effort and used a multifaceted approach to decreasing the number of HAPUs. As discussed in the literature, multiple approaches were used to decrease the occurrence of HAPUs (Berlowitz &
Frantz, 2007; Clarke & Marks-Maran, 2014; Virani et al., 2009). In Borgert, Goossens, and Dongelmans’ (2015) systematic review, they found the most frequently used implementation strategies were education, reminders, audits, and feedback. The same strategies were followed during the project. Nurses were educated through seminars, poster boards, and one-on-one education. When tested, ICU nurses were able to correctly identify PUP strategies and the components of the PUP pilot program. The author reviewed quizzes to identify missed items; although not a formal item analysis, she found that nearly all missed items were related to wound staging rather than the PUP strategies.

Knowledge translation strategies include elements such as exchanging information and feedback (Field, Booth, Llott, & Gerrish, 2014). According to Berlowitz and Frantz (2007), performance and feedback should be routinely measured in order for all staff members to be aware of the PU rates and the progression of the quality improvement project. During this project, monthly staff meetings were held to review the HAPUs and the PUP strategies. This helped to keep staff informed regarding unique cases in which a HAPU was found and how to remediate this for the future. This feedback provided a strong reminder for clinicians on the impact of preventive measures and their influence on patient outcomes; the meetings also showed management support for the project. Nurses were able to receive this information in a nonthreatening environment as part of a larger meeting in which a discussion among colleagues could occur. According to Borgert et al. (2015), to sustain successful implementation, it is important to create a culture of safety where staff are able to discuss the changes and to learn from mistakes without blaming or punitive actions.
Monitoring

Silicone Dressings

The project found a decrease in the number of HAPUs at intervention sites similar to that found in Santamaria et al.’s (2015), Park’s (2014), and Walsh et al.’s (2012) studies; the decreased number of HAPUs may have resulted from the use of silicone dressings. These studies supported the use of silicone dressings because of their ability to reduce friction, absorb excess moisture, and resist shearing forces. The multilayer silicone dressing applied to the sacral region and heel area may have given additional protection from urinary and fecal matter exposure. In November 2015, decreased adherence in applying silicone dressings to the intervention sites occurred. The decreased use of this key intervention occurred during the same period of time as increased intervention site HAPUs occurred. Lack of adherence to the PUP protocol was associated with an increase in HAPUs.

Repositioning

The repositioning of patients every 2 hours is standard practice in the hospital setting (Hagisawa & Ferguson-Pell, 2008). However, the use of a synchronized turning schedule brought a method for visual inspection of adherence to the PUP strategies. The coordinated effort on the part of the nurses to reposition the patients in the same direction allowed for easy visual audits by PUP champions or the author. The PUP champion or the author rounding the unit every 2 hours could easily identify if patients were in the appropriate synchronized position; the champion or facilitator was also available for nurses to have assistance in turning the patients. The regularly scheduled assistance of the PUP champion or facilitator removed the need for the nurses to search or wait for
someone to help turn the patients. According to Still et al. (2013), turning every 2 hours would reduce the number of HAPUs by 17% to the sacrum and buttock areas, and in this project there was a 50% reduction of HAPUs to the same body areas. However, the decreased adherence to turning patients from October to December corresponded to an increase in HAPUs.

The project demonstrated that despite the turning schedule patients developed HAPUs in nontargeted sites. This may have been the result of incomplete turning. HAPUs to the ear helix should not have occurred with adherence to the synchronized turning schedule. The author could not locate any studies regarding PUs to the helix area of the ear. However, literature has established redistribution (using supportive surfaces) and relieving (through repositioning) pressure to all bony prominences and/or pressure areas to reduce exposure to PU development. In addition, the reduction of blood flow and decreased tissue oxygenation lead to the development of necrosis and PU development (Bergstrom et al., 2013; Wong, 2011). The protocol required the correct method of repositioning the patients. It was essential to turn the patient and offload the entire side of the patient, including the lateral side of the cranium. However, there is a possibility that only the lower half of the patient was being offloaded and not the entire body. The reduction of HAPUs requires the entire side to be offloaded in order to reduce the occurrence of PUs to the cranium area.

**Photographing**

According to Russell (1999), photographing is an objective method of evaluation and is the best form of documentation to provide clear, high quality images for accurate observations of the condition of the sacrococcyx and heel areas. Similar to Russell’s
finding, the addition of photography as an assessment tool in this project was successful in providing a permanent record of the skin condition upon admission to the ICU. When a HAPU was identified, photographs taken upon admission were reviewed to determine whether any preexisting skin condition had been present, which may have led to ulcer development. In one case, the WCNS was able to compare the photographs taken on admission with a subsequent photograph showing an ulcer noted during admission. She was able to document skin discoloration on admission that validated a preexisting tissue injury rather than a HAPU. This preexisting tissue injury had subsequently advanced to a PU. Photographs provided an objective method of evaluation that cleared the hospital of responsibility for costs. Even though this method is not a direct preventive measure, it does increase sensitivity and focus for preventing PUs.

