

# Evidence-Based Prevention of Pressure Ulcers in the Intensive Care Unit

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The development of stage III or IV pressure ulcers is currently considered a never event. Critical care patients are at high risk for development of pressure ulcers because of the increased use of devices, hemodynamic instability, and the use of vasoactive medications. This article addresses risk factors, risk scales such as the Norden, Braden, Waterlow, and Jackson-Cubbin scales used to determine the risk of pressure ulcers in critical care patients, and prevention of device-related pressure ulcers in patients in the critical care unit. (*Critical Care Nurse*. 2013;33[6]:57-67)

**T**he development of hospital-acquired pressure ulcers is a great concern in health care today. Pressure ulcer treatment is costly, and the development of pressure ulcers can be prevented by the use of evidence-based nursing practice. In 2008, the Centers for Medicare and Medicaid Services announced that they will not pay for additional costs incurred for hospital-acquired pressure ulcers.<sup>1</sup> The development of a stage III or IV pressure ulcer is now considered a “never event.”<sup>2</sup> This change has resulted in an increased focus on preventive strategies and institutional scrutiny of pressure ulcers that develop in patients after hospital admission. The cost of 1 stage III or IV pressure ulcer may be between \$5000 and \$50000.<sup>2</sup> The actual cost of pressure ulcers is not known because it is unclear what costs were included in estimates, such as nursing care costs, material costs, and added acute care days related to the development of a pressure ulcer.<sup>3</sup> In the intensive care unit (ICU), patients have multiple factors that increase the risk of pressure ulcers developing. Typically the patient has respiratory equipment, urinary catheters, sequential compression devices, multiple intravenous catheters, and the infusion of vasoactive agents for hypotension that may contribute to inability to turn patients and increase the risk of pressure ulcer development. This article discusses the multiple risk factors present in critical care for the development of pressure ulcers, current practices, and evidence for interventions aimed at preventing pressure ulcers.

## CNE Continuing Nursing Education

This article has been designated for CNE credit. A closed-book, multiple-choice examination follows this article, which tests your knowledge of the following objectives:

1. Identify factors that place critically ill patients at increased risk for pressure ulcers
2. Describe the pressure risks associated with commonly used devices in the critical care setting
3. Apply evidence-based strategies for the prevention of pressure ulcers in critical care patients

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**Table 1** Classification of pressure ulcers

Classification	Description
Stage I	Nonblanchable area of redness over a bony prominence. If a stage I pressure ulcer is suspected, the nurse should reevaluate the reddened area at the next skin inspection or turning activity to determine if the redness is still present. Reactive hyperemia is a common condition that occurs with localized tissue pressure such as occurs when legs are crossed, and normal tissue colors returns when the pressure is relieved. If the reddened area is still nonblanchable, it should be considered to be a stage I pressure ulcer.
Stage II	Partial-thickness skin loss (limited to the epidermis) that may be described as a clear fluid-filled blister or shallow wound with a pink-red wound base.
Stage III	Full-thickness wound, loss of the epidermis, and invasion into the dermis. Stage III pressure ulcers do not involve loss of muscle, nor do they expose tendon, muscle, or bone tissue. In body areas that do not have subcutaneous fat layers such as the ears, nose, scalp, or malleolus, pressure ulcers that appear to be partial thickness should be considered a stage III pressure ulcer (Figure 1).
Stage IV	Full-thickness loss of the epidermis and dermis and extension into muscle layers. Bone, tendon, and muscle may be exposed. If cartilage, bone, or tendon is exposed in body areas that do not have layers of subcutaneous fat such as the ear, nose, scalp, or malleolus, the wound should be classified as a stage IV pressure ulcer. <sup>8</sup>
Unstageable	Ulcers in which the wound bed is covered with eschar or slough. Eschar is a hard, thick, black, brown, or tan scablike covering of the wound. Slough is a white, tan, gray, or green tissue or mucuslike substance covering the wound bed <sup>8</sup> (Figure 2).
Deep tissue injury	A bluish or purple area of discoloration over an area of pressure or shear that may also be described as a blood-filled blister.
Kennedy terminal ulcer	An ulcer that rapidly develops into a full-thickness wound. A pear, butterfly, or “U”-shaped ulcer in the sacrum, or a very small stage I or II area that rapidly progresses to a stage III or stage IV ulcer within hours.

