# Improving Tissue Integrity in Intensive Care Unit Patients

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## Introduction

Throughout clinical experiences in western Kentucky intensive care units, it has been observed that critically ill patients are not receiving fully implemented skin care practice according to hospital and company policy. Patients are not turned completely to one side or the other due to size, mechanical intubation, and other medical devices that may be intimidating to staff. Alderen et al., (2011) states that "in mechanically ventilated, critically ill patients, pressure ulcer risk is high and may result in negative patient outcomes and increased healthcare costs." Gallant, Morin, St-Germain, and Dallaire (2010) state that "In practice, pressure ulcers are indicators of quality of care." Hospital associated pressure ulcers have also been considered by the federal government and are now "included in 2 pay-for-performance programs under the Patient Protection and Afforable Care Act that have great implicatiosn for hospital finances: penalties for hospital-acquired conditions and value-based purchasing incentives" (Agency for Healthcare Research and Quality, 2016). For this study, a critical appraisal of several evidence based practice studies was completed and findings were compared to a local medical intensive care unit's skin integrity policy. I contacted the director of intensive care services at the local hospital and arranged a time to implement the teaching plan and policy change suggestions with staff. A flyer was created to advertise the teaching, and the director administered the flyers within staffing areas of the hospital as well as gathered staff on the day of teaching. A 10-minute teaching session was performed using lecture and visual poster board explaining the findings of the study along with a question and answer session at the end. Revisions to the current skin care policy were recommended to allow implementation into the intensive care unit nursing practice. Recommendations for quarterly in-service education regarding pressure ulcer staging and wound care implementation strategies were also suggested based on research findings. All research

findings and proposed policy changes were supplied to the director of critical care services as well as wound and ostomy care coordinator for revision.

## Theoretical Framework

The theoretical framework used to guide this research study was the information integration theory. This theory explores how attitudes are changed through integration (mixing, combining) of new information with existing cognitions or thoughts (Anderson and Zalinski, 1988). This theory suggests that all information has weight and value and how a person determines whether the information is important or not is determined by his/her perception of its weight and value. This theory suggests that to change an attitude it may be easier to remind the person of an idea rather than to persuade him/her to accept a new idea (Anderson and Zalinski, 1988). I integrated this theory into my research by suggesting the staff at the local hospital have a quarterly in-service regarding pressure ulcer and wound care. Rather than attempt to introduce new ideas into nursing practice, this would remind the nurses of previously learned and supported evidence and improve compliance with policies.

## Literature Review

A study by Carville, Leslie, Osseriran-Moisson, Newal, and Lewin (2014) focused on the effects of a twice-daily skin-moisturizing regimen for reducing the incidence of skin tears within an aged care facility. Skin tears were found to be the most common wounds among the elderly in hospitals, residential facilities, and the community, and they are predominately located on the extremities (Carville et al., 2014). This study utilized a cluster randomized control trial within 14 residential aged care facilities in Western Australia. The intervention group received twice-daily application of Abena, a pH neutral, and perfume-free, moisturizing lotion. The lotion was applied in a downward direction in a gentle manner. Data was collected from October 2011 to

March 2012 and measurements included age, gender, high or low care, day and time of skin tear occurrence, anatomical location of skin tear, and STAR skin tear classification which classifies skin tears according to its characteristics such as loss of tissue and presence of hematoma or ecchymosis (Carville et al., 2014). There were 420 participants in the intervention group and 564 participants in the control group, most were female and over the age of 80. One hundred and seventy two residents developed skin tears from the intervention group and 252 residents developed skin tears in the control group (Carville et al., 2014).

