

# Perspectives

Recovery Strategies From the OR to Home

**CEs for  
Nurses**

## Accreditation Information

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## Learning Objectives

After reading these articles, the learner should be able to:

1. Define a pressure ulcer that has developed from a medical device.
2. List one intervention for preventing pressure ulcers from respiratory devices, bariatric equipment, and cervical collars.
3. Describe interventions for implementing and sustaining urinary catheter securement as part of a catheter-associated urinary tract infection (CAUTI) and pressure ulcer prevention program

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# Prevention of Pressure Ulcers Due to Medical Devices

Vicki Haugen, BSN, RN, MPH, CWOCN, OCN

Pressure ulcers from medical devices are a growing concern to care providers and facilities alike. While the typical presentation of a pressure ulcer is near or over a bony prominence, a device-related pressure ulcer occurs near or under the medical device and may have the same shape as the device. Any medical device can cause a pressure ulcer if unattended long enough; e.g., an unconscious person with a cochlear implant who remains lying on that side without repositioning.

An increasing array of medical devices is multiplying the risk for this type of skin injury. A patient with a medical device is 2.4 times more likely to develop a pressure ulcer than a patient without a device.<sup>1</sup>

As with other pressure ulcers, if they begin or worsen in the hospital setting, the Centers for Medicare and Medicaid Services (CMS) does not reimburse for the cost of care.<sup>2</sup> This is true for all Stage III and IV pressure ulcers.<sup>3</sup>

The nationwide incidence of device-related pressure ulcers is unknown. But recent reports indicate that 25%–29% of full-thickness, hospital-acquired pressure ulcers were from medical devices.<sup>4,5</sup>

## Sources of the problem

Patients at highest risk for developing device-related ulcers are those

with impaired sensory perception (paralysis, neuropathy), decreased alertness, oral intubation, and language barriers.<sup>5</sup> Additionally, edema and body moisture contribute to device-related pressure ulcers.

Any medical device that exerts with sufficient pressure on skin can cause tissue injury. Such ulcers occur sooner in areas of less adipose tissue.<sup>6</sup> Apold (2012) identified cervical collars, other immobilizers, oxygen tubing, stockings or boots, and nasogastric (NG) tubing as the most frequent sources of device-related pressure ulcers. Apold also noted that staff were often unaware of the need to remove or reposition devices regularly, nor they did not know how to identify a poor fit for a device.<sup>5</sup>

## Prevention of device-related pressures: general recommendations

The first step in ulcer prevention is a comprehensive head-to-toe skin inspection—upon admission and prior to device application. This identifies any pre-existing ulcers and allows for early intervention. Customize the skin inspection to the patient, based on risk factors and any device(s) already in place. If any skin is already damaged, use extra protection if a device must be positioned in that area.<sup>6</sup>

# Implementing And Sustaining Urinary Catheter Securement

By Denise Nix, MS, RN, CWOCN

In this article and quality improvement study, there will be a brief overview of the significance, risk factors and interventions for preventing CAUTI and pressure ulcers followed by a detailed discussion related to catheter securement including importance, selection, and implementation.

## Significance

In many facilities, hospital-acquired catheter-associated urinary tract infection (CAUTI), and pressure ulcers were under the radar until the year 2008, when the Centers for Medicaid & Medicare Services (CMS) discontinued reimbursement for many hospital-acquired conditions. Resources and efforts prior to 2008 focused disproportionately on treatment rather than prevention of these hospital-acquired conditions despite evidence that prevention of CAUTI and pressure ulcers decreases costs, infection, length of stay, and death (See Table 1).

Once a patient develops a CAUTI they are then at risk for going on to develop a blood stream infection (BSI). In fact CAUTI is the leading cause of secondary BSI; 17% of hospital-acquired BSIs are due to UTIs

and its associated mortality is 10%.<sup>1</sup> A report from 61 Quebec hospitals over a 3-year period revealed that 21% of all BSIs identified 48 hours or more after admission came from a urinary source.<sup>2</sup>

Data related to urinary numbers of catheter-associated pressure ulcers are unavailable. Overall, the cost of treating pressure ulcers in the US is estimated at \$9.1 to \$11.6 billion annually. Each year, about 60,000 patients die in the US as a direct result of pressure ulcers (AHRQ, 2011).<sup>3</sup> These statistics are startling when we consider the fact that people come to the hospital when they are ill, trusting that they will be taken care of and protected from adversities.