**Evaluation**

Other factors may have influenced the increase of HAPUs, such as two PUP champions leaving the organization during the same time period. This resulted in the loss of institutional knowledge, which is critical to sustaining excellence in clinical practice in an organization (Virani et al., 2009). Without the presence of PUP champions, the unit lost resources who were knowledgeable about PUP strategies and interventions. The practice of floating experienced ICU nurses familiar with the PUP strategies out of the unit was associated with the sporadic use of the PUP strategies, as validated by the compliance audit. The PUP audit in November 2015 revealed a decreased adherence to the PUP strategies, which may have contributed to the increase of HAPUs in November. In addition, the November census was at a high of 379 patients. A high census and the lack of resources may have contributed to the increase of HAPUs in November.
Prior to PUP implementation, two HAPUs developed within the first 2 weeks of January. These developed prior to the inauguration of the PUP strategies as part of standard nursing care in the ICU. In February, one patient developed two Kennedy terminal ulcers; one was located at an intervention site and the other at a nontargeted site. The Kennedy terminal ulcer is a type of PU that occurs during the stages of the dying process and is often unavoidable (Vera, 2014). Therefore, the HAPUs in January and February were outliers and were not appropriate indicators of the effectiveness of the PUP strategies (Sibbald, Krasner, & Lutz, 2010).

**Sustainability**

Clarke and Marks-Marlan (2014) define sustainability as a long-term durable change in practice or process. However, sustainability seemed to elude this quality improvement project. The PUP program had difficulties being sustained at the end of 2015, probably due to the significant loss of experienced ICU staff and the wound care team. Virani et al. (2009) discussed contributing factors that lead to poor sustainability, such as organizational factors and the departure of key staff. It is difficult to anticipate possible variations that influence project outcomes. However, a quality improvement project needs to include plans for reevaluation of the project and the development of active strategies for sustaining positive practice change when adverse situations develop. This project did experience difficulties in maintaining sustainability during the last 3 months in 2015. Suggestions for improvement will be recommended in the next chapter.

**Recommendations**

- Employees’ educational test records were kept in employees’ files, which limited access to the information. Records of educational programs and results of pre and
posttesting to guide additional and/or ongoing educational needs must be kept in a confidential manner and in a location where educational data can be extracted easily.

- Audits were informally conducted and discussed in staff meetings, but no records were kept. Structured reports of HAPU occurrence should be made visible to unit staff; strategies to address unusual occurrences of HAPUs outside intervention sites should be implemented promptly by the quality improvement team, which includes the PUP champions (management), the lead WCNS, and staff.

- Incorporate strategies to sustain the PUP program target adherence rate of 90% by conducting and maintaining recorders of regular audits of adherence to interventional strategies.

- Structured processes, such as HAPU prevention orientation to new staff and readily visible reminders in the unit of prevention strategies, can help ensure that policies/protocols are maintained despite staff turnover/changes.

- The creation of an audit result dashboard to document the results of the random audits is required to monitor PUP strategies. This is to evaluate overall adherence to prevention strategies as well as to identify individual staff members who need further education or intervention. The individual dashboard for staff is to be held in confidentiality and to be used as an improvement tool and not as a punitive one.

- The EMR needs to be reconfigured to include a place for documentation of PUP strategies to facilitate data extraction and regular performance reports.
CONCLUSION

This project focused on the use of evidence-based practices to decrease the number of HAPUs in an ICU. The knowledge-to-action framework was used as a systematic method to implement the PUP project. This project included reviewing literature, actively involving stakeholders, having PUP champions, educating staff, implementing preventive strategies, compiling data, and performing an outcome assessment and a compliance assessment. The PUP pilot program initially demonstrated a decrease in HAPUs at the intervention sites and this change was sustained for a number of months.

Teamwork from disciplines, such as medicine, nutrition, and nursing, and the support of management were influential in the initial success of the PUP program in preventing PUs. The nursing staff were instrumental as the first line of defense against HAPUs. Nurses were present to assess risk factors for patients, initiate preventive measures, and assess if further strategies were necessary. Quality improvement components, such as managerial support, staff support, and accountability, were in place for most of 2015. However, the organizational infrastructure was unable to sustain quality improvement during unforeseen staff variations.

The final 3 months of 2015 followed with increased HAPU occurrence at intervention and nonintervention sites, demonstrating the lack of sustainability of quality improvement efforts as well as a lack of response to the increased occurrence of cranial and helix HAPUs. The knowledge-to-action framework addresses sustainability issues and calls for a reevaluation and the addition of new strategies when system failures occur. In this project, the following strategies would have contributed to improved
sustainability: maintenance of key champions, institutionalization/publication of PUP strategies, regular audits of performance with reports to staff, academic detailing to improve performance as necessary, and modification of the EMR to include silicone dressings in order to trigger ICU nurses to document dressing applications.
REFERENCES


Allen, B. (2012). Effects of a comprehensive nutritional program on pressure ulcer healing, length of hospital stay, and change to patients. Clinical Nursing Research, 22, 186-205.


Hollister Incorporated; patent application titled “Endotracheal Tube Holding Device With Bite Block” published online. (2014). *Politics and Government Week, 7758*.


