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| **Wound Care, Part 2**  **Nursing Care** https://ce.nurse.com/Images/BigOrange_bar.jpg  The goal of this program is to provide nurses with information about current, commonly used wound care dressings, and their application to different wounds. After you study the information presented here, you will be able to —   * Describe the goal of wound care treatment. * Identify five desirable qualities in products selected for wound care. * Describe three categories of wound care products and their applications. |

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| *Fifty-nine-year-old Sarah was admitted to the hospital with severe abdominal pain caused by a ruptured appendix. She had an emergency exploratory laparotomy and an appendectomy. Approximately one month later, when readmitted for evaluation of recurrent severe abdominal pain, surgeons found multiple abscesses throughout her abdomen. Her second surgical procedure was a total abdominal hysterectomy and lysis of adhesions. Due to multiple abscesses, Sarah left the hospital with a postoperative abdominal incision that remained open to heal by secondary intention.*  *The initial assessment of the home health nurse, who cared for Sarah over the next few months, was documented as follows: “The patient was discharged to home with a large, full-thickness, midline abdominal wound, extending from the umbilicus to the suprapubic area. Initial measurements of the wound were 8 cm L x 5 cm W (at the widest point) x 4 cm D (centrally). There were 3 cm of undermining at 12 o’clock and no sinus tracts. The wound base was 25% yellow slough tissue and 75% healthy red granulation tissue. There was no eschar noted and no evidence of epithelial tissue formation. The periwound area was erythematous around the entire periphery; however, there was no edema, denudation, maceration, or induration noted. There was a large amount of blood-tinged, serous exudate with no odor.*  *“The patient was afebrile, without signs or symptoms of wound infection. She was mentally alert and oriented, although mildly depressed. Her medical conditions, including hypertension, angina, and peptic ulcer, were currently controlled with oral medications. Her appetite was fair, but improving, and included liquid nutritional supplements three to four times daily. Her activity level was limited due to generalized weakness and restricted to promote rest.”*  *Sarah’s postoperative wound care was ordered to be continued three times daily: Irrigate with full-strength hydrogen peroxide, rinse with normal saline, pack with dry “4x4s,” and cover with a dry dressing. On a scale of one to five, the patient’s pain level at the wound site was one to two, rising to four to five during dressing changes.*  *The home healthcare nurse noted that this treatment could be improved by several modifications.*   * *Although hydrogen peroxide is sometimes used as an antiseptic for wound cleansing, it is cytotoxic and retards wound contraction and epithelialization. The elimination of this agent as a wound irritant and a reduction in the complexity of the treatment could promote compliance and reduce cost.* * *Packing the wound three times daily with dry “4x4s” was uncomfortable for the patient and failed to contain the large output of exudate. A more absorbent dressing could reduce the dressing changes to once daily.* * *Covering the wound with a dry dressing was not controlling “strike through” of drainage. The patient was not only anxious about leakage, but about the gap in the dressing that the adhesive tape allowed whenever she shifted her position.*   *The home healthcare nurse called Sarah’s primary provider to recommend a once-daily, wound care regime: Irrigate with normal saline; pack gently with calcium alginate rope dressing; cover with foam dressing; and secure with soft, conformable fabric tape. By reducing the dressing changes to once daily and by using a softer material for packing, the patient experienced less pain with the wound treatment. Because the foam dressing and fabric tape contained the exudate, the patient’s anxiety over leakage was eliminated.*  *This treatment was continued for two months until the area of undermining closed, the exudate output diminished, and the wound contracted with a base of 100% granulation tissue. A final wound protocol included: Irrigate daily with normal saline; apply hydrogel to wound base; cover with foam dressing; and secure with soft, conformable fabric tape. This regimen was continued for one month until full epithelialization and closure of the wound was achieved.*  Sarah’s story illustrates the care of wounds within the framework of the nursing process. This section will emphasize planning and product selection that leads to implementation, evaluation, and reassessment.  With more than 4,000 products on the market for wound healing, choosing the best one for a specific wound can be difficult. The decision is based on assessment of the patient’s general health, wound assessment, and principles of wound care. These principles include relief or elimination of causative factors (e.g., control blood sugar, relieve pressure), eradication of impediments (e.g., necrosis, drainage, infection, malnutrition, medications), and protection of healthy tissue. Products can then be selected according to objectives for wound care, such as skin cleansing, wound cleansing, debridement, skin protection, and wound protection. Select products whose main functions match your objective. (See grid for “Wound Care Products by Objective.”) Before recommending a specific product, nurses must also consider the ease of application for the caregiver, who may be a nurse, patient, or family member; frequency of the dressing changes; and cost. Because several products may be used during the course of a single wound healing, a nurse must be familiar with a variety of products and their uses, including their track record of efficacy.  The goal of treatment is to provide the optimum environment so wound repair can take place without interference. This is best achieved through products that promote moist wound healing. A moist environment enhances angiogenesis, the process of new capillary formation and cellular tissue repair, and epithelial cell migration. The wound then begins to contract and closure becomes visibly evident. The products selected for wound care should —   * Support moist wound healing. * Not traumatize healthy granulation tissue or periwound skin. * Be comfortable and reduce or eliminate pain during dressing changes. * Prevent infection. * Fill in dead space. * Facilitate removal of slough, necrosis, and eschar. * Remove excess drainage. * Prevent desiccation. * Provide thermal insulation. |