Over a six-month period the control group developed 946 skin tears while the intervention group developed 450 skin tears. Extremities were the most common site of skin tears at 93.27% with the upper extremities totaling 53.8% and lower extremities totaling 39.47%. Upper extremity injuries were attributed to higher levels of dependent care the resident needed, while lower extremity injuries were attributed to bumps and falls of ambulatory residents in lower care areas (Carville et al., 2014). The main contributory factor for skin tears in both groups was found to be fragile skin followed by outcome of a fall and then poor skin turgor. The most skin tears occurred on Saturdays while the least occurred on Thursdays. Most skin tears occurred in the resident's room or bathroom during transfers or assistance with bathing (Carville et al., 2014). None of the facilities studied reported having a standardized skin moisturizing protocol that described the skin moisturizing lotion to be used or frequency of application. The study found that twice-daily application of moisturizer to the extremities of residents, as compared to usual skin care practices, reduced skin tear incidence by almost 50% (Carville et al., 2014). The study findings support the need for standardized twice-daily skin moisturizing protocols along with mandatory staff education on skin tears and their prevention (Carville et al., 2014).

Another study by Tayyib, Coyer, and Lewis (2015) found that ICU patients are at high risk for impaired skin integrity and pressure ulcer development and can benefit from a pressure ulcer prevention bundle. Care bundle refers to the implementation of a set of three to six mandatory interventions that are targeted toward a specific procedure, symptom, or treatment (Horner & Bellamy, 2012). Data was collected from October 2013 to February 2014 in two Saudi Arabian tertiary referral hospital intensive care units. The nurses assigned to care for the patients worked 8-hour shifts and had a minimum of a bachelor's degree, with 2-3 mechanically ventilated patients to one nurse. The prevention bundle implemented included risk assessment, skin assessment, skin care, nutrition, repositioning, support surface, education and training, and care of medical devices (Tayyib et al., 2015).

A skin assessment tool was used as well as pressure ulcer staging tools; the Braden Scale was used to determine risk of developing an ulcer and results were divided into 5 subcategories from no risk to very high risk. The Sequential Organ Failure Assessment (SOFA) scores were used to determine the patient organ function or rate of failure in the ICU, and scores for each organ ranged from 0 (normal) to 4 (most abnormal) (Tayyib et al., 2015). The pressure ulcer prevention bundle and standard skin care were measured using a checklist for compliance. The hospitals were randomized to either intervention or control arm of the study and there was no blinding. The researcher and a trained bedside nurse performed assessments every 48 hours (Tayyib et al., 2015).

ICU registered nurses were informed about the prevention bundle through in-service education with brochures, a PowerPoint presentation, and consultation and clarification with the researcher that established supporting data for the bundle. Follow up and feedback was performed monthly with the registered nurses to ensure compliance to the bundle (Tayyib et al.,

2015). Five pressure ulcers developed in 70 participants in the intervention group, while 23 pressure ulcers developed in 70 participants in the control group with the most common areas being the sacrum, then the heels. The average time for repositioning in the control group was every 4.67 hours and in the intervention group 85% of the patients were repositioned every three hours based on ICU policy. 97% of the participants in the intervention group had their heels supported via heel protectors while 0% of the control group did (Tayyib et al., 2015). This study resulted in increased compliance of most processes of care with implementation of the PU prevention bundle; patients who repositioned more frequently had an improvement in ongoing care regarding medical devices (assessment, repositioning, and securement), and the patients heels were elevated and supported with greater frequency (Tayyib et al., 2015). Therefore, this study supports the idea that using a bundle approach with regular education and follow up increases RN awareness, improves compliance, and reduces incidences of pressure ulcers in the intensive care unit (Tayyib et al., 2015).

Another article by Behrendt, Ghaznavi, Mahan, Craft, and Siddiqui (2014) found that continuous bedside pressure mapping significantly decreases the rates of hospital associated pressure ulcers in medical intensive care units. During a two-month period from August to September 2011, patients admitted to the medical intensive care unit were either assigned to a continuous bedside pressure mapping system bed or a control bed without the system. The study revealed that the intervention group had a rate of pressure ulcers at 0.3% and the control group had a rate at 5% (Behrendt et al., 2014). A pressure ulcer bundle was used for all patients as the standard of care, as well as the Braden Scale for risk assessment. All patients' skin was assessed every eight hours for areas of redness (Behrendt et al., 2014).

