Wound Care: Moving Toward Healing

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Contact hours: 5

Course price: $29

Instructions

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Course Summary

Details comprehensive wound assessment, and introduces categories of wounds including pressure, venous insufficiency, diabetic, arterial, and surgical. Discusses elements of pressure injuries and the 4 stages that must be identified before treatment can begin. Documentation and measuring, reassessment and evaluation are spelled out. Advanced, palliative, and hospice care are discussed.

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Criteria for Successful Completions

80% or higher on the post test, a completed evaluation form, and payment where required. No partial credit will be awarded

Course Objectives

When you finish this course, you will be able to:

- Identify at least 5 treatment elements that contribute to increased wound healing.
- Name 6 factors that must be included in a comprehensive wound assessment.
- Properly identify various stages of pressure injuries, discuss at least three prevention techniques used in the home care setting, and identify 5 possible areas of pressure.
- Discuss the characteristics of venous insufficiency ulcers and list 2 benefits of edema control.
- Discuss at least three educational topics that will assist in wound prevention in diabetic patients and identify three characteristics of a diabetic foot wound.
- Describe arterial wound characteristics and the primary risk factors and intervention to assist in wound healing.
- List signs and symptoms of infection and identify topics to educate the patient and caregiver on surgical site wound healing.
  List at least 2 referral resources that promote effective wound healing and discuss the goal of palliative wound treatment.
- List 4 things to include in wound description and documentation.
- State an accurate time frame for reevaluation of acute and chronic wounds.

Wound Healing

This course discusses multiple types of wounds that are seen by practitioners in the home health, assisted living, and nursing home settings. As healthcare professionals, the greatest impact we can have is to provide education for our patients, families, caregivers, and each other. The ability to speak to our patients in simple, clear, and concise language greatly benefits everyone involved in their care. Encouraging and empowering caregivers is an important step in patient independence and healing. As caregivers for our patients, families, and their loved ones, our job is to inspire and motivate to create a space of healing and kindness.

Overall, the job of wound care is to teach patients and caregivers how to prevent complications, promote proper wound healing, perform appropriate dressing changes, observe complications, report any abnormal occurrences, and initiate positive lifestyle changes.

Educating the Patient

Patient education requires a collaborative approach among all disciplines, including social work, case management, respiratory therapy—and clergy, if desired. We must address multiple areas as we determine how the patient and caregiver are best able to learn; this includes not only the ability and readiness to learn but also any barriers to learning.

Culture, religion and language differences demand that teaching be adjusted to the patient and caregivers. Emotional, physical, cognitive, and financial limitations are additional issues. Teaching can be both formal and informal, and techniques should be varied to ensure multiple opportunities to retain and comprehend the information and to allow time for questions. Teaching methods used can be lecture, diagram, demonstration, teach-back, discussion, literature and hand-outs.

It is important not to assume anything about the patient or caregiver. Give information in small increments, with as many senses engaged as possible. Address the patient’s goals during the teaching sessions. Always observe the patient and caregiver as they perform wound care, correcting as necessary and providing encouragement.

Documenting of information taught plus any barriers to learning, learning preferences, teaching methods, and evaluation, is helpful to guide other disciplines and to promote patient/caregiver progress. The goal of patient education is to improve the patient’s quality of life and to address any challenges to a healthier life.

A Team Approach

Great outcomes grow from great collaboration. Successful clinicians utilize all possible resources in an effort to obtain the best possible patient outcomes. Wound care, especially, requires input and knowledge from all parties involved, including most of all the caregiver. Never underestimate the value of team discussion and brainstorming.

Ask questions and gather as much information as possible to determine an optimal care plan. Adjust, assess, and reevaluate as needed, especially when the wound healing has stalled. The patient must be involved and onboard with the plan of care or there will be no forward motion. Successfully involving patient and caregivers make all the difference in healing success.

Questions you should continue to ask with each visit to any patient include:

- Who are the key players needed in wound prevention?
- What areas of the skin are we looking at?
- What do you think the caregivers want to learn?

Focusing with each visit on patient and caregiver education about skin care basics, importance of prevention, and the benefits of healthy habits can lead to a safe and happy outcome. Improving quality of life is always the first objective for all patients. Skin care and wound prevention is a group effort that takes constant collaboration, education, and cooperation from the entire healthcare team. There are many ways we serve our patients on a daily basis. Wound prevention is one of the greatest gifts we can provide patients and caregivers to keep them safe and healthy at home.

