

# Reduction of Sacral Pressure Ulcers in the Intensive Care Unit Using a Silicone Border Foam Dressing

Nancy Chaiken

**PURPOSE:** We sought to determine if a silicone border foam dressing could decrease the incidence of sacral pressure ulcers in an intensive care unit.

**SUBJECTS AND SETTING:** The study setting was an intensive care unit located in a 303-bed hospital with a designation of level 2 trauma. The unit specializes in the care of critically ill medical and postoperative adults. Two hundred seventy-three patients participated in the study; their mean age was 65 years (range, 18-105 years).

**METHODS:** Baseline sacral hospital-acquired pressure ulcer (HAPU) incidence was determined during a period of 35 months; skin care representatives examined all patients in our critical care unit for HAPUs on a monthly basis. Based on this baseline incidence, we studied the effect of application of a silicone-bordered foam dressing applied to the sacrum. The observation period for our study intervention was 6 months; the sacral area was examined twice daily during this period.

**RESULTS:** The average baseline sacral HAPU prevalence during the 35-month observation was 13.6% as compared to an incidence of 1.8% during a 6-month prospective study. Three of the 5 patients developed suspected deep tissue injuries and subsequently expired. The remaining 2 subjects developed stage 2 pressure ulcers, one of whom also expired.

**CONCLUSION:** Following application of a silicone-bordered foam dressing, we were able to achieve a HAPU of 1.8%.

## Introduction

According to the Agency for Healthcare Research and Quality, there was an 80% increase in hospitalized patients with pressure ulcers between 1993 and 2006.<sup>1</sup> Intensive care unit (ICU) patients are typically at a higher risk for developing hospital-acquired pressure ulcers (HAPU) owing to their high acuity of illness and the presence of multiple comorbid conditions. Additional factors associated with an increased risk for HAPU in the ICU include mechanical ventilation, vasopressor requirements, moisture trapping, and possible shear factors when repositioning a patient.<sup>2</sup> Critically ill patients are also at increased

risk for pressure ulceration because they are unable to verbalize discomfort due to altered mental status or sedation.<sup>3,4</sup> The Braden Scale for Pressure Sore Risk is a validated tool often used in the ICU to assess pressure ulcer risk. However, the National Database for Nursing Quality Indicators (NDNQI) data reveal that the average Braden Scale score of an ICU patient is 15 as compared to 19 on general medical-surgical units, indicating a generally high risk for HAPU among critically ill patients.<sup>5</sup>

At Swedish Covenant Hospital, we experienced an ongoing problem of sacral HAPU in our ICU despite aggressive prevention practices and ongoing education about prevention of sacral wounds. Ultimately, we concluded that conventional preventative measures were insufficient to meet the needs of our ICU population. Other institutions have also faced this issue. For example, a quality improvement project at the Virginia Commonwealth University Health System measured a reduction in the incidence of HAPU following application of a silicone border foam sacral dressing in 41 patients.<sup>6</sup> We therefore elected to study the effect of a silicone dressing applied to the sacrum for prevention of sacral pressure ulcers. The aim of our study was to determine if the use of a silicone border foam dressing in the general ICU population could reduce the incidence of sacral HAPUs.

## Background

While not all HAPU are avoidable, efforts can be implemented to dramatically reduce their occurrence.<sup>3,7</sup> Our facility's Board of Directors identified reduction of HAPUs

■ Nancy Chaiken, ANP-C, MS, RN, CWOCN, Swedish Covenant Hospital, Chicago, Illinois.

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**Correspondence:** Nancy Chaiken, ANP-C, MS, RN, CWOCN, Swedish Covenant Hospital, 5145 N California Ave, Chicago, IL 60625 (nchaiken@schosp.org).