Prevention measures include pillows and wedges for support and bridging and encouraging patients to shift position every 15 minutes, if possible. They also turned patients every two hours. Any patient who received a Braden score of 18 or less on admission triggered the nurse-driven pressure ulcer prevention protocol. This included measurements of prealbumin and C-reactive protein, evaluation of need for a specialty bed, two-hour turning schedule, use of pillows and wedges, suspension of heels off of bed surfaces, limit to one hour in chair if patients cannot reposition themselves, and use of a static air seat cushion (Behrendt et al., 2014). The continuous bedside pressure mapping system consisted of a pressure-sensing mat and a control unit that provided digital images of areas of pressure and was placed over a mattress and under the standard bed sheet (Behrendt et al., 2014). The system measures twice per second to provide a live view of pressure. Red signifies high pressure of greater than 75 mm Hg and blue signifies low pressure of less than 10 mm Hg. The system also alerts the staff to turn the patients every two hours.

Two hundred and thirteen patients were enrolled in the intervention group and 209 were enrolled in the control group. 2 out of 213 patients in the intervention group contracted a hospital acquired pressure ulcer while 10 of 209 patients in the control group developed a pressure ulcer (Behrendt et al., 2014). There was a lack of blinding in this study and the patients were not assigned randomly due to bed availability. The results of this study cannot isolate a direct causality between the continuous bedside pressure monitoring technology and rates of hospital acquired pressure ulcers but the data does suggest that the use of this monitoring can be useful when added to the current pressure ulcer prevention protocols (Behrendt et al., 2014).

Another study by Grap et al. (2016) included 150 intubated and mechanically ventilated adult patients from a medical respiratory ICU, surgical trauma ICU, or neuroscience ICU in a

933 bed tertiary care, Mid Atlantic urban university medical center. Tissue interface pressure was measured using the XSENSOR pressure mapping system that was placed beneath a hospital sheet. The focus was on the seven most common pressure ulcer sites: left and right scapula, left and right trochanter, sacrum, and left and right heel. Three maximum pressure levels documented were greater than or equal to 32, 45, and 60 mmHg (Grap et al., 2016). Patients were enrolled in the study within 24 hours of intubation so that baseline skin assessments could be obtained using the national pressure ulcer advisory staging system and the Braden Scale for risk factors. Interface pressure was measured over a continuous 72-hour period while the patient was mechanically ventilated in bed (Grap et al., 2016). Skin assessments were performed twice-daily and the seven sites were observed for the first seven ICU days or until ICU discharge. There were only 12 participants who experienced skin changes during this study, however, five had skin changes at the time of enrollment. 32 mmHg was the pressure recorded that caused changes on the sacrum, while 45 mmHg caused changes on the trochanter. The trochanter was the location found to be above 60 mmHg pressure the greatest length of time. It was reported that in the setting pressure ulcer prevention strategies in use included a skin barrier (Mepilex, Molnlycke Health Care, Norcross, and GA) applied prophylactically to the sacral site for 97% of the subjects for at least one day during the study period (Grap et al., 2016). However, of the 14 changes identified during the study almost half were still found in the sacral region.

Another study by Bryne et al. (2016) examined the results of a prophylactic sacral dressing in high-risk intensive care unit patients on sacral and coccyx pressure ulcer development. The study suggested that the routine care of pressure ulcer prevention included repositioning, moisture management, support surfaces, and nutritional requirements. The study took place in an urban tertiary care academic medical center over three intensive care unit

categories. Several inclusion criteria and exclusion criteria were integrated to obtain a sample size of 243 patients; however, data was only received on 200 of those patients (Bryne et al., 2016). The Allevyn Gentle Border Sacrum Dressing manufactured by Smith & Nephew was used on all included patients at three-day increments and the skin underneath the dressing was assessed according to hospital policy (Bryne et al., 2016). All units reported decreased sacral pressure ulcer development from 3.4-7.6 per 1000 patient days, however a deep tissue injury did occur due to a dislodged sacral dressing (Bryne et al., 2016). Overall, the study found throughout the 7-month trial that the use of prophylactic sacral dressings decreased the incidence of pressure ulcers on the sacral, coccyx and buttock. However, limitations included lack of demographic information, non-randomization and incomplete documentation for several patients (Bryne et al., 2016).

