Pressure Ulcer Treatments

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Acknowledgements

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Purpose

The purpose of Pressure Ulcer Treatments is to briefly review the skin anatomy and physiology and staging of pressure ulcers. Preventative measures for pressure ulcers, general treatment principles, and the goals for wound healing will also be reviewed. This course will educate the healthcare provider on the treatments of pressure ulcers with both a discussion of the types of dressings for pressure ulcers as well as alternative treatments for pressure ulcers.

Learning Objectives

After successful completion of this course, you will be able to:

1. Describe the stages of pressure ulcers and prevention strategies.
2. Understand the general treatment principles for pressure ulcers.
3. List two goals for wound healing.
4. State the different types of dressings and describe when the dressings are used.
5. List the most common type of surgery for wound closure.
6. List three treatments for each pressure ulcer by stage.
Introduction

A national goal in the United States is to reduce the prevalence of pressure ulcers. When pressure ulcers happen, specialty nurses, such as Certified Wound, Ostomy & Continence Nurses (CWOCN), along with the primary RN or LPN need to understand how to care for the patient with a pressure ulcer. This course will focus on the development and prevention of pressure ulcers, dressings, and alternative treatments.

This course will not focus on diabetic, arterial, or venous ulcers. It will also not focus on other skin issues and their treatments such as moles, lesions, or burns. It will focus on the treatment of the pressure-induced wound. Although many of the same treatment modalities can be applied to both the pressure induced wound and other types of wounds, with the exclusion of burns, the only difference between pressure-induced wounds and others are the etiology.

Pressure Ulcers Assessment, Prevention, and Management

A thorough understanding of skin assessment and pressure ulcers can be reviewed from the RN.com’s continuing education course titled, *Pressure Ulcers Assessment, Prevention, and Management*. A brief overview on pressure ulcers and prevention of pressure ulcers will be reviewed in this course, but will have a more focused concentration on the treatment of pressure ulcers.
The Physical Exam

The following signs may indicate impending pressure ulcer development:

<table>
<thead>
<tr>
<th>Persistent erythema</th>
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<tr>
<td>Non-blanching erythema</td>
</tr>
<tr>
<td>Blisters</td>
</tr>
<tr>
<td>Discoloration</td>
</tr>
<tr>
<td>Localized heat</td>
</tr>
<tr>
<td>Localized edema</td>
</tr>
<tr>
<td>Localized induration</td>
</tr>
</tbody>
</table>

In patients with darkly pigmented skin, observe for:

| Purplish/bluish coloration   |
| Localized warms areas of skin |
| Localized edema              |
| Localized induration         |
Temperature, Moisture, Texture, and Edema

Skin temperature can range from cool to warm. Warm is always normal. Note if the overall skin’s temperature is cool or warm, or if it is localized.

Moisture
Normally, your patient’s skin should be dry with only a slight amount of moisture. Overly moist skin may be due to environmental conditions, anxiety, obesity, hyperthyroidism, fever, or diaphoresis. Dry skin affects approximately 59% to 85% of person’s older than 64 years of age (Hess, 2008). Many factors contribute to dry skin, including a low-humidity environment, the patient’s personal habits (smoking, alcohol intake, and poor nutrition), seasonal changes, chronic diseases, medications, and skin cleansers (Hess, 2010).

Texture, Thickness, Turgor, and Mobility
Inspect the skin for a normally smooth, mobile texture. You can check skin turgor by grasping the skin on the top of the hand and gently pulling up. After letting go of the skin, the skin should “snap” back into place within three seconds. Skin that remains elevated or “tented” may be due to age related changes, dehydration, or a combination of both.

Edema
When assessing edema it is useful to use an edema scale to guide your interpretation. This assessment is highly subjective and should be communicated at the patient’s bedside when possible so that each caregiver may interpret the degree of edema the same. Edema is often referred to as pitting or non-pitting edema. Although clinicians commonly grade pitting edema from 1+ to 4+ (mild to severe), there is no agreed upon definition of these grades. However, this type of grading scheme may help an individual clinician record relative changes in edema in an individual patient (Rose, 2012).
Review of the Pressure Ulcer

Pressure ulcers are lesions caused by unrelieved pressure that results in damage to the underlying tissue. Generally, these are the result of soft tissue compression between a body prominence and an external surface for a prolonged period of time (Berlowitz, 2012).

Etiology of Pressure Sores

![Etiology of Pressure Sores Diagram]

Review of Pressure Ulcer Staging

Recently in 2008, the National Pressure Ulcer Advisory Panel updated the definitions of the pressure ulcer staging. In order to prevent and treat pressure ulcers, it is important to understand the definitions of the following stages:

- Stage I
- Stage II
- Stage III
- Stage IV
- Unstageable
- Suspected deep tissue injury
- Ulcers not staged

Image source: ©Can Stock Photo/alila
**Review of Pressure Ulcer Staging**

**Stage I:**
- Nonblanchable erythema.
- Intact skin with non-blanchable redness of a localized area usually over a bony prominence.
- Darkly pigmented skin may not have a visible blanching; the color may differ from the surrounding area.
- The area may be painful, firm, soft, warmer or cooler than adjacent tissue.

(National Pressure Ulcer Advisory Panel [NPUAP], 2010)

**Stage II:**
- Partial thickness skin loss.
- Loss of dermis presenting as a shallow open ulcer with a red pink wound bed, *without slough.*
- Intact or open/ruptured serum-filled blister.

(NPUAP, 2010)

**Stage III:**
- Full thickness skin loss.
- Subcutaneous fat may be visible but bone, tendon, or muscle is not exposed.
- Slough may be present but does not obscure the depth of the tissue loss.
- Undermining and tunneling *may* be present.
- Depth of Stage III varies by anatomical location.
- Shallow Stage III pressure ulcers.
  - Occiput, malleolus, bridge of nose, ear

(NPUAP, 2010)
**Stage IV:**
- Full thickness tissue loss.
- Exposed bone, tendon, or muscle.
- Slough or eschar may be present on some parts of the wound bed.
- Tunneling and undermining are often present.
- May be extending into muscle and/or supporting structures making osteomyelitis possible.

(NPUAP, 2010)

**Unstageable Pressure Ulcer**
- The depth is unknown.
- Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed.
- Until enough slough and/or eschar is removed to expose the base of the wound the true depth cannot be determined.

(NPUAP, 2010)
**Suspected Deep Tissue Injury**

- Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear.
- The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer, or cooler in compared to adjacent tissue.
- Evolution may be rapid exposing additional layers of tissue even with optimal treatment.

(NPUAP, 2010)

Pressure Ulcer Images Courtesy of Lynch, S., 2013

**Ulcers Not Staged**

- Staging should not be used to describe skin tears, tape burns, perineal dermatitis, maceration, or excoriation.
- Staging should not be used to describe surgical wounds, arterial ulcers, venous stasis ulcers, neuropathic wounds or traumatic wounds.

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**Test Yourself**

The following description is in a nurse’s note:

Patient has a Stage II skin tear on their right lateral ankle. There is partial thickness skin loss presenting as a shallow open area with a red pink wound bed, *without slough*.

What is wrong with this nurse’s note?

