chapter 38

Providing Wound Care and Treating Pressure Ulcers

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Objectives

Upon completing this chapter, you should be able to:

Theory

1. Describe the physiologic process by which wounds heal.
2. Discuss factors that affect wound healing.
3. Describe four signs and symptoms of wound infection.
4. Discuss actions to be taken if wound dehiscence or evisceration occurs.
5. Explain the major purpose of a wound drain.
6. Identify the advantages of vacuum-assisted wound closure.
7. Compare and contrast the therapeutic effects of heat and cold.

Clinical Practice

1. Perform wound care, including emptying a drainage device and applying a sterile dressing.
2. Provide appropriate care for a pressure ulcer.
3. Perform wound irrigation.
4. Remove sutures or staples from a wound and apply Steri-Strips.
5. Give a heat or cold treatment to a patient.

Skills & Steps

Skill 38-1	Sterile Dressing Change
Skill 38-2	Wound Irrigation
Skill 38-3	Applying a Wet-to-Damp or Wet-to-Dry Dressing
Steps 38-1	Maintaining a Closed Wound Drainage Unit
Steps 38-2	Applying a Hydrocolloid Dressing
Steps 38-3	Removing Sutures or Staples
Steps 38-4	Irrigating the Eye or Adult Ear

Key Terms

abscess (ĂB-sĕs, p. 764)
adhesions (ăd-HĒ-shŭnz, p. 762)
adipose (ĂD-ĭ-pōs, p. 762)
approximate (ă-PRŎX-ĭ-māt, p. 762)
approximation (ă-prŏx-ĭ-MĀ-shŭn, p. 771)
binders (p. 769)
cellulitis (sĕl-ū-LĪ-tĭs, p. 764)
collagen (KŎL-ă-jĕn, p. 761)
débridement (dĕ-BRĒD-măw, p. 765)
erythema (ĕr-ĭ-THĒ-mă, p. 760)
eschar (ĔS-kăr, p. 765)
exudate (ĔKS-ū-dāt, p. 764)
fibrin (p. 760)
first intention (ĭn-TĔN-shŭn, p. 762)
fistula (FĬS-tū-lă, p. 764)
granulation tissue (grăn-ū-LĀ-shŭn, p. 776)
hemostasis (hē-mō-STĀ-sĭs, p. 760)
immunocompromised (ĭm-ū-nō-KŎM-prō-mīzd, p. 764)
integument (ĭn-TĔG-ū-mĕnt, p. 759)
keloid (KĒ-loyd, p. 762)
laceration (lăs-ĕr-Ā-shŭn, p. 762)
lysis (LĪ-sĭs, p. 761)
maceration (măs-ĕr-Ā-shŭn, p. 779)
macrophages (MĂK-rō-fāj-ĕz, p. 761)
necrosis (nē-KRŌ-sĭs, p. 760)
phagocytosis (făg-ō-sī-TŌ-sĭs, p. 760)
platelet aggregation (PLĀT-lĕt ăg-rĕ-GĀ-shŭn, p. 760)
purulent (PŪ-rū-lĕnt, p. 764)
sanguineous (săng-GWĬN-ē-ŭs, p. 764)
second intention (p. 762)
serosanguineous (sĕr-ō-săng-GWĬN-ē-ŭs, p. 765)
sinus (SĪ-nŭs, p. 764)
sloughing (SLŪF-ĭng, p. 765)
suppuration (sŭp-ū-RĀ-shŭn, p. 784)
third intention (p. 762)

9. The second day after surgery, the nasogastric tube is removed and an order is written for fluids as tolerated and a liquid diet. The patient is eager to try taking fluids. What should the nurse recommend that he do?
   1. Wait until his liquid diet tray arrives at mealtime.
   2. Start with small sips of water at first to see if they are retained.
   3. Take in a variety of fluids totaling 3000 mL/day.
   4. Go ahead and drink all the water he wants.

10. The patient has a PCA pump to be used for pain control. Should his pain not be adequately controlled with use of the pump, the nurse would first: *(Select all that apply.)*
    1. administer an oral analgesic in addition to the pump medication.
    2. seek a medication order change from the physician.
    3. use nonpharmacologic comfort measures.
    4. be certain that none of the drainage tubes are kinked.
    5. encourage the use of distraction.

11. On his third postoperative day, a patient states that he does not feel well and that he has a lot more pain in the incision area. You inspect the incision and notice that the lower end of it is very red. From these symptoms, you suspect that this patient has developed:
    1. an embolus.
    2. an ileus.
    3. a wound infection.
    4. an evisceration.

12. On the sixth postoperative day, a patient complains of malaise and pain in her right lower leg. The lower leg is warm to the touch and slightly swollen. You suspect that she may have _____. *(Fill in the blank.)*

Critical Thinking Activities

Read each clinical scenario and discuss the questions with your classmates.

Scenario A

Theresa Hijazi is scheduled for surgery this morning. You are assigned two other patients to care for as well as Theresa. One of these patients is stable and will be going home. The other patient is going for a computed tomography (CT) scan at 11 A.M.

1. Describe in detail how you would plan your morning care for these three patients.
2. Theresa shares with you that she really doesn't understand just what the surgeon is going to do to her. How would you handle the situation?

Scenario B

You have prepared your 16-year-old patient for surgery, given instructions, and left him a clean gown to put on. When you return to assist in transferring him to the stretcher for the trip to the OR, you find he has put on underwear and is wearing a St. Christopher's medal around his neck.

1. What would you do about the underwear?
2. How would you handle the situation with the St. Christopher's medal?

Scenario C

You are told to prepare the unit in 404 for the return of a patient from surgery.

1. What supplies do you need?
2. How would you arrange the unit?
3. How often will you need to take vital signs?
4. How often will you do other assessments?
5. What will you assess?

TYPES OF WOUNDS AND THE HEALING PROCESS

Wounds occur in a variety of ways. A surgical incision causes a clean and controlled break in skin integrity, whereas trauma may cause an irregular break in the skin or partial- or full-thickness loss of skin. Pressure can cause tissue breakdown and disruption of skin integrity. Burns can partially or completely destroy skin. The skin and mucous membranes are protective barriers for the body against infection. Thus injury to the **integument** (skin) brings risk of infection and may cause permanent damage. When the integument is injured, a complex healing process is initiated. Nurses act to prevent the invasion of microorganisms into wounds and to support and enhance the body's ability to effect wound repair.

Wounds may be **open,** occurring through the skin, or **closed,** without a break in the skin (Table 38-1). Closed wounds are typically caused by blunt trauma, twisting, pulling, straining, or deceleration force against the body.

Wounds may be partial thickness (superficial) or full thickness. **Partial-thickness** wounds heal more quickly, as new skin cells are produced by the epithelial cells remaining in the dermal layer of the skin. The fibrin clot that forms after an injury acts as the framework, and regrowth occurs across the open wound area. When a **full-thickness** wound occurs, the dermal layer is no longer present except at the wound margins. To heal, all dead (necrotic) tissue must be removed so that granulation tissue can gradually fill in the defect (Figure 38-1). The wound heals by contraction.

Wounds may be **clean** (free of microorganisms) or **dirty** (containing microorganisms). A wound is *infected* when it contains a large number of microorganisms that invade the tissue and release a variety of toxins.

Table 38-1 Wound Types and Characteristics

TYPE	CHARACTERISTICS	CHARTING DESCRIPTION
Closed		
Contusion (bruise)	Tissue injury without breaking of skin	Purple contusion 5 × 7 cm on left thigh
Hematoma	Tissue injury that damages a blood vessel; pooling of blood under the unbroken skin	4 cm diameter hematoma on right forearm
Sprain	Wrenching or twisting of a joint with partial rupture of its ligaments; causes swelling	Swelling of right foot and around malleolus No bruising noted
Open		
Incision	Surgically made separation of tissues with clean, smooth edges	Approx. 7 cm incision on right lower quadrant of abdomen; well approximated; clean and dry with sutures intact
Laceration	Traumatic separation of tissues with irregular, torn edges	5 cm jagged laceration approx. 4 cm deep on lateral aspect of left lower leg
Abrasion	Traumatic scraping away of surface layers of skin	Raw-appearing abraded area 6 cm diameter beneath left elbow
Puncture	Wound made by sharp, pointed object through skin or mucous membranes and underlying tissue	Small circular entry wound on bottom of left foot from stepping on nail
Penetrating	Variable-size open wound through skin and underlying tissues made by a bullet or metal or wood fragment; may extend deeply into body	Jagged deep wound on left chest at third intercostal space, 5 cm lateral to sternum
Avulsion	Tearing away of a structure or a part, such as a fingertip, accidentally or surgically	Avulsion of tip of left little finger from accident with knife Attached only by skin
Ulceration	Excavation of skin and/or underlying tissue from injury or necrosis	Ulceration on lateral aspect of left lower leg 4½ × 5¾ × 2 cm deep; yellow drainage present; wound edges reddened
Perforation	Internal organ or body cavity tissue opened, usually because of infection or a penetrating wound	Abdomen pale, hard to palpation with blue-tinged discoloration noted in right upper quadrant
Crush (could cause open or closed wound)	Tissue significantly disrupted or compressed because of high level of force being applied (e.g., person pinned against a wall by a car hitting him at a moderate speed); may are may not be visible lacerations or maceration of surrounding tissue	Both lower extremities with gross deformities; significant hematomas present, left greater than right, below the knees No pulses palpated in popliteal or pedal regions bilaterally

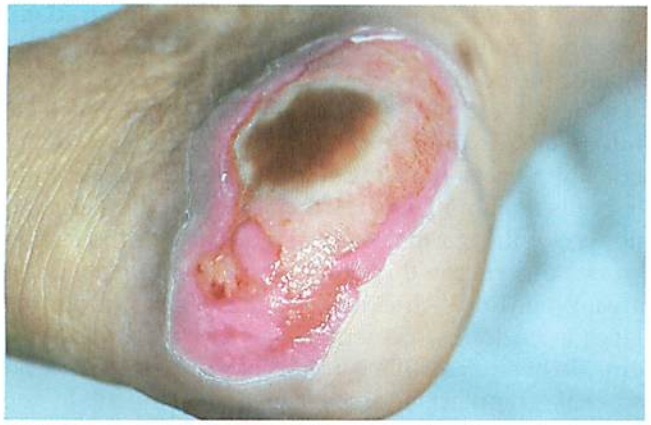


FIGURE 38-1 The brown necrotic tissue must be débrided before healing can take place in this pressure ulcer.

When a wound occurs, the two primary methods of healing are replacement of cells and regeneration. **Replacement** occurs in the form of fibrous connective tissue that does not have the same functional characteristics as the tissue lost when the wound occurred. When cells are not damaged beyond recovery, they restore themselves, with little to no permanent evidence of injury. If the blood supply has been disrupted to the new wound bed and **necrosis** (fatal injury to cells) has occurred, the affected tissue must heal by **regeneration.** New cells similar in structure and function to the dead ones are produced if the tissue is a type that will regenerate. Skin, mucous membranes, bone marrow, muscle, bone, liver, kidney, and lung tissue can regenerate with tissue that is structurally similar to that which was lost. Heart muscle and nerve cells are generally unable to regenerate.

PHASES OF WOUND HEALING

No matter what the cause of the wound, healing occurs in three distinct phases: the inflammatory phase; the proliferation or reconstruction phase; and the maturation, or remodeling, phase. **Inflammation** is a localized protective response brought on by injury or destruction of tissues. **The inflammatory phase begins immediately after injury and lasts about 3 or 4 days.** It includes constriction of blood vessels, **platelet aggregation** (clumping), and the formation of **fibrin** (protein essential to clotting) from the action of thrombin on fibrinogen and epithelial cell migration. This is the process of **hemostasis** (blood clotting or vessel compression) and clot formation. A scab forms to protect against pathogens. Epithelial cells migrate from the margins of the wound toward the base of the scab, and within about 48 hours, a thin layer of epithelial tissue forms over the wound. Chemical reactions releasing histamine and prostaglandin occur. Small blood vessels then dilate and become more permeable, causing serous fluid to leak into the traumatized area. The collection of plasma and electrolytes leaking into the interstitial spaces causes edema. The wound becomes reddened, swollen, and tender. Reactions that are more chemical bring phagocytic neutrophils to cleanse the wound. The phagocytic cells remove debris and protect against bacterial invasion by **phagocytosis** (engulfing of microorganisms or foreign particles).

The clinical signs of the inflammatory process are as follows:

- Swelling or edema of the injured part
- **Erythema** (redness) resulting from the increased blood supply

Communication

Concern About Scarring

Carl Heffner has had open heart surgery and comes to the cardiac rehabilitation center three times a week. The saphenous veins from both legs were used for grafts, so he has three healing incisions from this surgery. He is 64 and divorced.

Mr. Heffner: "When it gets warm this summer, I will hate wearing shorts to work out with these leg scars. They are so ugly. I feel like I have little red snakes going up my legs."

Nurse: "You are worried about the appearance of your legs?"

Mr. Heffner: "Yes, people must find these scars repulsive. I've always looked away when I've seen someone at the gym with all these scars."

Nurse: "Is it difficult to think of yourself looking different than you did before the surgery?"

Mr. Heffner: "Yes, I've always taken a great deal of pride in my appearance. There was a time when women told me I was handsome. Now I'm just a wreck."

Nurse: "How are you feeling now, compared with before your surgery?"

Mr. Heffner: "I feel much better. I am able to do more and am not fatigued all the time. I'm even thinking of playing tennis again."

Nurse: "So before your surgery, you had fairly constant chest pain, were very fatigued, and had to give up playing tennis. Let's look at what the surgery has meant to your life on the whole."

Mr. Heffner: "Well, sure, I'm much better after the surgery and I'm grateful to be alive. My stamina is improving daily and it looks like I will be able to play tennis again. I am really looking forward to that. But I am very self-conscious about getting out on the court in shorts. My buddies will probably tease me."

Nurse: "Have any of the other players had heart surgery?"

Mr. Heffner: "Yes, Charlie has, but he doesn't have these big red scars on his legs."

Nurse: "Did you know him at the time of his surgery?"

Mr. Heffner: "No, I came to the group a couple of years after that."

Nurse: "I think if you look, you will see that Charlie's leg scar has become white and isn't nearly as noticeable now. Yours will mature in that way also. It just takes time for the scar to mature and the red color to fade."

Mr. Heffner: "You think they won't be so prominent later on?"

Nurse: "Yes, they will smooth out and fade."

Mr. Heffner: "I could live with that a lot easier. Plus, players are supposed to keep their eyes on the ball, not on their partner's or opponent's legs!"

Nurse: "That's the spirit, Mr. H.!"