Summary:

In summary, the inclusion of a twice-daily skin-moisturizing regimen was found effective for reducing the incidence of skin tears within aged care facilities (Carville et al., 2014). A pH neutral and perfume free lotion such as Abena would be an effective inclusion into skin care policies in intensive care units across the healthcare system. Special attention to skin integrity should be implemented during transfers and while in the patient's bathroom (Carville et al., 2014).

A pressure ulcer prevention bundle including assessment, skin care, nutrition, repositioning, support surfaces, education and training and care of medical devices was found to be effective in improving skin integrity in intensive care unit patient's (Tayyib et al., 2015). In-service education, PowerPoint presentations, and consultation along with monthly follow up was

found to be effective in implementing new skin care procedures and policies and increases compliance (Tayyib et al., 2015).

Continuous bedside pressure mapping significantly decreases the rates of hospital associated pressure ulcers in medical intensive care units when used alongside a pressure ulcer prevention bundle (Behrendt et al., 2014). Patients should also be encouraged to shift positions every 15 minutes if possible. The Braden Scale for risk assessment was also found to be the most efficient assessment form regarding admission assessment data collection.

The seven most common pressure ulcer sites determined by the XSENSOR pressure mapping system included the left and right scapula, left and right trochanter, sacrum, and left and right heel (Grap et al., 2016). Baseline skin assessments were again obtained using the Braden Scale for risk factors. The study determined that 32 mmHg was the pressure that caused changes on the sacrum while 45 mmHg caused pressure changes on the trochanter. The trochanter was the location found to have a pressure above 60 mmHg for the longest duration (Grap et al., 2016).

A prophylactic sacral dressing in high-risk intensive care unit patients placed on the scrum and coccyx was found to decrease sacral ulcer development from 3.4-7.6 per 1000 patient days (Bryne et al. 2016). During this study a deep tissue injury occurred due to displacement of the dressing, therefore careful monitoring of the prophylactic dressing must take place every shift.

## Proposed Policy

The current policy used by the local hospital states under section 1 a: “On admission, a comprehensive skin assessment (head to toe skin inspection) is performed, with a targeted focus on the patient’s bony prominences, which are at greatest risk for pressure ulcer occurrence. A

consultation with a registered nurse for assessment may be utilized to ensure a thorough baseline assessment."

- I proposed that section 1a include the seven most common pressure ulcer sites found throughout my research to bring special attention to these sites during assessment. The new policy if reformed would read "with a targeted focus on the patient's bony prominences including the left and right scapula, left and right trochanter, sacrum, and left and right heel (Grap et al., 2016).
- Another proposal I made was to integrate a cosignatory aspect of the admission assessment with another registered nurse (RN). Another RN should cosign with the admitting RN that the comprehensive skin assessment was performed, as stated in the local hospitals policy. To integrate communication between interdisciplinary team members a respiratory therapist should be consulted for ventilator dependent patients. Respiratory therapists (RT) will work with the RN to establish a turning schedule and provide assistance with mechanical devices during the turning session. The RT should round at least once per shift with the RN for all ventilator dependent patients. A nutritionist consult should also be provided for every patient, and a cosignature provided with the RN on admission assessment. As defined by Byrne et al., (2016) nutrition parameters for pressure ulcer risk include prealbumin less than 20 mg/dL, albumin less than 2.5 g/dL, or nothing by mouth longer than 3 days. Underweight patients are defined by a body mass index less than 18.5 and morbidly obese patients are defined by a body mass index greater than 40 (Bryne et al. 2016). Any patient who falls within these guidelines should have a nutrition follow up weekly throughout the hospital stay and discharge, according to the guidelines stated by Bryne et al., (2016).

Section 1 h refers to ongoing daily shift assessment and states “with every 12 hour shift assessment, nursing will assess the patient’s skin integrity and document findings in the daily/shift assessment section of the patient’s EMR. The twelve-hour shift assessment is validated by several research studies as being effective for proper monitoring of skin integrity (Bryne et al. 2016).