**Categories of wound care products**

Categories of wound care products include skin cleansers, skin barriers, irrigants, hydrocolloids, hydrogels, transparent dressings, absorption dressings/wound fillers, hydrofibers, alginates, collagens, gauze dressings, foams, composite dressings, antimicrobial dressings, and enzymes (see grid for “Wound Care Products by Objective”). In addition, several adjunctive therapies include growth factors, living skin equivalents, hyperbaric oxygen, electrical stimulation, and vacuum-assisted closure. All types of agents are not equally effective in every circumstance. By understanding the indications, actions, and contraindications of products and their classification, the nurse can effectively individualize treatments for each patient. And these recommendations are likely to be changed as wound healing progresses. Evidence-based guidelines for pressure ulcers, and lower extremity arterial, neuropathic, and venous disease are available from the Wound, Ostomy, and Continence Nurses Society [www.wocn.org](http://www.wocn.org). 1,2,3,4 These guidelines is meant to support clinical practice by providing consistent, research-based clinical decisions. The purpose of the guidelines are to improve cost-effective patient outcomes, as well as increase wound research in the areas where gaps occur between research and practice.

Liquid or foam skin cleansers facilitate the removal of surface debris, such as wound drainage or incontinence effluent. They emulsify waste materials and neutralize drainage and odor. They should only be used around wounds and are not for use in wounds.

Skin barriers include creams, lotions, ointments, and sprays that lubricate and soften the skin, resulting in rehydration and protection. Some of these products form an occlusive barrier. They are predominantly used on intact skin, but some can be used on denuded skin seen with incontinence. Some have antifungal agents, as well. Skin sealants are also skin barriers that form a layer of plastic polymer over the skin, protecting it from corrosive drainage and friction of tape removal. They come in the form of wipes, gels, and cotton-tip applicators and may contain varying amounts of alcohol, which stings if applied to denuded skin.

Irrigants are used to cleanse the wound and provide a mechanical cleansing action that removes surface debris and drainage without traumatizing the wound. They should not be applied with excessive force. The most physiologic irrigant is saline, followed by commercial sprays. Irrigants such as acetic acid, hydrogen peroxide, povidone iodine, and Dakin’s solution have been found to be harmful to tissue.

Hydrocolloids are wafer-shaped dressings that contain hydrophilic (water-loving) colloids, such as karaya, pectin, and gelatin. They come in many thicknesses and shapes, including paste and powder forms. When applied to a draining lesion, hydrophilic particles mix with the exudate to form a gel that provides moisture for wound healing. Because the residue can have an offensive odor and be mistaken for infection, nurses need to cleanse the wound gently first, then evaluate odor.

Hydrocolloid wafers have a limited absorptive capacity that is not adequate for highly exudating wounds. Because the wafers are occlusive, they usually are not used on infected wounds; because they are adhesive, this form can damage delicate periwound skin.