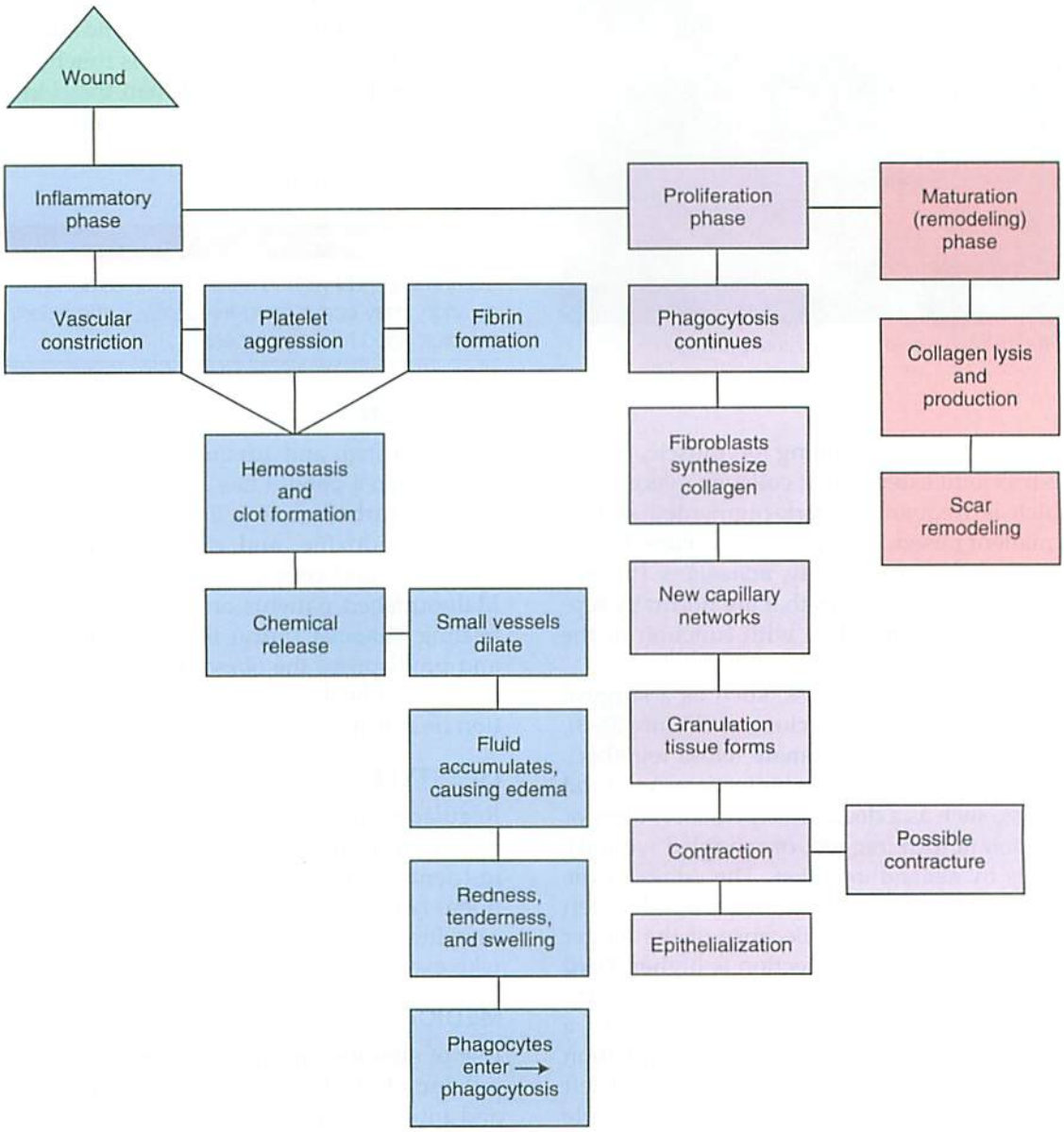
- Heat or increased temperature at the site
- Pain stemming from pressure on nerve receptors
- A possible loss of function resulting from all these changes

The proliferation stage begins on the third or fourth day after injury and lasts 2 to 3 weeks. Macrophages (monocytes that are phagocytic) continue to clear the wound of debris, stimulating fibroblasts, which synthesize collagen. Collagen (fibrous structural protein of all connective tissue) is the main ingredient of scar tissue. New capillary networks provide oxygen and nutrients to support the collagen and further synthesis of granulation tissue. This tissue is deep pink in appearance. A full-thickness wound begins to close by contraction as new tissue is grown. Scarring is influenced by the degree of stress on the wound. In 15 to 20 days, the risk of wound separation or rupture is less likely.

The final stage of healing, maturation, begins about 3 weeks after injury. Scar maturation, or remodeling, is the process of collagen lysis (breakdown) and collagen synthesis by the macrophages to produce the strongest scar tissue possible. Scar tissue slowly thins and becomes paler in color. At the end of this process, the scar is firm and inelastic.

The length of each phase depends on the type of injury and whether the wound heals by first, second, or third intention. The stages of healing are interwoven rather than linear. Different parts of a wound can be in different stages of healing. The process of wound healing is presented in Concept Map 38-1. To ensure adequate and timely wound healing, the nurse should implement the key steps found in Box 38-1.

When a wound occurs around a joint, attention is needed to maintain joint mobility and prevent a



CONCEPT MAP 38-1 Process of wound healing.

Box 38-1 Key Steps to Ensure Appropriate Wound Healing

- Keep surrounding skin and tissue clean and dry
- Ensure adequate oxygen and nutrient supply to the wound by maintaining appropriate body positioning to prevent undue or prolonged pressure.
- Ensure dressings, compression stockings, wound vacuum-assisted closure (VAC) units, and drains are applied and positioned correctly so that circulation is not impaired and the risk of developing lymphedema is minimized.
- Report any signs or symptoms of infection immediately to ensure appropriate therapies are quickly initiated.
- Provide appropriate nutrition and optimize blood glucose levels to aid in the healing process.

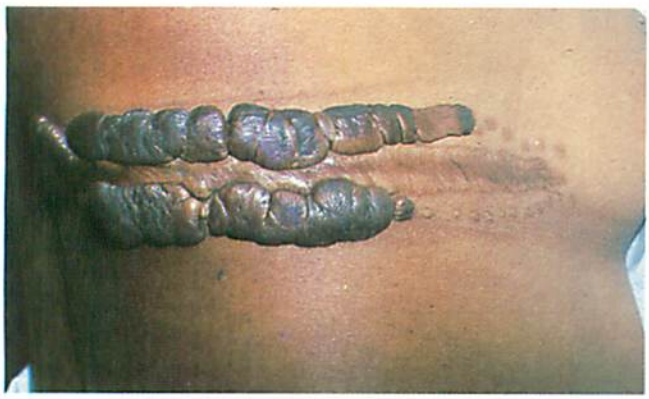


FIGURE 38-2 Keloid along a sutured wound.

contracture (abnormal shortening of muscle tissue) that will restrict joint extension. If collagen overgrowth occurs, which is frequent in dark-pigmented skin, a **keloid** (permanent raised, enlarged scar) occurs (Figure 38-2). In the interior of the body, **adhesions** (fibrous bands that hold together tissues that are normally separated) may grow and interfere with function of the internal organs.

A wound with little tissue loss, such as a surgical incision, heals by **first intention** (closure) (Figure 38-3). The edges of the wound **approximate** (close together), and there is only a slight chance of infection. A wound with tissue loss, such as a decubitus (pressure) ulcer or severe **laceration** (a torn, ragged, or mangled wound), typically heals by **second intention.** The edges of the wound do not approximate, and the wound is left open and fills with scar tissue. Because of the longer healing period, the chance of infection is higher. **Third intention** healing, also known as delayed or secondary closure, occurs when there is delayed suturing of a wound. Such wounds are sutured after the granulation tissue has begun to form. An abdominal wound left open for drainage and then later closed is an example of healing by third intention.

Think Critically

If a patient asks why swelling occurs after an injury, what would you say?

FACTORS AFFECTING WOUND HEALING

AGE

Healthy children and adults heal more quickly than those with chronic health conditions and the elderly. Metabolism and regeneration in the chronically ill and older adult are slower. Peripheral vascular disease impairs blood flow, which can impede healing. Atherosclerosis and atrophy reduce skin capillaries and impair blood flow to the wound. A decline in immune function reduces the formation of antibodies and monocytes necessary for wound healing. Reduced liver function impairs the synthesis of blood factors. Decreases in lung function reduce available oxygen needed for synthesis of collagen and the formation of new epithelial cells. Older skin is much thinner, more fragile, and easily damaged than the skin of younger people; thus older patients' skin should be handled carefully when performing wound care to avoid further wound formation.

Elder Care Points

Complications of wound healing, such as dehiscence and evisceration, may occur more frequently in the elderly because of the prolonged healing process.

NUTRITION

Added protein and adequate fluid are of great importance when a patient has a chronic wound. A diet that is rich in carbohydrates, lipids, vitamins A and C, thiamine, pyridoxine, and riboflavin, plus the minerals zinc, iron, and copper, is needed for wound healing. Malnourished patients are at risk for delayed wound healing. **Adipose** (fatty) tissue has less blood supply and predisposes the obese patient to wound infection and slower healing. (See Chapter 26 for more information on nutrition.)

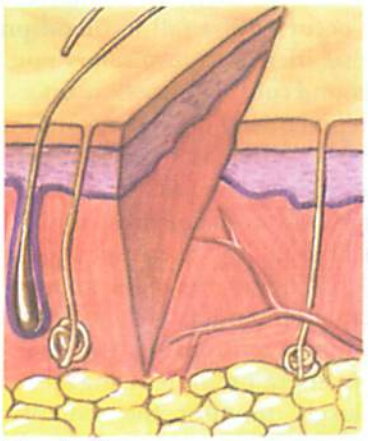
LIFESTYLE

Regular exercise enhances blood circulation and thus promotes healing, since blood brings oxygen and nutrients to the wound. Smoking reduces the functional hemoglobin of the blood, which limits oxygen-carrying capacity. The person who does not smoke and who exercises regularly typically heals more quickly.

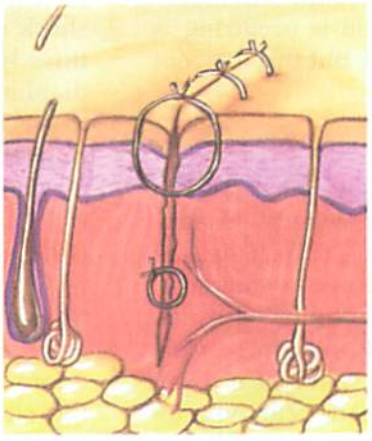
MEDICATIONS

Use of steroids, immunosuppressants and other anti-inflammatory drugs, anticoagulants such as heparin, and antineoplastic agents interfere with various aspects of the healing process. Steroids may mask the signs of

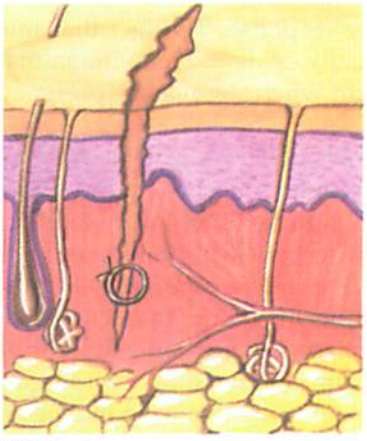
Healing by first intention



Clean incision



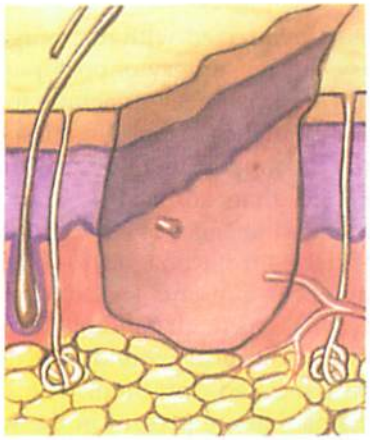
Early suture



"Hairline" scar

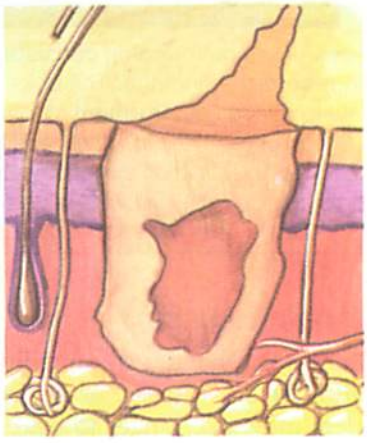
An aseptically made wound with minimal tissue destruction and minimal tissue reaction begins to heal as the edges are approximated by close sutures or staples. No open areas or dead spaces are left to serve as potential sites of infection.

Healing by second intention (granulation) and contraction



Gaping, irregular wound

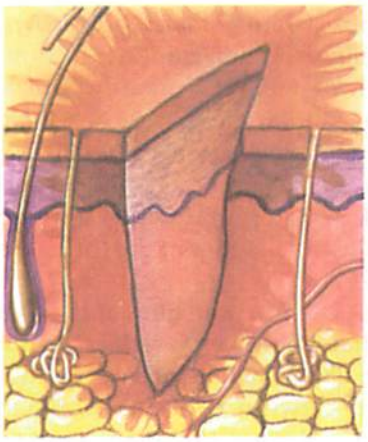
Granulation and contraction



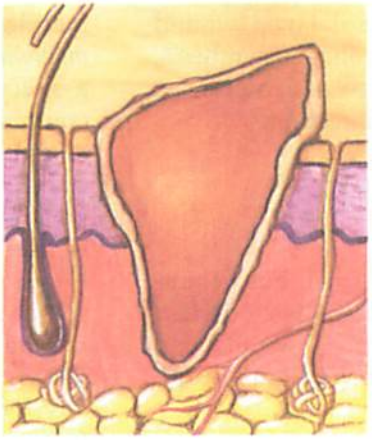
Growth of epithelium over scar

An infected or chronic wound or one with tissue damage so extensive that the edges cannot be smoothly approximated is usually left open and allowed to heal from the inside out. The nurse periodically cleans and assesses the wound for healthy tissue production. Scar tissue is extensive, and healing is prolonged.

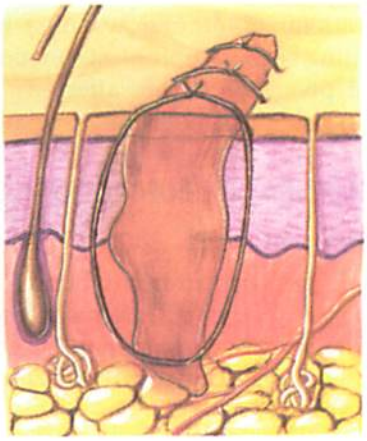
Healing by third intention (delayed closure)



Infected wound



Granulation



Closure with wide scar

A potentially infected surgical wound may be left open for several days. If no clinical signs of infection occur, the wound is then closed surgically.

FIGURE 38-3 The process of wound healing.

wound infection because they inhibit the inflammatory response. The fact that infection is occurring is usually evident due to inflammation, but this may not occur when steroids are present.

INFECTION

A wound infection slows the healing process. The acute phase of an infection is characterized by a sudden onset of symptoms and by the vascular changes of inflammation, especially swelling caused by fluid collecting in tissue. The acute phase is followed by an increase in white blood cells (WBCs), which overwhelm the invading microorganisms and clear away the damaged tissues so that healing can occur. A bacterial infection of the skin or mucous membranes frequently causes fluid drainage from the wound or damaged tissue.

Clinical Cues

Assess drainage for color, consistency, odor, and amount, then record the findings. The color may range from creamy yellow to dark green. **Purulent** (containing pus) drainage contains dead phagocytes, bacteria, and tissue and is thick in consistency. As the infection disappears, the drainage lessens, has minimal to no odor, is more serous or watery, and lightens in color. All signs of inflammation subside as healing occurs.

CHRONIC ILLNESS

Patients who have a chronic illness such as diabetes, cardiovascular disease, or a disorder of the immune system may take longer to heal. Slowed wound healing occurs from decreased oxygen and nutrients at the cellular level, disruptions in the normal metabolism of substances in the body that aid in the healing process, or inability of the body to fight infection.

Patients who are **immunocompromised** (with poorly functioning immune systems) have delayed wound healing because fibroblast function, collagen synthesis, and phagocytosis are affected. These patients are at high risk for health care–associated infection.

COMPLICATIONS OF WOUND HEALING

HEMORRHAGE

Some bleeding from a wound is normal, but hemorrhage is abnormal. Internal hemorrhage is evidenced by swelling or distention in the area of the wound and, perhaps, **sanguineous** (bloody) drainage from a surgical drain.

Clinical Cues

Monitor all patients with fresh surgical wounds for signs of hemorrhage. Be certain to check beneath the patient who had abdominal surgery to be certain blood isn't seeping from the side of the dressing under the patient.

If internal hemorrhage is extensive, hypovolemic shock may occur with a fall in blood pressure, rapid thready pulse, increased respiratory rate, restlessness, diaphoresis, and cold clammy skin. Intervene promptly to prevent a potentially life-threatening situation.

In other cases a **hematoma** may occur. A hematoma may appear as a swelling that is bluish red. If a hematoma is large, it may place pressure on blood vessels and obstruct blood flow to the surrounding tissue.

The risk of hemorrhage is greatest during the first 48 hours after surgery; when it occurs, it requires emergency intervention. If external hemorrhage occurs, apply extra pressure using sterile dressings to the site; closely monitor the patient's vital signs. Notify the surgeon, since the patient may need to be immediately returned to the operating room for further intervention.