- I proposed a section of the patient’s EMR be created to document that dressings are in proper alignment and placed over the wound area. A study by Byrne et al. (2016) found that a deep tissue injury developed due to a dislodged sacral dressing. Therefore the status of dressings and their placement should be recorded every shift.

The current policy classifies moisture associated skin damage as incontinence associated dermatitis, intertriginous skin damage (within skin folds), periwound kin damage due to excess wound drainage on skin, and peristomal skin damage due to leakage of ostomy effluent onto skin. However there is no reference to moisturizing agents being used on the patient’s skin to promote integrity.

- I proposed that a moisturizing routine be established for each patient per shift. A study by Carville et al. (2014) found that a twice-daily skin moisturizing regimen with a pH neutral, perfume free, moisturizing lotion reduced skin tear incidences by 50 percent. Staff should also ensure they use turning sheets to align patients as most skin tears in critically ill patients in this study were found on the upper extremities due to repositioning and poor skin integrity (Carville et al., 2014).

The current policy under section 3 a-d defines pressure ulcers according to the National Pressure Ulcer Advisory Panel 2014 guidelines including staging, medical device related pressure ulcers, and classification of wound as well as signs and symptoms of wound infection.

- The hospital should implement a quarterly educational session regarding pressure ulcer staging as defined in section 3 a-d. In-service education should include how to identify and stage ulcers as well as education regarding the alignment and pressure-reducing device application, long-term care policy held by the hospital. A study by Tayyib et al., (2015) found that through in-services, meetings, and one-to-one bedside education provided by the researcher, continued throughout the study, increased compliance and integration of their proposed skin care bundle throughout the unit was successful. Another study by Behrendt et al., (2014) found that of the pressure ulcers developed in the intensive care unit during their measured time frame, all were staged at stage 2. With this finding, the hospital should implement teaching strategies that prevent stage one pressure ulcers from becoming stage two, such as applying a cradle boot, or wheelchair cushions which are listed in the alignment and pressure-reducing device application policy. Teaching should also focus on prevention of further developing pressure ulcers.

Overall, the hospital included in this study has a strong evidence-based skin care policy that is effective in reducing pressure ulcers and promoting skin integrity. Only minor adjustments are needed to increase the strength of the policy.

## Implementation

A ten-minute informational session over the bundle in appendix A was presented to the hospital to implement within their medical intensive care unit. Nurses were encouraged to refer to the bundle with any newly admitted patient as well as current patients. The recommended intensive care unit skin care bundle is listed below in appendix A and describes all recommended modifications to the current hospital's policy.

## Discussion

The skin care research was presented to a medical intensive care unit staff and coordinators in a rural western Kentucky hospital. A lecture presentation along with question and answer session was provided. It is unclear at this time if this research resulted in a change in policy for the hospital, or if any aspects of the proposed bundle were implemented into care. Further study could be performed to measure whether implementation of this bundle provided decreased numbers of hospital-associated pressure ulcers in the specific intensive care unit in question. A study could be performed regarding the intensive care unit and coronary care unit whom both serve critically ill patients within this hospital. One unit could provide the newly suggested skin care plan and the other could provide current skin care policies to determine effectiveness of the bundle. Limitations to this study included no implementation measurements provided to determine if this bundle specifically decreased incidences of pressure ulcers within this intensive care unit.

## Conclusion

This study was conducted to thoroughly evaluate a local rural hospital's skin care policy for validation and evidence based inclusions. A review of literature was completed and suggestions related to findings were incorporated into the hospital's policy. A 10-minute presentation was completed within the intensive care unit of the hospital and those in attendance included registered nurses as well as directors of the unit. The material covered included findings of the literature review and suggestions for inclusion in the skin care policy. It was determined that interdisciplinary team members as well as prophylactic dressings and increased monitoring included in the care of the patient would improve outcomes and skin integrity of intensive care unit patient's.

