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Using Conformational Positioning to Reduce Hospital-Acquired Pressure Ulcers

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Prevention of pressure ulcers is an ongoing concern. This article reports on the evaluation and usage of a new positioning device that adapts to the contours of the body and led to a decrease in the incidence of nosocomial pressure ulcers in a cardiothoracic intensive care unit. **Key words:** *hospital-acquired pressure ulcers*, *nosocomial*, *positioning devices*, *pressure ulcers*, *prevention of pressure ulcers*

WITH an increase in regulatory oversight and pressure ulcers considered a medical error, a reduction in hospital-acquired pressure ulcers is a major concern for hospitals. Public reporting of quality indicators, which include pressure ulcers, has increased awareness of events that may adversely affect a patient's ability to heal and recover from a hospitalization. With the most recent update in 2011, the National Quality Forum has revised the list of "never events" to include 29 events that are divided into 6 categories: surgical, product or device, patient protection, care management (which include pressure ulcers stage III and higher), environmental, radiologic, and criminal.[1]

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The Institute for Healthcare Improvement launched its 5 Million Lives Campaign in December 2006 through December 2008, with a goal of the reduction of 5 million instances of patient harm, including reduction of hospital-acquired pressure ulcers. Prevention of pressure ulcers was determined to be achievable with the use of science-based guidelines, and the Institute for Healthcare Improvement set the goal of zero-pressure ulcers.[2] The Centers for Medicare & Medicaid Services no longer reimburses hospitals for the care of patients who develop a stage 3 or higher pressure ulcer during their hospitalization.[3] The American Hospital Association estimated the national costs of inpatient hospital care of $940 billion in 2006, and potentially preventable complications are estimated to add 9.4% to 9.7% to hospital inpatient costs.[4-7] In hospitalized adults, the additional primary or secondary diagnosis of pressure ulcer cost $11 billion in 2006.[8]

For the patient, pressure ulcers result in excessive pain, suffering, and increased cost of care with extended days of hospitalization. Because of the impact of the new legislation, reimbursement changes, and the negative effects of skin breakdown on patient care, efforts were put into place in our hospital

system to evaluate products and techniques that would be beneficial for patients in protecting their skin from harm.

CHALLENGES

As the acuity of patients increased in our hospital, so did the incidence of skin breakdown and the development of full-thickness pressure ulcers in our hospital's cardiothoracic intensive care unit (CTICU).[9] The need to provide the best patient care resulted in an assessment of our incidence and prevalence data. Our intensive care units (ICUs) historically have had a higher incidence of hospital-acquired pressure ulcers, and the complexity and comorbidities of patients were cited as the reasons these numbers were higher in the ICUs versus the medical-surgical units. Our facility began to investigate interventions that were in place in the ICUs to prevent hospital-acquired pressure ulcers.[10-17] When discussing potential issues affecting our prevention efforts, turning and positioning challenges were a factor cited frequently by staff. In reviewing the positioning devices in use, pillows were available on the unit, but each pillow differed in their thickness. Some of the pillows available to use as positioning devices were new and thick while others were older and flat. Flat pillows were usually folded in half to assist in decreasing pressure between the knees. Wedges were also used as a positioning device, but some patients complained they were too hot, and rashes were noted on a few patients' skin after removal. Even though these solid foam wedges were enclosed in a pillowcase to cover the vinyl cover, skin changes were noted. Staff theorized that the wedges did not breathe and might be the cause of the skin irritation as more moisture was noted on the skin after the wedge was removed.

Staff dissatisfaction with the use of vinyl covered foam wedges and the varying thickness levels of pillows led to a search for alternative devices. When researching devices commonly used in the positioning of patients, we enlisted the assistance of our physical therapy department.[18-20] Sharing expertise and information revealed that there were few options in products at that time other than the current foam wedges and pillows that we were using. A literature search revealed the same results.

In the CTICU, the most common sites for hospital-acquired pressure ulcers were the sacrum and buttocks followed by heels and trochanters. In 2007, the incidence of hospital-acquired pressure ulcers was 49 for the year, and the staff members were frustrated that despite their best efforts, the rate had continued to increase from the 34 patients who developed a pressure ulcer in 2006.

PURPOSE

A decision was made to understand how turning and positioning were being implemented in our ICUs and whether we could reduce the incidence of hospital-acquired pressure ulcers. The CTICU was identified as the unit to begin this performance improvement project. Our goal was to determine whether an alternate positioning device would assist in reducing hospital-acquired pressure ulcers in this unit.