INFECTION

A wound may be infected with microorganisms at the time of injury, during surgery, or postoperatively. Local signs that a wound is infected include increased pain, redness, warmth in the surrounding tissues, and purulent exudate. Traumatic wounds are more likely to become infected than surgical wounds. A localized infection called an **abscess** is an accumulation of pus made up of debris from phagocytosis when microorganisms have been present. The fluid may be white, yellow, pink, or green, depending on the infecting microorganisms. Surgical wound infection is often a health care–associated infection, but can be from microorganisms that are present in the wound bed or on the surface of the skin.

The microorganism most frequently present in wound infections is *Staphylococcus aureus*. Other microorganisms commonly responsible for wound infections include *Escherichia coli*, *Streptococcus pyogenes*, methicillin-resistant *S. aureus* (MRSA), and *Pseudomonas aeruginosa*. When wound infection is suspected, a specimen of wound **exudate** (fluid accumulation containing cellular debris) is obtained and tested. A Culturette tube is used to obtain a specimen for the culture (see Chapter 24), and a sensitivity test is performed to determine which antimicrobial agent is most effective against the offending organism (Figure 38-4).

Cellulitis is an inflammation of the tissue surrounding the initial wound, with redness and **induration.** A **fistula** is an abnormal passage or communication usually formed between two internal organs or leading from an internal organ to the surface of the body. A fistula may result from an infection, or it may be present congenitally. Common postoperative fistulas are designated according to the organs or parts with which they communicate, such as a rectovaginal, anal, or biliary fistula. A **sinus** is a fistula leading from a pus-filled cavity to the outside of the body.

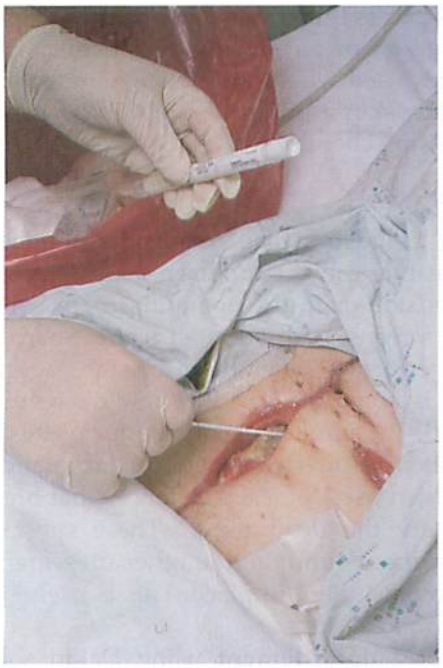


FIGURE 38-4 Take a specimen from the interior of the wound for a culture.

The best way to prevent wound infection is to maintain strict asepsis when performing wound care. Use sterile equipment, meticulous hand hygiene, sterile gloves, and sterile dressings. To prevent shedding of microorganisms into the wound, contain long hair so that it is not swinging over the wound, and remove the stethoscope from around the neck. Refrain from talking while dressing a wound to prevent microorganisms in the mouth or saliva from possibly landing in the wound.

? Think Critically

What discharge instructions would you give a patient about assessing for signs of wound infection?

DEHISCENCE AND EVISCERATION

Dehiscence is the spontaneous opening of an incision. Dehiscence of an abdominal wound often involves separation of the layers beneath the skin as well. **Evisceration** is the protrusion of an internal organ through the incision. Risk factors for dehiscence are obesity, poor nutrition, multiple trauma, excessive coughing, vomiting, strong sneezing, suture failure, and dehydration. The greatest risk for wound dehiscence is on the fourth or fifth postoperative day, before extensive collagen has built up. **A sign of impending dehiscence may be an increase in the flow of serosanguineous (serum and blood mixture) drainage into the wound dressing.** When dehiscence occurs, the patient may state that "something has given way." If dehiscence or evisceration occurs, quickly place the patient supine, and place large sterile dressings, or towels soaked in normal saline, over the incision and viscera. Notify the surgeon immediately and prepare the patient for return to surgery.

? Think Critically

What would you do if you were ambulating in the hall with a patient who has an abdominal incision and he bends forward suddenly and says "something gave way"?

TREATMENT OF WOUNDS

WOUND CLOSURE

Sutures and staples are typically used to hold the edges of a surgical wound together until the wound can heal. Traumatic wounds are usually cleaned, trimmed, and sutured closed. Sutures used to attach tissues beneath the skin are made of absorbable material, are not removed, and are reabsorbed or dissolve within a few days. Skin sutures are made of silk, cotton, linen, wire, nylon, or Dacron. Silver wire clips are also sometimes used. Large retention sutures may be used on a wound when the surgeon believes there is a danger of dehiscence. These are usually wire, and the portion of the suture outside the skin is covered with rubber. Sometimes the wound is small and Steri-Strips can be used. These are small, reinforced adhesive strips placed over the break in the skin that effectively hold the edges of the wound together while healing takes place.

Dermabond is a synthetic, noninvasive glue that decreases the trauma from removing a dressing, while providing a seal that protects underlying tissue without the need for bandages. This may sometimes be used in place of sutures in small areas. It loosens and comes off in 7 to 10 days. It is not used on mucous membranes.

The recommended method of open-wound classification is based on the wound's color rather than its cause or dimensions. There are three basic wound types: red, yellow, and black. The type of wound indicates the type of dressing needed. **Red wounds** are clean and ready to heal. Protection is the best method of treatment. A **yellow wound** has a layer of yellow fibrous debris or exudate. **Sloughing** (natural shedding of dead tissue) may cause drainage. A yellow wound needs to be frequently cleansed and should have a dressing that will absorb the drainage and débride the surface mechanically. A yellow wound often becomes infected. **Black wounds** need **débridement** (removal of all foreign or unhealthy tissue from a wound) of the **eschar** (sloughing dead tissue, usually caused by a thermal injury or gangrene) to heal. Eschar can be mechanically débrided by a surgeon, softened by soaks or enzyme substances, and gradually removed as it separates.

DRAINS AND DRAINAGE DEVICES

At surgery, one or more drains may be placed to provide an exit for blood, pus, fluids, or air that accumulates and could increase the risk of infection. The drain may be active or passive. An active drain is attached to a wound suction device to remove any accumulated exudate or other material. A passive drain has no suction device attachment; it works by the increased pressure inside the wound and depends on gravity and capillary action to pull out any fluid buildup. The drain is placed within the surgical area and exits through a "stab" wound (a puncture or slit made by the surgeon) at a location different from the incision. A Penrose drain is a flat rubber tube. Often a safety pin is placed at the external end of the drain to prevent it from slipping into the wound (Figure 38-5). Whenever this drain is ordered to be shortened, place a new safety pin proximal to where you will cut the drain tubing to the desired length before cutting the tubing. Various sizes of catheters can be used as drains also.

Plastic drainage tubes can be connected to a drainage system that is compressed and closed, applying slight suction to the drainage tube to help evacuate wound fluids (Figure 38-6). The Hemovac and Jackson-Pratt devices are examples of this (Figure 38-7). The fluid in a drainage device is measured and then emptied at the end of each shift, and the amount drained is entered on the intake and output record (Steps 38-1).

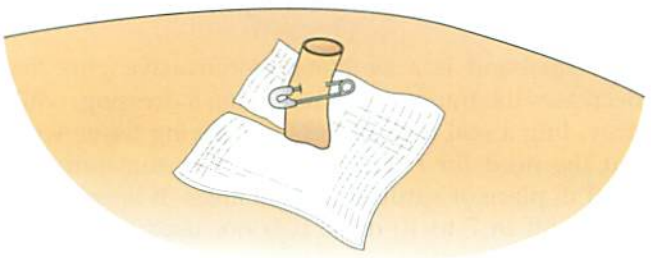


FIGURE 38-5 Penrose drain in a "stab wound" close to an abdominal incision.

Draining excess fluid from a wound area helps prevent the formation of an abscess or a fistula. Drains are sometimes used when traumatic wounds are sutured closed. The skin around the drain is cleansed during each dressing change.

DÉBRIDEMENT

Necrotic tissue must be removed from the wound before healing can occur. **Sharp débridement** is done at the bedside or in the operating room using sterile scissors, forceps, and a scalpel blade. Sharp débridement is performed when there are signs of cellulitis or sepsis. It is a painful procedure, and the wound bleeds afterward. The surgeon usually performs this function. Nurses often are directed to perform **enzymatic débridement,** which uses topical substances that break down and liquefy the dead tissue. These substances are placed in the wound, and another dressing is placed over it to hold them in place. This is useful for uninfected wounds.

Chemical débridement using Dakin solution or sterile maggots is occasionally used on a wound with necrotic tissue that isn't responding to other treatments. **Autolytic débridement** is a longer process that uses the body's enzymes to break down nonviable tissue in the wound. It is best used on small, uninfected wounds, since the type of dressing used provides a warm, moist environment that could encourage growth of bacteria if they are present. Closely monitor the wound for signs of infection during the autolytic process. **Mechanical débridement** is the physical removal of wound debris by irrigation or hydrotherapy with a whirlpool bath or ultrasound mist. The physical therapist performs the whirlpool procedure. With ultrasound mist therapy, microscopic saline bubbles and sound waves clean and débride the wound bed and remove bacteria while stimulating cell growth. Treatments are usually ordered three times a week. The procedure is usually painless, but may be followed by tingling and redness of the site.

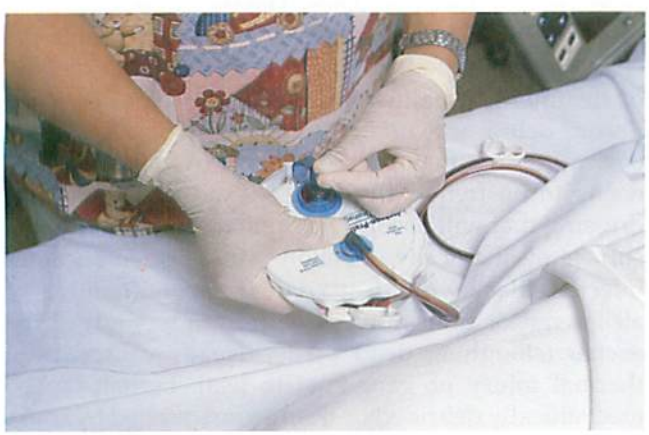


FIGURE 38-6 Compress the Hemovac-type drainage system to activate it.

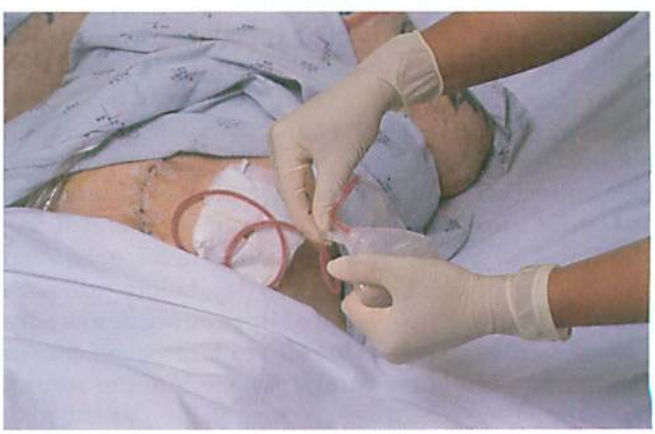


FIGURE 38-7 After emptying drainage, compress the bulb of the Jackson-Pratt–type drainage device to activate it.

Steps 38-1 Maintaining a Closed Wound Drainage Unit

A wound drainage unit pulls fluid from a wound to prevent swelling. It promotes healing and helps prevent the formation of an abscess or a fistula. Standard Precautions are followed and may require the use of a cover gown, mask, protective eyewear, and gloves. Jackson-Pratt drainage system bulbs should be drained and recompressed at least once every 4 hours and when they are at least two-thirds full. This ensures that the negative pressure is maintained while the drain is in place.

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

1. Place a waterproof underpad on the bed under the drainage device. Perform hand hygiene and put on personal protective equipment (PPE). *(Protects the bedding if spill occurs. Protects from transfer of microorganisms in splashed fluids.)*
2. Hold the device with the spout pointing away from you and release the vacuum by gently removing the plug from the pouring spout. *(Avoids contaminating yourself if fluid spurts out of the spout.)*
3. Do not touch the drainage spout or the plug. *(Touching these areas contaminates these surfaces, increasing the risk of infection.)*
4. Empty the contents into a measuring container. Note the amount and appearance of the drainage. *(Allows accurate output measurement. Provides data for documentation and evaluation.)*
5. Clean the pouring spout and the plug using a separate alcohol sponge for each. *(Prepares for reinitiation of vacuum and suction.)*
6. Reactivate the unit by fully compressing it. For a Hemovac, place the unit on a firm surface and compress it equally. For a Jackson-Pratt balloon-shaped device, tightly compress it in one hand and replace the plug in the drainage spout with the other hand. *(Compression creates a vacuum and causes negative pressure, which acts to suction drainage into the reservoir.)*
7. Check to see that the unit remains compressed when you release the manual pressure. Be certain that drainage tubes are not kinked or loose. *(Reinstitutes suction of the wound and ensures the drain[s] can safely collect fluid as it drains.)*
8. Secure the device to the patient's gown below the level of the wound. *(Prevents pulling on the drains and wound if the device is caught on something and aids in draining the fluid from the wound.)*
9. Remove and dispose of PPE, and wash your hands. Note the amount of drainage on the shift intake and output record. *(Prevents the transfer of microorganisms and tracks the amount of drainage.)*
10. Document amount, color, and odor of drainage and that system is recharged/compressed and drainage tubes are unkinked. *(Provides a record of your actions and findings.)*

The mist is delivered in a grid pattern, perpendicular to the wound.

Wet-to-dry dressings act to mechanically débride because they stick to the dressing materials, and a layer of cells is pulled off when the dressings are removed. They are occasionally used but no longer recommended because they also disrupt newly regenerated tissue.

Clinical Cues

The only necrotic wound for which débridement is not recommended is a pressure ulcer on a heel. According to Agency for Healthcare Research and Quality guidelines (Bonham, 2007), this type of ulcer is not débrided if the eschar is dry and if edema, erythema, or drainage is not present.

DRESSINGS

Dressings, which are protective coverings placed over wounds, serve a number of purposes. They prevent microorganisms from freely entering or escaping the wound, and they absorb drainage. Dressings can be used for applying pressure to control bleeding and for improving the adherence of a skin graft to the grafted site. Additionally, dressings help support and stabilize tissues and reduce discomfort from a wound.

A wide variety of dressing materials are available for dressing a wound (Figure 38-8). Choices are based on the location, size, and type of wound; whether infection is present or débridement is needed; and the frequency with which the dressing will be changed. Several standard sizes of dry sterile gauze are available: 2 × 2 inch (5 × 5 cm), 4 × 4 inch (10 × 10 cm), and 4 × 8 inch (10 × 20 cm). The size and number of gauze pads needed depend on the size of the wound and the amount of exudate. You may fold or cut dressings with sterile scissors to fit around drains.

Telfa and other nonadherent dressings have a shiny, nonadherent surface on one side that is applied to the wound. Exudate seeps through this surface and collects in the absorbent material on the other side. This dressing causes less wound trauma when it is removed.

FIGURE 38-8 Various types of dressings.

Surgi-Pads or abdominal pads (ABDs) are used to cover small gauze dressings. They hold the dressings in place and absorb and collect excess drainage. The more absorbent surface of the Surgi-Pad is placed facing the wound; the less absorbent outward side helps protect from external contamination. The outer side is usually indicated by a blue stripe or a seam.

Whichever dressings are used, the purpose is to fully cover the wound and supply sufficient absorbent material to contain any exudate produced. The outermost dressing should completely cover the inner dressings.

It has been known for some time now that superficial wounds heal faster when kept moist than when kept dry. A variety of air or fluid occlusive and semiocclusive wound dressings have been developed, including thin films, hydrocolloids, and foams. These dressings keep the wound moist while insulating and protecting it from external contamination. Foam dressings absorb drainage. These dressings are used more frequently than gauze for chronic or hard-to-heal wounds.

