

Wound Care

Abstract:

Wound care involves every aspect of wound management. Things that would be included would be the type of wound being treated, those factors that will affect wound healing such as diet and chronic conditions and determining the proper treatment for that specific wound. Once these factors have been determined a treatment plan will be created by the provider or the wound care team. Aspects will include proper wound care and frequent evaluation of the wound to adjust for changes in wound status.

Health care professionals play an important role in wound care by reporting any changes in patient symptoms such as increased pain or possible loss of sensation. They can also play a role in the physical aspects of the wound like increased bleeding, changes in discharge color or smell, or changes in skin appearance surrounding the wound. Health care professionals spend the majority of their time caring for and supporting patients and they will have front-line exposure to any subtle changes in patient status, including their wounds.

Learning Objectives:

1. Identify the definition of wound care.
2. Explain the different types of wounds.
3. Describe the dietary needs for best wound healing.
4. List complications of wound healing and what chronic conditions and medications impede wound healing.

Introduction

Wound care is more than just caring for the wound itself. Many other factors need to be considered when caring for a patient with a wound. Dietary factors play a role in ensuring the body has what it needs to provide for proper healing processes. Hydration enables the body to bring in immune support and the removal of old dying, damaged tissue. Patients with immobility issues must be moved frequently and areas that have wounds need to be protected.

Chronic conditions can play a major role in interfering with the healing process. Many chronic conditions can lower immune function, interrupting the healing process causing a delay in healing or even preventing healing. If the immune response does not eliminate bacteria, the proliferation of the infection continues, and new healthy skin cell formation will be paused.

Types of Wounds

There are 2 classifications of wounds, open or closed. Open wounds are wounds with exposed underlying tissue or organs and open to the outside environment. On the other hand, closed wounds are wounds that occur without any exposure to the underlying tissue and organs, with no opening in the skin. For this course, we will be discussing open wounds only. Below are the main types of open wounds and these will be discussed in detail.

Diabetic Foot Ulcers

Diabetic foot ulcers occur in those individuals with Diabetes I and II. Common causes are poor glycemic control (high blood glucose levels), calluses, foot deformities, improper foot care, underlying peripheral neuropathy and poor circulation, and dry skin.

There are 5 stages of diabetic foot ulcers. These can be called stages or grades.

Grade 0 - Foot symptoms like pain, only.

Grade 1 - Superficial ulcers involving skin and subcutaneous tissue.

Grade 2 - Deep ulcers involving ligaments, muscles, tendons, etc.

Grade 3 - Ulcer with bone involvement.

Grade 4 - Forefoot gangrene.

Grade 5 - Full-foot gangrene.

Arterial Ulcers

Arterial ulcers are caused by a reduced arterial blood supply to the lower limb. The most common cause is atherosclerotic disease of the medium and large-sized arteries. When the skin and underlying tissue are deprived of oxygen, the tissue begins to die, and an open wound forms.

Arterial wounds are normally round with well-defined margins. They tend to form on the outer ankle, heels, and on toes either on them or between them. They can also form in areas where there is pressure on the feet. Arterial ulcers have a distinct color of black, gray, brown, or yellow. This is typical due to the lack of circulation in the area. They also rarely bleed.

Arterial ulcers are likely to present with:

1. Little to no hair growth on the affected limb
2. Limb feels cold to the touch with little to no pulse
3. Skin and nails appear shiny, thin, and dry
4. Skin feels tight or taut

Venous Ulcers

Venous ulcers normally occur when there is damage to the valves inside the leg veins. These valves are important as they control the blood pressure inside the veins. When you walk the blood pressure inside your leg veins decreases. If the blood pressure doesn't fall when walking, the condition is called sustained venous hypertension. This type of hypertension could lead to ulcer formation in the lower legs, usually the ankles.

Causes of venous ulcers are varicose veins and chronic venous insufficiency. Varicose veins are large, bulging leg veins that have faulty valves and allow the blood to pool in the lower legs. Chronic venous insufficiency occurs when the blood in your lower legs can't be pumped back to the heart for circulation. The legs swell, possibly to extreme conditions

which causes pressure on the skin. This extreme pressure creates conditions for venous ulcers to form.