## APPENDIX A

### SKIN CARE PROTOCOL: PREVENTION AND MANAGEMENT OF SKIN BREAKDOWN

| Title: SKIN CARE PROTOCOL: PREVENTION AND MANAGEMENT OF SKIN BREAKDOWN | ☑️ Policy approved with Manual
(see Manual Signature Page and Manual Index)
Date: 1/14/2015 |
| --- | --- |
| OR | ☐ Policy Update: ☑️ NEW or ☑️ Revised
(Approved as below and added to Index) |
| Approval (by Chair or Meeting) | DATE: |
| Nursing: Patient Care | 01/7/2014 |
| Ancillary: Medical Staff Committee: Medicine | 11/14/2014 |
| Manual: Patient Care Services | Medical Staff Committee: |
| Policy Number: PCS: S-005 | Medical Executive Committee (MEC): 11/24/2014 |
| Origin Date: 4/29/2004 | Governing Board (GB): Policy Effective Date 01/14/2015 |

### SUBJECT: SKIN CARE PROTOCOL: PREVENTION AND MANAGEMENT OF SKIN BREAKDOWN

### PURPOSE: To identify patient at risk for skin breakdown.

A. To outline a wound management plan for patients with the potential or actual skin breakdown.

B. To present a descriptive record of clinical data related to area(s) of skin impairment, and provide a foundation for the formation of a comprehensive treatment plan.

### PRINCIPLES OF SKIN/WOUND CARE MANAGEMENT:

A. Reduce or alleviate causative factors, such as, pressure, shearing, friction, moisture, circulatory impairment or neuropathy.

B. Provide systematic support for wound healing, such as, nutritional and fluid support, and management of systemic conditions effecting wound healing.

C. Apply appropriate topical therapy, to facilitate cleansing, elimination of infection, and promote wound healing.

### SCOPE:
All patients admitted to Anaheim Regional Medical Center.

### RESPONSIBILITY:
All disciplines having direct patient contact.
DEFINITIONS OF TERMS:

A. Pressure Ulcer: "A pressure ulcer is localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated."

B. Mucosal Pressure Ulcer: "Mucosal Pressure Ulcers (MPu) are pressure ulcers found on mucous membranes with a history of a medical device in use at the location of the ulcer."

C. Mucous membranes: moist lining of body cavities that communicate with the exterior.

D. Partial Thickness: "Loss of dermis"

E. Full Thickness: "Tissue destruction extending through the dermis to involve the subcutaneous layer, possible muscle or bone"

F. Slough: "Loose, stringy necrotic tissue"

G. Eschar: "Thick leathery necrotic tissue, devitalized tissue."

POLICY:

A. Risk assessment (Braden Risk Assessment Scoring Grid) is completed within 12 hours of admission, at least every shift, with any change in patient skin condition and with a change in the level of care.

1. Patients with a Braden score of 18 or below, implement pressure ulcer prevention interventions.

2. Interventions are individualized based on patient condition and/or needs.

3. Pressure ulcer prevention interventions are implemented as soon as possible based on patient’s status and hemodynamic stability.

4. Refer to Pressure Ulcer Prevention interventions.

B. Skin assessment is conducted within 12 hours admission and at least every shift. Skin assessment includes, but is not limited to:

1. Focus on high risk areas such as bony prominences
2. Skin in contact with medical devices.
3. Skin temperature (localized areas of heat or cold),
4. Skin color and discolorations,
5. Skin texture, bogginess and turgor,
6. Skin integrity, painful/tenderness and moisture status.
7. Location
8. Stage or category (on admission and with dressing changes)
9. Size (on admission and with dressing changes)
10. Wound bed color (on admission and with dressing changes)
11. Drainage (on admission and with dressing changes)
12. Odor (on admission and with dressing changes)
13. Skin assessment is conducted by two patient care staffs; at least one staff member must be a licensed registered nurse. Inspection may be conducted by two licensed registered nurses or one licensed registered nurse and one unlicensed caregiver.

C. Classifying wounds:

Only pressure ulcers are staged. See below for NPUAP Pressure Ulcer Staging guidelines:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
<th>Further description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suspected Deep Tissue Injury</strong></td>
<td>Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.</td>
<td>Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.</td>
</tr>
<tr>
<td><strong>Stage 1</strong></td>
<td>Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.</td>
<td>The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. Stage I may be difficult to detect in individuals with dark skin tones. May indicate &quot;at risk&quot; persons (a heralding sign of risk).</td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td>Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.</td>
<td>Presents as a shiny or dry shallow ulcer without slough or bruising.* This stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration or excoriation. *Bruising indicates suspected deep tissue injury</td>
</tr>
<tr>
<td><strong>Stage 3</strong></td>
<td>Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscles are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling.</td>
<td>The depth of a stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep stage III pressure ulcers. Bone/tendon is not visible or directly palpable.</td>
</tr>
<tr>
<td><strong>Stage 4</strong></td>
<td>Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often include undermining and tunneling.</td>
<td>The depth of a stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and these ulcers can be shallow. Stage IV ulcers can extend into muscle.</td>
</tr>
</tbody>
</table>
56

and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis possible. Exposed bone/tendon is visible or directly palpable.

| Unstageable | Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed. Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as "the body's natural (biological) cover" and should not be removed. |


D. Do NOT reverse stages (Closed Stage IV pressure ulcer is a Stage IV pressure ulcer).

E. Mucosal pressure ulcers
   1. Do NOT stage.
   2. Document as "mucosal pressure ulcer"
   3. Indicate location and measurement (length x width x depth) of the mucosal pressure ulcer.

F. Closed surgical incisions are assessed daily for signs of infection, drainage, odor, and appearance. Notify physician or surgeon of any abnormal findings.
   1. Dressing changes are performed per physician orders.
      a. Wound Assessment and dressing changes are documented in the Skin section of the Assessment flow chart.

G. Patients and families are notified of skin impairment or deteriorating changes in skin integrity by the bedside registered nurse or wound care specialist.

H. The attending physician or surgeon is notified of skin impairment or deteriorating changes in skin integrity by the bedside registered nurse or wound care specialist.