The two dressings most commonly used are transparent film and hydrocolloid dressings. Many combination varieties and other wound dressings are also available. It is important to determine the desired action for treatment of the wound before choosing the appropriate dressing. Other types of dressings include hydrogels, calcium alginate, composites, collagens, and enzymatic débriders.

Transparent Film Dressings

Clear film dressings, such as OpSite, allow you to assess the wound without removing the dressing. The transparent dressing does not require the use of tape and is less bulky than a gauze dressing. These dressings are often used to cover intravenous catheter sites and to protect a stage I or II pressure ulcer. They are useful for superficial, partial-thickness wounds. They do not absorb drainage. A transparent film dressing should be changed when it no longer adheres to the skin properly. They may remain in place from 3 to 7 days. Do not use a transparent film dressing over an infected wound.

Assignment Considerations

Pressure Ulcer and Wound Observation

Remind UAPs to report any changes such as drainage, increased reddening, or a loose dressing to you. Perform your own assessments of wounds and pressure ulcers. Assessment is not the UAP's job.

Hydrocolloid Dressing

Hydrocolloid dressings such as DuoDERM keep a wound moist. They are water and air occlusive and self-adhesive. You cannot see through a hydrocolloid dressing. This dressing facilitates autolytic débridement and provides thermal insulation, keeping the wound warm. Once applied, this dressing may stay in place for 3 to 5 days as long as it stays intact with good skin contact on all edges. Hydrocolloids are not recommended for heavily draining wounds.

Securing Dressings

The dressing is secured to the wound using tape, stretch roller gauze (Conform, Kerlix, Kling), mesh netting, an elastic bandage, or Montgomery straps (tie tapes). The correct product must be selected for the purpose. Elastic tape or bandages provide pressure; stretch gauze and mesh netting allow some movement without dislodging the dressing; and Montgomery straps allow changing of the dressing without removing and reapplying tape, which can cause repeated skin irritation (Figure 38-9).

Tincture of benzoin may be applied to protect sensitive skin before the dressing is taped (Box 38-2). Strips of hydrocolloid dressing can be placed on either side of the wound edges, the dressing applied, and then tape applied to the hydrocolloid strips for wounds that

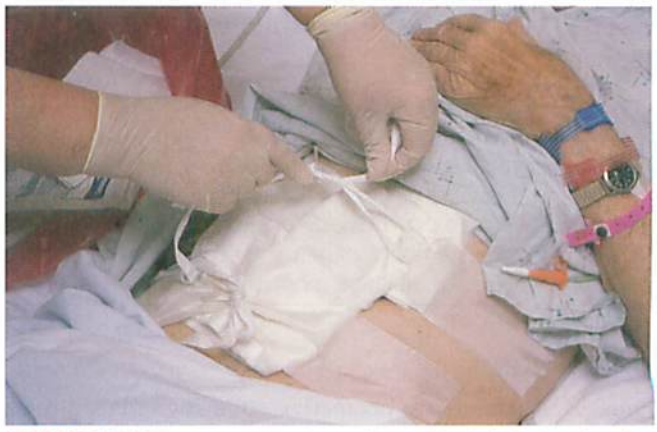


FIGURE 38-9 Montgomery straps may be used to hold a dressing in place.

Box 38-2 Principles for the Application of Tape on a Dressing

- Place the tape so that the wound will stay covered by the dressing and the tape will adhere to intact skin. Place strips of tape at the ends of the dressing, and space tape strips evenly across the middle.
- The tape should be long and wide enough to adhere firmly to intact skin on each side of the dressing, but not so long that activity will loosen it.
- Place the tape opposite to body action in the wound location. Tape should go across a joint or crease, not lengthwise along it (see Figure 38-10).
- Turning under the end of the tape leaves a tab, making removal easier.

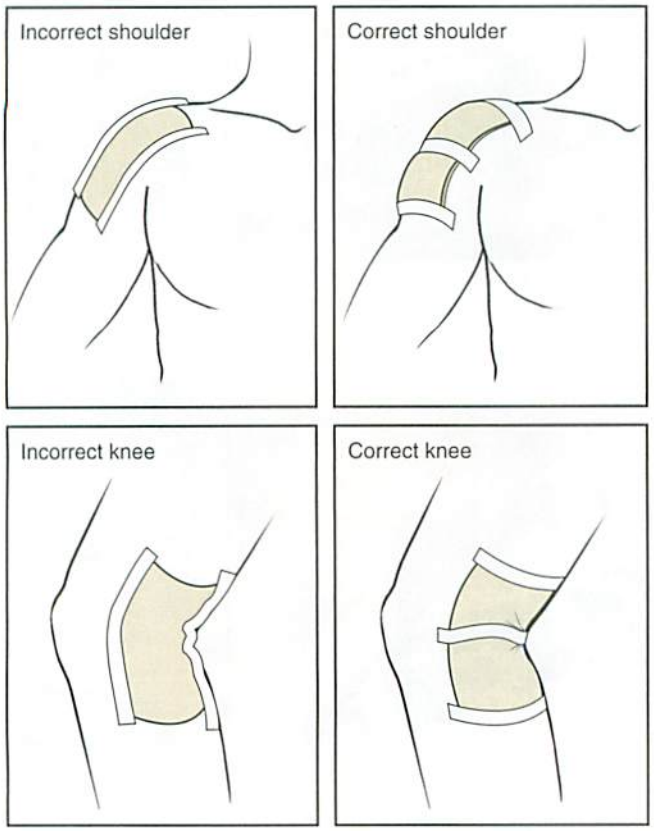


FIGURE 38-10 Tape across a joint or a crease.

need frequent dressing changes. Nonallergenic tapes are available for the patient who has an allergy to other types of tape. Ensure that tape adheres to the skin for several inches on both sides of the dressing, and if it is a large dressing, place a length of tape across the middle of the dressing (Figure 38-10). Do not apply tape over irritated or broken skin. To remove tape, gently loosen the tape ends and gently pull each parallel to the skin surface **toward** the wound while applying light traction to the skin away from the wound as the tape is loosened. If the tape will not loosen, adhesive remover may be used.

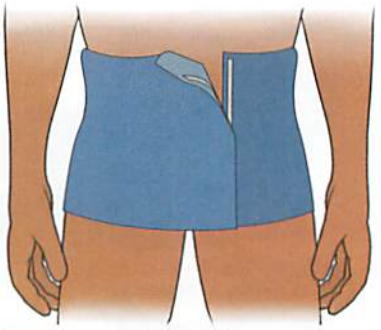


FIGURE 38-11 An abdominal binder provides support.

Clinical Cues

In the home setting, self-adherent plastic wrap can be used to secure dressings on patients who have problems with tape. Use the plastic wrap only for securing dressings over uninfected wounds.

BINDERS

Binders (wide elasticized fabric bands) are used to decrease tension around a wound or suture line, increase patient comfort, decrease lactation after childbirth, or hold dressings in place. An abdominal binder provides support and comfort for an abdominal incision when the patient must perform deep breathing and coughing exercises and when getting in and out of bed (Figure 38-11). An elastic athletic supporter is used to hold dressings in place on the male scrotum and perineum. Elastic mesh panties can be used to hold dressings in place for the female perineum.

Think Critically

Why should you assess the number and type of dressings needed for a particular dressing change before taking dressings to the patient's bedside?

NEGATIVE PRESSURE TREATMENT

Wounds that are difficult to heal may respond to negative pressure wound therapy. This treatment can increase healing rate by 40% while minimizing the need for dressing changes. The therapy, known as vacuum-assisted closure (VAC), involves applying a suction device to a special wound dressing to institute negative pressure at the wound site, drawing the edges together (Figure 38-12). Mechanical stretch of cells occurs, which increases cellular proliferation and tissue growth. The negative pressure and suction remove fluid from the wound, allowing increased blood flow, and thereby oxygen and nutrients, to be delivered to the wound (Box 38-3). After a few days of therapy, bacterial counts in the wound bed drop. The VAC system keeps the wound moist (Figure 38-13). The system may be used on a wound before a skin graft is performed to close the wound completely. Dressing changes for the system

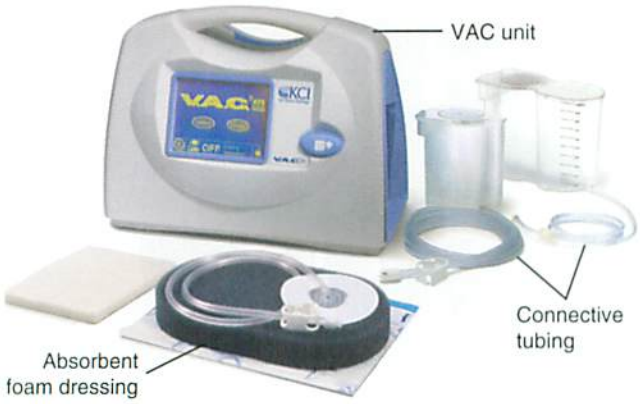


FIGURE 38-12 Wound VAC unit.

Box 38-3 Guidelines for Care of the Vacuum-Assisted Closure (VAC) Dressing

- Observe the dressing area when assessing vital signs.
- Film covering dressing must remain attached to skin in all areas for negative pressure to be maintained.
- Check the setting on the VAC unit and assess whether it is working properly.
- Assess for proper collapse of the dressing, indicating negative pressure is present. A whistling sound may indicate a leak.
- If a leak is present, press down gently around the drape and/or edges of the foam to better seal the drape. Use excess drape to patch over leaks.
- If the dressing needs to be replaced, follow agency protocol and instructions.
- Assess the patient for any complaints or problems in the wound area.
- Document your findings and that the unit is in place and functioning properly.

depend on the type of wound being treated. If the wound is infected, the dressing may be changed every 12 to 24 hours. For a clean wound, the dressing is changed three times a week. The relative contraindications to the use of a wound VAC are exposed organs, exposed blood vessels or nerves, and malignant (cancerous) tissue.

TREATMENT OF PRESSURE OR VASCULAR ULCERS

Causes, staging, and prevention of pressure ulcers, along with illustrations, are presented in Chapter 19. Treatment is discussed here along with care for most wounds.

Elder Care Points

Transparent dressings such as OpSite or Tegaderm placed over a reddened area can often prevent skin breakdown in the elderly.

Clean ulcers at each dressing change. Use only normal saline and apply light mechanical force with gauze sponges or irrigation fluid to prevent damage to new

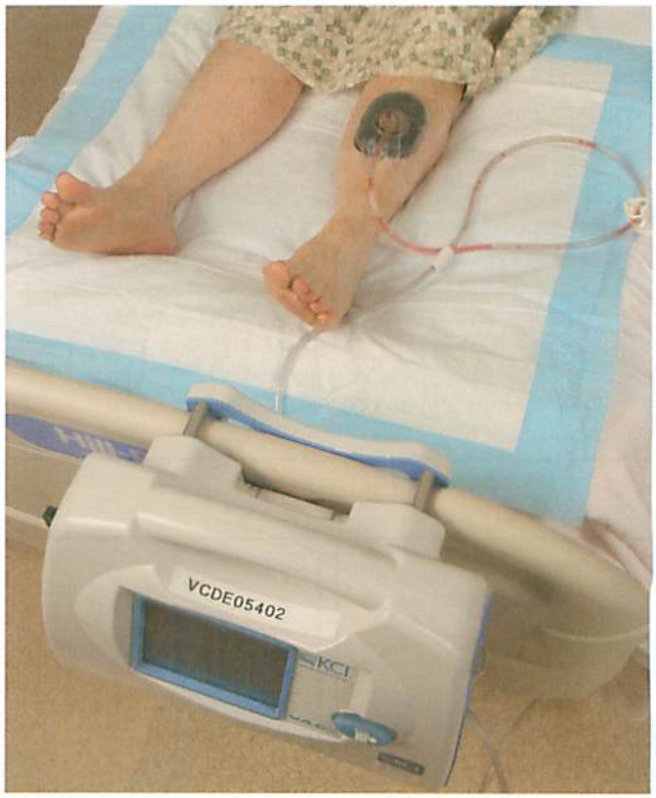


FIGURE 38-13 Vacuum-assisted closure (VAC) unit working on a chronic leg wound.

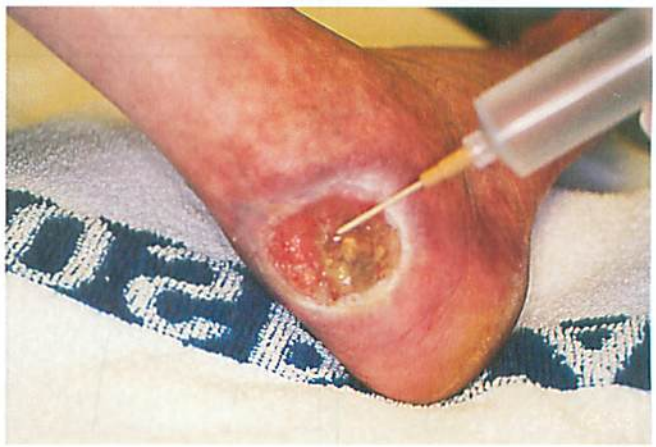


FIGURE 38-14 Wound irrigation using a 35-mL syringe and a 19-gauge plastic intravenous cannula.

granulation tissue. Use 250 to 500 mL of solution and irrigate using a syringe with a small catheter to reach undermined areas and tunnels (Figure 38-14). Cover the wound with a dressing selected according to the wound characteristics. For stage I ulcers, use protective dressings such as thin film to protect the ulcers from shearing forces and to keep them moist. For stage II ulcers that are uninfected, use a hydrocolloid, foam, or hydrogel dressing, which will protect against bacterial contamination. For a stage III ulcer that is draining, use a dressing that will absorb exudate and maintain a moist environment. **For infected ulcers, a nonocclusive dressing is always used.** Chemical

enzyme formulas may be used in the wound to help débride eschar in stage IV ulcers. Sometimes a wet-to-dry dressing may also be applied to help the sloughing of necrotic tissue by mechanical débridement. Occasionally hyperbaric oxygen chamber treatment is used to treat nonhealing wounds. NOTE: Stage II through stage IV wounds should be cleansed with saline or a noncytotoxic cleanser. Use a syringe and plastic cannula to perform pressure irrigation (8 to 15 psi) for stage III and stage IV ulcers to remove debris. Growth factors and VAC have also demonstrated success in healing stage III and stage IV ulcers. An unstageable ulcer needs eschar débridement chemically or mechanically before healing can begin. For a suspected deep tissue injury, aggressive pressure offloading needs to be accomplished. Various techniques are being studied to determine effective methods of pressure reduction, including air fluidized therapy and low frequency ultrasound.

❖ APPLICATION OF THE NURSING PROCESS

▪ Assessment (Data Collection)

Assessment includes complete inspection of all skin areas. Every abrasion, laceration, contusion, reddened area, **ecchymosis,** and incision should be noted. Be alert for signs of inflammation: redness, swelling, pain, heat, and loss of function. The location and appearance of wounds should be documented each day in specific terms because changes can occur rapidly.

During the wound care process, note the number and type of dressings saturated or the diameter of the drainage on the dressing. Assess the wounds by visual inspection, palpation, and smell, noting the wound's appearance and any drainage, swelling, odor, separation, and complaints of pain. Note the color of the wound and surrounding tissue, as well as the **approximation** (degree of closure) of the wound edges. Use the back of a gloved hand to detect increased warmth, tautness of tissue, or edema around the wound. Carefully assess the site for surrounding edema. Gently palpate the periphery of the wound for signs of pain. Assess for drain placement and security, the amount and character of the drainage, and the effectiveness of any suction device.