Pressure Ulcers

Pressure ulcers are also called bedsores or decubitus ulcers. These ulcers are actually injuries to the skin caused by prolonged pressure on that part of the skin. These ulcers commonly develop on bony prominences of the body such as the heels, ankles, hips, spine, and tailbone, and can even form on the head. The skin on these areas may develop a different color, feel colder or warmer than surrounding tissue, or may appear swollen or inflamed. The patient may tell you that the area feels tender to touch or tender when laying on that area. Health care professionals should watch for skin breakdown and any form of drainage must be reported immediately. If a patient is bedridden, the provider will most likely order padding for these areas and orders frequent repositioning of the patient.

The 4 stages of pressure ulcers are:

Stage 1 ulcers have not yet broken through the skin.

Stage 2 ulcers have a break in the top two layers of skin.

Stage 3 ulcers affect the top two layers of skin, as well as fatty tissue.

Stage 4 ulcers are deep wounds that may impact muscles, tendons, ligaments, and bones.

Vasculitis Ulcers

Vasculitis ulcers are a collection of inflammatory conditions that affect the integrity of micro-vessels in the human body. Vasculitis is caused by an abnormal immune response and inflammation of the blood vessels. The inflammation of the vessels causes damage, vessel integrity is compromised, and the formation of an ulcer occurs. Vasculitis is more common in the lower portion of the legs. Vasculitis ulcers are shallow with a red base, sometimes covered by yellow tissue, and have even shaped borders. The surrounding skin may be shiny, tight, warm or hot, and discolored. These types of ulcers are painful.

Chronic Wounds

Wounds that don't show signs of healing in 8 weeks are considered chronic. Chronic wounds don't heal, heal slowly, or heal but tend to recur. Chronic wounds can be caused by poor circulation, a diagnosis of Diabetes, or a weakened immune system. Ulcers are considered the most common chronic wounds.

Traumatic Wounds

There are several types of traumatic wounds, they will be discussed below.

Abrasions:

Abrasions occur when the skin rubs or is scraped against a rough surface. The wound on your skin matches the size and shape of the object it came in contact with. Abrasions can be quite painful.

Puncture Wound:

Puncture wounds are caused by an object that pierces the skin. The wound on the outside may be small but the wound can extend into many layers inside. Puncture wounds have an increased risk of infection because they are hard to clean and provide a warm, moist place for bacteria to grow.

There is a difference between a puncture wound and a penetrating wound. Puncture wounds may extend into different layers of tissue, but they do not enter a body cavity. An example would be a dog bite. Penetrating wounds are wounds that enter a body cavity.

Avulsion:

An avulsion would be a forcible tearing away or separation of a bodily structure or part. When layers of skin have been torn away and muscles, tendons, and other tissues are visible, it is an avulsion. If a limb has been completely amputated, it is an avulsion as well. This is a very traumatic injury and tissue, and body parts cannot always be reattached.

Lacerations:

A laceration is a deep cut or tear in skin or flesh. There are different types of lacerations:

A split laceration is skin between a hard object and bone. An example would be hitting your head on the corner of a metal drawer, breaking the skin open.

A tear laceration is caused by a projecting surface of an object being dragged over the skin. For example, an auto accident and catching your skin on a metal part of the car as you are being ejected.

Stretch lacerations which is caused by a heavy blunt impact on a fixed, localized area of skin causing the skin to overstretch.

Perforated lacerations are caused by objects capable of penetrating the skin. This could be caused by missiles and shrapnel from explosions.

Blast lacerations are caused by the local blast effect of expanding gases.

Cut lacerations are from blunted sharp weapons like knife blades or ice picks.

Crush lacerations occurs as a result of crush injury where the injury is caused by protruding bone fragments. This could be a limb being crushed by heavy equipment.

Burn Wounds:

Burns are caused by thermal, chemical, electrical, or radiation contact. Each of these will be discussed in further detail below.

Thermal

Thermal wounds are due to heat sources that raise the temperature of the skin and tissues and cause tissue cell death or charring. Hot metals, scalding liquids, steam, and flames, when coming into contact with the skin, can cause thermal burns.

Chemical

These burns are due to strong acids, alkalis, detergents, or solvents coming into contact with the skin or eyes. The area of contact will be red, swollen, and painful but blisters will not develop. Sometimes, deeper burns can occur and cause blisters and severe pain. Rarely, a strong acid or alkali

will cause a full-thickness (third-degree) burn that damages the skin all the way through.

Electrical

These burns are from electrical current, either alternating current (AC) or direct current (DC). If you encounter electricity and sustain a burn, you will likely have an entrance wound and an exit wound.