### Incidence of Pressure Ulcers in ICUs

Multiple studies of the prevalence and incidence of pressure ulcers have been done. Prevalence studies involve a snapshot of current pressure ulcers in a given unit on a given day.<sup>3</sup> Typically, the hospital assesses all patients' skin to determine if each patient exhibits the physical signs of a pressure ulcer, and if so, the pressure ulcer is staged. The incidence of pressure ulcers indicates the number of patients in whom pressure ulcers develop in a given health care setting.<sup>3</sup> Multiple studies<sup>1,4-7</sup> show that the incidence of pressure ulcers in the ICU ranges from 10% to 41%.

### Classification of Pressure Ulcers

The National Pressure Ulcer Advisory Panel (NPUAP) revised its pressure ulcer classification in 2007<sup>8</sup> (Table 1). Previously, pressure ulcers were classified as stage I through stage IV, or as unstageable. In areas such as the heels, scalp,

malleolus, or ears, the lack of subcutaneous fat layers makes progression of pressure ulcers from stage II to stage III or IV a concern (Figures 1 and 2). A new classification, deep tissue injury, is now included. Suspected deep tissue injury is described as a bluish or purple area of discoloration over an area of pressure or shear that may be difficult to discern in patients with dark skin. It may also appear as a blood-filled blister. Deep tissue injury may develop into a full- or partial-thickness pressure ulcer.<sup>8</sup> The depth of injury in a suspected deep tissue injury may not be evident at the time of identification. This injury may resolve or develop into a stageable pressure ulcer. (Table 2 lists websites offering additional information and pictures of pressure ulcers.)

In 1989, Karen Lou Kennedy, RN, CS, FNP, first described a pressure ulcer seen in terminal patients receiving long-term care. This ulcer is a rapidly progressing pressure ulcer seen in terminal patients with hours or days before death.<sup>9,10</sup> The Kennedy terminal ulcer is not currently described in national or international pressure ulcer guidelines, but critical care nurses should be aware of this ulcer classification as a potentially unpreventable pressure ulcer that may be seen in patients in whom death is imminent. The Kennedy terminal ulcer is most often seen in patients admitted to the ICU from long-term-care

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**Figure 1** Stage III pressure ulcer on heel.



**Figure 2** Pressure ulcer with eschar and slough on heel.

facilities. I have seen 2 rapidly developing pressure ulcers with the butterfly pattern in patients with septic shock who died within hours of admission to the ICU.

### Pressure Ulcer Risk Assessment Scales

Multiple risk factor scales have been developed, but they do not reflect the additional risk factors present in the ICU. The most common risk scales used in the United States are the Braden Scale and the Norton Scale. These 2 pressure ulcer risk scales are recommended by the Agency for Health Care Policy and Research.<sup>11</sup> The most common pressure ulcer risk scales used in Britain are the Waterlow and Braden Scales.<sup>12</sup> The Jackson Cubbin Risk Assessment Score is a pressure ulcer risk tool specific to European critical care units (Table 3).

Other studies of risk factors have examined comorbid conditions such as diabetes and peripheral vascular disease, score on the Acute Physiology and Chronic Health Evaluation, ICU length of stay, presence of mechanical ventilation, use of sedatives, and the use of instruments to measure the pressure at the interface between bed and patient.<sup>13-18</sup> Unfortunately, the independent and dependent variables in these studies do not point to a single predictor for pressure ulcers in the intensive care environment. Researchers have also studied patients' mobility and risk for pressure ulcer development. Progressive mobility protocols decrease the risk of pressure ulcers developing, but do not address the inability of patients to follow a progressive mobility protocol owing to hemodynamic instability or other physical restraints.<sup>19</sup> Prolonged stays in the ICU are related to increased incidence of pressure ulcers, but study variables