I. Patients and their families are educated about the prevention of skin breakdown and/or wound treatment plan of care.

J. Upon discharge, patients with skin impairment, receive a complete skin assessment with wound photographs by the discharging registered nurse on the day of discharge.

K. Upon transfer, patients with skin impairment receive a complete skin assessment with wound photographs by the receiving unit on the day of transfer.

L. The Case Manager coordinating discharge planner communicates the skin impairment to the receiving health care provider/facility prior to discharge.
PROTOCOL:
A. Skin assessment and risk assessment (Braden Scale) is conducted within 12 hours of admission.
B. Reassessment is conducted at least every shift, with a change in patient's skin condition and with a change in the level of care. Assess skin for early signs of tissue damage such as pain/tenderness, discoloration, bogginess, heat or cold to a localized area of skin.
C. The frequency of skin inspection with very high risk and high risk patients may be increased as needed.
D. Prevention interventions are followed per protocol.

<table>
<thead>
<tr>
<th>Braden Score</th>
<th>Level of Risk</th>
</tr>
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<tbody>
<tr>
<td>18-15</td>
<td>Low</td>
</tr>
<tr>
<td>14-13</td>
<td>Moderate</td>
</tr>
<tr>
<td>12-10</td>
<td>HIGH</td>
</tr>
<tr>
<td>9 and below</td>
<td>VERY HIGH RISK</td>
</tr>
</tbody>
</table>

E. Inspect the skin in contact with medical devices at least every shift. Inspect for any tenderness, discolorations, blisters, or open areas.
F. When taking a wound culture as ordered, cleanse the wound with normal saline and gently pat dry prior swabbing the wound.

NURSING CARE INTERVENTIONS:
A. Pressure Ulcer Prevention Interventions:
   1. Specialty mattress for moisture management and pressure redistribution
   2. Offload heels
   3. Encourage self-turning or assist the patient with turning and repositioning every two hours and as needed
   4. Incontinence management:
      a. Apply barrier cream or spray
      b. Avoid the utilization of diapers while in bed
      c. Use absorbent under pads
d. Foley catheter/condom catheter for urine containment per physician order

e. Fecal management system for stool containment per physician order

f. Keep patient clean and dry. Check for incontinence at least every 2 hours.

5. Apply pressure relieving foam underneath medical devices such as BIPAP and oxygen masks nasogastric tubes. Consider mask size rotation.
   Secure nasogastric tube to offload tube from skin.

6. Consider Silicone dressing Border to high risk areas such as sacrum, elbows, heels, trochanter, spine or any bony areas (refer to Silicone dressing Border application protocol) for pressure ulcer prevention.
   a. Date and initial the dressing.
   b. Write “P” to indicate dressing is for prevention

7. Educate patient and family on pressure ulcer prevention plan of care.

8. For patients with Braden Score of 12 or below: consult dietary.

B. Wound Cleansing and Dressing

1. Contact physician and request initiation of preprinted order sheet or obtain physician orders on cleansing and dressing of wound.

2. If preprinted orders are initiated, implement appropriate interventions based on the type and stage of wound (Attachment 2).

3. Explain the cleansing and dressing change procedure to the patient.

4. Assess for procedure related pain and obtain orders for pre-medication, if necessary.

5. Gather all of the needed equipment and set up the bedside stand.

6. Wash hands.

7. If splashes or spray of body fluids are likely, then use a mask, eye protection, face shield or gown.

8. Apply clean gloves and remove the old dressing. Note the amount, color, and odor of drainage. Dispose of soiled dressing according to infection control policy.

9. Assess skin integrity. Assess for reaction to adhesive material or tape. Assess wound (wound bed, periwound, drainage and odor).

10. Change gloves between tasks and/or after contact with material with high microorganism concentration.

11. Measure the wound using measuring device, if appropriate.
a. Wound measurements are recorded in centimeters using a disposable paper measuring tape.

b. The wound is measured by length (head to toe) and by width (left to right), and depth (base of wound to edge of skin).

c. Undermining and tunneling are measured in centimeters using the clock method to identify the location (12:00 head, 6:00 foot).

d. Wounds are measured at least weekly.

12. Open sterile packages of dressing supplies. Avoid touching surface that will be in contact with wound.

13. Replace dressing per physician orders, using appropriate supplies, products, and topical agents. Ensure that moist dressings are within the wound and are not in contact with intact skin to avoid maceration.

14. Remove gloves and wash hands

15. Noted date and time of dressing change on the dressing.

16. Dressing change orders are written in physician orders. RNs are responsible for dressing changes as ordered.

C. DOCUMENTATION:

1. Braden risk assessment is documented in the “Care needs/Safety/Braden/IV” flow chart of CPSI.

2. Initial skin assessment is documented in the Interdisciplinary Plan of Care electronic form.

3. Subsequent skin assessments are documented in the Skin section of the Assessment flow chart.

4. Each incidence of impaired skin and location is documented on the Skin Integrity Assessment electronic form. Skin Integrity Assessment electronic form is updated when wounds are identified with the date of discovery.

5. Wound photographs

   a. Photographs are completed on admission, upon discovery, and at least weekly, worsening wound, upon receiving patient from another area and on the day of discharge.

   b. When a photograph is used to document skin impairments, all photographs include a measuring guide with the following patient identifiers: patient initials, medical record number, and date of photograph taken.

   c. Photographs are uploaded into the CPSI images section.