Entrance Wound:

Skin transforms electrical energy into heat because of the resistance. This will produce a burn around the entrance point (dark spot in the center of the wound).

Table #1:



Exit Wound:

The electrical current flows through the body from the entrance point, until finally exiting where the body is closest to the ground. This foot suffered massive internal injuries that weren't initially visible as seen in table 2.

Table #2:



Another form of electricity is lightning. This image is of a man who was struck by lightning in the back.

Table #3:



Radiation

These burns are due to prolonged exposure to rays of the sun, or to other sources of radiation such as X-rays, or radiation therapy to treat cancer.

Sometimes radiation burns may have what is called a moist reaction. These reactions can also be called "weeping radiation burns." They usually occur around skinfolds, such as under the breasts. Skin can change in texture and color because of radiation burns.

Table #4:



Sunburn

Sunburns can be very damaging to your skin and over time, contribute to the possibility of skin cancer.

Table #5:



Gunshot Wound

A gunshot wound would be classified as a penetrating wound caused by a projectile (bullet) from a gun. Injury could include bleeding, bone fractures, and organ damage. Damage will depend on where the bullet came in contact with the body, what type of ammunition was used, how fast the bullet was traveling, and how it passed through the tissue.

Table #6:



Wound Care

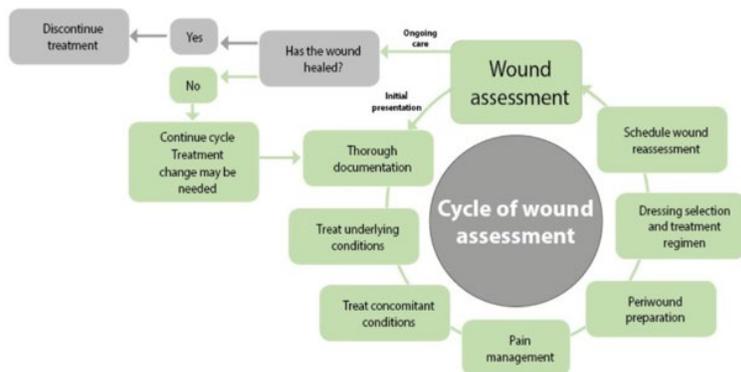
The 5 principles of wound care.

1. assessment
2. wound cleansing
3. timely dressing change
4. selection of appropriate dressings
5. antibiotic use

Assessing the wound is within the nursing scope of practice but health care professionals play an important role in wound care. Evaluating is done daily on a regular basis by health care professionals because they are the health professional that has the most contact with patients. Ensuring the patient is comfortable, that the wound has not wept through the dressings, and that the dressing is changed as ordered by the provider is a healthcare responsibility.

Health care professionals can assist with dressing changes if needed so it is important to understand the process of wound care. Patients with painful wounds will need pain coverage prior to the dressing change and health care professionals can notify the nurse or provider when the patient is comfortable and able to tolerate the change of dressings.

Table #7:



Changing Wound Dressings

Following the steps below with help with organization and the ability to complete the task efficiently and in a timely manner.

Prepare:

1. Ensure there is a clean working area
2. Gather supplies
 - a. This will vary depending on the type of wound, but some supplies will be needed no matter the type of wound dressing being completed. These may include:
 - i. Non-sterile gloves
 - ii. Adhesive remover
 - iii. Gauze sponges or pads
 - iv. Sterile normal saline
 - v. Gauze wrap
 - vi. Scissors
 - vii. Non-stick dressing
 - viii. Tape
 - ix. Biohazard disposal container

Removal of Old Dressing

1. Wash your hands with soap and warm water or an alcohol-based hand rub.

2. Don gloves
3. Slowly lift the corners or edges of the dressing or tape. If it sticks to the skin, dab the edges with an adhesive remover, a moistened gauze pad, or a moistened paper towel.
4. Hold down the skin surrounding the bandaged area. Gently and slowly remove the tape or dressing. Lift the tape across the skin rather than pulling away from the skin as seen in table #8.

Table #8:



5. Lift the edges of the dressing toward the center of the wound, then gently lift it from the wound.
6. If the dressing sticks to the wound, soak it with saline solution to help loosen it.
7. Carefully discard the old dressing after assessing the drainage into a plastic trash bag and tie it closed. Put that bag into a second plastic bag and throw it away.
8. Remove the gloves and wash your hands again.