**Table 2** Websites providing information on pressure ulcers

Website	Key information
<a href="http://www.npuap.org/resources.htm">http://www.npuap.org/resources.htm</a>	Pictures of various pressure ulcer stages Quick reference guide to evidence-based prevention Quick reference guide for treatment
<a href="http://woundconsultant.com/sitebuilder/staging.pdf">http://woundconsultant.com/sitebuilder/staging.pdf</a>	Pictures of pressure ulcer stages
<a href="http://www.slideboom.com/presentations/82699/Test-Your-Pressure-Ulcer-Staging-Skills">http://www.slideboom.com/presentations/82699/Test-Your-Pressure-Ulcer-Staging-Skills</a>	Self-test of staging pressure ulcers
<a href="http://emedicine.medscape.com/article/1293614-overview">http://emedicine.medscape.com/article/1293614-overview</a>	Pictures of pressure ulcers History and assessment factors Causes of pressure ulcers Nonsurgical treatment options for pressure ulcers
<a href="http://www.bedsorefaq.com/what-is-a-kennedy-terminal-ulcer/">http://www.bedsorefaq.com/what-is-a-kennedy-terminal-ulcer/</a>	Picture and information on Kennedy terminal ulcer
<a href="http://www.kennedyterminalulcer.com/">http://www.kennedyterminalulcer.com/</a>	Pictures for purchase only Current information on Kennedy terminal ulcer

**Table 3** Comparison of variables considered in various scales used to assess risk of pressure ulcers

Braden scale	Norton scale	Waterlow scale	Jackson Cubbin scale
Sensory perception	Physical condition	Sex	Age
Moisture	Mental status	Age	Weight
Activity	Activity	Build	Skin condition
Mobility	Mobility	Appetite	Mental status
Nutrition status	Continence	Nurses' visual assessment of skin condition	Mobility
Friction/shear		Mobility	Nutrition
		Continence	Respiration
		Factors contributing to tissue malnutrition	Continence
		Neurologic deficits	Hygiene
		Major surgery or trauma	Hemodynamic status
		Medication	

do not discriminate if increased length of stay is due to the patient's acuity or lack of bed availability in an appropriate lower level of care. Duration of mechanical ventilation is also associated with increased risk of pressure ulcer development.<sup>20-22</sup>

Variables in acuity in ICUs and lack of definitive studies addressing use of mechanical ventilation, vasoactive

In addition to pressure, moisture, friction, and shear contribute to the development of pressure ulcers.

medications, and mobility affect the results in studies of

pressure ulcer development. Even if the opinion is that a particular scale overestimates risk, it still identifies that the patient is at risk and encourages the use of preventive measures to prevent pressure ulcers from developing.<sup>23</sup> Research does show that increased nursing care directed at prevention decreases the development of pressure ulcers.<sup>20,21,23</sup>

### Individual Risk Factors and Strategies for Prevention of Pressure Ulcers

Pressure ulcers occur over bony prominences. The most common areas for pressure ulcers include the sacrum, coccyx, heels, and ear.<sup>1,4</sup> In addition to pressure, moisture, friction, and shear contribute to the development of pressure ulcers.<sup>3</sup> Pressure over a bony prominence causes tissue ischemia in the skin, muscle, and the fascia between the skin surface and bone. The pressure compresses small vessels and prevents both supply of oxygen and nutrients at the capillary interface as well as venous return of metabolic wastes. Metabolic wastes accumulate and cause local vasodilatation, which contributes to edema, which further compresses small vessels and increases edema and ischemia. Local tissue death then occurs, resulting in a pressure ulcer. Moisture contributes to maceration, which may make epidermal layers more vulnerable to breakdown from pressure.

Friction and shear may remove epidermal layers and make the skin more vulnerable to injury and pressure effects. Advanced age and nutritional deficiency also contribute to risk for pressure ulcer development.<sup>24</sup> Elderly persons have less subcutaneous fat, decreased dermal thickness, and decreased sensory perception. These factors makes elderly patients prone to more rapid tissue injury and less likely to respond to tissue cues to change position. Poor nutritional status causes a decrease in protein and renders tissue more susceptible to the effects of pressure<sup>24</sup> (Table 4).

Pressure on bony prominences such as the coccyx, trochanters, heels, and occiput have traditionally been minimized by using turning schedules every 2 hours and elevating patients' heels off of the mattress; however, the 2-hour repositioning regimen is not based on scientific study.<sup>3</sup> It is suggested that the patient be turned every 2 hours to alternating lateral and supine positions. The patient's body should be turned laterally 30° and the head of the bed elevated no higher than 30° to prevent pressure on the coccyx.<sup>24</sup> This position may promote ventilator-associated pneumonia in intubated patients and patients receiving enteral feeding. To prevent ventilator-associated pneumonia, it is suggested that the head of the bed be elevated higher than 30°.<sup>25</sup> Frequently, intubated patients are restrained or treated with sedatives to prevent removal of the endotracheal tube. Such precautions prevent the patient from changing position, and if the patient is also hemodynamically unstable, he or she may not tolerate lateral position changes.