A. It is Stage I pressure ulcer.
B. It is unstageable.
C. You do not stage a skin tear.

The correct answer is C. You do not stage a skin tear; you only stage a pressure ulcer.
General Treatment Principles

When a pressure ulcer develops, immediate actions will help prevent the worsening of the pressure ulcer. When a pressure ulcer is noted, there are six basic principles to think about to aid in healing besides the actual treatment of the wound with dressings or adjunctive therapies.

The principles are:
1. Preventative
2. Monitoring
3. Healing scale
4. Pain control
5. Assessment and optimum nutrition status
6. Mattresses and tissue pressure relief

Prevention
Prevention of pressure ulcers requires a multidisciplinary team approach. Together, the team is able to provide a holistic approach when caring for the patient and his/her pressure ulcer.

- All patients, regardless of whether or not they have a pressure ulcer, should have a change of position and good support to minimize tissue pressure. Pressure ulcers are most likely to occur in patients that experience sustained pressure over bony prominences.
- All patients should have a skin assessment, a risk assessment, education, and continuous evaluations in order to prevent pressure ulcers.

(Bryant & Nix, 2007)

Monitoring
A patient with a pressure ulcer should have the wound site monitored on a regular basis and documentation of:
1. The evaluation of the ulcer.
2. Integrity of the dressing, if present.
3. Condition of the skin surrounding the ulcer.
4. Presence of pain and adequacy of pain control.
5. Presence of possible complications such as infection.

(Berlowitz, 2013)
General Treatment Principles

Healing Scales
According to Berlowitz (2013), the healing process is described by scales that capture changes in surface area, extent of necrotic tissue and exudates, and the presence of granulation tissues.

There are a few Healing Scales used:
- Pressure Sore Status Tool (PSST)
- Sessing Scale
- Wound Healing Scale
- Pressure Ulcer Scale for Healing (PUSH)

PUSH Tool

According to NPUAP (2010), the PUSH tool is the most readily applied. You never change the stage of the pressure ulcer, even as it heals. You can use tools like the PUSH tool, to indicate how the pressure ulcer is healing.

Note! Once a Stage IV, always a Stage IV. Reverse staging as an ulcer heals is not recommended.

General Treatment Principles

Pain Control
Pressure ulcers can be quite painful for the patient. The pain can be caused by ischemia, infection, or breakdown of the surrounding skin (Berlowitz, 2013).

Treatment of pain includes:
- Oral non-opioids for mild pain
- Opioid analgesics for moderate to severe pain
- Topical anesthetics such as lidocaine
Patients Tolerance to Wound Care

Pain:
✓ Assess for pressure ulcer-related pain in adults using a validated scale.
✓ Assessment of pain should include an assessment of body language and nonverbal cues.
✓ Wound pain can indicate deterioration, infection, or even inappropriate wound treatments.
✓ Optimize pressure ulcer care to ensure that it is coordinated with pain medication administration.
✓ Pain should be measured/rated prior to each dressing change and post-dressing change.
   This is to determine if pain intervention given before the dressing change was sufficient.

(NPUAP, 2010)

General Treatment Principles: Nutritional Status

It is important to optimize protein and total caloric intake (especially with Stage III and Stage IV ulcers) since patients with pressure ulcers are in a chronic catabolic state.

A nutrition consult should be done on these patients and all nutritional deficiencies should be corrected. Corrections could be enteral or parenteral nutrition, increase protein intake, vitamin C supplementation, and zinc supplementation (Little, 2012).

Studies have shown that diets with higher protein and calories for patients with pressure ulcers has improved healing over a 12 week period versus those receiving lower limits of the recommended amounts (Van Anholt, et al., 2010).

You should only correct nutritional deficiencies on patients who are deficient. Previous practice was to give routine supplements. Routine supplementation with vitamins A, E, or C, zinc, copper, or iron is no longer recommended (Little, 2012).
Test Yourself
If your patient has a pressure ulcer but no nutritional deficiency, it is still a good practice to give the patient extra vitamins, zinc, and iron.

A. True
B. False

The correct answer is false. Routine supplementation with vitamins A, E, or C, zinc, copper, or iron is not recommended (Little, 2012).
General Treatment Principles: Mattresses and Tissue Pressure Relief

The final section of general treatment principles is the discussion of proper mattresses or supportive surfaces and tissue pressure relief by redistribution and repositioning.

Mattresses:

- Supportive surfaces are defined by National Pressure Ulcer Advisory Panel (NPUAP) as “a specialized device for pressure redistribution designed for management of tissue loads, microclimate, and/or other therapeutic functions.”
- Examples of support surfaces include: mattress, integrated bed system, mattress replacement or overlay, or seat cushion or seat cushion overlay.
- Choose a support surface compatible with the patient’s needs.
- All individuals at risk for pressure ulcers should continue to be turned and repositioned on a regular basis when a support surface is in place.
- Limit the amount of linen between the individual and the support surface.
- Ideally heels should be “floated” off the bed surface due the small surface area of the heel which makes it a challenge to try to redistribute the load from the heel through the use of a pressure-redistribution device (Lyman, 2009).
- Prolonged sitting results in a higher risk of pressure ulcer development.
- Use a pressure-redistribution seat cushion for individuals whose mobility is reduced and are at risk for pressure ulcer development.
- Limit time an individual spends in a chair without pressure relief.

(NPUAP, 2010)

Note! Donut-type devices or rings have been shown to cause ischemia over the pressure area causing more damage than good.
General Treatment Principles: Mattresses and Tissue Pressure Relief

Pressure Redistribution/Repositioning:
Immobility is the most significant risk factor for pressure ulcer development. *Patients with any degree of immobility should be closely monitored for pressure ulcer development.*

Repositioning involves a change in position of the lying or seated person in order to redistribute pressure, therefore, enhancing comfort. This should be done at regular intervals.

- Failure to reposition will result in tissue ischemia and probable tissue damage.
- Frequency of repositioning will depend on patients activity/mobility level, patients tissue tolerance to pressure, and patients overall skin and medical condition.
- Avoid positioning directly onto medical devices such as tubes or drains.
- Avoid positioning on bony prominences with existing pressure ulcers.
- Repositioning should be at a 30° tilted side-lying position. Avoid positions that increase pressure such as 90° side-lying position or semi-recumbent position.
- Use transfer aides to reduce friction and shear.
  - LIFT, don’t drag while repositioning.

(NPUAP, 2010)

Goals for Wound Healing

Once a pressure ulcer is noted, there are goals for proper wound healing of the pressure ulcer.

They include:

<table>
<thead>
<tr>
<th>Prevent infection</th>
<th>Proper cleansing</th>
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<tbody>
<tr>
<td>Remove nonviable tissue</td>
<td>Proper moisture levels</td>
</tr>
<tr>
<td>Eliminate dead space</td>
<td>Odor control</td>
</tr>
<tr>
<td>Minimize pain</td>
<td>Protection of wound and periwound skin</td>
</tr>
</tbody>
</table>

(Byrant & Nix, 2007)
Goals for Wound Healing: Prevent Infection

The first goal for wound healing is the prevention and management of infection:

- Infection is a common cause of wound chronicity:
  - Wound infection requires prompt intervention and aggressive treatment.
  - While initiation of systemic antibiotics is indicated for infections involving the bone or soft tissue it is not necessary to decrease the bacteria bioburden at the tissue level. Keeping this in mind will prevent unnecessary bacterial resistance.

- Steps to take to avoid wound infections:
  1. Cover the wound to protect from outside contaminants.
  2. Infection control precautions.
  3. Antimicrobials when indicated.