Cleaning the Wound

After removing the soiled dressing and noting the drainage it will be time to irrigate the wound and/or apply a new dressing. Follow these steps:

1. Don new gloves.
2. Place a protective barrier under the body where the wound is located.
3. Wet a gauze sponge or pad with saline or water. Gently clean the wound if this is written in the order. Never clean from the outside of the wound to the center as this will bring germs into the wound. Clean from the center, outwards.

4. Be sure to clean away any liquid draining from the wound.
5. Use new gauze as it becomes soiled or contaminated.
6. Throw all contaminated cleaning materials into the plastic trash bag.
7. Dry the skin surrounding the wound by patting it with a soft, clean gauze.
8. Check the wound for redness, drainage, swelling, and odor.
9. The new tissue growth at the bottom of the wound should be light red or pink and look lumpy or glossy. Do not disturb this tissue as it is fragile.

Table #9:



Apply the New Dressing

1. Once you have opened the packet, touch only the corners of the dressing so as to not contaminate the clean dressing.
2. Apply only topicals or packing that has been ordered by the provider.
3. Center the dressing over the wound.
4. Secure the dressing in place with tape, gauze wrap, Coban, or an ace wrap. The provider should have this on the order.
5. Remove gloves and wash hands with soap and water.

Notify the provider if any of the following symptoms are present. The following symptoms could mean that the wound is infected and not healing.

1. Fever or chills, nausea or vomiting.
2. Increased pain at the wound site.
3. Redness or swelling around or spreading out from the wound site.
4. The wound site or surrounding area feels warm to the touch.
5. A foul odor coming from the wound after the wound has been cleaned.
6. Any change in color or amount of drainage from the wound.

Specifics for certain wounds:

The gold standard for diabetic foot ulcer treatment includes debridement of the wound, management for the prevention of any infection, revascularization procedures when indicated, and off-loading of the ulcer.

Improving the blood supply to venous stasis ulcers is a priority. This can be done through angioplasty, surgery to clear out a blockage from a leg artery (endarterectomy), or a bypass operation to put in a new route for blood flow in the leg.

Pressure wounds are usually treated through irrigation of the wound with a sterile water solution of the provider's choice. The wound will be covered with special medical bandages designed to promote healing. These could include water-based gel (hydrogel, hydrocolloid, alginates, and foam dressings). If the wound is severe and deep into many layers of the skin the provider may order a procedure called wound debridement. Dead tissue will be removed using a scalpel or an ointment could be applied that dissolves dead tissue. This type of procedure will normally require a local anesthetic as this procedure can be painful for the live tissue surrounding the wound. These patients might also be treated with antibiotics, non-steroidal anti-inflammatory drugs such as NSAIDS, or other pain relievers.

When cleaning an atrial wound the cleaner is 0.9% normal saline or water. When cleaning this type of wound the process should be gentle and only enough pressure to dislodge the debris. The surrounding skin is very fragile due to decreased blood flow and arterial wounds will have minimal discharge due to this reason. Because there is minimal fluid in the skin in arterial wounds, moist, non-adherent dressings are indicated. Arterial ulcers are particularly vulnerable to bacteria, so the dressings applied are normally infused with antimicrobial properties for effective infection control.

Chronic wounds are wounds that have not progressed through the normal wound-healing process in a timely manner. These types of wounds are normally swabbed for infection to ensure the infection is not preventing the

wound from healing. Consistent cleaning and dressing changes are important, and at times they will require debridement.

Abrasions are gently washed with soap and water. Debris would have been removed but if the abrasion is deep, debris could surface over time. Once the wound has been washed, pat the wound dry with a sterile gauze pad and only apply ointment or a dressing if ordered by the provider. Small abrasions may not require a dressing. The abrasion should be cleaned daily and if a dressing is required it should be changed every time the wound is cleaned or if it becomes soiled by discharge from the wound.

Punctures wounds can be susceptible to infection or the possibility of tetanus bacteria entering the wound, especially if exposed to dirt, feces (poop), or saliva (bite). The wound should be washed daily for the first few days. Antibiotic ointment can be applied followed by the provider-ordered dressing of choice. The bandage should be changed daily or whenever it becomes soiled. Watching for signs of infection is important with any wound. If the wound is not healing, there is increased pain, pus, swelling, or if a fever is present, notify the provider. Infections may show streaks of purplish-gray or darker than normal skin color surrounding the wound or moving away from the wound.