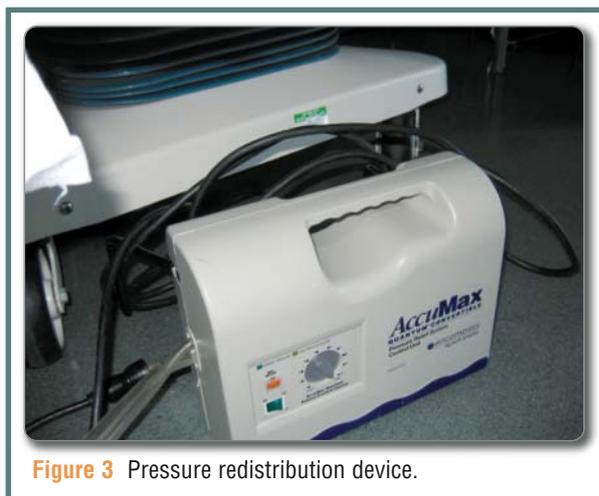
In addition, patients with femoral sheaths, intra-aortic balloon pumps, and low blood pressure have restrictions in repositioning and mobility. For these patients, it may be necessary to use preventive measures to decrease pressure between the mattress and the patient. Low-air-loss mattresses and pressure redistribution mattresses

**Table 4** Risk factors for pressure ulcer development

Factor	Effect
Risk scale score	Higher scores indicate increased risk
Pressure	Increased duration of pressure causes local tissue ischemia, edema, and ultimately tissue death
Immobility	Promotes unrelieved pressure on affected bony prominences
Moisture	Contributes to maceration of epidermis, which makes tissue more vulnerable to pressure Enzymes in fecal material can erode epidermal layers
Friction/shear	Removes epidermal layers, reducing the number of layers protecting dermal tissue
Nutrition	Decreased protein alters oncotic pressure and makes tissue prone to edema
Advanced age	Decrease in subcutaneous fat, decreasing protection from pressure effects Sensory deficits decrease cues to change position
Low blood pressure (hemodynamic instability)	Increases local tissue responses
Duration of mechanical ventilation	Indicates need to provide ventilation and oxygen Decreased oxygen levels in arterial blood indicate decreased oxygen to tissue
Vasoactive medications	Decreased blood pressure indicates decreased perfusion to tissues Vasoactive medications to improve blood pressure increase vasoconstriction and may decrease perfusion of distal tissues such as skin
Length of stay in intensive care unit	Duration of critical illness is associated with pressure ulcer development because of inability of the patient to change position, increased shear forces from sliding down in bed while on bed rest

are often used in these high-risk patients. Most studies of alternative mattress surfaces such as low-air-loss and pressure redistribution mattresses compare the specialty surface and regular hospital mattresses. Although manufacturers for both types of surfaces suggest that their surface is superior, no studies have shown that low-air-loss or pressure redistribution mattresses are superior.<sup>26</sup> Pressure redistribution mattresses have not been shown to decrease pressure on the heel, and heel elevation with pillows or heel lift boots must be used with this therapy<sup>11,26</sup> (Figure 3). 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. Air fluidized beds without head-of-bed elevation are used in the treatment of stage III and stage IV pressure ulcers and may be helpful in preventing pressure ulcers in very high-risk patients.<sup>24</sup> For all mattress surfaces, the manufacturer's recommendations must be followed.

When low-air-loss mattresses or mattress replacement therapy is used, the use of traditional linens is not recommended. The use of bed linens and plastic-lined (nonbreathable) pads prevents the drying effects of low-air-loss therapy because air flow is blocked. In addition, the use of bed linens contributes to wrinkles in the sheets, which may contribute to pressure. Underpads



**Figure 3** Pressure redistribution device.

should not be plastic-backed because the plastic blocks air flow and retains moisture. Certain populations of patients are not appropriate for low-air-loss mattresses, for example, patients receiving mechanical ventilation with an oscillator or patients with unstable spinal fractures. These patients need to be on a static mattress surface. Many “critical care beds” provide pulmonary rotation or turn assist. Critical care nurses must be knowledgeable about the therapies provided by the bed used and should not assume that rotation therapy makes positioning the patient every 2 hours unnecessary.