Hydrogels, which come in sheets or a gel, usually have a high water content of 90% or greater. However, one brand contains 60% saline, and another “dry” hydrogel consists of only 30% water. Hydrogels enhance epithelialization without reinjuring tissue. They don’t adhere to the wound base and have a soothing and cooling effect on the wound that promotes patient comfort. These agents soften slough or eschar in necrotic wounds and can be used when infection is present. Although hydrogels are nonocclusive, they can macerate periwound skin. Hydrogels have limited absorptive capacity and should not be used on highly exuding wounds. When combined with gauzes, they provide a convenient way to fill in wound dead space and provide moisture to the wound bed. A secondary dressing is recommended to maintain the moisture level required to promote wound healing.

Transparent dressings were the first dressings developed to promote moist wound healing. These products are semipermeable, permitting gaseous exchange between the wound and the air from the environment, while preventing bacterial invasion because of small pore size. Gas permeability also allows water vapor to pass through the dressing to reduce maceration of periwound skin. However, the rate of moisture vapor permeability varies with thickness.

Transparent films are nonabsorptive and the fluid collection visible under the dressing is often mistaken for infectious drainage. Because most of these dressings are adherent, they can damage a fragile wound base and periwound skin. Despite their adhesiveness, they also have a tendency to roll off when placed on high friction areas. Transparent films should not be used on infected wounds.

Absorption dressings/wound fillers are designed to handle large amounts of exudate — up to 20 times the weight of each dressing. Most absorption dressings are beads, powders, or pastes and when mixed, sometimes resemble the texture of applesauce. The dressings conform to the size and shape of the wound base. Because the dressing can only be changed by completely irrigating it from the wound, they are not usually used for wounds with deep undermining or sinus tracts. A secondary dressing to secure this material in the wound space is needed.

Hydrofibers are soft, sterile, nonwoven pad or ribbon dressings made from sodium carboxymethylcellulose fibers. The dressing interacts with wound exudate and forms a soft gel for easy removal. Hydrofibers absorb heavy exudate and control minor bleeding. They require a cover dressing and should not be used in dry wounds.

Calcium alginates are soft, nonwoven fibers of a cellulose-like polysaccharide derived from brown seaweeds, particularly the kelps. They are composed of both sodium and calcium acids and are available in pad or rope form. When alginates come into contact with wound exudate, the fibers turn into a soft hydrophilic, nonadhesive gel.

Alginates are highly absorbent (about 20 to 40 times their weight). They should not be used unless the wound has a high exudate output, otherwise they will dry out the wound base. The gel is easy to irrigate from the wound, and remaining fibers are biodegradable and nontoxic to the patient. Alginates can be used in infected wounds, and they have a hemostatic effect that can control minor bleeding. A secondary dressing such as gauze, foam, or composite dressing is necessary.

Collagens can be combined with alginates to form gels, sheets, or pads. Collagen is a protein that produces fibers in connective tissue and encourages the deposit and formation of granulation tissue in the wound bed. An alginate made from collagen is useful in wounds with drainage. Collagen products can help fill in wound dead space and manage partial-thickness or full-thickness and some infected wounds. A secondary dressing is needed.

Gauze dressings, commonly known as “4x4s,” are made from woven and nonwoven fibers of cotton, rayon, polyester, or a combination of these fibers. Most woven products are a fine or coarse cotton mesh, depending on the thread count per inch. Fine mesh cotton gauze is frequently used for packing, such as a normal saline wet-to-moist dressing, whereas coarse mesh cotton gauze, such as a normal saline wet-to-dry dressing, is used for nonselective debriding. One exception is a recently marketed product of nonwoven, 100% cotton gauze for debridement of necrotic tissue; this dressing does not adhere to or damage viable tissue when removed.

Most nonwoven gauze dressings are made of polyester, rayon, or blends of these fibers and appear to be woven like cotton gauze. In addition to being more absorbent than cotton gauze, these synthetic gauze products are stronger, bulkier, and softer. A general rule of thumb is not to cut loosely woven dressings because stray strings may become caught in the wound bed and become a source of infection.

Some gauze dressings, such as dry hypertonic saline gauze used for debridement, are impregnated with substances to promote healing. Other products contain petrolatum or other wound healing elements indicated for specific types of wounds.