Assess whether signs or symptoms of local or systemic inflammation or infection are present by reviewing temperature trends, WBC count, and patient report of discomfort. A temperature greater than 101° F (38.3° C), a WBC count greater than 10,000/dL, and a feeling of malaise may indicate wound infection. Assess acute wounds at least once every 8 hours and chronic wounds daily. Measure chronic wounds and pressure ulcers periodically to determine whether they are healing. It is important to note that in a dark-skinned person, you must rely on localized skin color changes at and around the wound site. The affected skin may be darker or shinier than surrounding skin. Assess the progress of healing by checking decreases in the size of the wound. The size of a nonsurgical wound should be measured and the length, width, and depth recorded as ordered or per facility protocol. It is especially important to measure chronic wounds such as pressure or vascular ulcers. Moderate postoperative pain is normal for 3 to 5 days, but persistent severe pain or sudden onset of new pain may indicate infection or internal hemorrhage.

If the initial dressing is in place, do not touch it until the physician changes it or leaves orders for the nurse to do so. Assess the dressing; its appearance provides some indirect information about the wound underneath it. The dressing may be dry and intact, or it might be soaked with serous or serosanguineous drainage. It is also important to assess the patient's reaction to the wound and her readiness to learn to do wound care. Document your findings after the dressing change.

Clinical Cues

Assess for allergy to iodine, medications, cleaning solutions, and tape because many patients are allergic to substances used in wound care.

▪ Nursing Diagnosis

Common nursing diagnoses used for patients with wounds are as follows:

- Impaired skin integrity related to surgical incision (or trauma)
- Risk for infection related to nonintact skin or impaired skin integrity
- Acute pain related to infected wound
- Activity intolerance related to pain and malaise from wound infection
- Disturbed body image related to wound appearance
- Deficient knowledge related to care of wound
- Anxiety related to need to perform wound care

▪ Planning

Include time for wound assessment and care in planning the work load. Consideration of whether dressings may become damp from bathing dictates whether wound care is provided before or after a shower or bath. Check orders for directives regarding wound care. **Dressing changes require a physician's order, and wound irrigations may be done only with an order.** Check the chart for the date of wound occurrence or the surgical procedure to understand how old the wound is. This information is essential to assess the progress of wound healing. Determine what supplies will be necessary for a dressing change or irrigation.

Sample goals/expected outcome statements related to the nursing diagnoses listed above are as follows:

- Incision will be well approximated without disruption.

- Wound will be clean and dry without redness or swelling.
- Pain will resolve when infection is cleared.
- Activity tolerance will improve when infection resolves.
- Patient will verbalize acceptance of wound appearance.
- Patient will learn to properly perform wound care before discharge.
- Practice of wound care before discharge will alleviate anxiety.

A specific time frame for the outcome to be met is individualized to each patient.

Implementation

When implementing wound care, the nurse must use the principles of asepsis presented in Chapters 16 and 17. Careful technique is essential to prevent contamination of the wound and spread of infection if it is present. Use Standard Precautions for all patient care, particularly during wound care, when one comes into direct contact with body fluids. **Use sterile gloves or sterile forceps whenever you touch an open or fresh surgical wound.** After the wound is closed or sealed, you may use nonsterile disposable gloves. If a dressing becomes wet, it must be changed (Nursing Care Plan 38-1).

Nursing Care Plan 38-1 Care of the Patient with a Vascular Ulcer

SCENARIO Frank Walters, age 72, who smokes one pack of cigarettes a day, has a vascular ulcer on his left lower leg. He had originally bruised the spot when working in the garden. Now he has a stage IV ulcer that is not improving. His physician has admitted him for débridement and whirlpool treatments because he lives 175 miles from the hospital.

***PROBLEM*/NURSING DIAGNOSIS** *Open wound*/Impaired skin integrity related to injury and decreased peripheral blood supply.
Supporting Assessment Data: ***Subjective:*** "It's been there for 2 months. It will not heal." ***Objective:*** 5- × 4½-cm open wound on lower lateral aspect of left leg with area of black eschar on upper aspect, yellow tissue, and purulent drainage.

Goals/Expected Outcomes	Nursing Interventions	Selected Rationale	Evaluation
Wound will be without infection within 10 days.	Obtain wound culture as ordered.	Culture will determine infecting organism.	*Is infection present?* Culture results pending.
	Administer antimicrobials as ordered by physician.	Antimicrobials will help fight infection.	
	Monitor signs of infection.	Tracking signs of infection will tell whether wound condition is improving.	
	Use whirlpool bath on lower leg daily.	Whirlpool flow will help débride and cleanse wound.	
	Débride mechanically with Travase.	Travase enzymatically breaks down necrotic tissue.	
	Maintain sterile wet-to-damp dressing on wound.	Damp wound environment helps break down eschar.	
	Medicate for pain as needed 30 minutes before whirlpool treatment and dressing change.	Whirlpool and dressing change on a stage IV ulcer may be painful.	
	Measure wound twice a week.	Measurements tell whether wound size is decreasing or increasing.	
	Encourage cessation of smoking to help promote wound healing and prevent further progression of vascular disease.	Smoking contributes to vessel damage that causes vascular disease.	Smoking fewer cigarettes.
	Turn q 2 hr.	Turning prevents formation of new pressure ulcers.	
Wound will close within 1 month.			*Has wound closed?* Progressing toward expected outcomes Continue plan.

Critical Thinking Questions

1. Why is smoking particularly contraindicated for this patient? Explain the pathophysiology of the effect nicotine and smoking have on the body.
2. Why does eschar need to be removed from the wound? Explain the pathophysiology of how eschar interferes with wound healing.

Wound Cleansing and Dressing Change

Clean wounds with warmed water, normal saline, or a noncytotoxic wound cleanser. Sometimes antimicrobial solutions are ordered for wound irrigation. Many of these solutions must be kept refrigerated, and the amount to be used should be allowed to come to room temperature before the irrigation. **Using cold solution lowers the wound temperature, which slows healing.** If antimicrobial solution is used, dilute it properly. Grossly contaminated or infected wounds are cleaned at each dressing change. Cleaning a healthy wound incorrectly can cause mechanical trauma and delay healing. Gauze pads are safer to use than cotton balls for cleansing because the cotton fibers can become imbedded in the wound and delay healing. For superficial, uninfected wounds, rinse lightly with normal saline rather than using gauze to reduce mechanical trauma. Avoid drying a wound after cleaning, since it heals better if it remains moist. Clean surgical wounds from the center outward to avoid pulling microorganisms from the skin into the wound. Change surgical and open wound dressings using sterile technique (Skill 38-1).

! Safety Alert

Solutions That Damage Granulation Tissue

Certain solutions are toxic to growing and normal cells and should not be used to cleanse granulating wounds. Never use Dakin solution (sodium hypochlorite), acetic acid, povidone-iodine, or hydrogen peroxide to clean an uninfected, granulating wound.

? Think Critically

What interventions would you place on the care plan for a patient with a surgical wound? What interventions might be needed for a patient with an open traumatic wound?

Skill 38-1 Sterile Dressing Change

Sterile dressing changes are performed for surgical wounds, open wounds, and pressure or vascular ulcers. The physician orders the frequency of the dressing change and irrigation solutions, if indicated.

Supplies

- Sterile gloves
- Clean gloves
- Tape
- Plastic discard bag
- Scissors
- Dressing supplies
  - Gauze sponges
  - Telfa dressings
  - Abdominal combination dressings
- Sterile normal saline solution
- Antiseptic swabs and solution
- Transparent film dressings
- Cotton-tipped applicators
- Bath blanket

Review and carry out the Standard Steps listed in Appendix D.

ACTION *(RATIONALE)*

Assessment (Data Collection)

1. Check the orders for directions for wound care and dressing change. *(A physician's order is required for wound care and dressing change.)*
2. Determine whether the patient is ready for the procedure. *(Saves time if the patient is not involved in another activity.)*

Planning

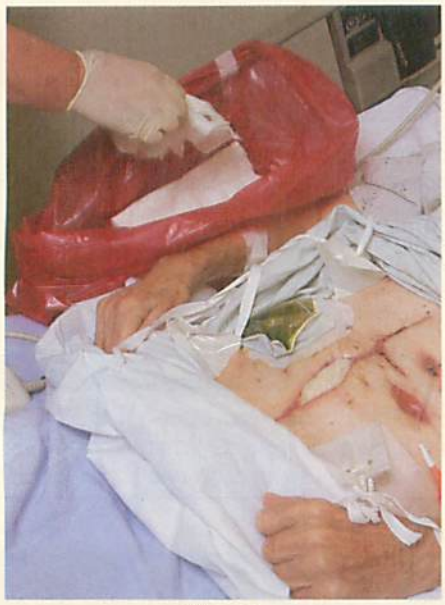
3. Check the nurse's notes for the types of supplies needed for the dressing change if in doubt as to what is needed, and visually assess the dressing that is in place. *(Ensures that the proper supplies will be on hand during the sterile procedure.)*

Implementation

4. Perform hand hygiene. Don clean gloves, loosen the binder or tape; remove the old dressing; pull off the tape toward the wound while stabilizing the skin with the other hand. If tape won't loosen, rub over it with an alcohol swab for several seconds or use adhesive remover. Wet the dressing with normal saline solution if it sticks to the suture line and wait a few minutes before removing it. Assess the drainage on the dressings and place them in the plastic discard bag. *(Gloves prevent spread of microorganisms; removing old dressing allows visual assessment of the wound and drainage. Pulling tape toward the wound prevents disruption of the wound. Alcohol or adhesive remover helps loosen stubborn adhesive.)*

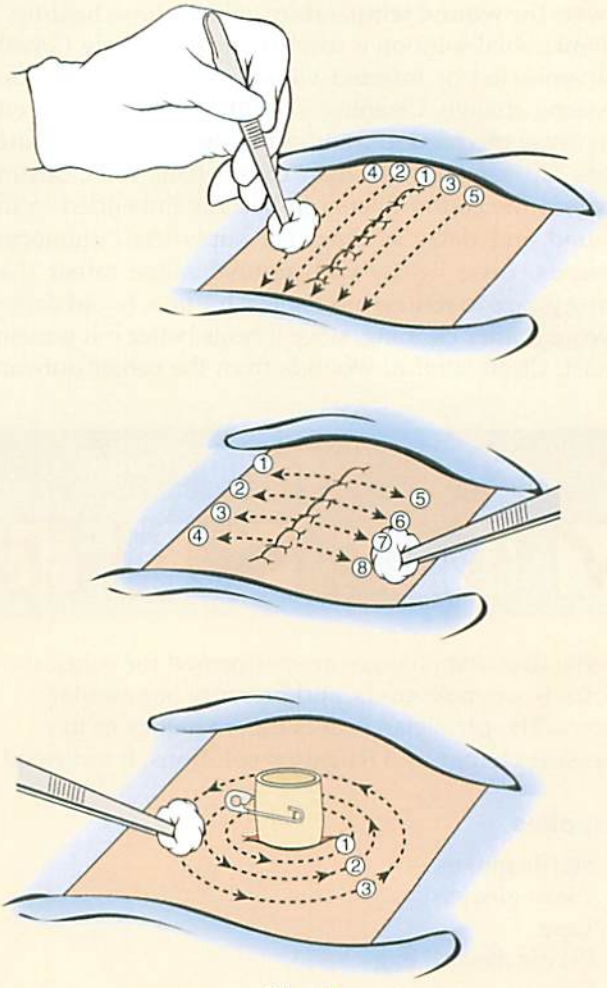
Continued

Skill 38-1 Sterile Dressing Change—cont'd



Step 4

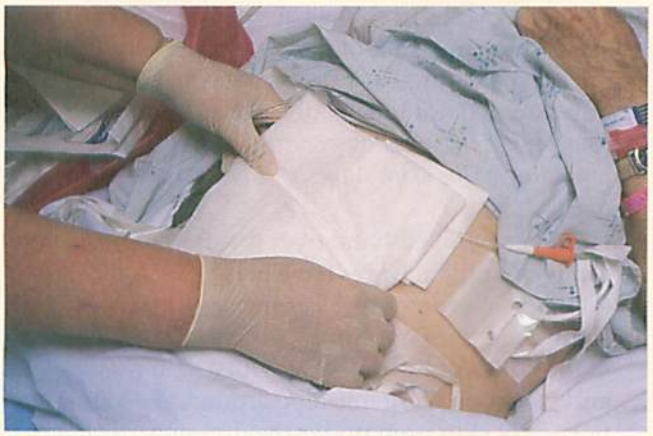
5. Inspect the wound, noting degree of healing, presence of pus, and necrosis; check for odor, drainage, and condition of sutures or drain. Remove gloves and discard them. Perform hand hygiene. *(Provides data for determining progress of wound healing or presence of infection.)*
6. Set up sterile field, placing items in the order in which they will be used. Open the sterile supplies. *(Assists in maintaining a sterile field during the procedure and allows the procedure to be done efficiently. Supplies ready for use.)*
7. Don sterile gloves and clean the area around the wound using normal saline or ordered disinfectant. Cleanse by one of the following methods:
   a. Use a separate swab to wipe from top to bottom on each side of the incision and continuing outward.
   b. Use a separate swab from the wound edge outward on one side and then on the other side from top to bottom. Do not cleanse directly over the wound unless there is excessive drainage and it is an agency policy. Cleanse the drain sites using a circular motion from the drain insertion site, outward.
   c. Use a circular motion from the wound outward in an ever-widening circle. *(Sterile technique prevents contamination of the wound. The top of the wound is considered the cleanest area. Cleansing by these methods prevents contaminating the wound. If considerable drainage is present, the wound itself is gently cleansed using a fresh swab for each single stroke.)*



Step 7

8. Apply ointment or medication using applicators if ordered. *(An order is essential for any medication. Using applicators decreases the chance of contamination of the tube or the medication container.)*
9. Apply the dressings by positioning them lightly over the wound area; cover the entire wound and do not move dressing once it is placed over the wound. Remove and discard the gloves. Secure the dressing in place. If tape will not stick to the skin, a skin preparation can be used on the skin surface. A binder or Montgomery straps may be used to hold the dressings in place. *(Moving the dressing from one area to another may transfer microorganisms; securing the dressing ensures that the wound stays covered.)*

Skill 38-1 Sterile Dressing Change—cont'd



Step 9

10. Contain the used dressings in the discard bag and deposit into the biohazard trash container. Perform hand hygiene. *(Prevents spread of microorganisms.)*
11. Assist the patient in obtaining a comfortable position in bed or, if ambulatory, assist as requested or required. *(Ensures patient's comfort.)*

Evaluation

12. Ask yourself: Are there signs of infection, such as redness and warmth around the wound edges; is thick or colored exudate present? Is the amount of drainage decreasing? Is the wound drain still in place? Had drainage soaked through the dressing? Did the dressing stay intact? *(Answers to these questions provide data regarding wound healing and whether the dressing was sufficient to cover the wound and contain the drainage, or whether the dressing could be discontinued.)*

Documentation

13. Document the condition of the wound, including the patient's subjective statements and objective observations. Include health teaching performed for wound care. *(Provides data regarding would healing and patient teaching. Documents use of supplies.)*

Documentation Example

7/19 1430 Dressing changed with sterile technique using six 4 × 4 gauzes and two combined ABDs. Incision clean, dry, and well approximated. Small amount of serous drainage on dressing. Skin cleansed with alcohol swabs. Reinforced teaching re keeping dressing dry and in place, technique for wound cleansing and dressing change, and signs and symptoms of infection to report immediately.

(Nurse's signature)

Home Care Considerations

- Wound care instruments can be cleaned with warm, soapy water and boiled for 10 minutes to sterilize. Allow to air dry and store them in a covered container.
- Remind the patient and family to dispose of soiled dressings in impermeable bags to prevent the spread of infection.
- Montgomery straps can be devised by using wide adhesive tape folded back on itself, making holes in the flap ends, and using a shoelace or rubber bands and safety pins to secure the straps together after they are attached to the skin.
- Provide patients with information on where to obtain dressing materials.
- Provide a wound flow sheet to encourage the patient or family to record the characteristics of the wound when the dressing is changed. Include columns for date and for a description of characteristics of the wound.
- For a child, helping the child change a dressing on a stuffed bear or doll helps decrease anxiety about dressing changes.
- The elderly often have decreased vision and may need more assistance than realized to perform wound care and assess the wound.
- Arthritis in the hands may make it difficult for a person to manage a dressing change independently.