Patients' heels are particularly prone to both pressure and shear. When in contact with the bed surface, heels are prone to pressure ulcers. With maneuvers to raise the patient in bed, the heels are also prone to the effects of shear forces if not lifted off of the bed during movement. Methods to reduce risk of pressure ulcers on the heel include the use of pillows and heel lift boots. When using pillows, it is important to ensure that the heel is not in contact with the mattress (Figure 4). If a heel lift boot device is used, it is important to ensure that the device is properly applied. Not only must the heel be properly placed, but the straps securing the device must be properly applied to prevent development of pressure ulcers (Figure 5). Ensure that the manufacturer's recommendations regarding appropriate sizing of the device are followed. The heel must be centered in the device properly (this may be difficult in patients who are able to move the lower extremities). The straps that secure the boot must not come in contact with skin surfaces or they may cause constriction and pressure, which can promote the development of pressure injury.

Nutrition is another identified criterion for pressure ulcer risk. Patients who are malnourished have more bony prominences and are therefore at greater risk for pressure ulcers. A low albumin level is an indicator of malnutrition (normal levels, 36-52 g/L). Prealbumin levels (normal level, 16-35 mg/dL) may be a reflection of current nutritional status. Albumin or prealbumin levels should be assessed routinely (weekly or biweekly) to indicate trends in the adequacy of nutrition therapy. Decreasing or low serial albumin or prealbumin levels should alert the intensive care nurse to inform the physician or nutritionist of the potential need to alter current

Patients who are malnourished have more bony prominences and are therefore at greater risk for pressure ulcers.

nutrition therapy. Nurses should identify

patients upon admission for nutrition status and advocate for the earliest possible nutrition supplementation. Ensuring adequate nutrition is particularly difficult in patients receiving vasopressors because the vasoconstrictive action of vasopressors constricts the gastric mucosa, preventing absorption of nutrients. In addition, enteral nutrition often causes loose stools. If patients are unable to indicate the need for a bedpan, they must rely on frequent nursing assessment of continence status.



Figure 4 Heel elevated off mattress by using pillows.

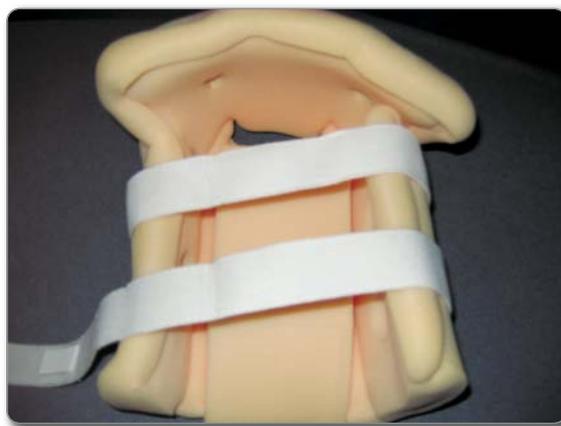


Figure 5 Heel lift device.

### Device-Related Pressure Ulcers

Approximately 10% of pressure ulcers are device related.<sup>1</sup> Unfortunately, no studies have addressed particular devices (eg, endotracheal tubes, tracheostomy tubes, or fecal containment devices) and their impact on the development of pressure ulcers in the ICU.

Intubated patients are at risk for nontraditional pressure ulcers related to the endotracheal tube and the devices used to secure the endotracheal tube. Endotracheal tube pressure can cause pressure ulcers on a patient's lips (Figure 6). Failure to follow manufacturers' recommendations for endotracheal securement devices may result in the development of pressure ulcers. Most manufacturers of endotracheal tube fastening devices recommend that use be restricted to patients who do not have facial edema, lip edema, or protruding teeth. The package insert for the Hollister Anchor Fast endotracheal tube securement device suggests that the endotracheal tube be repositioned every 2 hours.<sup>27</sup> The references noted in the package insert do not specifically identify the device

but are based on general 2-hour positioning schedules to prevent development of pressure ulcers.<sup>27</sup>

Cervical collars are another device that increases the risk for pressure ulcer development at contact points on the chin, shoulder, and ear. In studies of trauma patients with cervical collars, longer duration of collar use was associated with increased risk of pressure ulcer development. Use of cervical collars for more than 5 days is associated with a 38% to 55% risk of pressure ulcers developing.<sup>28</sup> Rigid collars made of foam or plastic are associated with a higher risk of pressure ulcer development than are padded collars.<sup>28</sup> Padded collars such as the Aspen or Miami cervical collar may prevent pressure ulcer development if used appropriately<sup>28</sup> (Figure 7). The manufacturer's guidelines should be used to ensure proper sizing and cleansing of removable padding. The neck is particularly prone to sweating, and moisture may macerate skin and make it vulnerable to pressure. When padded collars are used, it is advisable to order an extra set of pads to replace used pads after cleansing so that they can completely dry. The skin surfaces under the collar should be visualized by the nurse according to hospital's policy to determine if redness indicating pressure is present. If redness is present, the patient should be evaluated for appropriate size and application of the cervical collar.