Foams, although usually used as secondary dressings, can be used as primary dressings to prevent dehydration of the wound base, while absorbing exudate. The thickness and absorbency varies. Some foams have an adhesive border and others are impregnated with carbon for odor control. Foam dressings can be used on infected wounds. They should not be used alone on wounds with deep undermining or sinus tracts.

Composite dressings are often a mixture of the dressing types mentioned above. They are usually semipermeable and designed to absorb wound exudate. Both foams and composites may require a secondary dressing.

Antimicrobial dressings cleanse wounds by absorbing fluid, pus, and exudate, along with pathogenic bacteria, enzymes, and cellular residues. The pad or gel reduces the bacterial load through the slow release of small amounts of iodine into the wound fluid. They are contraindicated in patients with a sensitivity to iodine, in pregnant or breastfeeding women, and with Hashimoto’s thyroiditis, Graves’ disease, or nontoxic nodular goiter.

Metallic silver barrier dressings and creams deliver silver ions to tissue at a steady rate for extended periods and are designed to prevent bacterial colonization in infection-prone areas. These dressings may help to reduce the bioburden of a seriously infected wound, but they will not eliminate an existing infection. Antimicrobial gauze dressings containing polyhexamethylene biguanide resist bacterial colonization within the dressing. Manuka honey has also been found to inhibit the growth of bacteria. The honey is impregnated in dressings and creams.

Enzymes are chemical debriders that digest debris and necrotic tissue without destroying healthy tissue. They come in the form of an ointment or cream and require a cover dressing.

**Adjunctive therapies**

Biologics, including growth factors and skin equivalents, are topical treatments. Growth factors are actually many different cellular factors that stimulate wound healing activity. By applying growth factors to the wound bed and resolution or control of the underlying cause, wound healing has been achieved in wounds not responding to other methods of treatment. Skin equivalents, made from cultured skin tissue, are useful in a variety of wounds, such as burns, and venous and pressure ulcers. In the patient with burns, skin equivalents may be used in addition to autologous skin grafting or in place of cadaver grafts.

Hyperbaric oxygen (HBO) is delivered by placing patients in a chamber where they breathe 100% oxygen within a suitable pressure vessel at pressures greater than sea level. Time in the chamber stimulates collagen synthesis, and time out of the chamber promotes angiogenesis, which are both needed to heal the wound. This therapy is used for wounds, such as necrotizing soft tissue infections, gas gangrene, refractory osteomyelitis, thermal burns, compromised skin grafts, and flaps.

Electrical stimulation (E-Stim) involves the transfer of an electric current through a surface electrode pad that is in wet contact with the external skin surface or the wound bed. The current has positive effects on necessary components for wound healing, including blood flow, oxygen uptake, and DNA and protein synthesis. Indications include burns, pressure, diabetic and vascular ulcers, and surgical wounds.

Vacuum-assisted closure (VAC) involves a device with a special dressing placed over a wound that assists in wound closure by applying negative pressure to remove wound fluids and stimulate the growth of granulation tissue. The VAC is used for chronic wounds, acute and traumatic wounds, meshed grafts, flaps, and dehisced incisions.

**Implementation and evaluation**

After the nursing care is planned and the products selected, the implementation phase of the nursing process begins. Implementation of wound care involves interventions beyond the direct care of completing the treatment, including teaching and training activities of other caregivers, supervising care, and accurately documenting all nursing actions.

Although evaluation is listed as the final step in the nursing process, it is really an ongoing activity that leads to reassessment and new plans for patient care, as illustrated in the case study. As wound healing progresses, nurses need to evaluate the effectiveness of the implemented treatments and revise previous plans. To determine if a wound is healing, observe the wound bed tissue, the exudate, and the wound measurements. In some wounds, an improvement in the wound bed tissue, such as the absence of necrotic material and appearance of red granulation tissue, may be the first indicator of healing. Don’t limit evaluation to only the wound measurements. True wound healing is indicated by three parameters — an improvement in the appearance of the wound and periwound tissue, a reduction and clearing up of the wound exudate, and a reduction in the volume of the wound.

Appropriate wound care management involves every aspect of the nursing process to provide the necessary structure for care. It is heavily dependent on the nurse’s knowledge of the pathophysiology of wound healing, as well as the growing number of product categories available for treatment plans. Wound care by nurses knowledgeable about the complexities of wounds and their treatments enhances healing.