## Risk factors and Prevention Bundles

Knowing which patients are at greater risk for these adverse health events (AHEs) help target and refine prevention strategies. For example, a risk factor for CAUTI is catheter trauma, therefore, application of a securement device to prevent traumatic dislodgement is a priority strategy.<sup>4</sup> Presence of a medical device is a risk factor for pressure ulcers therefore securement to avoid linear

pressure ulcers on the thighs or buttocks caused by lying on nonsecured catheter tubing should be among the patient's bundle of preventive interventions.<sup>5</sup>

Experts agree that evidence-based bundles should be implemented and that compliance with the preventative strategies should be monitored.<sup>5-9</sup> Box 1 and Box 2 contain recommendations supported by direct and indirect research involving CAUTI and device related pressure ulcer prevention respectively.<sup>5,9</sup>

## Catheter Securement

Catheter securement happens to be a preventive intervention used in

### Box 1 CAUTI Prevention Bundle

- Insert by trained staff
- Use aseptic technique
- Use the smallest catheter possible
- Secure the catheter properly
- Maintain a closed system (tamper evident seal is helpful for auditing compliance)
- Remove the catheter as soon as possible (i.e. 24 hours for most surgical procedures)
- Do not allow the tubing to kink; keep off the floor and below the level of the bladder
- Empty the collection bag regularly with a separate measuring device

### Box 2. Prevention Bundle-device related pressure ulcer bundle

- Assess risk factors associated with medical devices and eliminate or minimize risk when possible. Risk factors associated with medical devices:
  - Sensory deficit and inability to communicate pain or discomfort "this tube underneath me hurts!"
  - Edema near the device
  - Inadequate equipment selection and/or fitting
  - Inadequate positioning and securement of device
  - Lack of routine skin inspection under and around the device
  - Impaired perfusion to the area of the skin associated with the device
- Secure device to avoid pressure, trauma, or dislodgement
- Follow manufacturers instruction for indications, monitoring, application and removal
- Inspect skin under and around the device at least daily
- With patient positioning, position tubing too so it is not under the patient or pannus
- Educate staff on correct use of devices and prevention of skin breakdown
- Monitor for edema under or around the tubing the device

Table 1. CAUTI and pressure ulcer Impact On The U.S. Health Care System

	Cost/AHE	Attributable LOS	Total Annual Cost (\$billions)	Total Annual Cases	Death/Annual Cases
CAUTI	\$896	Unavailable	0.28	77,079	Unavailable
Pressure Ulcers	\$43,180	10.8 days	\$9.1 to \$11.6	Over 300,000	60,000

Table from Bryant, R. Nix, D Developing and Maintaining a Pressure Ulcer Prevention Program. In Bryant, R. Nix, D. Coeditors: Acute and Chronic Wounds: Current Management Concepts, 4th Edition. St. Louis, Mosby. In Print

Data from Zimlickman E. et al . Health Care Associated Infections A Meta-analysis of Costs and Financial Impact on the U.S. Health Care System. Jama Internal Medicine, September 2, 2013

**Table 2. Features and Considerations of Various Indwelling Urinary Catheter Securement Products**

Features	Considerations
<b>Adhesive products</b>	<ul style="list-style-type: none"> <li>• Strong adhesives may cause skin damage with inappropriate application or removal technique</li> <li>• Weak adhesive products can fall off and cause catheter tension or dislodgement</li> <li>• Some adhesive products will stretch slightly to help reduce the incidence of post op tension and edema blisters</li> <li>• Determine if the adhesive is a waterproof or water resistant skin barrier product or tape. Some products can be wiped clean if soiled or wet while others will need to be changed</li> <li>• Some adhesive products can fall off and cause catheter tension or dislodgement if the skin is not properly prepped</li> <li>• Some adhesive products include a skin protectant prep to correct of adhesive challenges and improve compliance with it's use</li> </ul>
<b>Non Adhesive Straps</b>	<ul style="list-style-type: none"> <li>• Straps too tight can damage skin and impair circulation through venous compression</li> <li>• Straps too loose can lead to unintended catheter dislodgement</li> <li>• Must adjusted and readjust in the presence of edema, to accommodate changes in leg size</li> <li>• Important option for individuals with known sensitivities to adhesives</li> <li>• Can be moved from leg to leg as needed for patient preference and positioning considerations</li> <li>• Some non-adhesive products can be washed and reused (attractive in settings where less frequent reorders and payments are desired while less attractive in the presence of poor hygiene, inadequately contained feces, or frequently lost or misplaced supplies)</li> </ul>
<b>Single use or multiple uses</b>	<ul style="list-style-type: none"> <li>• Follow manufacturer's instructions to determine if multiple tubes or catheters are included in the indications for use</li> <li>• i.e. urinary catheters, jejunostomy tubes, subclavian lines</li> </ul>
<b>Closure method for catheter Holder</b>	<ul style="list-style-type: none"> <li>• Devices attach the catheter with adhesive tabs, Velcro tabs, or clamps.</li> <li>• Velcro tabs or clamps can be released and reattached without changing the adhesive that is attached to the skin</li> <li>• Some clamps better accommodate a variation of tubing sizes</li> <li>• Some clamps can collapse tubing if adjusted too tight</li> <li>• Clamps require more finger dexterity and strength to use than other closures</li> </ul>
<b>Instruction for use</b>	<ul style="list-style-type: none"> <li>• Instructions for use may be printed words and/or pictorials located on the package, on an insert inside the package, or on the device itself</li> <li>• Instructions printed on the device are generally not inclusive and intended as a supplement to instructions contained within or on package</li> <li>• Instructions printed on the package or on the adhesive backing that gets peeled away may end up in the trash without being read or without a possibility of future review</li> <li>• Devices indicated for multiple catheter use may require multiple sets of instructions</li> <li>• Some devices that contain instructions to include a skin protectant prep are packaged with a prep to improve compliance with use</li> </ul>

Source: Nix D and Pettis A (2014) Tying it all Together: Preventing Infection and Complications with Urinary Catheters. Safe Practice in Patient Care Volume 6 No.3 Saxe Healthcare Communications. Burlington, VT

pressure ulcers and CAUTI bundles. The intervention however remains frequently omitted due to a lack of understanding regarding its importance as well as appropriate selection and use of products.<sup>10,11</sup> The many techniques and products for securement available on the market today can certainly add to the confusion.