- If infection is suspected, wound culture should be obtained.

- Caveats of performing a wound culture:
  1. ALWAYS obtain all cultures before administering any antibiotics.
  2. Obtain the culture from healthy tissue.
  3. Collect the specimen using sterile technique.
  4. Be careful not to contaminate the specimen when placing it in the sterile container.
  5. Appropriately cleanse the wound prior to obtaining the culture.

(Bryant & Nix, 2007)

Did You Know?

- Wound contamination is the presence of bacteria on wound surfaces with no multiplication of bacteria.
- Wound colonization refers to the presence of replicating bacteria without clinical signs and symptoms of infection.
- Infection is the presence of microorganisms that invade the tissue and there is a systemic response to the invasion.

(Bryant & Nix, 2007)
Goals for Wound Healing: Proper Cleansing

The second goal of wound healing is to properly clean the pressure ulcer to encourage wound healing:

- The goal of wound cleansing is to remove bacteria and debris from wound bed while at the same time preserving and protecting healthy granulation tissue.
- Always clean a wound prior to the application of any dressing.
- Cleanse wound with non-cytotoxic cleanser. The most commonly used wound cleanser is normal saline. Normal saline provides a moist wound environment, promotes granulation tissue formation, and causes minimal fluid shifts in healthy cells.
- Research indicates that the optimum pressure for wound cleaning is between 5 and 15 psi (Baranoski & Ayello, 2012).
- Skin cleansers (used for bathing or incontinence care) should never be used as a wound cleanser due to their toxicity. Skin cleansers are formulated to breakdown the bond between fecal matter and the skin which are stronger and more toxic than wound cleansers.
- Acetic acid, hydrogen peroxide, and sodium hypochlorite (i.e. Dakins Solution) should be avoided. These solutions may damage tissue and delay healing.

(Hess, 2005)

Goals for Wound Healing: Remove Nonviable Tissue

The third goal of wound healing is to remove nonviable tissue.

- It is important to examine the patients' individual needs to determine the most appropriate debridement intervention.
- The methods of debridement should be consistent with the patients overall goals.
- There are different types of wound debridement.
Types of Debridement

The types of wound debridement will be discussed further and include:

- Surgical debridement
- Mechanical debridement
- Enzymatic debridement
- Maggot therapy
- Autolytic debridement

*Surgical debridement of necrotic tissue from the left leg.* Smuszkiewicz, P., Trojanowska, I. & Tomczak, H. (2008). This image is licensed under the Creative Commons Attribution 2.0 Generic license.

**Surgical Debridement:**

There are different aspects to consider when performing surgical debridement.

- Surgical debridement involves the use of a sharp instrument, either at bedside or in the operating room, which will remove devitalized tissue.
- It provides rapid results; however, it can be costly.
- Sharp debridement is highly selective of devitalized tissue only.
- There is a risk of hemorrhage and complications such as infection.
- Contraindications to sharp debridement include patients with clotting/bleeding abnormalities, malignant wounds, and ischemic tissue.
- Caution should be taken with immuno-compromised patients or with wounds involving hands and face.

(Baranoski & Ayello, 2012)

**Note!**

- Extensive debridement may be done under moderate sedation or general anesthesia in the OR setting as extensive debridement may cause severe pain.
Types of Debridement

Mechanical Debridement:
Mechanical debridement involves the use of physical forces to remove necrotic tissue.

- A wet-to-dry dressing involves moist dressings applied to wound and allowed to dry. When the dressing is removed with force, tissue is removed with the dressing. It can be used with non-surgical candidates; however, it is not cost-effective if frequent dressing changes are required. These dressings may macerate the periwound skin and may cause bleeding. Most importantly, these dressing changes are often PAINFUL. Please note these dressing changes are not selective and the exposed healthy tissue will be debrided and slow the healing process.
  - Wound irrigation allows removal of debris mechanically through pressurized fluids. This can be done using high-pressured irrigation or pulsatile lavage. It is important to remember that personal protective equipment is necessary.
    - High-pressure irrigation can be obtained using a 35 mL syringe and a 19 gauge angio-catheter. This provides enough pressure to remove wound debris without damaging the healthy tissue.
    - Pulsatile lavage is obtained using machinery that provides intermittent high-pressure irrigation combined with suction to remove the irrigant and debris. The apparatus allows adjustment of pressure to higher levels to remove debris.
- Whirlpool bath is a process by which movement of water dislodges loose debris. This may macerate the periwound skin, cause trauma to wound bed, and may lead to bacterial contamination of wound bed. This process can be labor intensive and can be time consuming. This form of debridement, however, will increase circulation to the wound bed.

(Bryant & Nix, 2007; Baranoski & Ayello, 2012)

Enzymatic Debridement:
The next type of debridement is the enzymatic debridement.

- This is a form of debridement where enzymes applied to the wound bed degrade and remove necrotic tissue. The enzymes will digest and dissolve the necrotic tissue in the wound bed by breaking down the wound matrix.
- This is an ideal option for patients who are non-surgical candidates.
- It is important to remember that the wound bed needs to be crosshatched or scored in order to facilitate the effectiveness of the enzyme and facilitate local penetration of the enzymatic agent.

(Baranoski & Ayello, 2012)
Types of Debridement

Maggot Therapy:

- Seventy years ago, maggots were used on wounds to control infection, provide fine debridement, and facilitate healing.
- The practice decreased in the 1940’s with the advent of modern antibiotics and improved surgical techniques.
- In 2004, the Food and Drug Administration (FDA) cleared for marketing their first live animal, medical maggots. Indications include debriding non-healing necrotic skin and soft tissue wounds including pressure ulcers.

(Sherman & Shaprio, 2007)

![Maggots on wound](image)

* A wound cleaned by maggots. Image provided courtesy of the National Institute of Health (2013).

Autolytic Debridement:

The final type of debridement reviewed is autolytic debridement. This is the use of one’s own body’s enzymes to remove necrotic tissue from the wound bed. Proteolytic enzymes and phagocytic cells soften and liquefy the necrotic tissue that is then digested by macrophages (Baranoski & Ayello, 2012).

- This can be a slow process; however, it is a less stressful process to patient and the wound.
- This process is contraindicated with an infected wound or deep extensive wounds.
- This type of debridement can be performed in any clinical setting.
- There is a risk for periwound maceration and an odor may be present.
- An example of this is when the practitioner uses a Hydrocolloid dressing (discussed later), such as a Duoderm, which initiates the autolytic process.
Test Yourself

Which of the following is the proper definition of mechanical debridement?
A. Use of a sharp instrument, either at bedside or in the operating room that will remove devitalized tissue.
B. Enzymes applied to the wound bed degrade and remove necrotic tissue.
C. Use of physical force to remove necrotic tissue.
D. Use of one’s own bodies enzymes to remove necrotic tissue from the wound bed.

The correct answer is C. Mechanical debridement is the use of physical force to remove necrotic tissue.

Goals for Wound Healing: Moisture

The fourth goal for wound healing is the maintenance of appropriate level of moisture.
- From research in the 1960’s, healthcare providers began to understand the importance of moist wound healing (Baranoski & Arelló, 2012). In order for epithelial cells to migrate across the wound surface, moisture is needed. Without moisture, the cells must burrow down underneath the wound bed to find a moist area for them to move across and heal the wound.
- The selection of an appropriate dressing that maintains a moist wound environment will assist in preventing tissue desiccation or maceration.
- Moderate to large amounts of drainage from the wound will require a dressing with absorptive properties. This moisture balance is imperative to facilitate timely wound healing.

