Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.

CE
2.0
ANCC CONTACT HOURS

Preventing skin injury in the OR

By Hester Cline Fletcher, MSN, Ed, RN, CNOR

Assessing patients before, during, and after surgery is an integral part of perioperative nursing. This assessment and intervention can prevent skin injury and reduce hospital length of stay in addition to undue pain. Prolonged surgery can be an added risk factor for pressure ulcer development in surgical patients.

According to the National Pressure Ulcer Advisory Panel (NPUAP), a pressure ulcer is defined as "localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure or pressure in combination with a shear."[1] With the prolonged pressures from surgery paired with immobility and tissue compression, pressure ulcers are a major risk factor. Pressure ulcers are caused by blood vessel occlusion from increased pressure and tissue compression as well as from reduced microcirculation. As a result, the tissue can't remove any excess fluids or toxic materials that develop in the area. The small changes in the tissue and pressure distort the affected areas, and necrosis can occur within a few hours.[2]

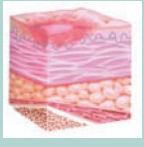
In 2007, the NPUAP updated the staging system for pressure ulcers. There are four stages of pressure ulcer development and two additional categories: unstageable pressure ulcers and suspected deep tissue injury.[1] (See *NPUAP stages of pressure ulcers.*)

Pressure ulcer prevention

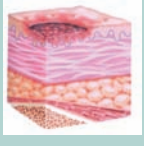
Due to the many changes in government intervention regarding healthcare reform, pressure ulcer prevention has received increased attention. The Centers for Medicare and Medicaid Services (CMS) includes stage III and IV pressure ulcers on their

Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.

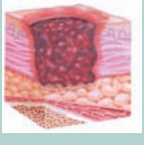
NPUAP stages of pressure ulcers[1]



Stage I–Pressure-related alterations of intact skin that differ from adjacent tissue are present. Skin tissue can be warm or cool, there can be firm or soft changes in tissue consistency and/or a painful sensation. The intact skin appears as a defined area of nonblanchable redness in individuals with lightly pigmented skin; however, in individuals with darker skin tones, visible blanching may be difficult to detect.



Stage II–Partial-thickness tissue loss involving the dermis that presents as a superficial open ulcer or as an intact or ruptured serum-filled blister.



Stage III–Full-thickness tissue loss involving damage to subcutaneous tissue. There may be exposed subcutaneous fat or necrotic tissue; however, muscle, tendon, and bone aren't visible. The ulcer may present as a deep crater; however, the depth varies based on the anatomic location.

Stage IV–Full-thickness tissue loss occurs with extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures. Undermining often occurs, and muscle, tendon, or bone may be visible. The depth of the ulcer varies based on the anatomic location.

Unstageable–Full-thickness skin loss is present with a wound bed covered with slough or eschar. The depth can't be determined.

Suspected deep tissue injury–A purple or maroon discoloration of a localized area of intact skin, or a blood-filled blister due to injury of the underlying soft tissue. These changes may be preceded by shear or pressure-related alterations of intact skin that differ from adjacent tissue. There may be warm or cool skin temperature changes, firm or boggy changes in tissue consistency, and/or a painful sensation.

Art courtesy of the Anatomical Chart Company.

list of hospital-acquired, provider-preventable conditions.[3] These conditions are defined as avoidable or never events (an event that should have never occurred).[3] CMS no longer reimburses for hospital-acquired stage III and IV pressure ulcers, as well as many other events, such as catheter-associated urinary tract infections and foreign objects retained after surgery.[3] CMS hopes to increase awareness and research to decrease the number of these events.[3]

Patients present for surgery with their own risk factors, including age, comorbidities (such as diabetes mellitus, hypertension, respiratory, cardiac, vascular, or neurologic disorders), poor nutritional state, smoking, obesity, impaired mobility, and decreased tissue perfusion. Impaired skin integrity in the OR can result from prolonged hypothermia, increased heat (primarily from warming blankets), shearing forces, friction, and moisture. Prolonged time spent in the OR and on the table, restricted mobility, shear and friction due to movement of the patient (on and off the OR table), patient positioning, and the use of assistive devices are additional factors that increase the likelihood of pressure ulcers in surgery.[4] Pressure ulcers can develop postoperatively within a few hours, but most occur 1 to 3 days after surgery.