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in the ICU as a goal; specifically, they charged staff with decreasing the incidence of sacral HAPU in the ICU from 12.3% to 5.9% within 1 year. As part of the goal to reduce HAPU in early 2008, we replaced standard mattresses with the Accumax Complete low air loss mattresses (Span-America Medical Systems Greenville, South Carolina) as part of a facility-wide initiative to reduce HAPU. Turning and repositioning compliance was reported at 100%. Additional prevention practices included the use of a moisture barrier petrolatum ointment after each incontinent episode. Kendall's Wings Plus incontinence pads (Kendall Healthcare, Mansfield, Massachusetts) were used to contain incontinence episodes. The nursing staff also had access to a bowel management system for collection of liquid stool. This device was inserted at the nurse's discretion with a physician order. Annual educational competencies were provided by the certified WOC nurse and unit educator. While these preventive interventions reduced the HAPU incidence on our medical/surgical units, they did not affect the incidence of sacral HAPU.

## Methods

The study was conducted at Swedish Covenant Hospital in Chicago, Illinois, a community-based, level 2 trauma, 303-bed hospital. The ICU specializes in the care of critically ill adults with a variety of disease processes ranging from systemic inflammatory response syndrome and multiple system organ dysfunctions to postoperative patients following cardiac procedures and craniotomy. Study procedures related to application of the sacral dressing and measurements of outcomes were approved by our institutional review board.

We used a nonexperimental prospective design for data collection. We initially measured the prevalence of sacral HAPUs over a 35-month period by examining each patient's skin monthly as part of our quality indicators. These measurements are a component of our standard facility protocols and were used as a comparison for data collected during our study. All pressure ulcers were reported to the skin care committee in a written document supplied by NDNQI and subsequently verified by a WOC nurse. Ulcers that were present on admission were not counted as part of sacral HAPU.

Prior to the initiation of the prospective study, the staff was in-serviced on application and use of the silicone border foam dressing. In-servicing on application and use of the Mepilex Border Sacrum 9.2" × 9.2" manufactured by Molnlycke Health Care, Norcross, Georgia, was completed. Subjects' sacral skin was examined every shift by the nursing staff within each 24-hour period by peeling back the silicone dressing and inspecting the underlying skin. Our study protocol called for changing the dressing twice a week on prescheduled days, but more frequent changes were often required due to incontinence and diaphoresis. The WOC nurse was alerted of any sacral skin alternation

and was then able to determine if the skin changes were due to pressure or other factors such as incontinent dermatitis. This inspection was used to determine sacral HAPU incidence over a 6-month period.

We also provided an educational session for staff who reviewed our defined skin care regimen, proper completion of the Braden Scale, and additional preventive interventions including turning and repositioning patients on a regular schedule every 2 hours. Key educational topics included skin assessment, the need to implement small body shifts using a wedge pillow on patients previously considered too unstable to turn, and head-of-bed elevation not greater than 30°. The WOC nurse visited the unit daily to assure adherence to the dressing application protocol and also to encourage nurses to adhere to turning and repositioning schedules. All patients were placed on a low-air loss pressure-reduction mattress noted earlier; these mattresses were owned by the hospital and not rented.

## Data Analysis

Baseline sacral HAPU prevalence was measured over a 35-month period. Sacral HAPU incidence was measured during a 6-month prospective data collection period.

## Results

The sacral HAPU prevalence in our ICU during the 35-month observation period was 12.3%. The silicone border foam dressing was applied to 273 patients in the experimental group; 2 patients refused to participate. The comparison group consisted of 291 patients. Participants had a mean age of 65 years (range, 17-105 years) (Figure). Diagnoses and length of ICU stay were comparable to those of the patient population from the previous 35 months. Nurse to patient ratio in the ICU remained constant. Total cost of the dressings during the 6-month period was \$6653.00.

Five patients developed sacral HAPU during the 6-month treatment period. All sacral HAPU wounds occurred during the first month of prospective data collection.