(Baranoski & Ayello, 2012)

Note!
- Desiccation = Extreme dryness
- Maceration = Excessive moisture
Goals for Wound Healing: Eliminate Dead Space

The fifth goal of wound healing is the elimination of the dead space. Absorptive dressings, gauze dressings, and filler dressings can all be utilized to fill this dead (or empty) space.

- Any wound with depth must be filled with the dressing. Open spaces within the depth of the wound will enable the formation of an abscess.
- To prevent the open space, fluff the dressing packing and completely fill the entire space of the wound. This will facilitate the healing process.
- It is important to ensure the dressing edges come in contact with the wound edges to promote formation of granulation tissue.

(Bryant & Nix, 2007)

Goals for Wound Healing: Control Odor

The sixth goal for proper wound healing is the controlling of odor. The healthcare provider will need to cleanse the wound with each dressing change.

- Devitalized/necrotic tissue will produce a malodorous scent. It is important to debride when this scent is present.
- The utilization of charcoal dressings will neutralize the odor.
- It is important to ensure frequent dressing change to control odor.
- Dressings that are saturated with drainage will also produce an odor.

Note! • Pseudomonas aeruginosa is one of the most common gram negative bacteria that causes wound infection. This bacteria will produce a fruity odor to the wound drainage and the color of the drainage will be a blue/green shade.
Goals for Wound Healing: Minimize Pain

The seventh goal of proper wound healing is to address and minimize pain. This was addressed briefly in the general treatment principles section.

- Assess the patient for pain before, during, and after dressing changes.
- Provide analgesia 30-60 minutes before dressing change.
- If patient’s dressing has dried out, thoroughly soak the dressing prior to removal.
- Attempt to use non adherent dressings.
- Avoid wet to dry dressings.
- It is helpful to use dressings that require fewer frequency changes.
- Pain assessment/medication prior to dressing changes is imperative. Be aware of patient’s current status of pain.
- Know your patients pain triggers and avoid whenever possible.
- Avoid unnecessary manipulation of the wound during the dressing change.
- Consider temperature of wound product before applying it to the wound (i.e. wound gels can feel cold in the wound bed which is uncomfortable to some patients).
- Be mindful of positioning the patient in a comfortable position during the dressing change.
- After procedure assess for patient comfort and adjust treatment regimen and dressing change appropriately.

Goals for Wound Healing: Protect the Wound and Periwound Skin

The eighth (and final) goal for proper wound healing is the protection of the wound and periwound skin.

- Skin sealants, ointments, or moisture barriers should be used to protect the periwound skin from moisture and adhesives.
- Appropriate intervals of dressing changes should be followed to prevent pooling of wound drainage on periwound skin.
- With each dressing change, the periwound skin should be evaluated to assess the effectiveness of the current dressing to ensure that it is protecting the periwound skin.

(Bryant & Nix, 2007)
Test Yourself

Which of the following is not a goal for wound healing?
- A. Prevent infection
- B. Remove nonviable tissue
- C. Keeping dead space
- D. Protection of the wound and periwound skin

The correct answer is C. The following are the goals for wound healing: prevent infection, proper cleansing, remove nonviable tissue, proper moisture levels, eliminate dead space, odor control, minimize pain, and protection of the wound and periwound skin.

Dressings Overview

The following sections will review the characteristics of the wound which guide the type of treatment needed, characteristics of the ideal dressing, and the types of dressings.

Pressure Ulcer Characteristics that Guide Treatment

Selection of the appropriate wound dressing can be challenging. Finding the right dressing depends largely on six key factors when dealing with the pressure ulcer wound.

1. Wound size
2. Amount of viable tissue
3. Amount of wound drainage
4. Wound location
5. Presence of necrosis
6. Presence of infection

(Hess, 2005)
Characteristics of an Ideal Dressing

There are important aspects to the ideal dressing that the healthcare provider should consider when assessing, placing, or removing a dressing. **Most importantly**, the dressing should maintain a moist wound environment to facilitate healing. Some other characteristics include:

- The dressing should be conformable for the range of use needed (i.e. to fill sinus tracts or tunnels).
- It should come in numerous size and shapes.
- It should be absorbent.
- The dressing needs to act as a barrier to wound contaminants.
- Ideally it should be accessible.
- It is important that the dressing assists with reducing pain/discomfort at the site of the wound.
- The dressing should be easy to remove from the wound bed.
- The healthcare provider should assess the dressing characteristics and make sure it aligns with the wound characteristics.
- The amount of drainage that the wound produces should match the amount of absorbency level of the dressing.
- The appearance of the dressing should be assessed with each dressing change. If the dressing is dry, then the dressing can be left in place longer to prevent drying out of the wound bed. If the dressing is saturated, the dressing should be changed at more frequent intervals.
- If the wound has depth, the dressing must be able to fill the entire depth of the wound.
- If the wound is shallow, the dressing must not be too bulky and add extra pressure to the wound bed.
- If the periwound skin is fragile, the dressing adhesive must not be too powerful and cause damage to the periwound skin.
- If the wound bed is odorous, the dressing should contain a charcoal component or be occlusive to the wound bed.

(Baranoski & Ayello, 2012)
Dressing Categories

Finding that right dressing for each individual pressure ulcer pertains largely to the characteristics of each wound as previously described. However, having an understanding of all the types of dressings available makes that choice easier. Wound dressings are separated into categories based on their individual properties (i.e. absorptive properties, hydration properties, filler properties, and adherence properties). Major dressing categories include, but are not limited to:

<table>
<thead>
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<th>Dressing Type</th>
<th>Characteristics</th>
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Dressing Categories: Traditional Gauze Dressings

Traditional gauze dressings are the most readily available dressing. Some characteristics are:
- They are moderately absorptive.
- They are an inexpensive wound treatment that can be used for a Stage II, III, or IV pressure ulcers.
- This type of dressing will need to be changed at least three times a day in order to not dry out the wound bed.
- Dressing changes with traditional gauze can be painful to the patient.
- They can be used as a wound filler in large or small wounds, tunneled wounds, and with undermining. Traditional gauze can be used as a secondary dressing or used for wet to dry mechanical debridement.

Note!
- When using gauze for mechanical debridement wound packing, the gauze should be opened and fluffed. The gauze should be loosely packed into the wound bed.

Image courtesy of Lynch, S., 2013
Did You Know?

A secondary dressing is also known as a topper dressing. It just means that it is the dressing placed on top. It can be on top of the skin or on top of another dressing.

Dressing Categories: Impregnated Gauze

The next gauze reviewed is the impregnated gauze. They are woven gauze impregnated with agents such as zinc, normal saline, hypertonic solution, or petrolatum.

- Most impregnated gauzes are designed to promote a moist healing environment and to facilitate ease in dressing removal without disruption of healing tissue.
- These types of dressings can be used on Stage II, III, or IV wounds. They can be used with infected pressure ulcers with cavities and tracts.
- They can be used for a loose packing; however, the dressing will need to be monitored for drainage as the gauze has minimal absorptive capabilities.