      1) Photographs should be taken with camera settings as “small” or “640x480”

      2) File name for the photo is the location of the wound.

   d. Wound measurements are documented on the skin section in assessment flow chart.
6. Dressing changes and wound assessments are documented on the skin section of the assessment flow chart.
   a. For dressing changes ordered to be performed less frequent than daily, evaluate wound at each dressing change.
   b. Evaluate the dressing condition every shift and as needed.
      1) Document the condition in place of the treatment (i.e.: Dressing remains clean, dry, and intact)

7. Physician and family notification of wounds are documented in the skin section of the assessment flow chart.

8. The Skin Integrity Assessment electronic form and photos are completed for patients with actual skin impairment.

9. Document the turning intervention on the flow sheet. (See activity section on flow sheet. R=right, L=left, B=back, etc.)
   a. Patients on a pressure relief mattress or specialty bed are required to be assisted with turning and repositioning every two hours.
   b. If patient is hemodynamically unstable and turning is medically contraindicated:
      1) Turning and repositioning should be resumed as soon as possible
      2) Documentation of turning and patient’s intolerance to turning is documented in nurse’s notes

10. Specialty support surface and offloading devices
    a. Documented in the “Equipment in use” section of the “I&O/Activity” flow chart of CPSI.

11. Patient care staff (RN or PCA) performing the intervention is responsible for documenting the completed intervention.

**WOUND CARE SPECIALIST:**

A. Request for Wound Care Specialist (WCS) consultation is done by CPSI system.

Request WCS consultation for the following patients:
1. With Stage II, III, IV, Unstagable, Suspected DTI pressure ulcers
2. Multiple chronic wounds
3. Worsening wound
4. New wound (except surgical wounds)
5. IV infiltration with visible wounds (blisters and/or signs of tissue damage)
6. Bruising over bony prominences
7. Patients with Braden Score 12 or below
B. Consultation is completed by the next business day from the time the order is placed in CPSI.

C. WCS recommendations are written in the Consult/Follow up Flow Chart for WCN.

D. The Wound Care Specialist (WCS) re-evaluates wounds within seven days, until discharge or the wound is resolved. Wounds are re-evaluated at the discretion of the WCS. Dressing changes, assessments and interventions performed by the Wound Care Specialist are documented on the Consult/Follow up Flow Chart for WCN.

E. The Wound Care Specialist may conduct patient, family, and staff education/demonstrations when available. This is documented on the education tab.

EDUCATION:

A. Document teaching interventions on the education tab under wound care.

B. Education may be performed by the bedside registered nurse or WCS.

REPORTING:

A. Patients who are admitted with skin impairment or who develop skin impairment during their hospitalization have a Report of Unusual Occurrence completed and sent to the Patient Safety Risk Management Department.

B. The Wound Nurse and the Patient Safety Risk Manager determine the need to report to external agencies.

MONITORING:

A. All patients with skin impairment excluding routine surgical incisions with physician treatment orders.

B. Performance Improvement indicators are aggregated, analyzed and reported to Performance Improvement Patient Safety (PIPS) quarterly.

REFERENCES/AUTHORITY:


Supplement to April 2005 OWN Ostomy Wound Management. Pressure ulcer prevention and Care.

**PRIMARY POLICY OWNER:** Patient Care Services

**PAST POLICY APPROVAL DATES:** 05/16/2005, 11/01/2006, 5/5/2008, 5/2/2011
Preprinted Orders for:
Skin Management and Breakdown Prevention
Patients with Impaired Skin Integrity and/or at risk patients with Braden Scale 18 or less:

<table>
<thead>
<tr>
<th>Clinical Assessment</th>
<th>For all patients:</th>
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<tbody>
<tr>
<td></td>
<td>♦ Assess, document, photograph and measure wound.</td>
</tr>
<tr>
<td></td>
<td>♦ Document assessment in ASSESSMENT FLOWCHART / SKIN INTEGRITY E-FORM</td>
</tr>
<tr>
<td></td>
<td>☐ Wound Care Nurse Consult for:</td>
</tr>
<tr>
<td></td>
<td>☐ With Stage II, III, IV, Unstageable, Suspected DTI pressure ulcers</td>
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<td></td>
<td>☐ Multiple chronic wounds</td>
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<tr>
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<td></td>
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<table>
<thead>
<tr>
<th>Braden Scale:</th>
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<table>
<thead>
<tr>
<th>Nutrition/ Fluids</th>
<th>☐ Nutritional Consult: Evaluation and Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐ Albumin &amp; Pre-albumin level (For multiple stage 2, all Stage 3 &amp; 4, if not done within last 7 days.)</td>
</tr>
</tbody>
</table>

| Treatment and Interventions | ♦ Turn and reposition patient every 2 hours and as needed. |
|                            | ♦ Offload heels from the mattress surface. |
|                            | ♦ Place patient on appropriate support surface. |
|                            | ♦ Skin care for incontinence: |
|                            |   • Consider fecal management system per physician orders. |
|                            |   • Apply protective barrier cream to perineal and perianal area every 12 hours and as needed after each incontinent episode. |