During a surgical procedure, it's important that the entire team be aware and responsible for placing the patient in the optimal position for maximum exposure for surgery with maximum reduction in skin injury. Poor surgical positioning and the misuse of devices can cause skin breakdown, nerve damage, ischemia, and, in some uncommon instances, death. Patient positioning should involve the entire team, including surgeons, the anesthesia team, and the perioperative nursing staff and should maintain AORN standards. The following are considerations for positioning[4,5]:

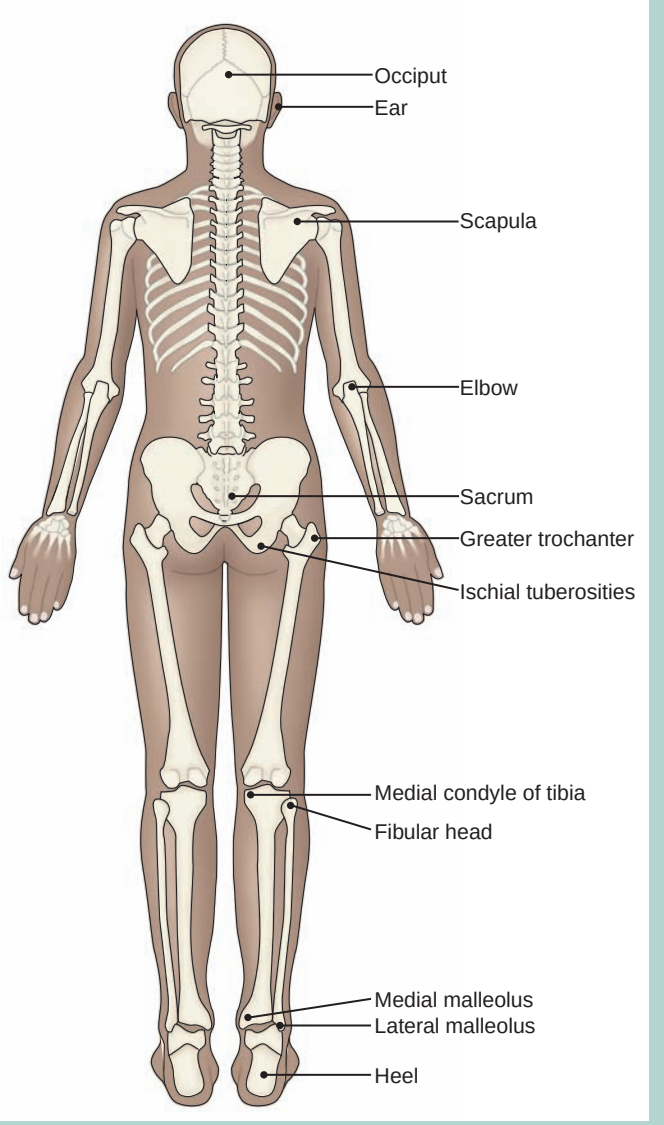
- maintain the patient's dignity
- adequate surgical site exposure for optimal surgery
- optimal airway for ventilation; avoid undue pressure on the chest
- adequate I.V. line access and anesthesia equipment
- reduce nerve, muscle, and bony prominences from pressure and observe elbows, shoulders, toes, and fingers for entrapment

Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.

• maintain good circulation on all body surface areas
• avoid poor perfusion due to leg elevation and lithotomy positioning risks.

Improper positioning can result in injury to the brachial plexus, ulnar, radial, peroneal, and facial nerves. Improper positioning can also result in skin breakdown, especially over susceptible areas and bony prominences (see *Areas susceptible to pressure ulcers*). Eye injury is another risk during surgery and is caused by pressure on the eye, especially in prone positions.

Areas susceptible to pressure ulcers



Source: Smeltzer SC, Bare BG, Hinkle JL, Cheever KH. *Brunner & Suddarth's Textbook of Medical-Surgical Nursing.* 12th ed. Philadelphia, PA: Wolters Kluwer/Lippincott Williams & Wilkins; 2010:184.