Tracheostomy tubes also have the potential to contribute to pressure ulcer development, especially for patients receiving mechanical ventilation. Turning and positioning may cause tension on tubing, which can promote displacement of the faceplate of the tracheostomy tube or cause movement of the tube. Faceplate pressure may cause pressure ulcers over the bony prominence of the clavicle(s) at the sternal junction. The risk for pressure is higher when the tracheostomy tube is still sutured because the tracheostomy dressing cannot be easily inserted. Secretions from the stoma site and tracheostomy tube may collect under the tube and promote maceration of the skin. After the sutures are removed, if a patient has excessive secretions from the stoma, a foam dressing may be used to absorb exudate and prevent pressure from the faceplate. To prevent pressure caused by ventilator tubing from causing torque on the tracheostomy tube, place a rolled towel under ventilator tubing near the connection to the tracheostomy tube so that the tubing does not deflect downward, causing tension and thus deflecting the faceplate downward.

Bilevel positive airway pressure and continuous positive airway pressure masks also predispose patients to the



Figure 6 Endotracheal tube securement device.



Figure 7 Padded cervical collar.

development of pressure ulcers at the points where the mask touches the patient's face. These masks both have pressure points over the ears from the straps, and partial masks have pressure points over the nasal prominence. Although no published studies have described preventive measures other than making sure that the straps are not too tight, alternating a partial face mask (Figure 8) with a full face mask (Figure 9) may be helpful in preventing further skin breakdown. Other strategies to prevent pressure ulcer development on fragile nasal skin include the use of foam dressings to decrease pressure. Thin foam dressings may be helpful as they not only decrease pressure but also prevent air leaks that may compromise oxygenation. Hydrocolloid dressings do not relieve pressure, but they do reduce friction and shear.

Rigid transfer boards may produce shear injuries because the patient slides over a rigid surface. Multiple



**Figure 8** Partial bilevel positive airway pressure (BiPAP) mask.



**Figure 10** Ergo Nurse device.



**Figure 9** Full bilevel positive airway pressure (BiPAP) mask.

ergonomic products are available to prevent shear effects during transfer and repositioning of patients. Among these products are the Hover Matt (HoverTech International), Ergo Nurse (Ergonurse Inc), and slip sheets. The Hover Matt is a lateral transfer device that uses an inflatable mattress that enables the patient to float on the mattress during transfer. Use of this device reduces nursing

effort and shear forces on the patient. When the patient is transferred and repositioned, the mattress is deflated and the patient is turned from side to side to remove the deflated mattress. The Ergo Nurse is a rigid frame with straps that are connected to bar connectors for the patient's bed sheets. When the bed is lowered, the patient is lifted and can be repositioned up in bed or from side to side, preventing friction or shear injuries (Figure 10). The Ergo Nurse device is also available in bariatric size. Slip or slide sheets are made of material that slides over bed surfaces and does not have edges or a rigid surface that can cause friction or shear. There is no evidence that one product is superior to another.

Fecal incontinence can contribute to skin breakdown because of the enzymes present in fecal matter.<sup>5,29</sup> Enzymes in and the pH of fecal matter may act in conjunction with moisture to promote skin maceration and epidermal erosion. Topical skin barriers assist in providing a barrier between moisture and skin; however, frequent cleansing because of diarrhea reduces the effectiveness of the skin barrier. Fecal containment devices are an effective way to prevent skin damage due to moisture and enzyme action on perianal tissues. Indwelling fecal containment devices include products such as the Flexi-Seal (ConvaTec Inc), Actiflo (Hollister Global), and Zassi (Zassi Medical Evolutions Inc) devices. Topical fecal containment pouches are also available. Appropriate