<table>
<thead>
<tr>
<th>☐ Skin Tears</th>
<th>Separation of epidermis from dermis. Usually in the arms, hands, and legs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cleanse affected area with Normal Saline (NS), pat dry.</td>
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<td>2. Cover affected area with a thin layer of petroleum/xeroform gauze</td>
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<td>3. Cover with dry dressing and kling/kerlix</td>
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<td>4. Change every 3 days and as needed for saturation, displacement, or soiling.</td>
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<td>5. <strong>If condition does not improve in 1 week, please notify the wound care nurse (WCN) for evaluation.</strong></td>
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<thead>
<tr>
<th>☐ Incontinence Associated Dermatitis (IAD)</th>
<th>Skin irritation with raised erythema with or without skin denudation (skin erosion R/T moisture</th>
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<tbody>
<tr>
<td>1. Wash affected area thoroughly with soap and water, pat dry</td>
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<tr>
<td>2. Apply a thin layer of protective barrier cream to affected areas Q12H and PRN after pericare.</td>
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**If condition does not improve in 1 week, please notify WCN for evaluation.**
### Yeast Rash

Appears in moist skin folds, underneath breast, axillary, abdominal folds or thighs. Red, pruritic burning rash.

1. Wash affected area thoroughly with soap and water, pat dry.
2. Apply Interdry Ag to separate skin folds.
3. Change cloth every 5 days or when soiled. Remove and replace after each bath.
4. **If condition does not improve in 1 week, please notify the wound care nurse (WCNS) for evaluation.**

### Stage I or II Pressure Ulcers

Nonblanchable redness or partial thickness wounds.

1. Cleanse with NS or Wound Cleanser, pat dry.
2. Apply Z-Guard Cream to affected area.
3. Cover with Optifoam Gentle for protection.
4. Change daily and PRN if soiled/dislodged.
5. **If condition does not improve in 1 week, please consult WCN.**

### Stage 3 or 4:

Full thickness loss into subcutaneous fat (3) or bone or muscle (4)

1. Cleanse with NS or Wound Cleanser, pat dry.
2. Apply Aquacel Ag to affected area.
3. Cover with Optifoam Gentle for protection.
4. Change daily and PRN if soiled/dislodged.
5. **Consult WCN.**

### SDTI:

Nonblanching purple undertones over a bony prominence.

1. Offload affected area.
2. Apply foam dressing for protection
   a. Lift and assess site Q shift for any changes in condition.

**Consult WCN.**

### Unable to stage:

Full thickness loss with eschar or slough covering wound bed.

1. Same treatment options as Stage 3 of 4.
2. **Consult WCN.**

### Support Surface

<table>
<thead>
<tr>
<th>Bariatric Beds for patients over 250 pounds</th>
<th>At Risk patients with Braden Score 15-18</th>
<th>Moderate Risk patients with Braden Score 13-14</th>
<th>High Risk Patients with Braden Score 10-12 or below with moisture related issues</th>
<th>High Risk Patients with Braden Score 10-12 or below with moisture and/or mobility related issues</th>
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<td>Atmos Air</td>
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<td>Low Air Loss (LAL) – Stryker Air II</td>
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<td>Dolphin: Fluid Immersion Simulation (FIS)</td>
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**MD Signature**

**Date/Time**

**Transcribed by**

**Date/Time**

**Note by RN**

**Date/Time**
APPENDIX B

STANDARD TURNING SCHEDULE

Face to the Right

11/23 L
09/21 R
07/19 B

Face to the Left

01/13 B
03/15 R
05/17 L
APPENDIX C
CUSTOMIZED TURNING SCHEDULE

Face to the Right

Face to the Left

01/13
03/15
05/17
07/19
11/23
09/21
APPENDIX D

WOUND CARE TEST

Wound Care – Post Test- 2015

1. This pressure ulcer is located on the right buttocks. There is a loss of the dermis. The wound bed is red without slough. Braden scale is 14.
   a. Stage I
   b. Stage II
   c. Stage III
   d. Stage IV
   e. Unstageable

2. The treatment based on the PPO is:
   a. Place on Stryker Air II low air loss.
   b. Turn and reposition every 2 hours.
   c. Apply z-guard barrier cream + cover with optifoam gentle.
   d. None of the above.
   e. All of the above.

3. Left hip erythema does not blanch when light pressure is applied. Epidermis is intact. No blistering is observed.
   a. Stage I
   b. Stage II
   c. Stage III
   d. Stage IV
   e. Suspected Deep Tissue Injury

4. The treatment based on the PPO is:
   a. Leave open to air. No treatment required.
   b. **Apply z-guard barrier cream and cover with foam dressing.**
   c. Cover with aquacel AG and optifoam gentle.
   d. Cover with xeroform and dry dressing.
5. Sacrococcygeal pressure ulcer has subcutaneous visible in the wound bed. Wound edges are macerated. Pt is incontinent of urine and stool. Pt is positive for c-diff with frequent bowel movements. Braden Score: 12
   a. Stage I
   b. Stage II
   c. Stage III
   d. Stage IV
   e. Unstageable/unable to stage

6. Treatment implemented based on PPO:
   a. Aquacel AG and optifoam gentle.
   b. Apply z-guard barrier cream around the dressing.
   c. Consider using a fecal management system and obtain order from physician for placement to contain stool.
   d. Place pt on low air loss mattress for moisture management.
   e. All of the above.