The link between CAUTI and urinary catheter securement is thought to be related to lack of stabilization leading to excessive catheter movement, pulling, poking, and subsequent trauma to the bladder and urethral wall leaving that open mucosa vulnerable to bacterial invasion. A 16-month surveillance of uri-

nary catheter related bacteriuria and trauma was performed at the Minneapolis VA Medical Center resulting in 6,513 surveyed urinary catheter days. Of these, 100 instances of catheter associated genitourinary trauma (1.5% of urinary catheter days) were identified. Of the 100 trauma instances 32% led to interventions such as prolonged catheterization, cystoscopy or suprapubic catheter placement. Trauma leading to intervention accounted for as high a proportion of urinary catheter days (0.5%) as di symptomatic UTI (0.3%).<sup>12</sup>

Darouich and colleagues (2006) examined the relationship between UTI and catheter securement with a prospective randomized multicenter trial with 127 patients with spinal cord injury and multiple sclerosis.<sup>13</sup> Researchers measured UTI rates with and without adequate catheter securement and showed a 45% decrease in patients with catheters that were properly secured. The study was too small to demonstrate statistical significance, however, 45% fewer UTIs may be of clinical significance to patients and caregivers confronted with the effects of UTIs. Two more recent studies examined the effects of indwelling urinary catheter securement as part of a bundle of interventions to decrease the incidence of CAUTI. Both took place in community hospitals and both showed

**Box 3. Clinical Problems Resulting From Lack of Proper Indwelling Urinary Catheter Securement**

- Unintended catheter dislodgement
- Pain, discomfort, and bladder spasms from the catheter moving and poking the bladder and urethra
- Urinary retention and obstruction of urinary flow either from kinked tubing or trauma to the anatomical structures
- Linear pressure ulcers on the thighs or buttocks caused by lying on non secured catheter tubing
- Meatal tears and penile erosion when unsecured tubing is stepped on or caught in hospital equipment (i.e. side rails, wheel chairs)
- Infection
- Time and money to replace catheters and treat pain, infection, and wounds

statistically significant reductions in CAUTI.<sup>14,15</sup>

Despite the limited direct evidence, multiple respected health organizations accept proper catheter stabilization as best practice for the prevention of CAUTI.<sup>1,4,16,18-20</sup> (2012). As if that is not convincing enough, Box 3 lists a multitude of clinical problems that can occur when urinary catheters are not secured properly including Linear pressure ulcers on the thighs or buttocks caused by lying on non secured catheter tubing.<sup>21</sup>

Using catheter securement to assist with prevention of device related pressure ulcers has only recently gained attention in evidence based guidelines. For the first time, a recently published International guideline for pressure ulcer prevention has a section on medical device related pressure ulcer. It clearly states that patients with medical devices should be considered at risk for pressure ulcers.<sup>5</sup> The incidence of device-related pressure ulcers nationwide is unknown. In 2010, 26% of full-thickness hospital-acquired pressure ulcers in Minnesota hospitals were reported to be related to medical devices<sup>22</sup> (MDH, 2010). Individual hospitals and organizations report medi-



Figure 1 Example of Velcro® Locking Urinary Catheter Securement Device. (Courtesy of Dale Medical Products Inc.)

cal device related pressure ulcer incidence (all stages) ranging from 23%-42% of all pressure ulcer stages.<sup>22-24</sup> Researchers report that the pediatric population is particularly vulnerable with estimates of up to 50% of pediatric pressure ulcers related to medical equipment and devices.<sup>25</sup> Box 2 presents risk factors and interventions related to prevention of medical device-related pressure ulcers.

catheter to the thigh. These devices have adjustability and can even be used with large/obese patients. (Figure 1)

When evaluating a product for effectiveness or failure, it is critical to first ensure that the product is used correctly and according to the manufacturer's instructions. For example, it would be inaccurate to conclude that a particular device failed to be effective if the skin was not prepped according to the manufacturer's instructions or if the product was not replaced at the frequency the manufacturer recommended.