Lastly, a tetanus vaccine or a booster may be ordered if the patient has not had one in the past 10 years. A booster is another dose of the tetanus vaccine given following the initial vaccine. A booster shot boosts your immune system and helps prevent tetanus bacteria from invading the body. Tetanus is a serious and sometimes fatal disease caused by a neurotoxin produced by the bacterium called *Clostridium tetani* when it enters the body through a wound. The risk for tetanus is significantly higher if the puncture wound is on the feet and not cleaned right away.

Avulsions can be very traumatic and serious. They could require vacuum-assisted negative pressure dressings, skin grafts, the use of a hyperbaric chamber (to increase the concentration of O₂ in the wound), growth factors, and skin substrates that mimic the surface properties of human skin.

The goal for patients who have suffered from an avulsion is not only to heal but to also achieve the highest level of physical functioning possible. This can involve the use of additional specialties, such as occupational therapy (OT), and physical therapy (PT).

Lacerations need to be cleaned either with soap and water, or a sterile saline solution. This will be in the provider's order and will remove debris that could be impeding the healing process. The provider will also have an order for the type of dressing that should be applied after the wound has been cleaned. Loosely cover the wound with the appropriate dressing in the provider's order and secure it in place with medical tape, ace, or Coban. This dressing will keep the wound covered for protection from further injury, and to prevent bacteria from entering the wound. They also help prevent the wound from drying out by keeping it moist, which promotes healing.

Elevating the wound above the level of the heart prevents swelling and in turn, can help reduce pain that is caused by inflammation. Finally, determine if the patient has ever had a tetanus shot or when they last received a tetanus shot and if they are in need of a boost.

Gunshot wounds will have been assessed by the provider. If the wound does not require surgery, then the following steps will guide care. If the gunshot required surgery the wound will be treated as a surgical wound. If no surgery was required, wash the wound with clean water 1-2 times a day. The use of hydrogen peroxide and alcohol is not recommended as they dry the skin and can be corrosive, impeding healing. Cover the gunshot wound according to the provider's order. This could be a thin layer of petroleum jelly, such as Vaseline, followed by a non-stick bandage. Keep the wound dry for the first 24-48 hours.

Antibiotics may be ordered and should be taken as prescribed. If the wound is on an extremity, the limb can be propped up on a pillow or other object to minimize swelling and pain associated with inflammation.

Initial treatment of minor thermal injuries starts with cooling the area. Use room temperature or cool tap water, not ice which can cause more damage to the skin. Gentle cleansing with mild soap and water, usually a

dressing is not needed for minor thermal injuries. For partial and full-thickness thermal burns a dressing will be applied which will be applied after the application of topical antibiotic and a nonadherent gauze such as Adaptic or Xeroform. This will be covered with a layer of puffy dry gauze, and an outer layer of elastic gauze roll for protection.

Chemical wounds can be topical or inhaled. If topical, the wound is cleaned and covered with medicated creams and sterile wraps. These will need to be changed as ordered by the provider, this is usually daily. The patient will need adequate pain control, this will be in the provider's order. If the chemical was inhaled there could be breathing issues and the patient could possibly have a breathing tube in place. As the topical burn heals, itching may become a real problem. Medication could be prescribed to help with this issue.

Electrical wounds are treated with many different types of dressings. The appropriate dressing will be chosen depending on the depth of the burn, the amount of area involved, and where the burn is located. Gauze and gauze fabric, polyurethane foam dressing, hydrogel, hydrocolloid, and transparent film are choices for this type of wound.

Lichtenberg figures (LFs), also known as ferning pattern, feathering, keraunographic markings, or arborescent burns, are pathognomonic skin signs for a lightning strike injury. The most common chronic sequelae reported are brain injury and chronic pain syndromes. Lightning injuries differ from electrical injuries from high voltage because lightning injuries usually do not cause significant internal or external tissue destruction along the path of grounding of the current.

Radiation burns are caused by being exposed to excessive X-rays (rare) and radiation for the treatment of cancer. Treatment for radiation burns often includes prescribed steroid ointments. These may include radiation burn creams and/or radiation burn lotions applied regularly over a prescribed timeframe. Hydrogel dressings are commonly used for burn wounds and are composed of about 90% water suspended in a gel made up of insoluble hydrophilic polymers which swell up on contact with water and some are combined with alginate dressings. They control the exchange of fluid at the wound-bandage surface. The hydrogel dressing provides moisture which

enables painless debridement of necrotic and infected tissue, promotes granulation tissue formation, and encourages complete healing.