BACKGROUND

The CTICU is a 22-bed surgical ICU dedicated to the care of the pre- and postoperative cardiac surgical patients, as well as thoracic surgery patients. Admission criteria include patients requiring cardiopulmonary bypass such as coronary artery bypass, valve replacements/repairs, aortic aneurysms/dissections, thoracic procedures, sternal wound debridements, and flaps. All patients require postoperative mechanical ventilation, and some may need assistance such as intraaortic balloon pump, ventricular assist device, and continuous renal replacement therapy. Many of these patients require the administration of 1 or more vasopressors, vasodilators, inotropes, sedation, and analgesia. The vulnerability of the cardiothoracic patient to skin breakdown encompasses many variables: age, nutritional status, continence, comorbidities,

postsurgical course/complications, postsurgical hemostasis, and mobility.

The usual staffing is 1 registered nurse (RN) per 2 patients. Patients who are on several vasoactive medications such as epinephrine, norepinephrine, or vasopressin, or with complex issues requiring additional therapies (eg, intra-aortic balloon pump) would have 1 RN assigned to that patient only. The Total Care SpO2RT® (Hill-Rom Company, Evansville, Indiana) Pulmonary Therapy beds are the standard ICU beds as these surfaces were originally selected for their patient benefits in the pressure redistribution properties and pulmonary toileting features. Turning and positioning are done at a minimum every 2 hours and more frequently as needed. Of note, though, after certain cardiac procedures, patients may not be moved for up to 72 hours. Loss of skin integrity due to prolonged exposure to moisture has been an ongoing issue in this unit and other ICU units in our hospital.

A device that had been introduced into our health system's neonatal intensive care units to provide Conformational Positioning for the neonate was selected to compare with our present system of pillows and foam wedges. Conformational positioning has been defined as "the ability to 3 dimensionally contour to a patient's body while simultaneously providing the necessary support to maintain a therapeutic position."[5] This fluidized positioning device (FPD) is composed of a fluidized medium surrounded by a flexible membrane of urethane. A fluidized medium has been defined by the manufacturer (Sundance Solutions White Plains, New York) as a material that is, by definition, not a fluid but functions like a fluid when acted on by an outside force. The positioner is unique in that it possesses characteristics that include no predisposition to a shape. This allows the product to conform to the patient, promoting neutral alignment that is specific to each patient.

METHODS AND EVALUATION

For the purpose of the study, the medium size (measuring 25″ × 36″) was selected as this device corresponded with our average pillow size (measuring 20″ × 26″) in length and width that staff was presently using. This positioning device was to be used for side-to-side turns and heel elevations. Education was provided to all staff in the unit, and an evaluation tool was devised to assess the device's ease of use, versatility in meeting various body types and sizes, maintenance of patient in a desired position, and keeping the skin intact. The goal was to evaluate the product in 20 patients for the time period they remained on the unit. The duration of this study encompassed approximately 4 months, and over this time it allowed for input from a majority of the unit's staff, both RN and patient care associates.

The patients chosen for these evaluations had decreased mobility or were unable to independently turn and position, making them most vulnerable to pressure ulcers. Many of the patients had undergone open heart surgery and, because of various factors, remained intubated or sedated, or required vasopressors. Although the patients were unable to verbalize comments to the staff, nurses were cognizant of patients' discomfort and nonverbal signs of pain.

FINDINGS

Staff needed education to use the device appropriately. Pillows and wedges are meant to hold a position but do not interact with the body. The FPD needed to be placed flat alongside the patient, and then the patient had to be rolled back onto the device. After the patient was turned on the device, staff was then encouraged to push in on the FPD to allow the material to contour to the shape and presentation of the body. Without this step, the conformational aspect of the device was not achieved. Figures 1 and 2 demonstrate the use of the device.

During the evaluation, staff found that the FPD did not slide out from its position. When a patient was turned onto the device and it was molded around the body's contours, there was no movement of the device out of that position. For those patients who were

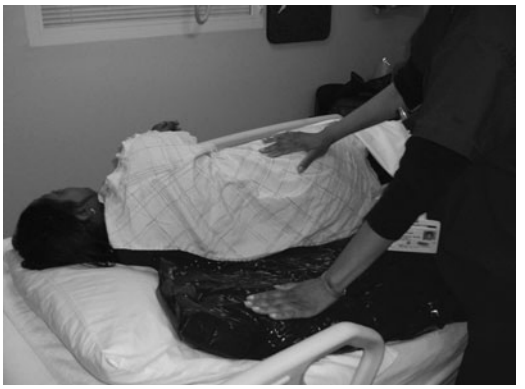

Figure 1. Initial placement of fluidized positioning device.