**Box 4. Factors To Consider In Selecting A Product To Secure An Indwelling Urinary Catheter**

- Patient population
  - products are available in pediatric and bariatric sizes (see Figure 1)
- Effectiveness
- Reliable wear time
- Skin reactions
  - i.e. latex or adhesive allergies
  - nonadhesive products are available (see Figure 2)
  - immature skin is at higher risk for sensitivities to ingredients and adhesives
- Ease of use including
  - amount of time required to perform the procedure
  - ease of understanding instructions and packaging
- Extent of education or training required for appropriate use
- Staff acceptance of product
- Cost and contracts

**Securement Device Selection**

Box 4 lists factors to consider in selecting a product for indwelling urinary catheter securement. Many of the factors considered for product selection will depend on the features and considerations of the various commercially available devices. Multiple options including nonadhesive and latex free options for patients with adhesive and latex sensitivities should be part of every facility's product formulary. Most non-adhesive devices use a stretch band and a Velcro® locking system to hold the

**Box 5 Tips for Adhesive Removal**

- With the fingers of the opposite hand, push the skin down and away from the adhesive.
- Remove the adhesive product low and slow back over itself in the direction of hair growth, keeping it horizontal and close to the skin surface.
- As the product is removed, continue moving fingers of the opposite hand as necessary to support newly exposed skin.
- Use medical adhesive remover if needed to loosen the adhesive bond
- Consider using lotion, petrolatum, or mineral oil if not reapplying an adhesive product to the same area.

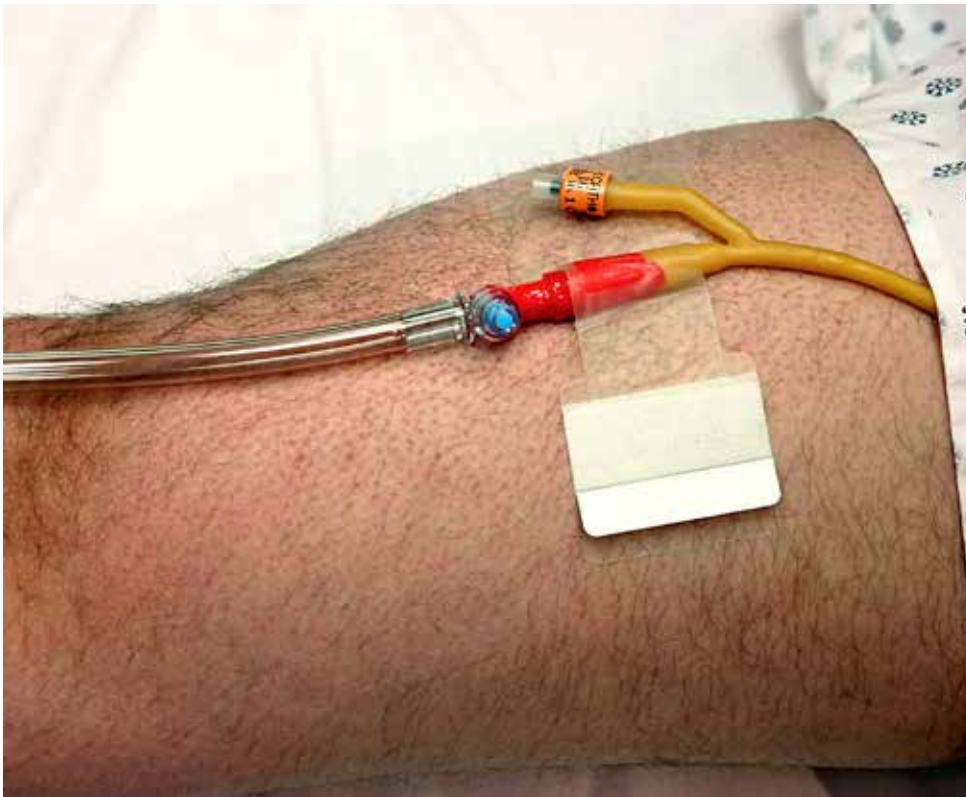


Figure 2 Example of Adhesive Indwelling Urinary Catheter Securement Device. (Courtesy of Dale Medical Products Inc.)

### Device Application and Removal

All products should be applied to clean dry skin. If a nonadhesive (Velcro-type) product is used, additional skin preparation is generally not required (Figure 2). The Velcro-type leg band devices should be positioned around the patient thigh. Simply place the leg band around the thigh. Manufacturers instructions state that two fingers should fit snugly under the band to avoid compression. Once the leg band is in place, the indwelling urinary catheter can then be secured with the interlocking tabs at the Y port of the proximal end of the catheter.”

When using an adhesive product, however, hair may need to be removed first (Figure 2). Skin can be prepped and protected from adhesive with protectant films. When allowed adequate time to dry on the skin, protectant films serve as a barrier between the epidermis and the adhesive so during the removal, the adhesive removes the clear film product rather than the thin layer

of epidermis it’s trying to protect. Skin protectant films can also repel moisture and cover the oils on the skin that have potential to threaten wear time by impairing the adhesion of the product.<sup>26</sup> Many securement devices are prepackaged with a skin protectant prep. Unless the manufacturer states that a skin protectant should not be used with their product, it is desirable to package a skin protectant with the securement device together to facilitate skin protection and wear time reliability while saving time gathering supplies. Once the skin protectant is dry (if applicable) the paper is peeled off the adhesive and the device can be applied.