Sunburn injuries can be in many different stages. If blisters are present, you have a second-degree burn. These blisters should never be popped as this will leave an entrance for bacteria to enter the body, leading to infection. Petroleum products or ice should not be applied to sunburnt skin. Petroleum products trap heat in, and ice may cause more skin damage. It is best to not disturb the skin by trying to remove the dry peeling skin. The patient will probably be prescribed a pain reliever such as ibuprofen or acetaminophen. Topical gels may be prescribed to soothe the skin. These would include gels containing a topical anesthetic as well as aloe vera gel and calamine. Cooling the skin in a cool bath or with cool compresses may also bring relief. Keeping the patient out of the sun, making sure they are dressed in loose-fitting clothing, and offering hydration will aid in the healing process and pain relief.

Things Affecting Wound Healing

Age and Gender

As the body ages its ability to repair the skin decreases. The reduction in growth factors and stem cells in the skin makes it more difficult to repair. Diseases, especially those that affect the circulatory system like peripheral vascular disease interfere with adequate blood flow to the surface of the skin and lower extremities. Nutrition can also interfere with or slow the healing processes of the body. It is also believed that estrogen produced by the ovaries of women aids in wound healing while those males with higher testosterone levels may have a longer period when it comes to wound healing.

Stress

Stress is a normal occurrence but when it becomes chronic, the body will experience changes in the way it functions. If the body is in a state of chronic stress, chemicals such as epinephrine and norepinephrine will be released continually keeping the body in a state of fight or flight. The body's reaction to these increased chemicals will cause blood pressure and heart rate to remain at an increased rate. Cortisol (stress hormone) levels will remain increased, interfering with the immune system, slowing its reaction time, and delaying wound healing. If stress continues, the body has a more difficult time

fighting off toxins and controlling inflammation which is a necessary element to wound healing.

Diabetes

Diabetes is a barrier to wound healing because elevated blood sugar levels stiffen the arteries and cause blood vessels to narrow. When the vessels narrow the amount of blood flow and oxygen to a wound decreases. An elevated blood sugar also decreases the function of the red blood cells that carry the oxygen and nutrients to the tissues and in direct relation, lowers the ability of the white blood cells to fight infection. Of the 25 million Americans that have diabetes, approximately 15% of those patients will develop a foot ulcer at some point as foot ulcers are the most common wounds for diabetics.

Diabetic Neuropathy

Diabetes affects the smallest arteries and nerves and those nerves and vessels farthest from the heart. This leads to diabetic neuropathy which is a loss of sensation usually occurring in the toes and feet of diabetics. Because of this loss of sensation, these individuals may not notice a developing sore, leading to a wound and/or infection.

Infection

Infection is one of the primary reasons why a wound won't heal. Rarely will an organism on the surface of the skin cause an infection but occasionally the number of organisms is too great. This proliferation of bacteria along with other factors allows infection to occur.

Immune System Deficiency

Some conditions can have a negative impact on the body's ability to fight infection. Some of these conditions include diabetes, multiple sclerosis, asthma, and lupus. If these infections are not treated they can lead to other conditions like gangrene, sepsis, or a bone infection like osteomyelitis.

Arterial and Venous Insufficiencies (Peripheral Vascular Disease)

Good blood flow needs to be present to move needed oxygen, nutrients, and immune cells throughout the body. If this is interrupted or limited wound

healing will not occur or will take longer than normal. When there are insufficiencies in venous return to the heart or arterial output does not reach all areas of the body, skin breakdown can occur, and healing will be delayed or not occur.

Insufficiencies occur for different reasons. Atherosclerosis, an arterial insufficiency, is the buildup of fat, cholesterol, and other substances in the walls of arteries, preventing adequate blood flow primarily to the lower extremities. When veins leading away from a wound do not function properly, blood, lymph, and dead cells pool around the wound impeding the healing process and possibly leading to infection.

Chronic Obstructive Pulmonary Disease (COPD)

COPD, a lung disease, which can have both chronic bronchitis and emphysema, leads to decreased oxygen absorption. Oxygen is critical for all wound-healing processes. Oxygen protects wounds from infection, helps with collateral circulation, and assists in wound contracting.