(Bryant & Nix, 2007)

Image courtesy of Lynch, S., 2013
**Dressing Categories: Hydrocolloid Dressing**

The main purpose of a hydrocolloid dressing is to maintain a moist wound environment. This dressing can also be used for autolytic debridement.

- A hydrocolloid dressing can be used on Stage II wounds and can be used as a secondary dressing for Stage III and Stage IV pressure ulcers.
- Depending on the depth of the pressure ulcer and the amount of drainage, these dressing can be used in combination with other wound care treatments.
- They have an impermeable barrier which protects the wound from outside bacterial invasion.
- These dressings have an adhesive border and are capable of absorbing minimal to moderate wound drainage.
- Hydrocolloid dressings come in variable shapes, sizes, and widths.
- These dressings are not recommended for use in third-degree burns or with pressure ulcers that have heavy drainage.
- It is recommended when using hydrocolloid dressings that you select a minimum of 2-3 cm overlap from the margin of the wound.
- Typically hydrocolloid dressings are changed three times a week.

(Bryant & Nix, 2007)

Image courtesy of Lynch, S., 2013
Dressing Categories: Transparent Films

Transparent films are dressings with an impermeable, thin, adhesive film that have no absorptive capabilities. The main function of transparent films is to protect whatever is under it.

- This dressing can be used on healed intact skin for protection, Stage I for protection, and minimally draining Stage II pressure ulcers.
- It will promote autolytic debridement (refer to previous slide on debridement), provide a moist healing environment, and protect the wound from external contaminants.
- It can also serve as a secondary dressing.
- Transparent films should not be used on an infected wound.
- It is recommended that you provide approx. 4-5cm margin from the wound edge to the surrounding skin during application.
- These dressings can be left in place for up to seven days.

(Bryant & Nix, 2007)

Image courtesy of Lynch, S., 2013
Dressing Categories: Hydrogel Dressings

The main purpose of this dressing is to add moisture/fluid to the wound bed. This type of dressing is available in two forms; gel or a sheet form. Hydrogel dressings should be used on dry wound beds with minimal drainage. It can be used on both necrotic and infected wounds.

- The hydrogel dressing will require a secondary dressing for protection of the wound bed and to facilitate adherence of the dressing.
- The hydrogel dressings are conforming to the wound and can also assist with autolytic debridement.
- It is important to monitor the periwound skin for any maceration or fungal involvement (such as candidiasis) from inappropriate use of the hydrogel dressing.
- Hydrogel sheets that have adhesive covers can be changed approximately three times a week.
- Gel form and hydrogel sheets without adhesive covers will need to be changed daily.

(Bryant & Nix, 2007)

Image courtesy of Lynch, S., 2013
Dressing Categories: Foam Dressings

Foam dressings are semi-permeable, hydrophilic dressings that are conformable to the wound bed. The main purpose of foam dressings is to absorb the wound drainage (minimal to heavy drainage), while promoting a moist healing environment and insulating the wound bed.

- These dressings can be used on Stage II through Stage IV wounds.
- Foam dressings can be used in conjunction with other types of dressings such as films or alginates.
- Non-adherent forms of foam dressings can protect any friable periwound skin. They are not recommended for dry pressure ulcers or for pressure ulcers with sinus tracts unless an additional dressing is used to fill the sinus tract.
- The foam dressing should be approximately 2-3cm larger than the wound.
- Typically the foam dressing is changed up to three times per week depending on the wound characteristics (i.e. drainage) and the additional use of wound care products.

(Bryant & Nix, 2007)

Note!
- Hydrophilic means to have an affinity for water; readily absorbing or dissolving in water (Bryant & Nix, 2007).

Image courtesy of Lynch, S., 2013
Dressing Categories: Hydrofiber Dressing

Hydrofiber is a highly absorbent, non-adherent wound dressing/packing. These dressings are usually available as sheets or ribbons. They will become a hydrophilic occlusive gel when they come into contact with wet wounds.

- These dressings are usually changed based on the amount of wound drainage.
- Hydrofiber dressings gel upon contact with moisture. This process locks in fluid that is absorbed by the dressing. This helps to maintain a moisture balance in the wound bed that is not too wet or too dry which protects the edges of wounds from becoming macerated. This type of dressing provides a passive method of wound control by filling in dead spaces where bacteria tend to proliferate.
- It can be used with compression bandages.
- Advantage to a hydrofiber dressing is that it conforms to irregularly shaped wounds easily, they are comfortable for the patient to wear, they are easy and painless to remove, and can be worn for several days which make them cost-effective.

(Swezey, 2009)

Note!

- Hydro comes from the Latin word water. Philic comes from the Latin word philia which means indicating a tendency towards.

Image courtesy of Lynch, S., 2013
Dressing Categories: Calcium Alginate Dressing

- A calcium alginate dressing is derived from brown seaweed in a rope or pad form. These dressings will gel as fluid is absorbed.
- This dressing is a conformable moisture-retentive dressing which also insulates the wound.
- This dressing can be used on Stage II through Stage IV pressure ulcers that have moderate to heavy drainage. They can also be used on both necrotic and infected wounds.
- The rope form can be used on tunneling wounds or wounds with sinus tracts.
- A secondary dressing is required to secure the calcium alginate to the wound. These dressings can be changed up to once a day.
- A calcium alginate dressing is not recommended for non-draining wounds.

(Bryant & Nix, 2007)
**Dressing Categories: Contact Layers**

The main goal of contact layers wound dressing is to protect the wound base. This non-adherent dressing is placed in contact with the wound base and allows passage of exudates from the wound to a secondary dressing.

- The contact layer can be used with deep wounds to protect the wound base in a minimally to heavy draining wound.
- A contact layer will always require a secondary dressing.

(Bryant & Nix, 2007)

Image courtesy of Lynch, S., 2013
Dressing Categories: Antimicrobial Dressings

Antimicrobial dressings work to control or decrease the bioburden. They are mainly used on infected wounds. Antimicrobial dressings are found as ointments, impregnated gauzes, pads, island dressings, and gels.

- These dressings can be used on Stage II through Stage IV pressure ulcers. It can be used on odorous wounds with minimal to heavy wound drainage.
- By decreasing the microbial levels in the wound, these dressings can reduce healing time and are easy to use.
- It is important to know that antimicrobial dressings should not take the place of systemic antibiotics.

(Bryant & Nix, 2007)

Note!

- Bioburden refers to the degree of microbial contamination or microbial load; the number of microorganisms contaminating a wound (Bryant & Nix, 2007).

Image courtesy of Lynch, S., 2013
**Dressing Categories: Collagen Dressing**

Collagen dressings are derived from bovine, porcine, or avian sources. They work to accelerate wound repair and stimulate wound healing.

- Collagen dressings will require a secondary dressing.
- These wound care dressings can be used on Stage II through Stage IV pressure ulcers. They can be used with minimal to moderate drainage.
- They can be used on infected wounds.
- Collagen dressings may absorb slightly.
- These dressings are easy to remove and apply.
- Collagen dressings are not indicated for patients that have known sensitivity to the ingredients.
- These dressings come in:
  - Non-adherent pouches or vials
  - Gels loaded into syringes
  - Pads
  - Powders
  - Freeze-dried sheets

(Bryant & Nix, 2007)

**Dressing Categories: Honey-Based Dressings**

Honey-based dressings have been found to exert anti-inflammatory and antibacterial effects without antibiotic resistance. They are able to promote moist wound healing, decrease wound odor, and facilitate debridement.