Indwelling urinary catheter devices are anchored to the thigh or abdomen. Suprapubic catheters should be secured to the abdomen. Indwelling urethral catheters should be secured to the upper anterior or inner thigh for women and ambulating men. Men are encouraged to

secure their catheters to their lower abdomen during sleep to decrease the potential for necrosis and urethral erosion of the penile shaft. In the presence of obesity, it may be necessary to secure the catheter high on anterior thigh or abdomen but away from skin folds to help prevent tubes from falling into the skin folds contributing to pressure ulcer formation.<sup>4</sup>

The tab designed to hold the catheter is then affixed to the part of the catheter that is large enough to ensure a snug, stable fit and stiff enough to prevent collapse. Frequency of product change is dependent on the manufacturers recommendations. The device must be changed sooner if it appears loose, permanently soiled, or signs of skin irritation are detected upon daily skin inspections.<sup>4</sup> Tips for safe adhesive removal are provided in Box 5.<sup>27,28</sup> Nonadhesive products that become loose due to decreased edema can be simply readjusted rather than changed as long product is clean, its integrity is intact, and the skin has not developed sensitivities to the product. The exact location of the securement device should be rotated when the device is changed to reduce the risk of skin irritation.<sup>4</sup> As stated in Table 2, a nonadhesive securement device can be relocated anytime as desired for skin care, patient preferences and position.

### Sustaining Compliance with Urinary Catheter Securement

All securement devices require staff education. The extent and method of education required to ensure efficacy and safety varies by the intended user and the product selected for use. Education should include appropriate techniques for skin inspection and preparation, product application, product removal, frequency of change and docu-

mentation requirements. As stated earlier, staff that is knowledgeable about the indications for catheter securement and its role in CAUTI prevention bundles are likely to perceive its importance. Unfortunately, even settings with nurses who believe in the importance of proper catheter stabilization still have many indwelling urinary catheters unsecured.<sup>10,11</sup> However, nursing leadership involvement with quality initiatives, education, and frontline staff input for product selection may be instrumental in promoting and sustaining compliance with urinary catheter securement.<sup>11</sup>

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### General best practice guidelines for preventing device-related pressure ulcers

**Placement:** Whenever possible, do not place the device over an already injured area.<sup>7</sup>

**Device choice/placement:** Choosing the correct device in the correct size is essential in applying the device and in preventing related skin injury. Cushion the device as needed over bony prominences or areas with minimal subcutaneous body fat.<sup>7</sup>

**Positioning:** Avoid positioning a patient directly on top of a medical device, such as a drainage system.<sup>8</sup>

**Frequency:** Remove devices daily or more often to inspect the skin.<sup>7</sup> (See Table 1 for frequencies.)

**Monitoring:** Inspect and reposition any device regularly, especially those placed under a bedridden or immobile patient.<sup>7</sup> Carefully monitor all edematous areas for device-related pressure. Recognize that damage to highly pigmented skin manifests as even darker skin.<sup>4</sup>

**Education:** Educate all staff to look for skin damage around devices. A nursing assistant may be the first care provider to notice pressure damage from a urinary catheter while bathing a patient.

**Documentation:** Record all abnormal findings, care and interventions given.<sup>9</sup>

**Quality improvement:** Clearly define who is responsible for routine skin inspection, its frequency, and how it is documented. Establish clear hand-off communication regarding all occurrences of device-related ulcers. Use an interdisciplinary team with respiratory therapy, nursing and other appropriate members to update policy and care recommendations.<sup>9</sup>

**Pediatric patients require size- and weight-specific fittings of their medical devices. More than 50% of pediatric pressure ulcers are device-related,**

### Critical care patients

Immobilized and compromised patients pose increased risk for pressure ulcer development in general. But the critical care milieu is full of medical devices, which pose incremental challenges for preventing device-related pressure ulcers. Unstable critical patients are frequently a challenge to turn and reposition, underscoring the need to minimize device placement under the patient. Monitor skin under and around rectal probes, rectal fecal incontinence devices, tracheostomy face plates and neck ties, endotracheal tubes, respiratory devices, NG tubes, oxygen probes, arterial line tubing, and all other tubes/devices. Higher rates of edema in many critically ill patients require close observation of skin where tubes, catheters, blood pressure cuffs, and other devices can cause pressure tissue injury.<sup>7</sup>

### Pediatric patients

Pediatric patients require size- and weight-specific fittings of their medical devices. More than 50% of pediatric pressure ulcers are device-related,<sup>10</sup> so follow manufacturers'

guidelines closely for this population. Frequent dressing changes and use of adhesives can cause skin injury. Encourage creative methods of securing dressings, such as soft cloth bands around the abdomen or advanced wound care dressings that require less frequent changes.<sup>11</sup>

EEG leads, braces, immobilizers, chin rests, NG tubes, and many respiratory devices are common causes of compromised skin in pediatric patients. Gastrostomy tubes that are too short can cause pressure injury at the tube site. Providing devices in multiple sizes, along with educating staff in each device's proper use and fit, can help protect this very vulnerable population.