Paraplegia/Quadriplegia

Spinal cord injuries or paralysis in the lower extremities cause a lack of sensation leaving these patients without awareness that they may need repositioning or something is causing pain. This leaves these patients prone to acquiring pressure sores that can worsen and become infected quickly.

Poor Nutrition

Malnutrition and inadequate nutrient intake can hinder wound healing and result in infection. Protein is essential in wound healing and takes up to three times the normal daily requirement. If inadequate carbohydrate intake occurs the body will break down proteins in the body to use for energy. Nutrition is vitally important for wound healing.

Vitamins play an important role in the healing process as well. Vitamins A, C, and E, as well as zinc, iron, copper, and manganese, are all critical for efficient wound healing.

Dementia, Alzheimer's

When patients have dementia or Alzheimer's they are less likely to participate in prevention or treatment of wound care. They may have the inability to understand their condition and comply with the provider's ordered treatments.

Emotional Disorders and Depression

Depression can cause patients to become non-compliant with performing the physical aspects of wound care, especially with major depression. Other disorders may cause the patient to not trust or be afraid of the aspects surrounding wound healing and refuse dressing changes, topical medications, or oral medications.

Tobacco Use

According to the World Health Organization, tobacco smokers are at significantly higher risk for impaired wound healing than non-smokers. They also state that chronic exposure to tobacco has been shown to harm almost every organ of the body, skin included. Tobacco smoking narrows blood vessels which reduces oxygen supply and nutrients which directly affect wound healing. To add additional insult, nicotine, the chemical found in tobacco, can cause arteries to spasm, narrowing them even more.

Smoking tobacco has also been linked to impaired immune system function. The cells and antibodies associated with the immune system no longer function optimally. Vitamin C deficiency is common in tobacco users because the immune system utilizes this vitamin to fight against the harmful effects of smoking. Vitamin C supports the vascular system and the skin, smoking depletes these levels leaving these systems vulnerable.

Alcohol

The use of alcohol has several negative effects on the body including wound healing. These include reduced blood flow to the wound, increased inflammation, and impaired tissue function through decreased collagen synthesis. Reduced blood flow occurs due to blood vessel constriction slowing the healing activity. Cytokines, small proteins that signal the immune system cause increased fluid to remain in and near the wound. And finally, collagen,

a crucial structural protein that is critical for wound healing through strength and support is impaired.

Obesity

Obese patients will have decreased tissue perfusion and oxygenation due to increased adipose tissue. This is again impacted by decreased lung volume and shortness of breath caused by increased visceral adipose. Increased weight causes additional pressure on dependent tissue that may already have compromised vascular and lymphatic responses. There is also more likelihood of friction and shear, moisture associated skin damage, and possible fungal or yeast infections.

Medications that Affect Wound Healing

Immunosuppressants

Immunosuppressants are used to suppress the immune system to avoid rejection of an organ transplant, or they can be utilized for auto-immune diseases like lupus or rheumatoid arthritis. One function of our immune system is the ability to heal wounds, so by suppressing the immune system, wound healing will also be suppressed.

Corticosteroids

Prescription-based corticosteroids mimic the effects of those naturally produced in the body but are synthetic in form. Corticosteroids are used to reduce inflammation within the body related to a number of health problems including asthma, skin rashes, and lupus. Corticosteroids slow the healing process.

NSAIDs

Nonsteroidal anti-inflammatory drugs are pain-relieving medications that reduce swelling, pain, and fever. These medications can interfere with blood platelet function (clotting) and can delay wound healing.

Anticoagulants

Anticoagulants interrupt the clotting process. Blood clots are beneficial in wound healing because they create a barrier that prevents blood loss and enables the wound to close and heal.

Diet

When the body is healing it will need more calories and nutrients. Wounds will heal faster if the patient eats more of the right foods. Below are guidelines to promote healing.