Critical Thinking Questions

1. Why is a wound cleansed from the inside toward the outside? If a wound is infected, would your technique for cleansing change?
2. What would you need to do if tape will not hold the dressing in place on the skin?

Hydrocolloid Dressings

Hydrocolloid dressings are applied only to uninfected wounds; they keep the wound moist and block entry of microorganisms. A variety of hydrocolloid dressings are available. These are often used on a vascular or pressure ulcer to promote healing after the wound is clean (Steps 38-2).

Wound Irrigation, Débridement, and Packing

Irrigation is the flushing out of an area with a liquid. Wound irrigation is done only with an order from the physician and requires sterile technique. Using a piston syringe instead of a bulb syringe helps prevent aspiration of drainage and contamination of the syringe. For deep wounds with small openings, a sterile straight

Steps 38-2 Applying a Hydrocolloid Dressing

Hydrocolloid dressings are used to provide a moist environment for wound healing in uninfected wounds. They occlude air and promote breakdown of necrotic tissue in wounds, thereby providing an alternative to mechanical débridement. These dressings may be left in place for up to 7 days, with 3 to 5 days being the average.

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

1. Clip the hair around wound site and cleanse the wound. *(The dressing will adhere better and be less uncomfortable when removed.)*
2. Choose a large enough dressing to cover a 1¼-inch border of healthy skin around the entire wound. *(For the dressing to adhere properly and remain in place while absorbing drainage, a 1¼-inch border is necessary.)*
3. Open the paper from the back of the dressing, and smooth the dressing in place from the center outward, peeling back the backing as you progress outward. Do not touch adhesive surface. *(Smoothing the dressing prevents pulling and wrinkling of the skin. Adhesive adheres better if not touched.)*
4. Hold your gloved hand over the dressing for a few minutes until all edges have adhered firmly. *(Warmth helps dressing adhere properly.)*
5. If dressing does not firmly adhere, cleanse the skin at the edges of the dressing with a skin prep pad and use hypoallergenic tape around the edges. Do not apply skin prep under the dressing. *(Skin prep makes skin tacky so that tape will adhere well. Tape holds the dressing in place. Skin prep over broken skin or wound may damage the tissue.)*

catheter may be attached to the syringe. The wound edges may need to be held open so that the solution can reach the depths of the wound. Skill 38-2 presents the steps in irrigating a wound.

A wound may be packed with gauze to facilitate formation of **granulation tissue** (connective tissue with multiple small vessels) and healing by second intention or to débride the wound. Usually moistened or medicated non–cotton-filled gauze is used in the form of fluffed (unfolded and loosely placed) 4 × 4s or strips. Either a wet-to-dry or a wet-to-damp technique is used. In the **wet-to-dry** technique the dressings are moistened and packed into the wound and allowed to dry between dressing changes, which are done every 4 to 6 hours. As the dressings dry, they trap necrotic material and mechanically débride the wound when the dressing is removed. Removal of the dry packing is painful because it may remove some granulation tissue also. This technique is falling out of favor, but is still occasionally used. The **wet-to-damp** technique for packing is the preferred treatment for *uninfected* wounds (Skill 38-3). Moistened gauze packing is placed in the wound to absorb exudate, but is not allowed to dry before removal and therefore does not damage newly formed tissue.

Clinical Cues

Administer ordered analgesia sufficiently ahead of performing a dressing change on a large or infected wound so that it is effective during the procedure. Wound dressing changes can be painful, especially when débridement and packing are involved.

Débridement of necrotic tissue may be performed by using enzymatic powder, ointment, or granules that are packed into the wound, or by cutting away dead tissue (sharp débridement). Enzymes break down the necrotic tissue, and wound packing absorbs the debris. Surgical débridement is performed by a surgeon or an advanced practice nurse. The wound heals slowly from the base upward. In many instances the body's own healing processes cause sloughing of the necrotic tissue (autolytic débridement). Petroleum jelly may be used on the skin around the wound to prevent maceration from wet dressings.

Elder Care Points

Teaching how to perform dressing changes must occur before discharge. The elder who requires dressing changes at home may have difficulty performing this task due to poor vision, loss of joint flexibility, and arthritis. Always assess whether the elder or a caregiver can be properly taught how to perform a dressing change.

Patient Teaching for Wound Care

Before the patient is discharged, teach proper technique for cleaning and dressing the wound. Send the patient home with sufficient dressings to last until someone can purchase the needed items. Teach the patient the signs and symptoms of infection, and insist that they be reported immediately, so that intervention can be started quickly to treat the infection. Send home written instructions with the patient to reinforce the teaching.

Skill 38-2 Wound Irrigation

Wound irrigations are ordered by the physician. They are performed when a wound is infected, has large amounts of drainage, or contains necrotic material.

Supplies

- Sterile gloves
- Protective eyewear
- Mask
- Impermeable gown
- Underpad
- Sterile solution container
- Irrigation set
- Syringe with large-bore blunt needle or sterile angiocath
- Normal saline or ordered solution
- Basin to catch solution

Review and carry out the Standard Steps listed in Appendix D.

ACTION *(RATIONALE)*

Assessment (Data Collection)

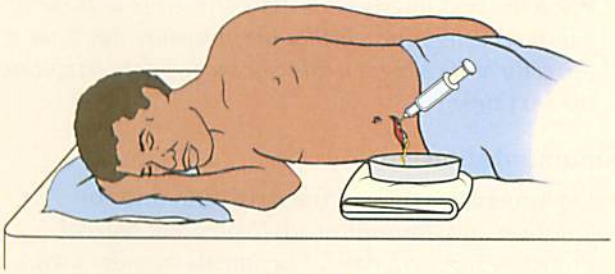
1. Check the orders for wound irrigation to determine solution to be used and whether a sterile or clean irrigation is ordered. *(Solution ordered depends on condition of wound and whether infection is present.)*

Planning

2. Determine whether patient is ready for the procedure and whether all dressing and irrigation supplies are on hand. *(Saves time and promotes efficiency.)*

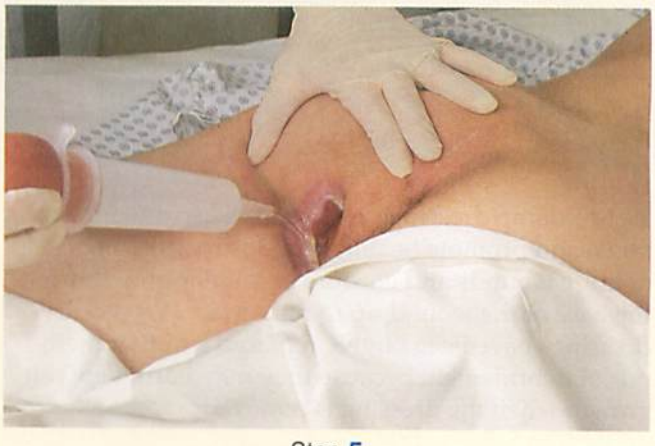
Implementation

3. Perform hand hygiene. Put on clean gloves. Using aseptic technique, expose the wound, placing the soiled dressings in the discard bag. Remove gloves and perform hand hygiene. *(Prevents transfer of microorganisms; exposes the wound for irrigation.)*
4. Aseptically prepare the irrigation set by pouring the solution into the container and checking the action of the syringe plunger. Place an underpad beneath the area to be irrigated. Place a basin to catch drainage against the side of the area being irrigated. Have the patient hold the basin in place if possible. *(Preparing the irrigation set ensures that the equipment is ready before putting on sterile gloves. An underpad protects linens from moisture. The basin catches most of the irrigation fluid.)*



Step 4

5. Don sterile gloves. Draw up solution into the syringe by pulling back on the plunger or squeezing the bulb. Hold the tip of the syringe about 1 inch from the wound surface, and steadily push on the plunger or squeeze the bulb to eject fluid into the wound. Repeat until all debris is washed from the wound or the amount of solution ordered for irrigation has been used. Irrigate all areas of the wound. *(Keeping the syringe tip 1 inch away from the wound surface prevents contamination of the syringe. Using a 20-gauge needle or angiocath on the syringe causes an effective spray to cleanse the wound. Fluid washes out debris and necrotic tissue.)*



Step 5

6. Dry the skin with gauze sponges so that tape will stick, and apply a sterile dressing. *(Prepares the wound for the dressing; covers the wound.)*
7. Remove the gloves and discard them. Perform hand hygiene. *(Prevents the transfer of microorganisms.)*

Continued

Skill 38-2 Wound Irrigation—cont'd

Evaluation

8. Ask yourself: Was sterile technique maintained if ordered? Was all debris washed from the wound? Were the bed linens kept dry? *(Answers to these questions determine whether the procedure was done correctly or if changes need to be made before irrigating the next time.)*

Documentation

9. Document the time of the irrigation and the solution and amount used. *(Notes that ordered procedure was performed. Documents supplies used.)*

Documentation Example

7/19 1830 Left buttock wound irrigated with 150 mL normal saline using sterile technique. Wound with pink tissue and serous drainage; no odor noted. Sterile dressing applied.

_____
(Nurse's signature)

Special Considerations

- When the irrigation is not ordered as a sterile procedure, equipment is kept as clean as possible and reused. This is common in the home environment.
- All irrigations of deep wounds should be done with sterile technique.
- If the patient cannot hold a basin against the area in which it is needed, use pillows covered with plastic and underpads to position the basin firmly against the skin.

Home Care Considerations

- In the home setting a clean plastic trash bag and a towel can be placed under the area to be irrigated or treated with wet compress dressings to protect the mattress or furniture with each dressing change

Critical Thinking Questions

1. What is a better device for irrigating a wound than a bulb irrigation syringe?
2. If special irrigation solution is ordered and has to be kept refrigerated, why should it be heated? How would you heat it?

Skill 38-3 Applying a Wet-to-Damp or Wet-to-Dry Dressing

Wet-to-damp dressings are used to keep a wound moist and promote healing; wet-to-dry dressings help débride wounds and encourage cellular growth from the base of the wound up to the surface. Wet-to-dry dressings have been largely replaced by other methods of débridement because they may harm new cell growth when the dressing is removed.

Supplies

- Gauze sponges
- Sterile basin
- Tape or binder
- Discard bag
- Sterile normal saline
- Sterile gloves
- Clean gloves
- Underpad

Review and carry out the Standard Steps listed in Appendix D.

ACTION *(RATIONALE)*

Assessment (Data Collection)

1. Check the order, assess the old dressing if one is in place, and determine whether the patient is ready for the procedure. *(Ensures that the proper dressing is applied to the right patient.)*

Planning

2. Plan the appropriate time in your work schedule to perform the dressing change. Determine whether all needed supplies are available and on hand at the patient's bedside. Wet-to-damp dressings are changed more frequently than wet-to-dry dressings. *(Assists in performing the procedure smoothly and quickly.)*

Skill 38-3 Applying a Wet-to-Damp or Wet-to-Dry Dressing—cont'd

Implementation

3. Prepare the work space, and open the dressing packages and sterile container for the wetting solution; perform hand hygiene and don clean gloves. *(Readies the dressings and solution for work. Institutes Standard Precautions.)*
4. For wet-to-damp dressing, slowly and carefully remove the gauze. If it is stuck to the wound, add a little normal saline to loosen it. For wet-to-dry dressing, gently and steadily pull the gauze away from the wound, since this helps débride the necrotic tissue. Place used dressings in the discard bag. *(Pulling a stuck dressing loose damages new tissue. A wet-to-dry dressing is not remoistened when removing it.)*
5. Remove dirty gloves, perform hand hygiene, and pour the sterile wetting solution into the basin. *(Solution should be poured before putting on sterile gloves.)*
6. Don the sterile gloves. *(Prepares hands for sterile procedure.)*
7. Place the needed dressings in the wetting solution or moisten dressing materials by pouring solution on them. *(Dressings should be thoroughly soaked.)*

Step 7

8. Wring out dressings one by one and lightly press fluffed gauze into the wound, covering all exposed surfaces. *(Dressings should be moist without dripping. Moisture encourages healthy tissue growth. Gauze pads must be unfolded and lightly packed to be most effective.)*
9. Cover with a second moist dressing for a wet-to-damp dressing and then a dry, sterile 4- × 8-inch combined dressing in a single layer on top of the wet dressings. Additional dry dressings may be added as needed to keep the outside dry. *(To promote wound healing, the entire wet-to-damp dressing must be changed at regular intervals before the inner dressing dries out. The physician may order how frequently this is to be done; if not, change the entire dressing at least every 2 hours. If moisture reaches the outside of the sterile dressing, it can provide an avenue for pathogens to enter the wound.)*
10. Remove the gloves and discard them; tape the edges of the dressing; perform hand hygiene. *(Secures the dressing. A binder may be used in place of tape.)*

Evaluation

11. Ask yourself: Did the inner dressing stay damp in the wet-to-damp dressing? Did the outer dressing stay dry? Is necrotic tissue being removed from the wound by the wet-to-dry dressing? Is pink granulation tissue appearing in the wound? If the inner dressing for the wet-to-damp dressing is drying, change the dressing more frequently. Add sufficient dressing material to keep the outer dressing dry. *("Yes" answers to these questions determine that the procedure is successful.)*

Documentation

12. Document the times of dressing changes, the procedure, and the appearance of the wound at the completion of the procedure. *(Verifies that orders were carried out and documents the course of wound healing.)*

Documentation Example

7/19 1430 Wound packed with fluffed 4 × 4s moistened with normal saline. Sterile technique maintained. Wound 2.2- × 3.4-cm area of black eschar at 3 o'clock position; wound yellow at base. Pink tissue at edges.

_____

(Nurse's signature)

Special Considerations

- Using a moisture barrier ointment on the skin around the wound protects the skin from **maceration** (softening of tissue from soaking in moisture). Petroleum jelly protects the skin from moisture.
- If a wet-to-dry dressing is ordered, leave out the second moist dressing and cover with only one layer of dry dressing.

Continued

Skill 38-3 Applying a Wet-to-Damp or Wet-to-Dry Dressing—cont'd

Home Care Considerations

- In the home environment, often clean rather than sterile technique may be used.

Elder Care Points

- Elderly patients have thinner and more fragile skin that is easily damaged. It is preferable to use a stretch gauze wrap or a binder rather than to repeatedly apply and remove adhesive tape during dressing changes.

Critical Thinking Questions

1. Why would a binder be ideal to use to secure a wet-to-damp dressing?
2. Why must black eschar be removed from a wound for it to heal?

Patient Teaching

Wound Care

Teaching regarding wound care should begin as soon as possible for the hospitalized patient. Home care patients receive ongoing teaching. Include others in the household who will assist with wound care in all instruction. The following points should be covered in the teaching program:

- Factors that assist with wound healing: exercise, nutrition, rest, not smoking
- Where to obtain needed dressing supplies
- Expected appearance of the wound now and as it heals
- Signs and symptoms of infection to report to physician immediately: increased redness, swelling, pain, purulent drainage, persistent increasing fever, increasing malaise
- Importance of keeping the wound and dressing clean and dry
- Limitations on activity related to the wound
- Proper handwashing: before and after doing wound care or touching the wound area
- Disposal of used dressing supplies in a sealable plastic bag, following local guidelines for disposal of biohazardous waste

Instruct the patient in dressing change along with demonstration; seek a return demonstration of dressing change. The following points should be covered:

- Removing dressing
- Assessing the wound
- Cleansing the wound; wound irrigation, shower cleansing if allowed
- Caring for a drain
- Caring for a wound suction device: emptying, activating suction, positioning to prevent pull on drain
- Applying a new dressing
- Disposing of old dressings

When teaching a patient about wound care in the home:

- Instruct when it is essential to wear gloves.
- If drainage system is in place, explain its purpose, how to safely use it, and whom to contact if device appears to be malfunctioning.
- Summarize teaching for wound and drain care.
- Provide written instructions in the patient's, or caregiver's, preferred language.
- Instruct when to call and make an appointment with the physician or surgeon.