### Long-term care patients

Long-term care is a growing venue for elderly patients and those with chronic, complex or serious illnesses. Lower extremity stockings and wraps are common in a population with decreased perfusion and lower extremity edema. Correctly sized stockings and wraps are critical in preventing pressure, especially at the ankle and behind the knee. In patients with decreased sensation, braces and splints are a significant risk factor for skin injury from friction, pressure, or pinching. Immobile and bedridden patients left lying too long on bedpans incur pressure injury to their sacral and gluteal areas. Oxygen tubing and masks are frequent offenders behind the ears or on the nasal bridge if not repositioned regularly.<sup>4</sup>

### Bariatric patients

Bariatric patients offer unique challenges in preventing skin damage from pressure. The higher percentage of adipose tissue can lead to increased perspiration and altered skin barrier function.<sup>12</sup> Beyond that,

many facilities lack specific equipment or sufficient staff to properly care for morbidly obese patients. Right-sized devices—such as larger blood pressure cuffs, abdominal binders, compression stockings and leg wraps can help prevent skin injury.<sup>12</sup> Even wrong-sized arm rests on chairs and commodes may cause pressure ulcers in larger patients.<sup>15</sup>

Assessment issues and comorbidities increase the risk of bariatric patients developing pressure ulcers. Repositioning patients and examining skin folds is challenging. Also, co-occurring diseases predispose patients to pressure ulcers. Even when a device is not involved, pressure ulcers are prone to form on these patients' buttocks or in skin folds.<sup>12</sup>

**Specific tips for this patient population:<sup>15</sup>**

Use sufficient staff and the proper equipment. Example: Overhead or ceiling lifts to turn patients and chair lifts for getting patients out of bed must be adequately strong and easily accessible for larger patients.

Cleanse and apply moisture control products (barrier creams, skin sealants). Skin folds, particularly under the abdominal pannus or in the gluteal cleft, retain moisture and are at great risk for pressure injury. When turning a bariatric patient on their side, observe shear and friction especially in those areas. A good skin regimen, along with repositioning, helps prevent skin breakdown. In addition, silver-impregnated linen towels can keep skin folds apart and aid in odor/bacterial control. Dry skin needs moisturizers to prevent scratches and skin breaks.

Use adequately sized commodes, chairs, beds, and side rails to prevent pressure injuries that could occur from rubbing against the railings.

Reposition Foley catheters away

**Patients with multiple skin folds, moisture issues, and shorter necks are at risk for pressure injury from trach plates and ties.**

from large thigh skin folds to prevent pressure injury. Besides moving the catheter with each patient repositioning, pad the catheter away from the skin if needed. Tube and catheter holders can provide securement away from skin folds.

Use longer trach tubes, ET tubes, and neck ties to prevent obvious tissue injury to the neck, face, and oral and respiratory areas.<sup>6</sup> These should be readily available to staff. One company (Dale Medical Products, Inc.) makes bariatric-size trach holders/ties for a neck circumference up to 28 inches; the ties are 1½ inches wide.

**Specific types of devices related to pressure ulcer development**

While many devices can lead to pressure injury, it helps to take a more detailed look at the higher risk devices and how to minimize their pressure. The following recommendations are adapted with permission from the Minnesota Hospital Associ-

ation's initiatives, which grew out of statewide data collected on Stage III, IV, and unstageable ulcers.<sup>4</sup>

**Respiratory Devices**

Recent Minnesota Department of Health Data noted that 30% of all device-related pressure ulcers were due to respiratory devices.<sup>5</sup> Specific skin care recommendations for those devices:

- Inspect the skin under and near the device, as noted in Table 1.
- Pad the nasal bridge at the first sign of skin changes. Use hydrocolloid, thin foam or silicone-type dressings. This decreases friction—not pressure.
- Consider ear pads on oxygen tubing or use softer tubing (less likely to cause pressure).
- Secure masks (including NPPV and CPAP) to obtain adequate placement but do not over-tighten.
- Foam dressings can cushion a respirator mask to help prevent skin injury.<sup>7</sup>
- Check strap tension on masks every 4 hours. Replace straps that lose elasticity.
- Change neck ties when they are soiled, and consider using foam-padded ties.
- Check tracheostomy faceplates for pressure to the skin underneath. Collaborate with respiratory therapy to offload pressure due to drag on the faceplate from ventilator tubing.
- Observe faceplate sutures for skin injury and inquire about suture removal 7 days post tube insertion.
- Follow the recommendations for