**Table 5** Risk factors and interventions to prevent pressure ulcers

Who is at risk?	Interventions
Identification of risk	Use a risk-identification scale each shift to identify which patients are at risk
Devices	Become familiar with the manufacturer's recommendation for devices used in your unit (endotracheal securement devices, bilevel and continuous positive airway pressure masks, heel lift devices, mattresses) Ensure that tubing and devices are not placed between skin surfaces; make sure ventilator tubing is not causing tension on tracheostomy tube and faceplate
Friction/shear	Is your unit using appropriate lift and turning devices? Use assistive devices that reduce friction and shear; ensure the appropriate number of staff are present to lift/turn patient
Pressure	Consider the use of pressure-relief devices including specialty mattress surfaces, padded cervical collars, heel lift devices, and pillows
Moisture	Use skin barrier creams, topical or indwelling fecal containment devices
Nutrition	Identify patients at risk and promote feeding at the earliest time possible; request specialty mattresses as soon as risk is identified
Vasoactive medications, patient unable to be turned every 2 hours	Provide a specialty mattress to reduce skin interface pressure
Comorbid conditions that contribute to pressure ulcer formation	Flag the patient at risk and use critical thinking to determine appropriate therapy: heel lift device, specialty mattress, device
Quality assurance	Identify unit-specific statistics Track prevalence and report to staff Celebrate decreases in occurrence Identify best practices Contribute to critical care-specific research in pressure ulcer prevention and risk

application and use of these devices may prevent pressure ulcers from developing by preventing skin contact with fecal enzymes and moisture.<sup>29</sup>

### Bariatric Patients

Bariatric patients present a unique challenge to critical care nurses and may be at increased risk for pressure ulcers because of moisture in skin folds, device pressure, and inability to perform position changes due to issues related to staffing and appropriate equipment.<sup>30</sup> Bariatric patients may be at higher risk for development of pressure ulcers because adipose tissue typically has a decreased blood supply compared with muscle tissue and the increase in weight increases pressure on tissues. Adhering to manufacturers' guidelines for the use of equipment as well as using appropriate equipment and sufficient personnel for repositioning and lifting patients should assist in reducing risk.

### Use of Preventive Measures

Many recently published quality improvement articles indicate that unit-based quality assurance projects that identify effectiveness of preventive measures and

prevalence of pressure ulcers are particularly helpful in preventing pressure ulcers in patients.<sup>31-33</sup>

Unit-based performance activities include teaching nursing staff how to identify risk factors and how to stage pressure ulcers, but the most important aspect of the quality initiatives appears to be in communicating the effectiveness of the therapy in terms of success in days without pressure ulcer development.<sup>31-33</sup>

Unit-based quality initiatives that document the number of days that have passed between occurrences of hospital-acquired pressure ulcers are one way to communicate this

success in preventing pressure ulcers from

developing. Using a 2-nurse handoff report and assessment on admission and shift change, which includes conducting a skin assessment, reinforces individual accountability in interventions to prevent development of pressure ulcers. These activities are a demonstrated quality tool for identifying pressure areas before they become stage I or greater pressure ulcers.<sup>32-34</sup> Heightened

Skin inspection should occur on each shift or more often in patients at risk of pressure ulcer development.

awareness of patients' risk for pressure ulcers and unit pride contribute to highly effective preventive measures (Table 5). Critical care nurses have the unique challenge of identifying the appropriate interventions to prevent pressure ulcer development and ensuring that they are knowledgeable about the manufacturer's recommendations for devices used in the care of the patient. The Institute for Clinical Systems Improvement suggests that upon admission a risk assessment and skin assessment be performed, existing wounds be documented, and treatment goals be established.<sup>34</sup> If a patient is at risk for pressure ulcers or has an existing pressure ulcer, appropriate referrals to nutrition services and wound care specialists should be initiated. Hospital protocols for prevention of pressure ulcer development, which should include pressure relief, moisture management, and nutrition support, should be instituted. Skin inspection should occur on each shift or more often in patients at risk of pressure ulcer development.

### Further Research Needed

Critical care nurses have many opportunities to develop and produce studies on the prevention and treatment of pressure ulcers. Further research is needed to study the prevalence of device-related pressure ulcers and effective nursing measures to prevent development of pressure ulcers. Research regarding vasoactive medications, pressure ulcer risk scales appropriate to critical care nursing, and appropriate interventions also are needed. CCN

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None reported.



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To learn more about preventing pressure ulcers, read "Patient-specific and Surgical Characteristics in the Development of Pressure Ulcers" by Tschannen et al in the *American Journal of Critical Care*, March 2012;21:116-125. Available at [www.ajconline.org](http://www.ajconline.org).

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