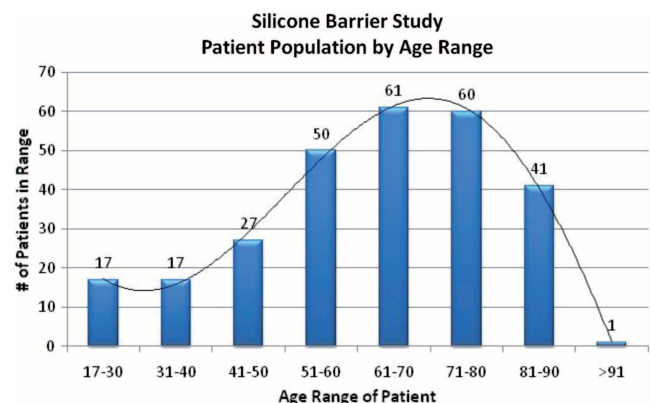


FIGURE. Study intervention subject age ranges.

Three patients were found to have deep tissue injuries and subsequently expired; the remaining 2 developed stage 2 pressure ulcers, one healed and the other patient expired. Fewer patients in the treatment group developed sacral HAPU when compared to the baseline prevalence measured during a 35-month observation period.

## ■ Discussion

In a climate of health care cost reduction and liability, it is imperative that the incidence of HAPUs is reduced. Swedish Covenant Hospital ICU was able to reduce the sacral HAPU incidence in our ICU to 1.8% by utilizing the silicone border foam dressing when compared to baseline prevalence rates measured over a 35-month period. These results are comparable to those reported by Brindle,<sup>6</sup> using a group of critically ill patients cared for at the Virginia Commonwealth University Health Systems.

Our findings raise several questions. What is the influence of shear, friction, and moisture on sacral pressure ulcer development in the critically ill patient? The second question is: what is the role of the ICU nurse in pressure ulcer prevention practices and how important do they consider skin breakdown? Did the increased attention to the sacral area with dressing application and maintenance of the dressing contribute to the reduction of pressure ulcers? These questions also highlight the need for WOC nurses to display a strong presence in the ICU arena with the possibility of one WOC nurse on that dedicated unit. Typical strategies to reduce friction include the use of turning sheets, heel protectors, and a 30° head-of-bed elevation. Shear and friction skin injury creates a process in which the epidermal and dermal layers adhere to bed surfaces causing destructive events to the underlying areas of the skin.<sup>8</sup> Excessive moisture results in hyperhydration of the skin, rendering it more vulnerable to dermal erosion, and an increased risk for pressure ulceration via mechanisms that are not well understood.<sup>9</sup> We believe that the use of the silicone border foam dressing reduced the incidence of HAPU by creating a waterproof seal and diminishing the magnitude of shear and friction created by moving patients in bed or patient movement when the head of the bed is elevated.

We also observed that 4 of 5 patients who developed sacral HAPU during our prospective observational period died. Three of these patients experienced suspected deep tissue injuries. This finding might signify that those patients who are critically ill may be at increased risk for developing skin failure and HAPU during the end of life.

## Limitations

Because we initially measured sacral HAPU, using NDNQI procedures as compared to measuring HAPU incidence during this prospective observational study, we are not able to directly compare results using inferential statistics. We also acknowledge that our educational intervention may have influenced results. In addition, we acknowledge that daily visits to the ICU by the WOC nurse might have encouraged nurses to turn patients more frequently than the pretreatment group.

## ■ Conclusion

Evaluation of sacral HAPU prevalence over a period of 35 months revealed a prevalence rate of 12.3%. We measured a HAPU incidence of 1.8% during a 6-month prospective study. These findings suggest that routine application of the sacral dressing may have reduced the incidence of HAPU in our ICU. While routine use of a silicone border foam dressing should not be the only intervention employed to reduce sacral HAPU in the ICU, it should be considered when traditional preventive interventions such as routine turning and repositioning and use of pressure redistribution surfaced prove ineffective or only partly effective.

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