**Table 1: Skin inspection chart for respiratory devices**

Respiratory device	Inspection frequency	Focus of inspection
Nasal cannula	Every 8 to 12 hours	Back of ears
Mask	During oral cares	Back of ears, bridge of nose
Tracheostomy	Every 8 to 12 hours	Neck, under face plate
Endotracheal tube	Every 2 hours during oral care	Neck, lips, mouth, face



frequency of inspections (Table 1).<sup>4</sup>

### Tracheostomy care

A tracheotomy creates a direct airway from the anterior aspect of the neck into the trachea (wind-pipe). The stoma (hole) is a tracheostomy. Proper trach tube length and patient positioning are crucial. However, when young or obese patients are “trached,” they present extra challenges for ulcer prevention. For example, patients with short or obese necks may be more difficult leading to possible complications include hemorrhage, loss of airway, subcutaneous emphysema, wound infections, stomal cellulites, tracheal ring fractures, poor trach tube placement, and bronchospasm.<sup>14</sup>

Patients with multiple skin folds, moisture issues, and shorter necks are at risk for pressure injury from trach plates and ties. Vigilantly observe the skin under both and frequently clean the skin under the plate. Specific trach device recommendations:<sup>4</sup>

During routine tracheostomy site care (at least every 8-12 hours) skin integrity and tension is checked under the straps, around and in back of the neck, around the stoma, and under the tracheostomy tube flange/faceplate. Commercially available foam/collar type adjustable tracheostomy straps can be used rather than ties or twill (Figure 1).

Skin cleansing is done under the tracheostomy faceplate including under trach securing device and frequent changing of moist or soiled faceplate dressings. A standard procedure for management of tracheostomy sutures is in place. Observe for faceplate suture skin irritation and collaborate with surgeons to remove faceplate sutures at a specified protocol time-line. Observe for faceplate suture skin irritation and collaborate



Figure 1. Example of Adjustable Tracheostomy Holder (Courtesy of Dale Medical Products Inc.)

with surgeons to remove faceplate sutures at a protocol-specified protocol time.

### Orally intubated patients

During every routine oral care, observe the neck, lips, and mouth for skin injury. Check the tension and skin integrity under and around the ETT and straps, tape or ties. Use approved methods such as a ventilator arm to offload pressure caused by drag from ventilator tubing. Replace tube securement products when they become soiled, wet, or no longer able to hold the tube properly. Consider using a commercial stabilizer for comfort, easy adjustment, prevention of skin breakdown, and prevention of accidental tube displacement. When using commercial stabilizers: Position ETT holders approximately ½” from (not touching) the patient’s lip. Follow manufacturer’s instructions for correct application and change frequency.

### Cervical collar

Cervical collars are the second most common cause of device-related pressure ulcers.<sup>5</sup> Collars should be snug but not tight. In addition:<sup>4</sup>

Consult with first responders

ASAP to reduce the time a patient spends in an emergency/stabilizing collar. The goal for definitive care (collar removal or change to a longer-term collar) is ≤ 24 hours.

If the patient’s condition permits, inspect and clean the skin during change from transport collar to longer-term collar.

#### **Collar placement guidelines:**

- Maintain cervical spine alignment.
- Connect the collar Velcro straps on both sides of the neck.
- Ensure a snug fit: the patient should not be able to move the chin off the shelf and inside the collar.

#### **Frequency of care**

While stabilizing the patient’s cervical area, remove the collar to cleanse, inspect, and palpate skin every 8–12 hours; document device removal and your findings.

#### **Ongoing inspection and care**

The patient should be lying down. Get assistance from another staff member to maintain cervical alignment.

Remove the collar’s anterior section. Have a second caregiver maintain cervical alignment. Assess skin



Figure 2. Dale Medical NG Securement Device (Courtesy of Dale Medical Products Inc.)

for redness, rashes, or skin breakdown. Pay special attention to chin, jaw, ears, shoulder, and sternum.

If the collar has removable inner pads, remove them daily (and as needed) and attach clean pads. Make sure the pad covers the edges of the collar and no hard plastic edge comes in contact with the patient's skin.

To wick away moisture, consider using thin dressings that do not alter the fit of the collar. Replace the collar (snug but not tight). Log-roll the patient on one side, maintaining cervical alignment. Remove the posterior section of the collar. Inspect and palpate the scalp for breakdown, paying special attention to the occipital area and ears. Replace the posterior collar (snug but not tight) If the collar fit is in question or pressure injury occurs, consult with an orthotist.<sup>4</sup>

### Nasal Gastric Tube

Pressure ulcers from nasogastric tubes (NG) are usually mucosal tissue injury and thus not truly a skin pressure ulcer, and not currently an issue for hospital care reimbursement. However, they are painful,

and can compromise the tissue that can increase the risk for skin integrity.

A recent study from Rush University reminds clinicians about the overall pressure prevention guidelines, which state that the skin and mucosa around the NG tube should be routinely inspected and repositioned if it should rest on either the mucosa or skin.<sup>16</sup>

This study compares the usual taping methods for securing NG tubes with a commercially available securement device that allowed for easier removal. It provided statistically less mucosal tissue injury with the commercial device. (Figure 2) The off-loading is the key for prevention of skin injury.

### Other devices

Splints and casts can cause friction and pressure injury to skin underneath. Check the skin daily around non-removable casts and upon cast removal. Removable splints should be taken off daily or as directed by the physician for skin inspection. If skin problems arise, col-

laborate with an orthotic specialist to add padding or refit a splint.