Preoperative assessment

The preoperative assessment should include a review of the surgical preference cards and the surgeon's special requests for equipment and/or patient positioning. The perioperative nurse should conduct a preoperative interview with the patient to determine suitability for positioning and risk factors that may increase the likelihood of skin breakdown. In addition, the history and physical exam findings, lab and diagnostic test results, and the anesthesia provider's pre-anesthesia assessment findings should be reviewed and discussed prior to surgery.

The assessment data should include[4,5]:
• age, height, weight, and body mass index
• vital signs
• list of medications and allergies
• medical history, comorbid conditions, any pain-related issues, and cultural considerations
• nutritional status
• skin integrity
• range of motion and any mobility limitations
• implanted devices
• Jewelry should be removed prior to surgery, if possible. If the patient feels that he or she can't remove it (for example, transdermal jewelry implants), the patient should sign a waiver due to the increased risks that are associated with the implant in place:
• prosthetics
• catheters and drains
• lab results.

The type and length of the surgical procedure, patient positioning during surgery, and the anesthesia provider's access to the patient during the surgery are additional factors that need to be considered.[4,5]

Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.

The circulating nurse is expected to assess the need for special equipment that may assist in pressure relief, such as a specialized transfer device to move obese patients; pressure-relieving mattresses for beds post-op; gel padding on the OR table; axillary rolls; stirrup holders with padding; and skin dressings that can be applied to the sacral areas, heels, and cheeks. The equipment should be inspected to make sure that it's working properly and is in good condition. All surfaces that touch the patient's skin should be smooth, and all wrinkles should be smoothed on skin surfaces. In addition, all moisture should be removed.[4]

The supine position is the most common for abdominal procedures and many orthopedic and chest surgeries.

Positioning and risks

Supine position—The supine position is the most common for abdominal procedures and many orthopedic and chest surgeries.[6] The most common injuries associated with the supine position are back pain, respiratory compromise, and pressure ulcers on the occiput, thoracic vertebrae, elbows, scapulae, sacrum, and heels.[6] All these areas should be padded when in the supine position, and the heels should be elevated off the OR table. The patient's arms should be placed with the palms up and secured to prevent them from falling off the arm boards or dropping below the level of the OR table.[4] Legs should be straight and in proper body alignment, the head should be positioned in a donut headrest that is padded, preferably with gel padding.[5]

Trendelenburg position—This position may be used for some lower abdominal procedures to help facilitate visualization of pelvic organs.[5,6] The head down position poses many issues for the patient under anesthesia, and the length of time the patient is in Trendelenburg position should be limited to the time needed to perform the procedure.[6] A decrease in lung volume and air exchange, along with blood pooling in the upper torso, are the most serious risks involved with this position.[5] Additionally, there is a risk of brachial plexus injuries with increased pressure on the clavicle.

Reverse Trendelenburg position—Reverse Trendelenburg position is used for some head and neck surgeries.[6] The patient is positioned with the feet lower than the head, and a well-padded foot board should be in place to support the patient's body, maintain alignment, decrease the risk of sliding, and prevent foot drop.[4,5]

Lateral position—The patient is placed on the nonoperative side, and this position is commonly used for thoracic, kidney, and orthopedic procedures.[6] Spinal misalignment and pressure ulcers on the dependent side are some of the risks involved with the lateral position. The ear, acromion process of the scapula, greater trochanter, iliac crest, lateral aspect of the knee, and malleolus are the areas of greatest concern.[5] All areas of compression should be adequately padded, and if the legs are placed together, a pillow should be used between them. The lower leg should be flexed while the upper leg is straight. A head rest should be placed under the patient's head along with an axillary roll under the dependent arm.[4,5]

Sitting position—The sitting position, or Fowler position, is used for some neurosurgical, ear, and nose procedures.[6] The patient's arms are flexed and should be kept secure to prevent falling or injury; the arms may be placed on pillows resting on the lap.[5] The patient should be padded at the buttocks, sacral area, elbows, knees, and heels.[5]