Suture and Staple Removal

Although some physicians prefer to remove their own sutures or staples, others write orders for their removal. Suture scissors, forceps, and sterile technique are used to remove sutures (Figure 38-15). The suture is clipped so that the exposed part will not be pulled through the skin (Steps 38-3). A special staple remover implement is used to remove staples (Figure 38-16). Inspect the suture after it is pulled out to see that it appears whole. Parts of sutures left under the skin cause inflammation because they are foreign bodies. Steri-Strips are often applied to reinforce the incision as sutures are removed (Figure 38-17). Review with the patient how to care for the wound and stress the importance of allowing the Steri-Strips to come off on their own.

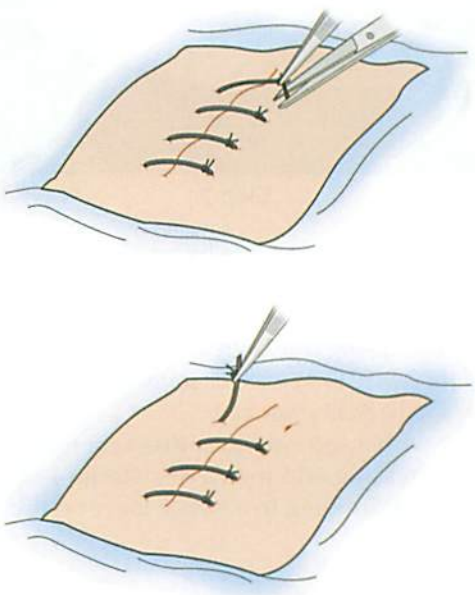


FIGURE 38-15 Clip beneath the knot with scissors to remove the suture.

Steps 38-3 Removing Sutures or Staples

Sutures or staples are removed when the wound is well sealed and connective tissue has formed. Although the time for suture removal may vary, it usually is done 7 to 10 days after they have been placed. A physician's order is required for removal of sutures or staples.

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

1. Perform hand hygiene, don clean gloves, and remove the dressing, discarding it in a plastic waste bag. Remove gloves and perform hand hygiene. *(Prevents transfer of microorganisms; exposes the sutures or staples.)*
2. Assess the wound. If crusts or dried blood is on the sutures or staples, apply clean gloves and cleanse the wound with sterile gauze dampened with normal saline. *(Lessens the risk of contaminating the wound as the sutures or staples are removed.)*
3. Open the suture or staple removal set. *(Readies the equipment for use.)*

For Sutures

4. Pick up the forceps with the nondominant hand and the suture scissors with the dominant hand. *(This allows good control of the instruments.)*
5. Lift the knot of the suture away from the skin with the forceps, and slip the curved tip of the scissors under the suture beneath the knot. Cut the suture beneath the knot and, using the forceps, pull it from the skin in one smooth motion. *(Prevents pulling exposed suture back through the skin. The entire suture must be pulled free.)*
6. As long as the skin stays well approximated, remove every other suture. If wound shows no signs of separation, remove the remaining sutures. *(Removing every other suture provides a safeguard in case the wound begins to separate.)*

For Staples

4. After opening the equipment, place the lower jaw of the staple remover under the staple. Be certain the tip is all the way under the staple. *(Positions the tool to crimp and open the staple.)*
5. Press the handles of the staple remover together all the way to depress the center of the staple. *(The staple must be firmly pressed between the two parts of the staple remover to allow it to be pulled free of the skin.)*
6. When both ends of the staple are visible, lift it up and away from the skin. Drop the staple into the discard bag. *(Removes the staple; prevents transfer of microorganisms and injury by a sharp object.)*

For Sutures and Staples

7. Gently cleanse any dried blood from the suture or staple sites with an antiseptic sponge. *(Suture holes are open to the atmosphere and can admit bacteria. Dried blood may contain microorganisms.)*
8. Place Steri-Strips or a dressing over the incisional area as ordered. Often the incision is simply left open to the air. *(Secures the wound.)*
9. Place all used supplies in the discard bag. Remove gloves and discard them. Perform hand hygiene. *(Prevents transfer of microorganisms.)*

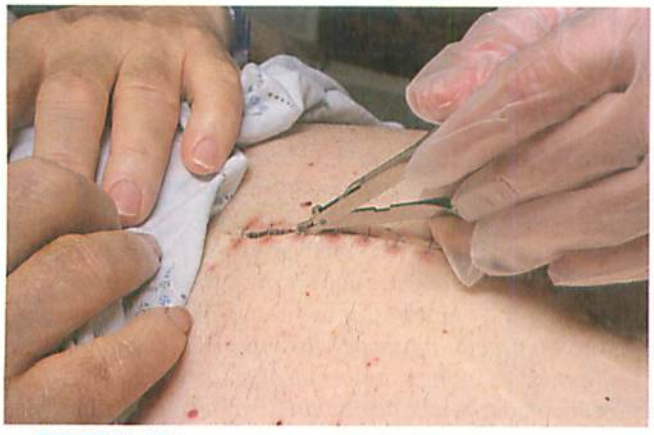


FIGURE 38-16 A special implement is used for staple removal.

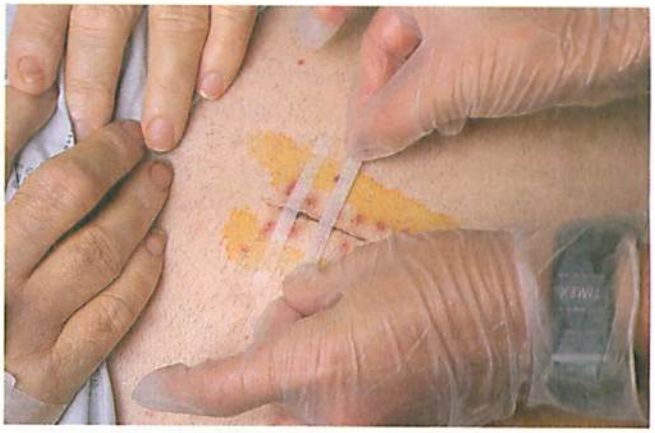


FIGURE 38-17 Apply Steri-Strips to support the incision after suture removal.

Elder Care Points

Healing time is slower in elderly people with impaired circulation related to atherosclerosis or arteriosclerosis, which can decrease blood flow to the wound area. Sutures may need to be left in a few days longer than in younger or healthier patients.

Eye, Ear, and Vaginal Irrigations

Irrigations must be performed when there is a possibility of debris or caustic substance in or near the eye. Using Standard Precautions, irrigate the affected eye(s) with the prescribed solution, usually sterile saline or tap water. In the emergency department special eyecups and a continuous irrigation system are sometimes used (Steps 38-4).

Ear irrigations are used to remove cerumen or foreign bodies that occlude the ear canal and prevent sound from reaching the tympanic membrane. Ear irrigation is ordered by a physician and should not be performed if there is a possibility that the tympanic membrane is perforated. The irrigation is performed in a fashion similar to the eye irrigation except the solution is directed toward the roof of the auditory canal while holding the pinna of the older adult up and out with the other hand (see Steps 38-4). The pinna for the child is pulled slightly up and back; for the infant, pull the pinna down and back. Sometimes a Water-Pik with a special nozzle is used to irrigate the ear. Only the lowest settings on the irrigation device should be used.

Steps 38-4 Irrigating the Eye or Adult Ear

The eye may need irrigating when it has been injured by debris or chemicals. Gently continue irrigation until debris is cleared away, or for 10 to 30 minutes after a chemical injury. The ear is irrigated when wax or debris is obstructing the canal and preventing sound from reaching the tympanic membrane.

Review and carry out the Standard Steps in Appendix D.

ACTION *(RATIONALE)*

Eye Irrigation

1. For irrigation with a syringe, place the patient in a supine position with the head angled in the direction of the affected eye. Position the examination light to illuminate the affected eye. Place an underpad and towel on the bed to protect the linens and clothes. Place an irrigation basin close to the face to catch the irrigation solution. *(Irrigation fluid will run away from the eye and not contaminate the other eye. Good light is needed to visualize the area well.)*
2. Prepare the irrigation set and fluid. *(Fluid should be at room temperature. Sterile normal saline or tap water is used.)*
3. Don gloves and remove any crusty discharge on the eyelid with a gauze or a cotton ball moistened with sterile normal saline. Discard the used cotton balls in a discard bag. *(Using fresh gauze or a cotton ball for each stroke from the inner canthus to the outer edge maintains aseptic technique.)*
4. Load the irrigation syringe with the prescribed fluid. With the nondominant hand, gently but firmly pull the upper eyelid toward the eyebrow and pull the lower lid down toward the cheek to expose the conjunctival sac. Ask the patient to look downward. *(Assists in maintaining the eye in an open position to receive the irrigation fluid.)*
5. Hold the irrigation syringe about ½ to 1 inch above the eye and gently depress the plunger or bulb of the syringe to irrigate the eye, directing the stream from the nasal edge of the eye across to the outer edge. Repeat the irrigation until the desired result occurs or the total amount of solution ordered has been used. Allow patient to close eye between washings if large amount of solution is required. *(Solution removes debris or contaminant from eye. Too much pressure of fluid may damage the cornea. Closing the eye from time to time can help move debris from the upper conjunctival sac to the lower one and help remove the offending item [e.g., eyelash or piece of metal].)*
6. Dry the eyelid with a sterile gauze or a cotton ball. Provide a towel to the patient to dry the face. *(Makes the patient comfortable.)*
7. Record the procedure, being certain to include the solution used and the amount, the appearance of the eye and surrounding tissues, and the patient's response to the therapy. *(Documents how procedure was performed and how well it was tolerated by the patient.)*

Ear Irrigation

1. Place the patient in a sitting position. Drape the shoulder on the side to be irrigated with an underpad and towel, and place the light so that the area is well illuminated. *(The syringe is easier to use with the patient sitting. Underpad and towel help keep the patient dry.)*
2. Fill the syringe with warm solution (98.6° F [37° C]). Have the patient hold the basin firmly against the neck under the ear. *(Cool water is uncomfortable and causes dizziness and nausea through stimulation of the equilibrium sensors in the semicircular canal. Positioning the basin properly prevents water from running down the neck.)*

Steps 38-4 Irrigating the Eye or Adult Ear—cont'd

3. Straighten the ear canal by grasping the upper portion of the adult pinna and gently pulling upward and backward. *(The canal is straightened so water can penetrate better and debris can be washed out.)*
4. Place the tip of the syringe just into the entrance of the external meatus, and point the tip upward and inward toward the posterior auditory canal; push the plunger or depress the bulb in slowly and carefully. *(The flow of solution is directed forward to wash out debris.)*
5. Inspect the ear canal to see that it is clean. Dry the ear and the neck area. *(Cerumen may still be blocking the canal.)*
6. Repeat until the canal is clean. Be certain solution is still warm. *(Allows visualization of the tympanic membrane and allows sound to reach the membrane.)*
7. Document the procedure, including what the drainage looked like and how the patient tolerated the procedure. *(Records how the procedure was performed and the results obtained.)*

Clinical Cues

Instilling a wax softener such as carbamide peroxide (Debrox) per agency protocol before flushing the ear makes flushing quicker and easier on the patient. Allow the patient to rest for 10 to 20 minutes after instilling the drops before flushing the ear.

A vaginal irrigation may be ordered for infection or surgical preparation of the vagina. Frequently, the patient administers the irrigation herself.

Hot and Cold Applications

Either dry or moist forms of heat and cold can be applied to the body to promote healing. Usually a physician's order is necessary for a treatment because both systemic and local effects occur. The order should include the body site to be treated, the type of treatment, and the frequency and duration of the application. Check your agency's policy for various types of heat and cold treatments.

Assessment of the patient and the area to be treated is essential to identify any contraindications for the treatment (Box 38-4). Assess circulation in and around the area to be treated. Be certain that the patient has intact sensation so that damage will not occur from temperature extremes. When cold is applied to a lower extremity, assess for capillary refill, note skin color, and palpate skin temperature and distal pulses so that a baseline of the area can be documented in the chart.

Use of Heat. Heat is applied to skin surfaces to provide general comfort and to speed the healing process (Table 38-2). Heat is often used for patients with musculoskeletal problems such as joint strains or low back pain. The amount of blood diverted to the skin through vasodilation reduces the blood circulating through internal organs and tissues. The degree of systemic effect is related to the size of the area to which heat is applied. Systemic circulatory changes may cause faintness, a faster pulse, and some degree of dyspnea.

Box 38-4 Contraindications for Heat and Cold Applications

HEAT

- Heat should not be applied over an area in which active bleeding is occurring, since it will increase the bleeding.
- Heat to the abdomen is contraindicated if there is a chance the patient has appendicitis because it may cause the appendix to rupture.
- If a patient has cardiovascular problems, it is unwise to apply heat to a large part of the body, causing massive vasodilation that may divert blood supply from major organs.

COLD

- Cold is not applied to an injury area if it is already edematous because it will slow circulation and prevent absorption of interstitial fluid.
- When neuropathy is present, cold is not applied because the patient is unable to determine whether tissue becomes too cold.
- If the patient is shivering, cold is not applied. Shivering raises body temperature.

Adapted from Potter, P. A., & Perry, A. G. (2009). *Fundamentals of Nursing* (7th ed., p. 1330). St. Louis: Elsevier Mosby.

If such changes occur, closely monitor the patient's vital signs. The principles for application are the same for each method used when applying heat (Box 38-5). Heat can be applied locally by means of a hot water bottle, an electric pad, an aquathermia pad, or a disposable heat pack (Figure 38-18). Moist heat is used in the form of compresses, hot packs, soaks, or a sitz bath (see Chapter 19). Table 38-3 provides general ranges of temperature for heat application, but check the agency procedural manual for recommended temperatures.

To protect patients from burns caused by heat applications, measure the temperature of the liquid if possible. If no thermometer is available, place the prepared pack against the inner aspect of your own arm. If there is any doubt about whether it is too hot, cool it down.

Table 38-2 Therapeutic Effects of Heat and Cold Applications

PHYSIOLOGIC RESPONSE	THERAPEUTIC BENEFIT
Heat	
Vasodilation	Improves blood flow to injured body part; promotes delivery of nutrients and removal of wastes; lessens venous congestion in injured tissues
Reduced blood viscosity	Improves delivery of leukocytes and antibiotics to wound site
Reduced muscle tension	Promotes muscle relaxation and reduces pain from spasm or stiffness
Increased tissue metabolism	Increases blood flow; provides local warmth
Increased capillary permeability	Promotes movement of waste products and nutrients
Cold	
Vasoconstriction	Reduces blood flow to injured body part, preventing edema formation; reduces inflammation
Local anesthesia	Reduces localized pain
Reduced cellular metabolism	Reduces oxygen needs of tissues
Increased blood viscosity	Promotes blood coagulation at injury site
Decreased muscle tension	Relieves pain

Adapted from Potter, P. A., & Perry, A. G., Stocker, P. A., Hall, A. M. (2013). *Fundamentals of Nursing* (8th ed., p. 1211). St. Louis: Elsevier Mosby.

Box 38-5 Principles of Heat Application

- Heat causes dilation of blood vessels and increases the supply of blood to the area.
- Heat stimulates metabolism and the growth of new tissues. Heat is effective in clearing away the debris of infection by bringing antibodies and leukocytes to the site and through **suppuration** (the formation of pus). Hot packs or compresses applied to infected sites promote earlier healing.
- Extreme temperature changes stimulate pain receptors. Heat application may be painful or soothing.
- Applications of heat to portions of the body activate the autonomic nervous system, which produces systemic responses in the body.
- Vasodilation of superficial vessels of the skin decreases the blood supply elsewhere in the body because the blood volume is constant in a closed system. Vasodilation produces skin redness and warmth.
- Water is more effective than air as a conductor of heat.