Remove leg wraps or lower extremity compression stockings as directed; and, when appropriate, allow them to remain off until the skin rebounds from pressure creases or indentations.

Each time you reposition a patient, reposition Foley catheters and any other tubes, such as rectal probe tubing or fecal incontinence tubing, to ensure they are not directly under the patient. Pay special attention to inspecting deep skin folds from edema or obesity. Padding the tubing between edematous skin folds can help prevent pressure.

Remove bedpans or urinals promptly and inspect skin each time. If reddened skin is noticed, check for blanching. Patients should never stay on bedpans long enough to develop non-blanchable redness.

### Patient, Family, and Nursing Education

Educate patients and families on pressure ulcer prevention. Whenever possible, tell patients to alert staff if they feel any pain or other abnormal sensation to their skin from a medical device. Engaging the family in pressure ulcer prevention enlarges the surveillance team.

Assemble a pressure ulcer prevention team; include all representatives vested in the medical devices used. For example, a respiratory therapist can help educate nursing staff about respiratory devices and inform nurses of any skin damage seen during their care of the patient. Ongoing quality improvement programs must include routine reviews of any occurrence of a device-related pressure ulcer to determine root causes and evaluate necessary changes for preventing further pressure ulcers.

## Conclusion

New medical devices and advances in care will require ongoing vigilance for pressure ulcer prevention. Nursing must be ready to meet these challenges head on. To avert pressure injuries, maintain a high level of suspicion and vigilance in inspecting the skin near and under any medical device.

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## Learning Objectives

After reading these articles, the learner should be able to:

1. Define a pressure ulcer that has developed from a medical device.
2. List one intervention for preventing pressure ulcers from respiratory devices, bariatric equipment, and cervical collars.
3. Describe interventions for implementing and sustaining urinary catheter securement as part of a catheter-associated urinary tract infection (CAUTI) and pressure ulcer prevention program

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## Faculty Disclosures

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Nurse Planner: Lisa Caffrey, RN, MSN, CIC disclosed no conflicts of interest.

- Device related pressure ulcers can be caused by which of the following?
  - Blood pressure cuff
  - Trach ties
  - Oxygen mask
  - All of the above
- Bariatric patients can often be fit with size appropriate medical devices that aid preventing related pressure ulcers?
  - True
  - False
- Which of the following interventions in NOT appropriate for preventing pressure ulcers related to respiratory devices?
  - Pad the bridge of the nose under a face mask at first sign of reddened skin
  - Clean and inspect the skin under a trach plate.
  - Remove trach ties completely from trach plates if skin at the first sign of pressure injury.
  - Collaborate with the physician how when and to remove a cervical collar.
- Replace tube securement devices when they become wet or soiled or unable to hold the tubes.
  - True
  - False
- Engaging family in pressure ulcer prevention enlarges the surveillance team.
  - True
  - False
- Urinary catheter securement helps reduce CAUTI by
  - Preventing catheter dislodgement
  - Minimizing catheter movement against the urethra or bladder wall creating an opening for bacteria to invade
  - Reducing bladder spasms
  - Decreasing pressure ulcers on the thighs or buttocks
- When selecting an indwelling urinary catheter securement method, it is important to consider
  - creative techniques for adapting and fixing products so they can be used on children, neonates, and adults
  - skin protection because all products contain some concentration of latex
  - effectiveness and ease of use
  - Both A and B
- Which statement about skin protectant preps is True?
  - All skin protectant preps contain alcohol
  - Skin protectant preps must be given adequate time to dry in order to be effective
  - Securement devices are always packaged with skin protectant preps
  - Skin protectant preps generally make the skin oily and impair adhesion of the securement device
- All of the following are appropriate indications for urinary catheter placement except:
  - Acute urinary retention or bladder outlet obstruction
  - Need for accurate measurement of urine output in critically ill patients
  - Potential for sacral pressure ulcers in incontinent patients
  - To improve comfort for end of life care if needed
- All of the following are appropriate interventions for device related pressure ulcer prevention except :
  - Avoid commercial securement devices
  - Inspect skin under and around the device at least daily
  - Educate staff on correct use of devices and prevention of skin breakdown
  - Monitor for edema under or around the tubing the device

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<p>What is the highest degree you have earned (circle one) ?</p> <p style="margin-left: 40px;">1. Diploma    2. Associate    3. Bachelor's 4. Master's    5. Doctorate</p> <p>Indicate to what degree you met the objectives for this program: Using 1 = strongly disagree to 6 = strongly agree rating scale. Please circle the number that best reflects the extent of your agreement to each statement.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%; text-align: center;">Strongly Disagree</th> <th style="width: 20%; text-align: center;">Strongly Agree</th> </tr> </thead> <tbody> <tr> <td>1. Support the bundle elements recommended for reducing VAP in the ICU patient</td> <td style="text-align: center;">1   2   3   4</td> <td style="text-align: center;">5   6</td> </tr> <tr> <td>2. 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5. Discuss how morbid obesity increases the risk of accidental decannulation	1   2   3   4	5   6																																																																																																											
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