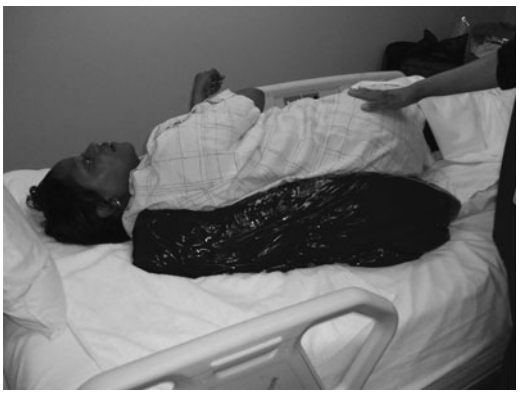

Figure 2. Patient positioned on fluidized positioning device.

prone to frequent movements, the ability of the device to remain in place was an asset in positioning. Staff assessed that patients were more comfortable and not as likely to move in the bed, potentially reducing friction and shearing's deleterious effects on the skin. When patients were placed on their backs, the staff used the FPD under their legs to elevate their heels. Staff again noted that the FPD did not slide out from their legs. Advantage of using the device was its ability to conform to the body and yet not to have a memory when used for a different turn cycle.

There were no moisture concerns with the use of this device as we had seen with foam devices. We also did not observe any skin changes with its use. Initially, the staff expressed concerns about the weight of the FPDs in comparison to the weight of the foam wedges and pillows; however, as the staff became comfortable with the device, its weight was not an issue. The staff evaluated the use of the positioning device with 20 patients, using a scale of excellent to poor. More than 70% of the staff rated the versatility of the device, ability to maintain the patient's position, and ability to keep the skin intact as excellent. In terms of ease of use, 60% of the staff rated it was excellent and 35% as good.

Initial rates of pressure ulcers in 2008 (n = 22) had shown a decrease of 45% over the same period in 2007 (n = 49) in the CTICU after introduction of these devices. Approximately $10 000 was spent on the purchase of these devices. The following years have shown a continuous decrease in hospital-acquired rates of pressure ulcers except for the year 2010. In that year, several factors affected the acuity of the patients such as an increased length of stay. For example, patients undergoing repair of aneurysms (dissections) resulted in a 50% increase in the length

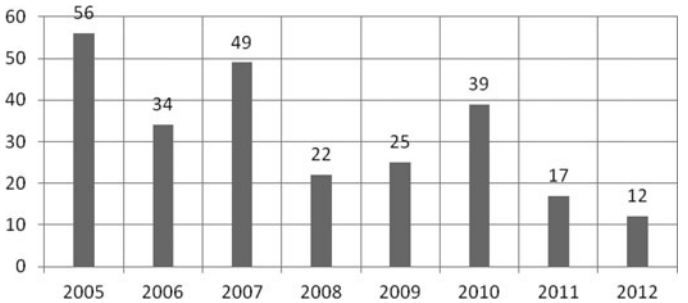

Figure 3. Rate of hospital-acquired pressure ulcers by year in the cardiothoracic intensive care unit.

of stay within the unit. The incidence of hospital-acquired pressure ulcers is reported in Figure 3.

We also noted a decrease in the incidence of hospital-acquired pressure ulcers on the sacrum and buttocks. In 2007, 39 patients had developed a sacral pressure ulcer, and this number has decreased yearly (with the exception of 2010 when 28 patients developed a sacral pressure ulcer) to 9 patients in 2012. We have been successful in decreasing pressure ulcers on the buttocks from a high of 8 patients in 2007 to zero incidence for the past 2 years. During this same time frame, we found a decrease in full-thickness pressure ulcers (stage III and higher) as well and are continuing our preventive efforts to decrease these rates overall.

Costs

The initial cost of the FPDs (approximately $175 per device) was higher than the costs for a pillow ($6) and a wedge ($25). As the cost of these devices would be absorbed under the unit's budget, there was an initial concern about costs. Using the benchmark of the cost of care for one pressure ulcer estimated at $3500 up to $60 000 for a full-thickness stage IV pressure ulcer,[6] outlay cost of these devices was inconsequential in the long term.

DISCUSSION

The use of this fluidized positioner has been implemented in the unit and introduced into the other ICUs. Initially because of costs, the FPDs were used only in the ICUs with patients who met certain criteria such as Braden Scale score fewer than 18 and older than 60 years of age, among others. However, within the first year of usage, we eliminated these criteria after observing a decrease in the incidence of hospital-acquired pressure ulcers. We now use the FPDs in our ICUs for any patient who is at risk for developing a pressure ulcer. The incidence of pressure ulcers has continued to decrease in our ICUs. For example, the surgical intensive care unit has shown a decrease of 52% in hospital-acquired pressure ulcers from 2009 (n = 42) to 2012 (n = 20), and the medical intensive care unit has a decrease of 27% from 2009 (n = 30) to 2012 (n = 22).

Families are satisfied with the device as patients report increased comfort when being positioned. We have taught families how to use the FPD and have sent them with the patients to their homes or rehabilitation facilities. The device maintains its effectiveness for 4 months and then begins to lose its moldability. After that time it no longer has the ability to contour as well to the shape of the body.

In addition to patients indicating that the FPD has increased their comfort, staff has reported the ability to easily position obese patients and patients expressing less discomfort during the process. Staff continues to favor the flexibility of the FPD, and the CTICU has maintained the decline in hospital-acquired pressure ulcers.

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