Protein

Protein provides muscle and skin repair and helps boost immunity. Good sources of protein include:

1. Lean animal meat (beef, pork, chicken, or fish)
2. Dried beans, peas, lentils, or tofu
3. Nuts, peanut butter, or seeds
4. Cheese, yogurt, or egg

Carbohydrates

Carbohydrates supply energy so the body heals. Good choices include:

1. Whole grain breads and cereals
2. Potatoes, rice, or pasta
3. A variety of fruits and vegetables
4. Foods with vitamin A, such as bright orange fruits and vegetables, and dark green leafy vegetables
5. Foods with vitamin C, such as citrus fruits, peppers, tomatoes, strawberries, cantaloupe, and broccoli

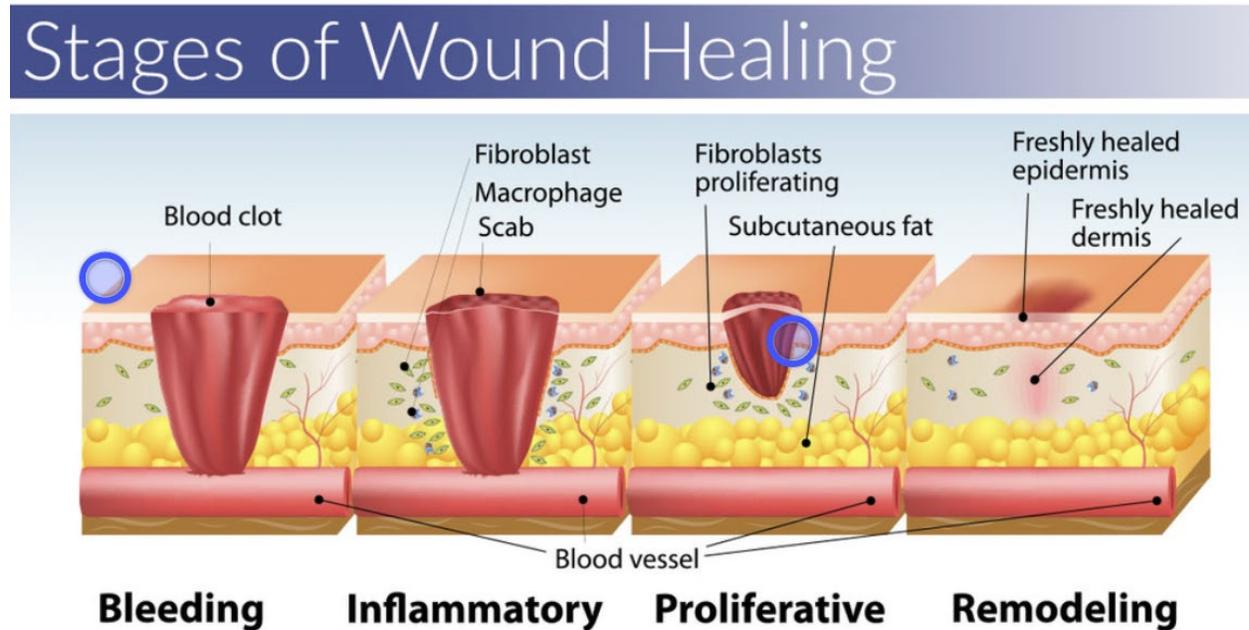
Dairy

If you do not have allergies or sensitivities to dairy be sure to include at least 3 servings per day. One serving of milk or yogurt is one cup.

Water

Water will replace fluid lost if the wound is draining. Drink about 6 to 8 cups of liquids each day, unless directed differently by your provider.

Stages of Healing



When the skin is cut, scraped, or punctured, it will bleed. Platelet cells will begin to aggregate forming a clot. This will protect the wound and prevent further bleeding. The clot also contains a protein called fibrin, which forms a net to hold the clot in place.

Once the clot has formed the blood vessels will allow nutrients and oxygen to enter the wound for healing to begin. This will create inflammation in the area of the wound. White blood cells enter the area to protect and clean the wound for prevention of infection. During this time the balance of oxygen and nutrients is important to establish good wound healing.

The blood cells, red and white, arrive to build new tissue. Collagen is produced, serving as scaffolding to support the repair process. This process forms a red scar that will eventually dull in color. This tissue will become stronger as time passes.

Summary

Wound care encompasses many aspects to ensure adequate healing. These include dietary needs, current medications and medical conditions, daily lifestyle choices, and what type of injury sustained. Health care professionals will monitor not only the wound itself but those aspects mentioned above. Care plans for direct wound care will be established and this will include details on how often the dressings will be changed to what type of dressing will need to be applied. Debridement and irrigation are performed on certain wounds while other wounds may require gels that will debris the wound over time. Wound care is very specialized and should be followed for the best results.

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