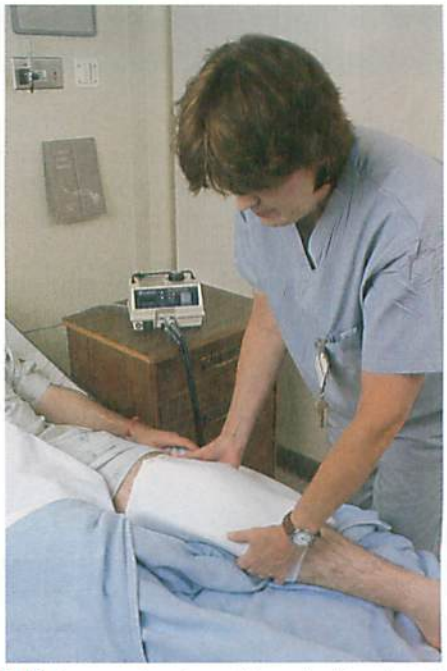


FIGURE 38-18 An aquathermia pad is applied for a heat treatment.

Table 38-3 Temperature Ranges for Heat and Cold Treatments*

DESCRIPTION	RANGES
Heat Treatments	
Warm	93°-98° F (33.9°-36.7° C)
Hot	98°-105° F (36.7°-40.6° C)
Very hot	105°-110° F (40.6°-43.3° C) for at-risk adult or child under age 2 yr 105°-125° F (40.6°-51.7° C) for normal adult, dry heat only
Cold Treatments	
Tepid	80°-93° F (26.7°-33.9° C)
Cool	65°-80° F (18.3°-26.7° C)
Cold	55°-65° F (12.8°-18.3° C)
Very cold	Below 55° F (below 12.8° C)

*Discontinue the treatment when numbness occurs.

Use a flannel or cloth cover for all hot and cold packs. Observe the condition of the skin frequently for signs of burning or blistering, and be attentive to complaints. Caution the patient and the family not to increase the temperature of heating pads or of water in hot water bottles.

Heat Applications. Hot water bottles are filled two-thirds full, the air is expelled, and the plug is attached. A heat lamp is a gooseneck lamp with a 60-watt bulb. A heat lamp provides heat by radiation and is placed 18 to 24 inches (45 to 60 cm) from the area of treatment. Heat applications are left in place for 15 to 30 minutes and may be ordered to be repeated each hour or several times a day.

Assignment Considerations

Applying Heat Treatments

In many states, UAPs are allowed to apply heat treatments or warm moist compresses to wounds under the nurse's supervision. When assigning this task, you should remind the UAP of the proper temperature to maintain for the treatment and the specific time the treatment should be applied. The UAP should notify you when the treatment is complete so that you can assess the wound area and the patient's response to the treatment.

An aquathermia pad, or K-pad as it is often called, is constructed with tubes containing water. An electrically controlled unit pumps warmed water through the tubing network. The reservoir of the K-pad is filled to two-thirds full with *distilled* water. The temperature is usually set with a key for 105° F (40.6° C). Cover the pad before application (see Figure 38-18).

Safety Alert

Precautions with Heating Pads

When the back is treated with a heating pad, do not let the patient lie on the pad. Heat is not dissipated properly if the patient lies on the pad, and burns can occur. Place the patient prone or on the side to apply the pad.

When hot compresses are ordered, heat the solution to the temperature ordered, dip the gauze or cloth in the solution, and wring it out. Use sterile technique, including sterile gloves and supplies, when there is broken skin in the area of treatment. Heat a small amount of solution at a time. You may use petroleum jelly beneath the pack or compress to protect the skin.

In the home, hot compresses can be made with washcloths dipped in hot water and wrung out. Once the compress is in place, place a plastic wrap covering on top to help retain the heat. You may place a towel over the plastic wrap. Gel packs are also available that can be heated in a microwave oven. A freshly boiled egg with the shell removed can be placed inside a sock to apply heat to an eye where inflammation is causing discomfort. The egg can be reheated in hot water. Dispose of the egg when treatment is finished.

When a soak is ordered, submerge the part to be treated in warm water or solution for 15 to 20 minutes. Use a commercial pack to apply heat to a large area of the body.

Whenever heat is used, you must ensure the patient's safety. Some patients are much more likely to suffer burns: those with sensory impairment; impaired mental status with decreased level of consciousness or confusion; and impaired circulation from peripheral vascular disease, diabetes, or congestive heart failure. When an appliance is no longer in use, return it to central service immediately so that charges to the patient will cease. Document the use of heat or cold devices each shift to ensure insurance payment to the agency.

Safety Alert

Safety Factors When Applying Heat

Heat is not usually applied immediately after injury or surgery because it increases bleeding and swelling. Electrical appliances such as heating pads must be checked for defects by the agency engineering department. Check the appliance and the cord before use to prevent shock or sparks. Do not use anything with a frayed cord or loose plug. Avoid using safety pins with a heating pad or K-pad. Use an electric pad with moist packs only when the unit is designed to be used with moisture. When a heating pad is in use on a patient, check the temperature setting frequently.

Think Critically

What would you do if you had been giving your patient a heat treatment with a heating lamp and, when you return to discontinue the treatment, you find she has lowered the lamp to within 6 inches of the treatment area and now the skin is very red and she says it is more painful?

Use of Cold. Cold is used for two main purposes: (1) to decrease swelling and (2) to decrease pain (see Table 38-2). Cold is often immediately applied to an injury to prevent swelling. When cold is applied to the skin or a part of the body, vasoconstriction causes the skin to become pale and cool. When it interferes with adequate circulation, it can damage body tissues, as in the necrosis caused by frostbite.

Systemic effects of cold are the reverse of those of heat. More blood is sent to the internal organs, and the body acts to conserve heat. The autonomic nervous system is activated, and muscle contractions may produce shivering in an effort to produce heat.

The physician usually indicates the temperature to be used for cold applications (see Table 38-3). Very cold applications are used for 15 to 20 minutes at a time; longer application can damage the skin and underlying tissue.

Cold Applications. Cold is applied in the form of compresses, packs, ice bags, ice collars, or hypothermia blankets. Cold compresses consist of gauze or cloth material placed in a basin containing ice chips and a small amount of cold water. The compress is then wrung out and placed on the designated site. The compresses are changed every 15 to 20 minutes.

Cold packs are used for tonsillectomies, perineal wounds, sprains, nosebleeds, fractures of bones, dental extractions, and reduction of postoperative swelling of some parts of the body. Most disposable cold packs are applied directly to the skin, but check the manufacturer's directions. Ice bags or ice collars are reusable. Small ice bags can be made by placing ice chips loosely in a vinyl or nitrile glove and tying it

with a knot. This works especially well for applications to the nose or eye. Some gel packs are reusable and are placed in the freezer until frozen. When the gel pack becomes warm, it's either discarded or, if it was placed inside of a sealed plastic bag, in some cases it can be cleansed and returned to the freezer.

A hypothermia blanket is used to lower body heat for patients who are running a persistently high fever. Because this treatment decreases the rate of metabolic processes, it may be used during surgery to reduce blood flow and oxygen requirements and is often used for patients who have severe brain injuries. The cooling blanket is attached to a machine that supplies the blanket with a cooled solution of distilled water and 20% ethyl alcohol. Place the blanket in direct contact with the patient's skin. Continually monitor the patient's temperature when the blanket is in use. Avoid chilling to the point of shivering because this activity causes the temperature to rise.

Most cold treatments require a physician's order before application. Care must be taken to assess the skin and circulation in the area of application, and distal to it, before, during, and after the treatment. Prolonged, very cold applications may cause frostbite. Cold therapy is applied for a maximum of 20 minutes at a time. Precautions taken are the same as those for patients who are at risk with heat applications.

Home Care Considerations

Use of Cold in the Home Setting

In the home, ice bags can be made with crushed ice in tightly closed plastic bags. These should be wrapped in cloth such as a diaper or dish towel before application to the skin. A bag of frozen peas or corn also makes an effective cold pack. The vegetables can be refrozen for repeated treatment, but should be discarded after the end of treatments. A quick, efficient cold pack can also be made by wetting a washcloth, folding it in quarters, and freezing it inside a zipper-locking plastic bag.

Patient Teaching for Hot and Cold Applications. Assess the caregiver's ability and availability to administer the hot or cold treatment safely. Sterile compresses can be prepared at home in a pressure cooker if one is available. Caution the patient and the family not to heat washcloths or other linens in the microwave oven because fire can occur. Check the cords on home lamps to be used for heat treatments and on heating pads. Instruct the patient to place the heating pad over her body (not under), to never fall asleep when using one, and to never to use the high setting to avoid burns.

Evaluation

Evaluative statements indicating that some previously stated goals/expected outcomes have been met are as follows:

- Wound edges are well approximated.
- Wound is clean and dry without redness or swelling.
- Patient states that pain is gone.
- Patient states that energy has returned and is ambulating in the hall.
- Return demonstration of dressing change was properly performed.

It is important to evaluate the outcome of the heat or cold treatment. Is it producing the desired effect? If not, it should be discontinued or another method tried. When the outcome is such that the initial problem is gone, the physician is notified and the treatment is discontinued.

Get Ready for the NCLEX® Examination!

Key Points

- Wounds are open or closed, and clean or dirty.
- Wounds may be partial thickness and heal by epithelialization or full thickness and heal by contraction.
- Surgical wounds heal by first intention because they have little tissue loss at the surface.
- Wounds with tissue loss heal by second intention.
- The elderly may heal less quickly than children or younger adults.
- A diet rich in protein; carbohydrates; lipids; vitamins A, B, and C; and the minerals zinc, iron, and copper is needed for wound healing.
- Regular exercise enhances blood circulation, bringing oxygen and nutrients to a wound.
- Smoking reduces the oxygen-carrying capacity of the blood and therefore slows healing.
- Steroids, other anti-inflammatory drugs, heparin, and antineoplastic agents interfere with healing.
- Chronic illness such as diabetes, cardiovascular disease, or an immune disorder may delay healing.
- Complications of healing are hemorrhage, infection, dehiscence, and evisceration.
- Negative pressure via VAC may be used for chronic wounds that are not healing.
- The three basic wound types are red, yellow, and black.
- Red wounds are clean and ready to heal, yellow wounds contain debris or exudates, and black wounds need débridement.
- Wound drains are placed to provide an exit for blood and fluids that accumulate. Draining a wound helps prevent the formation of an abscess or fistula.
- To activate a wound suction device, compress the body of the device and close the outlet.

- Dressings protect the wound, prevent microorganisms from entering or escaping, help to support and stabilize tissues, and reduce discomfort.
- Binders are used to provide support and to hold dressings in place.
- Clean wounds should be irrigated only with normal saline; antimicrobial solutions damage granulation tissue.
- The type of dressing placed on an open wound depends on its classification or stage.
- Débridement is accomplished surgically or by enzyme or chemical formulas.
- Assessment for signs of infection is important; check for purulent drainage, odor, increased redness, pain, and swelling. On an extremity, limitation of movement may indicate infection. Systemic signs include a temperature greater than 101° F (38.3° C), a WBC count greater than 10,000/dL, and a feeling of malaise.
- Progress of healing is determined by decrease in size of the wound and improved appearance.
- Always assess for allergy to cleansing solutions, medications, and tape before beginning wound care.
- Nursing diagnoses always include Impaired skin integrity and Risk for infection. Other diagnoses are based on individual problems.
- Planning includes checking the physician's specific orders for wound care. Specific goals/expected outcome statements are written for the patient's individualized nursing diagnoses.
- Principles of asepsis are used for wound care; sterile technique is important for all wounds treated in the hospital until the wound is sealed. At home, clean technique may often be used.
- Patient teaching regarding wound care is an important and ongoing nursing intervention.
- Contaminated or infected wounds are cleaned at each dressing change.
- Hydrocolloid dressings are applied only to uninfected wounds; they keep the wound moist and absorb drainage.
- When irrigating a wound, the solution must reach all undermined areas and tunnels.
- Sutures are usually removed in 7 to 10 days, but may remain longer in some patients.
- Heat increases the blood supply, bringing oxygen and nutrients to the tissues and removing waste products and excess fluid, thereby reducing pain by relieving pressure on nerve endings.
- Cold is used to decrease swelling and pain. Very cold applications are used for 15 to 20 minutes at a time.
- Evaluate the outcome of a heat or cold treatment and wound care; determine whether goals/expected outcomes are being met.
- Assess the home caregiver's ability to provide wound care or hot and cold treatments. Assess safety factors in the home environment, and check equipment to be used for the patient.

Additional Learning Resources

SG Go to your Study Guide for additional learning activities to help you master this chapter content.

evolve Go to your Evolve website (http://evolve.elsevier.com/deWit/fundamental) for the following FREE learning resources:

- Animations
- Answer Guidelines for Think Critically boxes and Critical Thinking Questions and Activities
- Answers and Rationales for Review Questions for the NCLEX® Examination
- Glossary with pronunciations in English and Spanish
- Interactive Review Questions for the NCLEX® Examination and more!

Review Questions for the NCLEX® Examination

*Choose the **best** answer for each question.*

1. Your patient has had abdominal surgery for a ruptured appendix and requires postoperative care and dressing changes. The wound has been left open, and irrigations are ordered. When irrigating a wound, it is *most* important to:
   1. irrigate slowly to prevent discomfort.
   2. ensure the solution reaches the depths of the wound.
   3. prevent wetting of the bed and covers.
   4. use vigorous irrigation flow from the syringe.

2. If a wound appears infected, you should:
   1. cleanse it with an antiseptic solution.
   2. obtain an order for a culture to be performed.
   3. apply an antibiotic ointment.
   4. change the dressing every 2 hours.

3. The assessment of the wound indicates healing is occurring when:
   1. the center tissue is white.
   2. bleeding has stopped.
   3. there is no further drainage from the wound.
   4. pink granulation tissue is visible.

4. When assessing for wound infection, you know that signs of wound infection may be: *(Select all that apply.)*
   1. a rise in temperature.
   2. increasingly rapid respirations.
   3. a white blood cell count above 10,000/dL.
   4. restlessness and discomfort.
   5. purulent drainage.
   6. tenderness around the wound.

5. When caring for a pressure ulcer, you know that:
   1. eschar must usually be removed before the wound will heal.
   2. pink granulation tissue should be cleansed with antiseptic solution.
   3. keeping the wound dry and covered will aid healing.
   4. heat treatments hurt new tissue and slow healing.

6. Hydrocolloid dressings are useful for open wound dressings because they:
   1. keep the wound moist while blocking entry of microorganisms.
   2. débride the wound and soften eschar.
   3. supply bacteriostatic action to clean the wound.
   4. contain an antiseptic, allow moisture to evaporate, and protect the wound.

7. If you are assisting a surgical patient to the bathroom and he suddenly says, "It feels like something has given way," you would suspect that _____ has occurred. *(Fill in the blank.)*

8. Proper technique for removal of sutures is to:
   1. clip the suture below the knot.
   2. assure the patient that suture removal does not hurt.
   3. refrain from pulling an exposed suture through the wound.
   4. apply a Steri-Strip before removing the suture.

9. Cold packs applied during the first 24 hours after injury decrease swelling by:
   1. increasing vasodilation so blood flow will carry away excess fluid.
   2. causing vasoconstriction and decreasing bleeding from damaged blood vessels.
   3. decreasing circulating blood volume so that swelling cannot occur.
   4. dulling pain and thereby reducing cellular enzyme release.

10. Heat is helpful in healing a wound because it:
    1. causes constriction of blood vessels and reduces edema.
    2. soothes nerve endings, lessening pain.
    3. causes vasodilation, bringing oxygen and nutrients to the injury.
    4. causes vasodilation, which moves blood out of the area.

Critical Thinking Activities

Read each clinical scenario and discuss the questions with your classmates.

Scenario A

Gregory Hansen requires a sterile dressing change for an abdominal incision.

1. How would you determine what is needed in the way of supplies?
2. How would you set up your sterile field? (Be specific.)
3. Because it is best not to talk while doing a sterile procedure, how would you begin to teach Mr. Hansen to do the dressing change himself?
4. Describe the factors you would assess to determine whether Mr. Hansen's wound is infected.

Scenario B

Joshua Weintaub just had surgery on his nose for a deviated septum. Ice packs are ordered. What would you use and how would you perform the ice applications?

Scenario C

Heat lamp treatments are ordered for the donor site from which skin graft material was taken on Bruce Herez's leg.

1. What type of lamp is used for this treatment?
2. How would you set up Mr. Herez and the lamp for the treatment?
3. How often would you check on Mr. Herez during the treatment?