- Prior to dressing application, the healthcare provider must assess the patient for an allergy to honey, bee products, or bee stings. It is best not to use this product if the patient is allergic.
- Honey is not considered appropriate for dry, necrotic wounds.
- Some patients complain of stinging or a burning sensation.
- Educate family/patient that honey staining of the skin may be removed with soap and water.

(Pieper, 2009)
Surgery for Wound Closure

Along with dressings, treatments for pressure ulcers may include surgery for wound closure. For wound closure on a pressure ulcer, wound closure is most commonly done using one of the following four methods:

1. Linear closure
2. Skin grafts
3. Tissue: Local flaps and distant flaps

Each one of the above surgical interventions will be discussed separately.

Linear Closure:
- Linear closure involves bringing the wound edges together and closing those using sutures.
- This type of surgical closure is typically used with a traumatic wound when little tissue is missing.

(Bryant & Nix, 2007)

Skin Grafts:
- Commonly, skin grafts are called autografts.
- These grafts usually include the epidermis and extend down into the dermis which is removed from the donor site and placed over a shallow, vascularized pressure ulcer.
- Skin grafts will not replace subcutaneous tissue or muscle. It will only replace down to the dermis level. Because of the depth of the skin graft, it will not provide the cushion that subcutaneous tissue provides over a bony prominence.

(Bryant & Nix, 2007)
Surgery for Wound Closure

Tissue Flaps:
Tissue flaps are the most common surgical modalities for pressure ulcers. There are two types of tissue flaps that we will discuss; local flaps and free flaps.

1. Local Flaps: The most commonly used flaps are the local flaps. They are categorized according to the anatomical structures involved, the methods used to move the flap and the methods used to retain perfusion of the flap.

   Anatomical:
   - Skin flaps - involve just the epidermal and possibly the dermal layer.
   - Fasciocutaneous flaps involve a portion of the epidermis, dermis and the subcutaneous layer. These flaps provide padding and coverage of the pressure ulcer.
   - Myocutaneous flap involve the rotation of all the tissue layers. These flaps provide optimal coverage over a bony prominence and are often used to cover a pressure ulcer.

   Methods Used to Move the Flaps:
   When categorizing tissue flaps according to the method used to move the flap you will find advancement flaps, rotation flaps, and transposition flaps.

   Retaining Perfusion:
   When categorizing tissue flaps according to methods of retaining perfusion you will find random flaps and axial flaps. The random flaps retain the dermal and subdermal vasculature while the axial flaps usually contain and one artery for perfusion (Bryant & Nix, 2007).

2. Free Flaps: With free flaps, the donor site is completely removed from the donor wound and placed on the recipient wound. The microvasculature is carefully connected to the recipient site using special consideration to all of the vessels involved in the wound bed. This flap is not frequently used as it involves microvascular salvation and it is a difficult surgery (Bryant & Nix, 2007).
Adjunctive Therapies

The following adjunctive therapies are used along with proper prevention, goals, and dressings for the pressure ulcer. They include:

1. Negative pressure wound therapy/vacuum assisted closure
2. Hyperbaric oxygen
3. Ultrasound therapy
4. Electrical stimulus
5. Growth factors

Negative Pressure Wound Therapy (NPWT) or Vacuum Assisted Closure (VAC):
NPWT or VAC therapy enhances healing by reducing increasing blood flow, decreasing edema, and increasing the formation of granulation tissue (Berlowitz, 2013).

- This system consists of a computer-controlled therapy, canister, sterile plastic tubing, foam dressing, and clear drape.
- The negative pressure pulls the exudate through the sponge dressing, into the tubing and collects inside the canister.
- In general, negative pressure is indicated for Stage III and Stage IV pressure ulcers.
- Clinical benefits of negative pressure wound therapy/vacuum assisted closure include:
  o This therapy maintains a moist wound environment.
  o It allows for accurate measurement of wound drainage.
  o NPWT and VAC decreases edema of periwound area while increasing local vascularity to wound bed.
  o The wound is protected from bacterial invasion by this dressing which then decreases bacterial colonization.
  o The negative pressure has shown to increase the rate of granulation tissue formation while at the same time increasing the rate of wound contraction.
- Negative pressure created by the pump is in the range of 0-200 mmhg depending on the system used and physician preferences.

(Brown, 2009)

Test Yourself

Wound vacuum assisted closure (VAC) is only used on Stage IV and unstageable pressure ulcers.
A. True
B. False

The correct answer is false. In general, negative pressure therapy or wound vacuum assisted closing (VAC) is indicated for Stage III and Stage IV pressure ulcers.

Adjunctive Therapies

Hyperbaric Oxygen Therapy (HBO):
What is HBO or HBOT?
• It stands for hyperbaric oxygen therapy. It is a mode of therapy in which the patient breathes 100% oxygen at pressures greater than normal atmospheric pressures.
What does it do?
• The research states that HBOT is a treatment for pressure ulcers because during the treatment, there is a potential to promote healing and reduce bioburden in the wound bed.
How does it do it?
• HBOT exerts a bacteriostatic effect on the wound bed by increasing the generation of oxygen free radicals that damage bacterial membranes DNA strands. Also, the raise in tissue oxygenation enhancing leukocyte activity.
What does the literature say?
• HBO has been used, but data is still being collected on the efficacy of the treatment.

(Gray & Ratliff, 2006)
Adjunctive Therapies

Ultrasound:
- Research is still being done on the efficacy of non contact low-frequency ultrasound as a treatment option for suspected deep tissue injury. One case study suggests that the role is preventing the suspected deep tissue injury from progressing to a higher-stage pressure ulcer (Honaker & Forston, 2011).
- Therapeutic ultrasound delivers energy through mechanical vibrations in the form of sound waves at frequencies above detection by the human ear.
- Low frequency ultrasound has been shown to effectively debride necrotic tissue, eradicate some strains of bacteria from the wound and facilitate wound healing.
- Ultrasound treatment cannot be used near electronic implants/prostheses, on areas of malignancy or over the lower back or abdomen during pregnancy.

(Baranoski, 2012)

Electrical Stimulation:
With electrical stimulation, direct current is applied to the wound to enhance healing. It promotes the migration and proliferation of fibroblasts (Berlowitz, 2013). Electrical stimulation uses electrical current to stimulate cellular processes involved in wound healing (Baranoski, 2006).
- Use of electrical stimulation is limited in clinical practice.
- Electrical stimulation appears to be most effective on Stage III and IV pressure ulcers. Typically with those pressure ulcers that have failed traditional wound care modalities. The literature suggests that an optimal electrical charge of 300 to 500uA/sec produces positive effects on the pressure ulcer. Determining the optimal charge based on the wounds stage, depth, and drainage need to be studied further (Baranoski, 2012).

Growth Factors:
Growth factors are proteins that occur naturally in the human body. These proteins cause cellular growth and cell migration and will assist in wound healing. They are obtained through the use of the body’s platelets and macrophages made chemically or biochemically outside of the body.
- Growth factors are available by prescription only and should be used on clean, granulating wounds only.
- The healthcare provider should be aware not to use growth factors on necrotic wounds or on patients with any neoplasms.