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## Appendix A

Intensive Care Unit Skin Care Bundle

Admission:

- Performed head to toe skin assessment including a focused assessment on the bony prominences areas of the left and right scapula, left and right trochanter, sacrum, and left and right heel (Grap et al., 2016).
    - Two nurses required to cosign to ensure validity of assessment data.
- Nutritionist consult
    - Byrne et al. (2016) states skin pressure risk high if any of the following are determined:
        - Prealbumin < 20 mg/dL
        - Albumin < 2.5 g/dL
        - Nothing by mouth status > 3 days
        - Underweight: BMI < 18.5
        - Overweight: BMI > 40
    - If any of the above criteria is established on admission, a nutritionist consult will be provided weekly including family and RN until discharge from intensive care services.
- Respiratory Consult
    - If the patient is reliant on mechanical ventilation, the RN will consult RT to establish a turning schedule with the RT present.
    - The RT will assist in the turning session by helping manage the mechanical ventilation tubing at least once per shift.
    - The RT will perform one-to-one bedside teaching with the RN regarding the mechanical ventilation and proper control during turning.
    - Placement of mechanical ventilation will be verified after each turning session.
- Use of the Braden Scale to assess risk for pressure ulcer development
    - Areas to be assessed: sensory perception, moisture, activity, mobility, nutrition, friction/shear
    - Score Range:
        - 19-23: no risk
        - 15-18: low risk
        - 13-14: moderate risk
        - 10-12: high risk
        - 9 or less: very high risk
    - “General Braden Scale Focused Interventions” and/or “Wound Order Set” will be provided if the patient scores equal to or less than 18 or a 1-3 in any of the above subsets. A facility specific Visual Cue tool for at risk patients will also be placed in the patients room.

Per Shift:

- Assess skin integrity and document findings in the daily/shift assessment section of the patient’s EMR.
- Assess status and position of all dressings and record in the EMR (Byrne et al., 2016).
- Use of the Braden Scale to assess risk for pressure ulcer development
    - Areas to be assessed: sensory perception, moisture, activity, mobility, nutrition, friction/shear

    - Score Range:
        - 19-23: no risk
        - 15-18: low risk
        - 13-14: moderate risk
        - 10-12: high risk
        - 9 or less: very high risk
    - "General Braden Scale Focused Interventions" and/or "Wound Order Set" will be provided if the patient scores equal to, or less than 18, or a 1-3 in any of the above subsets. A facility specific Visual Cue tool for at risk patients will also be placed in the patient's room.
- Nurse should initiate turning schedule every 1-2 hours and set audible timer for assigned patient rooms to ensure compliance with schedule.
- Moisturize the patient's skin using a hospital-approved agent once per shift with regard to the upper and lower extremities (Carville, Leslie, Osseiran-Moisson, Newall, & Lewin, 2014).
- Respiratory Consult
    - If the patient is reliant on mechanical ventilation, the RN will consult RT to establish a turning schedule with the RT present.
    - The RT will assist in the turning session by helping manage the mechanical ventilation tubing at least once per shift.
    - The RT will perform 1-1 bedside teaching with the RN regarding the mechanical ventilation and proper control during turning.
    - Placement of mechanical ventilation will be verified after each turning session.
- Prophylactic Sacral Dressing
    - At risk patients or those determined appropriate by a wound and ostomy care nurse for a prophylactic sacral dressing of the hospitals choosing will have the dressing applied and changed every three days.
    - With each shift the nurse should peel back the dressing to inspect the underlying skin.
    - If any changes from baseline are present or soilage of dressing, remove the dressing and consult he WOCN for evaluation.
    - Bryne et al., (2016)

Per Quarter

- The RN will attend an in-service educational program and 1-1 bedside teaching regarding pressure ulcer staging as defined by the Maintenance of Skin Integrity policy section 3 a-d. Education will also include the alignment and pressure-reducing device application, long-term care policy held by the hospital. The nurse will demonstrate competency in staging ulcers as well as pressure prevention device application. Educational sessions will also refer to specific strategies based on hospital policy to prevent stage 1 ulcers from developing into stage two ulcers.

Report Immediately

- Presence of new or acquired pressure ulcer/wound following daily assessment
- Signs and symptoms of wound infection
- Elevated temperature
- Abnormal lab data results

- Worsening of existing pressure ulcer/wound
- Change in treatment is required based on assessment