Lithotomy position—The lithotomy position is used for gynecologic, genitourinary, and some colorectal procedures.[6] The patient is placed on the table, and the legs are placed in one of the four lithotomy levels: exaggerated, high, standard, or low elevation from the table.[6] Hip dislocation and back strain are common issues while in the lithotomy position, so both legs should be placed in the holders at the same time to prevent overstretching the lumbosacral plexus nerves.[4] Pressure ulcers on the heels and peroneal nerve damage from pressure on the lateral aspect of the calf (caused by the leg holder) are common injuries that may

Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.

occur with the lithotomy position.[5] Patients in the lithotomy position are at risk for compartment syndrome if they remain in the position for long periods of time. The perioperative nurse should protect the patient's hand and fingers to prevent a crush injury, which can occur if caught in the moving parts of the OR table when breaking it down and placing it in lithotomy.[5,6] Additional padding should be added to the sacral area, and a patient's legs should be removed simultaneously from the stirrups every 2 hours during long procedures.[4,5]

The circulating nurse should ensure that the OR table and patient's bed have the appropriate weight limits before placing the patient on them.

Prone position—The prone position is used for some neurosurgical, orthopedic, and rectal procedures; the patient is positioned lying face down with the abdomen on the OR table.[6] The patient is initially placed in the supine position, and after anesthesia is administered and the patient is asleep, the patient is placed in the prone position with the help of no less than four staff members.[4] The anesthesia provider supports the patient's head and neck and maintains the patient's airway. Some of the risks in the prone position include respiratory compromise, abdominal wall compression, corneal abrasions, and pressure ulcers on the ears, breasts, abdomen, elbow, genitals, hips, knees, and toes.[5]

Two chest rolls should be placed from the clavicle to the iliac crest area so that the abdomen is free and can allow for the diaphragm to move and permit lung expansion. The toes should be elevated off the OR table by padding the lower legs.[4,5] Assistive devices, such as a face pillow and prone positioning facial device, can be used to secure the head and airway. Cheek padding may be an option to reduce cheek skin tears along with careful application of tape so that it doesn't cause skin tearing when securing the endotracheal tube. Arms should be carefully rotated and placed at the patient's sides upon rolling and then flexed with palms facing down. The patient's arms should not be placed above the head.[4,5]

Jackknife position—The jackknife position is a modified prone position that requires many of the same precautions as the prone position. This position is used for rectal procedures, such as a hemorrhoidectomy.[6] Again, patients must be log rolled into the prone position and padded in the same areas as stated in prone.[5]

Obese patients pose more risks due to their size and weight of tissues impacted. Staff members should take extra precautions to monitor for the following cardiopulmonary issues[4,5]:

- airway compromise, difficulty with endotracheal intubation, and the risk of hypoxia
- intra-abdominal pressure on the diaphragm and an increased risk of aspiration
- potential for an increase in cardiac output and the risk of inferior vena cava compression.

The circulating nurse should ensure that the OR table and the patient's bed have the appropriate weight limits before placing the patient on them. The circulating nurse should also ensure that the equipment needed for the case is available (for example, extra-long safety straps).

Once the patient is on the table, the surgical area and the patient should be assessed for risks, and the patient should be positioned in good body alignment. Legs should be uncrossed and positioned in a way that will discourage skin reddening and subsequent breakdown. The metal parts of the table should not be in contact with the patient's skin, and staff members who are scrubbed in during the procedure shouldn't lean on the patient. Instruments shouldn't rest on the patient for long periods of time. Scrub preparatory materials can add moisture and can increase the risk of skin breakdown or chemical burns and shouldn't be allowed to pool under the patient.[5]

Documentation

The patient's skin and risk assessments along with findings should always be documented preoperatively. Padding that has been placed while positioning the patient should be checked. Once the patient is in the final resting position, peripheral pulses

Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.

should also be checked and documented before and after the procedure. Postoperatively, skin should be checked for any areas of redness that don't blanch when pressed. All concerns should be relayed to the surgeon and the postanesthesia care unit nurse as well as a possible consult with the wound ostomy continence nurse so appropriate follow-up care can be initiated when the patient is transferred to the medical-surgical or specialty unit.[4,5]