(Brown 2009)
General Overview of the Pressure Ulcer Treatment by Stage

- Stage I
- Stage II
- Stage III
- Stage IV
- Unstageable
- Suspected deep tissue injury

Treatment of a Stage I Pressure Ulcer:
Stage I is a warning, a warning that more serious lesions may develop if appropriate preventative measures are not instituted in a timely fashion (Berlowitz, 2013). In a Stage I, the skin is not broken but is red or discolored (without bruising). The redness or change in skin color does not fade within 30 minutes after pressure is alleviated.

How to treat this pressure ulcer:
1. Most importantly, keep pressure off the affected area.
2. Make sure the patient maintains good hygiene. Wash with normal saline solution or wound cleanser, rinse well, and gently pat dry. Do not rub vigorously. Apply protective moisture barrier creams.
3. Evaluate diet and consider a nutrition consult.
4. Review mattress, wheelchair/chair cushion, transfers, turning technique and schedule as contributing factors to the Stage I.
5. Utilize heel boots or pillows to float heels off the bed.
6. Implement a turning schedule for offloading this area with at least every two hour turning and repositioning.
7. If the Stage I pressure ulcer is caused by friction, a protective dressing, transparent film, foam or hydrocolloid, will help protect the area and allow the skin to slide easily. Change protective dressing 1-2 times a week.

(NPUAP, 2010a)

Image courtesy of Lynch, S., 2013
Did You Know?

The most important treatment a healthcare provider can do for a pressure ulcer at ANY stage is to keep pressure off the affected area!

General Overview of the Pressure Ulcer Treatment by Stage

Treatment of a Stage II Pressure Ulcer:
As previously discussed, a Stage II pressure ulcer is a partial thickness loss of the dermis presenting as a shallow open ulcer with a red pink wound bed, without slough.

How to treat this pressure ulcer:
1. Keep pressure off the affected area.
2. Make sure the patient maintains good hygiene. Wash with normal saline solution or wound cleanser, rinse well, and gently pat dry. Do not rub vigorously. Apply protective moisture barrier creams.
3. Evaluate diet and consider a nutrition consult.
4. Review mattress, wheelchair/chair cushion, transfers, turning technique, and schedule as contributing factors.
5. Utilize heel boots or pillows to float heels off the bed.
6. Implement a turning schedule for offloading this area with at least every two hour turning and repositioning.
7. Cleanse the wound with normal saline solution or a wound cleanser and dry carefully.
8. Topical dressings to consider include hydrogel, a thin foam dressing, a hydrocolloid dressing, or cover with a protective barrier ointment. Foam dressings or hydrocolloid dressings can be left on until they wrinkle, roll, or loosen (approximately three days). Barrier ointment should be applied every eight hours and as needed after each incontinence episode.
9. If the Stage II pressure ulcer presents as an intact serous fluid filled blister, the treatment is to elevate the area (if applicable), offload the area (if applicable), and apply barrier protective wipe to the area every shift.
10. Check for signs of wound healing with each dressing change or application.

(NPUAP, 2010a) Image courtesy of Lynch, S., 2013
General Overview of the Pressure Ulcer Treatment by Stage

Treatment of a Stage III Pressure Ulcer:
The staging of pressure ulcers can be very challenging. Nurses have reported being less confident in identifying Stage III pressure ulcers (Baranoski & Ayello, 2012). Stage III pressure ulcers are full thickness skin loss. Subcutaneous fat may be visible but bone, tendon, or muscles are not exposed.

How to treat this pressure ulcer:
1. Consult wound care RN, if available.
2. Keep pressure off the affected area.
3. Make sure the patient maintains good hygiene. Wash with normal saline or wound cleanser, rinse well, and gently pat dry. Do not rub vigorously. Apply protective moisture barrier creams.
4. Evaluate diet and consider a nutrition consult.
5. Review mattress, wheelchair/Chair cushion, transfers, turning technique, and schedule as contributing factors.
6. Utilize heel boots or pillows to float heels off the bed.
7. Implement a turning schedule for offloading this area with at least every two hours turning and repositioning.
8. Cleanse the wound with normal saline solution or a wound cleanser and dry carefully.
9. Consider using a hydrofiber or an alginate dressing with silver if signs of topical infection are present.
10. Consider using an enzymatic debride necrotic tissue as part of the majority of the wound bed.
11. Consider a surgical debride if the patient is a candidate for this intervention.
12. If the wound bed presents as moist without signs of infection, absorb the drainage with a plain hydrofiber or calcium alginate dressing and cover with a secondary dressing.
13. If the wound bed is dry, hydrate the wound with a hydrogel dressing and cover with a secondary dressing.
14. A pressure redistribution support surface should be placed on the patient’s bed.
15. Check for signs of wound healing with each dressing change/application.

(NPUAP, 2010a) Image courtesy of Lynch, S., 2013
General Overview of the Pressure Ulcer Treatment by Stage

Treatment of a Stage IV Pressure Ulcer:
A Stage IV pressure ulcer is full thickness skin loss with exposed bone, tendon, or muscle. Slough and eschar may be present.

How to treat this pressure ulcer:
1. Consult a wound care RN, if available.
2. Keep pressure off the affected area.
3. Make sure the patient maintains good hygiene. Wash with normal saline or wound cleanser, rinse well, and gently pat dry. Do not rub vigorously. Apply protective moisture barrier creams.
4. Evaluate diet and consider a nutrition consult.
5. Review mattress, wheelchair/chair cushion, transfers, turning technique, and schedule as contributing factors.
6. Utilize heel boots or pillows to float heels off the bed.
7. Implement a turning schedule for offloading this area with at least every two hours turning and repositioning.
8. Cleanse the wound with normal saline solution or a wound cleanser and dry carefully.
9. Consider using a hydrofiber or an alginate dressing with silver if signs of topical infection are present.
10. Consider using an enzymatic to debride necrotic tissue as part of the majority of the wound bed.
11. Consider a surgical debridement if the patient is a candidate for this intervention (please refer to previous sections on debridement).
12. If the wound bed presents as moist without signs of infection, absorb the drainage with a plain hydrofiber or calcium alginate dressing and cover with a secondary dressing.
13. If the wound bed is dry, hydrate the wound with a hydrogel dressing and cover with a secondary dressing.
14. A pressure redistribution support surface should be placed on the patient’s bed.
15. Consider application of negative pressure wound therapy.
16. Check for signs of wound healing with each dressing change/application.

(NPUAP, 2010a)  
Image courtesy of Lynch, S., 2013
General Overview of the Pressure Ulcer Treatment by Stage

Treatment of an Unstageable Pressure Ulcer:
The main characteristic of an unstageable pressure ulcer is that the depth of the wound base is unable to be determined due to the presence of devitalized tissue; therefore, we don’t know which stage it is in.

How to treat this pressure ulcer:
1. Consult a wound care RN, if available.
2. Correct and manage causative and contributing factors (turn schedule for pressure relief, prevention of friction, and shear, float heels)
3. Provide systemic support for wound healing (nutritional support, perfusion, oxygenation, glucose control)
4. Consider a surgical consult for debridement evaluation which might include excisional, chemical, or autolytic debridement (please refer to previous debridement sections).
   a. Contraindications to debridement include:
      i. Stable dry eschar of the heel or ischemic foot without erythema or exudate.
      ii. The patient’s individual clinical condition.
5. Treatment options for dry eschar of the heel or foot:
   a. Swab dry eschar with Betadine solution daily (if no documented allergy) to prevent further infection.
   b. Apply dry gauze or leave open to air.
   c. A vascular/surgical consult would be indicated based on the patient’s individual goals for healing.