**Patient education**

The nurse who is armed with the necessary knowledge and skills for wound care can then educate patients and caregivers in all healthcare settings. Areas to address include:

* Wound etiology
* Risk factors
* Principles of wound healing
* Importance of nutrition
* Skin care and skin inspection
* Appropriate wound care
* Strategies to prevent recurrence

Education of patients and caregivers is essential for them to understand their roles in wound assessment, prevention, and management.

Scenario:

Ms. R is a 36-year-old white female admitted from home to an acute care hospital with bilateral stage IV ischial pressure ulcers. She also has bowel and bladder incontinence. Upon assessment of the ulcers, both have necrotic tissue and are draining large amounts of foul smelling, purulent drainage. She has a specialty bed and cushion to reduce pressure on the ulcers. Ms. R is depressed about being on bedrest to prevent the ulcers from worsening. Her family is very supportive and has taken on the responsibility of prevention and treatment of her pressure ulcers. They have never had any formal instruction and are feeling guilty about the development of the pressure ulcers.

During the course of her hospitalization, both ulcers are surgically debrided, and she is treated with an antibiotic for her MRSA wound infection. An assessment of her wound on day four reveals a very thin layer of slough in the base of the wounds after surgical debridement and less wound drainage and less odor.

**1 ) What is the initial objective for wound care?**

* Protect the skin
* Cleanse the skin
* Debride the ulcers
* Protect the wound

**2 ) Prior to surgical debridement, which product should be selected to manage the wound drainage?**

* Hydrocolloid
* Hydrogel
* Transparent film dressing
* Hydrofiber

**3 ) Which principle of wound care is the MOST important to teach the caregivers about pressure ulcers?**

* Protect healthy tissue
* Eradicate impediments to wound healing
* Alleviate pressure on the ulcer

**4 ) The MOST important goal of any product selected for wound care should be to —**

* Provide moist wound healing.
* Provide comfort.
* Provide thermal insulation.

**1 ) A common category of wound care product available in sheet or gel form is —**

* Calcium alginates.
* Hydrocolloids.
* Hydrogels.
* Foams.

**2 ) Which of the following is an indication for using an absorption dressing?**

* Moist wound healing
* Nonselective debridement
* Prevention of dehydration
* A large volume of exudate

**3 ) The goal of wound care treatment is —**

* To provide an optimum environment for healing.
* To facilitate the processes involved in wound repair.
* To avoid complications or interference in the healing process.
* All of the above

**4 ) An optimum environment for wound healing is best achieved —**

* By protecting healthy periwound skin from trauma.
* By prevention of infection.
* Through products that provide a moist environment.
* By relieving pressure.

**5 ) Hydrocolloids —**

* Are wafer-shaped dressings that contain hydrophilic elements like karaya.
* Are specifically for high exudate wounds.
* Are commonly used on infected wounds.
* Are useful for patients with delicate periwound skin.

**6 ) Transparent dressings promote —**

* More aesthetic wound care.
* Moist wound healing.
* Dry wound healing.
* Consistent moist vapor permeability regardless of thickness.

**7 ) “4x4s” are —**

* Always used for packing.
* Always used for debridement.
* Two types: woven and nonwoven.
* Preferably made of cotton because they are stronger, bulkier, and softer than synthetics.

**8 ) Foams are —**

* Used on infected wounds.
* Often used as a secondary dressing.
* Used as primary dressing to prevent dehydration of wound base while absorbing exudate.
* All of the above

**9 ) Absorption dressings —**

* Handle large amounts of exudate.
* Conform to the size and shape of the wound base.
* Both a and b
* Neither a nor b

**10 ) Which of the following dressings was one of the first to be developed for moist wound healing?**

* Foams
* Transparent dressings
* Hydrogels
* Composite dressings

**11 ) Implementation of the wound care management plan includes —**

* Performing or assisting with direct patient care.
* Teaching and training activities.

Supervision of care.

* All of the above

**12 ) Which of the following is comprised of specific acids and derived from seaweed?**

* Foams
* Calcium alginates
* Transparent dressings
* None of the above