7. Pt’s breast fold is moist with reddened areas. Pt complains of occasional burning or itching to area.
   a. Yeast Rash
   b. Pressure Ulcer
   c. Diabetic Ulcer
   d. Venous Ulcer

8. What treatment would you implement (based on the preprinted orders)?
   a. No treatment required.
   b. Tell patient burning and itching to that area is normal.
   c. Wash with soap and water. Apply interdry AG sheets to separate the skin folds. Notify physician of skin condition.
9. This patient has a boggy grey discoloration of the medial heel and a blood filled blister on the Achilles. What stage is the medial heel?
   a. Stage I
   b. Stage II
   c. Stage III
   d. Unstageable
   e. Suspected Deep Tissue Injury

10. What treatment would you implement (based on the preprinted orders)?
   a. Offload at all times with waffle boots.
   b. Cover with foam dressing for protection.
   c. Apply z-guard barrier cream.
   d. All of the above.
   e. A & B only.

11. Right heel pressure ulcer with slough and eschar.
   a. Stage II
   b. Stage III
   c. Stage IV
   d. Unstageable
   e. Suspected Deep Tissue Injury

12. What treatment would you implement (based on the preprinted orders)?
   a. **Cover with Aquacel AG and Optifoam gentle.**
   b. Cover with xeroform and optifoam gentle.
   c. B & C
   d. None of the above

13. An ulcer on your patient’s right plantar foot is circular with pink wound bed and calloused periwound. You note Charcot’s foot to the right foot. The patient’s wound is ______.
   a. Diabetic ulcer.
   b. Venous ulcer
   c. Arterial ulcer
   d. Pressure ulcer

14. Your patient has a foley catheter and incontinent of bowel. In your shift, the patient has had a bowel movement 4 times. The patient has large area of superficial skin breakdown to the sacrococcyx region, inner thighs, and bilateral buttocks. This patient’s skin breakdown is:
Wound Care – Post Test- 2015

a. Moisture Associated Skin Damage
b. Pressure Ulcer
c. Diabetic Ulcer
d. Venous Ulcer

15. What is the best treatment for this patient’s skin breakdown?
   a. Apply a diaper on this patient so he doesn’t have to be changed too often.
   b. Place the patient on a low air loss mattress and apply barrier cream to affected area.
   c. Cover the area with Mepilex border.
   d. Apply a diaper, but change the patient frequently.

16. Bariatric mattresses are ordered for patients with a weight ____________________
   a. Greater than 250 lbs.
   b. Less than 100 lbs.
   c. Greater than 100 lbs.
   d. Less than 250 lbs.

17. When uploading the photo into CPSI, the photograph file name is:
   a. “wound”
   b. Wound location
   c. Wound location / RN initials
   d. Wound location & stage

18. You receive in your shift report that patient A has a dressing on the right heel. You do not know the frequency of the dressing change or the treatment. Where would you find the treatment for the right heel?
   a. Medact/ “Chrons” in EMR viewer
   b. It doesn’t matter; use the dressings available when performing dressing change.
   c. Call wound nurse to find out the treatment.
   d. Ask the patient the treatment.

19. Pressure Ulcer Prevention SKIN Bundle includes incontinent management with: application of skin barrier cream and using absorbent under pad (Ultrasorb) to protect the skin.
   a. True
   b. False

20. Nutrition assessment and/or intervention is a component of pressure ulcer prevention.
   a. True
   b. False
21. Wound measurements are in centimeters and documented by length x width x depth. Measurements are:

   a. Length: head to toe, Width: left to right, depth: deepest part of the wound to skin surface.
   b. Length: longest part of the wound x width: shortest part of the wound, depth: deepest part of the wound to skin surface.
   c. Length: left to right, width: head to toe; depth is not necessary to measure.

22. Wound photographs are taken on admission, weekly, and ____________.

   a. Upon discharge from facility
   b. When needed if wound worsens.
   c. Upon receiving patient from another unit.
   d. Only when asked by physician.
   e. A, B, C only

23. When taking photographs, a measuring guide is included in the photograph with current date and patient’s full name.

   a. True
   b. False

24. Pressure Ulcer Prevention Interventions include offloading patients’ heels ONLY when the patient’s heel is erythemic.

   a. True
   b. False

25. Pressure Ulcer Prevention Interventions include turning and repositioning patients at least every 2 hours.

   a. True
   b. False
Wound Care – Post Test- 2015

Answer questions 26-31 using the following patient conditions. Apply the Braden Scale to each question.

Mr. Smith is 80 years old. He was admitted for anemia and GI bleed. Mr. Smith has a history of diabetes, hypertension, peripheral neuropathy, early onset dementia. He was brought to the emergency room by his daughter. Mr. Smith is alert and oriented to name only. He is able to verbally communicate, but is not able to express his basic needs (toileting). He has a Foley catheter in place and is incontinent of bowel. Mr. Smith is having loose frequent stools and requires to be cleaned with every turning and repositioning. Mr. Smith was ambulating at home with a walker, but is now bedbound due to weakness. He is not able to turn and reposition himself, but occasionally make slight movements with his legs. Mr. Smith is currently NPO for a colonoscopy. Mr. Smith occasionally slides down and requires assistance to move up on the bed.

Score Mr. Smith’s risk for pressure ulcer based on the Braden Score criteria provided.

26. Sensory perception (ability to respond to pressure-related discomfort)
   a. Completely Limited: unresponsive to painful stimuli due to diminished LOC or sedation OR limited ability to feel pain over most of body.
   b. Very Limited: Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness OR has a sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body.
   c. Slightly Limited: Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.
   d. No Impairment: Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.