**Once the pressure ulcer is debrided please refer to previous sections for treatment of Stage III and Stage IV pressure ulcers.

(NPUAP, 2010a) Image courtesy of Lynch, S., 2013
General Overview of the Pressure Ulcer Treatment by Stage

Treatment of a Suspected Deep Tissue Injury Pressure Ulcer:
This pressure ulcer is a purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear.

How to treat this pressure ulcer:
1. Offload all pressure to this area if possible.
2. Correct and manage causative and contributing factors (turn schedule for pressure relief, prevention of friction, and shear, float heels).
3. Systemic support for wound healing (nutritional support, perfusion, oxygenation, glucose).
4. Assess each shift for wound progression/deterioration as this may occur even with all above interventions in place.

(NPUAP, 2010a)

Image courtesy of Lynch, S., 2013
Case Study One

Mr. L is a 65 year old gentleman that is admitted to the hospital for lethargy and leukocytosis. Mr. L's past medical history is significant for embolic stroke six months ago and hypertension. Mr. L is noted to have right sided hemiparesis and tends to roll onto his back when positioned on his side. The patient has been a resident of a skilled nursing facility for approximately six months. Mr. L's daughter is present with him and reports that he has had a pressure ulcer on his coccyx for approximately two months with no improvement. The referral from the nursing home states that they have been doing wet to dry gauze packing to the coccyx pressure ulcer three times a day.

- WBC 12,000
- Albumin 2.9
- Vital signs are 150/82, 80, 20, 101.2 PO

During his admission assessment you find that Mr. L’s skin is intact except for the pressure ulcer to his coccyx. The pressure ulcer is approximately 6cm x 4cm x 3cm with undermining from 12-6 0’clock of 2cm. The wound bed is 80% filled with yellow slough and 20% filled with pale pink wound bed. The periwound skin is intact. The periwound skin is also peeling in some areas. The dressing that was removed was saturated with blue/green looking drainage with a fruity odor to it. Mr. L. denies any pain/discomfort during the dressing change.

**How would you stage this pressure ulcer?**
This is an unstageable pressure ulcer due to the presence of 80% devitalized tissue.

**Is the periwound skin infected?**
Due to the blue/green drainage and the fruity odor and the elevated WBC it appears the wound may be infected.

**What does blue/green drainage with a fruity odor tell you?**
Due to the color of the drainage and the odor, pseudomonas is suspected.

**What is the recommended treatment at this point?**
Due to the presence of 80% devitalized tissue the wound will not heal without further intervention. Debridement of the wound bed must be done in order to facilitate healing. Also, during the debridement it will be appropriate at that time to obtain a deep wound culture to verify any infection. Surgical debridement would be the at this point the recommended, fastest most appropriate approach.
Case Study One

Mr. L. and his daughter agree that surgical intervention for debridement aligns with their goal of healing the wound and Mr. L. is brought to the OR the next day for the procedure. The day after the surgical debridement the doctors’ order reads, “Remove surgical packing and begin NS irrigation and moist to dry dressing changes to coccyx three times a day.”

Prior to removing the surgical dressing, what is the most important question you should ask Mr. L.?
At this point, it is imperative to assess Mr. L’s pain level. It is also important to discuss with Mr. L that he may experience pain/ discomfort during the dressing change and it may be in his best interest to receive pain medication prior to the dressing change.

You pre-medicate Mr. L. prior to removing the dressing. After removing the dressing you note a large amount of serosanguineous drainage. The wound bed now measures 6.5cm x 5cm x 4cm no undermining noted. The wound bed is 90% beefy pink granulation tissue. The periwound skin remains intact.

Although the MD has written for wound care, is there an advanced wound care modality that would be more beneficial for Mr. L.?
The negative pressure wound therapy modality would be appropriate at this time. The necrotic tissue has been removed and the wound bed is healthy and pink. The NPWT modality will decrease the number of dressing changes, will be less painful for Mr. L., and will be able to contain the amount of drainage that is being produced.

What other advanced wound care modalities could you try on this wound?
Calcium alginate, hydrofiber, and a foam dressing would all be appropriate. These types of dressings are all capable of absorbing large amounts of exudate and protecting the periwound skin from maceration while at the same time preventing the wound from drying out and providing moist wound healing.
Case Study Two

Mrs. C is an 80 year old nursing home resident who is admitted to your hospital after falling and breaking her left hip while ambulating alone to the bathroom. Mrs. C’s past medical history is significant for diabetes, coronary artery disease, and Alzheimer’s. Mrs. C is brought immediately to the OR from the emergency room and is admitted to the orthopedic floor later that evening. Once settled after receiving report, the nurse goes into Mrs. C’s room to assess her. Mrs. C is sweating, shaking and crying in pain.

Vital signs at that time are:
- BP 140/86
- HR 100
- RR 24
- Temp 99.9 PO
- Blood glucose level 142mg/dl

Due to her Alzheimer's disease, Mrs. C is unable to rate her pain level. However, it is clear using objective signs of sweating, shaking, and crying out, that Mrs. C is in pain. The nurse medicates Mrs. C as per MD orders and attempts to reposition her. Mrs. C yells out in pain; therefore, the nurse leaves her on her back and heels on the bed because she is too uncomfortable to be moved. 45 minutes later, it appears that she is sleeping and that her pain level has decreased, the nurse leaves her alone. Throughout the night, the nurse leaves her alone as she is sleeping.

At the end of the shift, the nurse goes into Mrs. C’s room and attempts to straighten out Mrs. C’s legs as she is diagonal in the bed. As the nurse gently lifts her affected leg, the nurse notices a 5cm x 5cm purple fluid filled blister.

**What stage is this pressure ulcer?**
The purple blister is called a suspected deep tissue injury. Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear.

**What do you believe caused this large purple fluid filled blister on the heel of the surgically repaired hip?**
A suspected deep tissue injury as this was caused by Mrs. C laying in the same position for the entire shift. The pressure of her heel resting on the mattress caused this injury. Furthermore, the pain that she was experiencing caused her to tense her operative hip and press her heel even further into the mattress.
Case Study Two

What would you do first for this type of pressure ulcer?
The most important intervention is to elevate the heel off the mattress at all times. The heel must be floating in the air. This can be done by placing a pillow under the patient’s calf or by using a boot that suspends the heel in the air.

What is the recommended treatment for this pressure ulcer?
The best treatment for a suspected deep tissue is to leave the blood filled blister open to air and monitor it every shift. If the blister opens or shows any signs of infection it will need to be unroofed via sharp debridement. If the blister starts to drain but is not showing any signs of infection, the nurse could utilize a foam dressing to contain the drainage and protect the periwound skin from the drainage.

How often are foam dressings changed?
The foam dressings are usually changed dependent on the amount of drainage.

Conclusion

When a pressure ulcer happens, it is important to identify and document on the pressure ulcer immediately. Begin working as a team with the primary healthcare provider and/or certified wound RN to guide treatment for the patient’s pressure ulcer. As with healing of all pressure ulcers, no matter what the treatment is, the causative factors must be addressed in order to heal the wound and prevent further deterioration of the wound.
References


References


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