All staff should receive annual education and competency validation on patient positioning, wound and skin assessments, and moving patients in a manner that will not cause skin breakdown. When patients are identified as having skin issues postoperatively, a quality report and mechanism for reporting should be established to improve and look at trends in pressure ulcers incurred in the OR. Although patient safety is everyone's job, it's essential that the perioperative staff pay particular attention to preventable skin injuries. By early detection of potential risks, proper alignment, and padding of the patient, pain, injury, and undue costs are reduced for the patient. **OR**

REFERENCES

1. National Pressure Ulcer Advisory Council. NPUAC pressure ulcer stages/categories. http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-ulcer-stagescategories/.

2. Pokorny ME, Koldjeski D, Swanson M. Skin care intervention for patients having cardiac surgery. *Am J Crit Care. 2003;12(6):535-544. search.proquest.com/docview/227906516?*accountid=458.

3. Department of Health and Human Services, Centers for Medicare and Medicaid Services. Medicaid program: payment adjustment for provider-preventable conditions including healthcare-acquired conditions. 42 CFR Parts 434, 438, and 447. Part III: 76(108). 2011. http://www.gpo.gov/fdsys/pkg/FR-2011-06-06/pdf/2011-13819.pdf.

4. Association of periOperative Registered Nurses. Recommended practices for positioning the patient in the perioperative practice setting. In: *2013 Perioperative Standards and Recommended Practices.* Denver, CO: AORN, Inc.; 2013.

5. ECRI Institute. Healthcare risk control. Patient positioning. *Executive Summary.* 2011;4:6-9. www.ecri.org/Documents/PSA/February_2011/SurgAn6.pdf.

6. Heizenroth PA. Positioning the patient for surgery. In: *Alexander's Care of the Patient in Surgery.* 14th ed. St. Louis, MO: Elsevier Mosby; 2011:162-173.

Hester Fletcher is a nursing educator coordinator II at the University of Virginia, Charlottesville, VA.

The author has confirmed that she has no financial relationships related to this article.

DOI-10.1097/01.ORN.0000446028.71828.87

For more than 88 additional continuing education articles related to surgical topics, go to Nursingcenter.com/CE.

CE CONNECTION

Earn CE credit online:
Go to http://www.nursingcenter.com/CE/ORnurse and receive a certificate *within minutes*.

INSTRUCTIONS

Preventing skin injury in the OR

TEST INSTRUCTIONS

- To take the test online, go to our secure website at http://www.nursingcenter.com/ORnurse.
- On the print form, record your answers in the test answer section of the CE enrollment form on page 35. Each question has only one correct answer. You may make copies of these forms.
- Complete the registration information and course evaluation. Mail the completed form and registration fee of $21.95 to: Lippincott Williams & Wilkins, CE Group, 74 Brick Blvd., Bldg. 4 Suite 206, Brick, NJ 08723. We will mail your certificate in 4 to 6 weeks. For faster service, include a fax number and we will fax your certificate within 2 business days of receiving your enrollment form.
- You will receive your CE certificate of earned contact hours and an answer key to review your results.There is no minimum passing grade.
- Registration deadline is June 30, 2016.

DISCOUNTS and CUSTOMER SERVICE

- Send two or more tests in any nursing journal published by Lippincott Williams & Wilkins together and deduct $0.95 from the price of each test.
- We also offer CE accounts for hospitals and other health care facilities on nursingcenter.com. Call 1-800-787-8985 for details.

PROVIDER ACCREDITATION

Lippincott Williams & Wilkins, publisher of *ORNurse2014* journal, will award 2.0 contact hours for this continuing nursing education activity. Lippincott Williams & Wilkins is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

Lippincott Williams & Wilkins is also an approved provider of continuing nursing education by the District of Columbia and Florida #50-1223. This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 2.0 contact hours.

Your certificate is valid in all states.

The ANCC's accreditation status of Lippincott Williams & Wilkins Department of Continuing Education refers only to its continuing nursing educational activities and does not imply Commission on Accreditation approval or endorsement of any commercial product.

Copyright © 2014 Lippincott Williams & Wilkins. Unauthorized reproduction of this article is prohibited.