27. Moisture (degree to which skin is exposed to moisture)
   a. Constantly Moist: skin is kept moist almost constantly by perspirations, urine, etc. Dampness is detected every time patient is moved or turned.
   b. Very Moist: Skin is often, but not always moist. Linen must be changed at least once a shift.
   c. Occasionally Moist: Skin is occasionally moist, requiring an extra linen change approximately once a day.
   d. Rarely Moist: Skin is usually dry, linen only required changing at routine intervals.
28. **Activity (degree of physical activity)**
   a. **Bedfast: confined to bed.**
   b. **Chairfast: Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.**
   c. **Walks Occasionally:** Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair.
   d. **Walks Frequently:** Walks outside room at least twice a day and inside room at least once every two hours during waking hours.

29. **Mobility (ability to change and control body position)**
   a. **Completely immobile:** Does not make even slight changes in body or extremity position without assistance.
   b. **Very Limited:** Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.
   c. **Slightly Limited:** Makes frequent though slight changes in body or extremity position independently.
   d. **No Limitation:** Makes major and frequent changes in position without assistance.

30. **Nutrition (USUAL food intake pattern)**
   a. **Very Poor:** Never eats a complete meal. Rarely eats more than 1/3 of any food offered.
      Eats 2 servings or less of protein (meat or dairy) per day. Takes fluids poorly. Does not take a liquid dietary supplement. OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.
   b. **Probably Inadequate:** Rarely eats a complete meal and generally eats only 1/2 of any food offered. Protein intake includes only 3 servings of meat or daily products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feedings.
   c. **Adequate:** Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products per day). Occasionally will refuse a meal, but will usually take supplements when offered. OR is on a tube feedings or TPN regimen which probably meets most of nutritional needs.
   d. **Excellent:** Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Do not require supplementation.
31. **Friction & Shear**

a. **Problem:** Requires moderate to maximum assistance in moving. Complete lifting without sliding again sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction.

b. **Potential Problem:** Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.

c. **No Apparent Problem:** Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.
APPENDIX E

PUP FLYER

MEDICAL CENTER ICU

New Strategies for Pressure Ulcer Prevention

The PUP Project

Saying NO to pressure damage

- Photograph sacrococcyx area to **ALL** patients entering the ICU.
- Patients with Braden Scale $\geq 18$ must be placed on a low air loss mattress.
- Patient with Braden Scale $\geq 18$ must have dietary consult within 24 hours of arrival to hospital. Apply
- Silicone dressing sacrum to sacrococcyx
- Apply Silicone dressing heel to bilateral heel area.
- Evaluate and document skin condition under dressing every shift.
- Change dressing every 5 days.
- Label dressing with “P” for prevention.
- Date and initial dressing.
- Follow the standardized turn schedule.
- Apply skin barrier cream and using absorbent under pad (Ultrasorb).

For any questions or suggestions please contact: The Wound Care Nurse
APPENDIX F

PUP AUDIT

DATE: _______________

Please circle:

Photo:
Yes to indicate photographs taken upon arrival to both areas and documented to the EMR
No to indicate photographs of any one of the three areas not in medical record.

Silicone Dressing:
Yes to indicate one intact dressing on sacrococcyx area and heels;
No to indicate no dressing in place to designated areas

Dietitian:
Yes to indicate the dietician consulted on the case within 24 hours of arriving to the ICU
No to indicate the dietician did not consult on the case within 24 of arriving to the ICU, documentation in medical record

<table>
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<tr>
<th>PT</th>
<th>Date</th>
<th>Photo Heels // Sacrococcyx</th>
<th>Silicone dressing Heels // Sacrococcyx</th>
<th>Dietitian Assess 24h</th>
<th>Special Mattress</th>
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APPENDIX G

TURNING SCHEDULE AUDIT

DATE: ________________

Please circle:

**Yes** to indicate patient was turned every two hours

**No** to indicate patient was not turned every two hours

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APPENDIX H

PRESSURE ULCER PREVENTION TIMELINE

- October–December 2014
  Literature review on PUP strategies and PUP project approval from the ICU director to conduct the DNP project.

- October–January 2015
  Meetings with lead WCNS.
  Reviewed policy.
  Made adjustments to policy.

- January 2015
  Identified 31 HAPUs hospital wide and 10 in the ICU.

  Hospital wide—74% of the HAPUs were heel, coccyx, sacrum, sacrococcyx, and sacrogluteal areas.

  ICU—80% of the HAPUs were coccyx, sacrum, sacrococcyx, and sacrogluteal areas.

- January 14, 2015
  Skin policy approval received.

- Mid-January 2015
  Previous strategies: low-air-loss mattress, Z guard, turning every 2 hours, off load heels; seldom do ICU patients get out of bed.

  Approval to do pilot program in ICU given by the ICU director.

  These PUP strategies were new in ICU:

  - Photographing patients on admission: sacrum and heels
  - Synchronized turning
  - Dietary to see ICU patient within 24 hours
  - Silicone dressing to sacrum and heels: prevents shearing forces
• Mid-January–February 2015 The author informed the ICU staff on the new PUP strategies:
  • Staff meetings
  • Education boards
  • Flyers
  • One-on-one dialog with staff member

• Mid-January 2015 Lead WCNS created a test for the nurses and completed by February 6, 2015.

• February–March 2015 The author, ICU director, and PUP champions auditing for compliance.

• February–September 2015 The author reviewed HAPU reports.

• July 2015 The author conducted PUP program audit.

• September–October 2015 WCNSs left the organization.

• November 2015 The author conducted PUP audits:
  • High census: 379
  • 2 ICU managers left
  • ICU nurses floating off the unit