Comprehensive Assessment

Wound healing involves assessing many different areas that affect your patient. The patient's living environment, medical status, nutrition plan, pain level, wound etiology, and psychosocial situation all contribute to effective or difficult wound healing. Caregiver education can greatly reduce patient stress and increase wound healing while preventing breakdown.

Preventing and treating wounds is much like solving a puzzle. As healthcare providers and caregivers, we find multiple pieces affect and predict how we care for patients and their caregivers in the home health, assisted living, and nursing home environment. Wound prevention and treatment play a major factor in quality of life for our patients. We need to communicate the goals of care and any daily/weekly changes to other caregivers as soon as possible in order to prevent further complications or breakdown.

Healthcare issues can be overwhelming to many people and, without effective education about the healing process, often patients will not heal efficiently or quickly, if at all. Simple, concise language is welcomed in times that can be overwhelming; it is easier to receive and more likely to be remembered. A comprehensive and individualized plan of care addresses any skin changes or comorbidities, as well as emotional, psychological, financial, and support system needs. It is vital to educate the patient's caregivers because prevention is important for maintaining quality of life.

The Skin

Our skin is the biggest organ of the body, weighing approximately six pounds. The major functions of the skin are protection, immunity, thermoregulation, sensation, metabolism, and communication. Our skin affects our health in multiple ways. Throughout the aging process our skin becomes more prone to trauma and breakdown. This is due to a decrease in subcutaneous fat between the epidermis and dermis and a decrease in cell turnover rate. In young adults, epidermal turnover takes approximately 21 days. However, by 35 years of age, this turnover time is doubled, lengthening our healing rates (Bryan & Nix, 2015).

The skin, like all other organs, is fed by the body's blood supply. When a patient stays in one position too long without moving, the blood supply is no longer able to reach the skin and this causes breakdown. The ability to reposition and mobilize oneself also decreases as we age, putting patients at risk for increased pressure leading to this breakdown of skin. With aging, vision changes and dexterity issues affect how patients are able to assess their skin as well as their ability to perform proper wound treatment and identify risks.

Comorbidities

A thorough assessment during the first visit with a wound care patient is the initial step in prevention and treatment. A patient with a large number of comorbidities is at higher risk for skin breakdown due both to fragility and to how certain health issues can delay the skin's healing ability.

Did You Know. . .

The average wound care patient has three comorbidities.

As an effective healthcare provider, it is critical to the patient's success for you to look at how other issues will impact overall health. Prevention and protection are critical for keeping patient's safely at home.

A fully comprehensive history helps determine possible causes of skin breakdown. Certain comorbidities will automatically guide you in determining a plan of care to handle the wound treatment; for example, conditions that impact tissue perfusion, reducing blood flow and oxygen to the tissue, paralysis, neuropathy, immunocompromised conditions, and chemotherapy and radiation will all delay wound healing rates.

Other conditions impacting healing times are diabetes mellitus, congestive heart failure, peripheral vascular disease, chronic obstructive pulmonary disease (COPD), and obesity. Diabetes Mellitus has the biggest impact on skin care and treatment. When diabetes mellitus is uncontrolled, patients are at an increased risk for skin breakdown and delay in healing. Certain medications will also change the normal wound healing process.

Steroids and blood thinners can make the skin more prone to injury, with an increased risk for injury and trauma. A patient who has been on steroids for a long period of time will have what clinicians refer to as *steroid skin*, which looks paper thin and can easily tear with the smallest impact. Patients' histories can guide the plan of care, and collaboration with primary care providers (PCPs) and those in other disciplines is necessary to determine a wound healing protocol.

Patients who smoke need proper education on the effects of the body's ability to heal. Cigarette smoking constricts the blood vessels, affecting both perfusion and oxygenation, and limiting circulation in the feet. The less blood supply to extremities, especially when wounds are present, the longer the healing time and the more risk of infection.

Nutrition

Adequate nutrition can be easily over looked or neglected as we collaborate with patients and their families. In long-term care settings, malnutrition is seen in 21% to 51% of the population and in the outpatient and home-care population malnutrition is between 13% and 30% (Ryan, 2017). Much of the body's ability to heal comes from proper nutrients that feed the new skin cells. Protein is a building block for the skin. Discussing daily/weekly protein choices underscores the importance of good nutrition. Written information with pictures of protein foods can be beneficial for the patient.

Wound care patients need increased protein in the diet. Because many people are unsure what correct protein choices are, be sure to review acceptable food choices with the patient. Try asking patients what they ate today rather than simply asking if they ate protein. Avoid yes and no questions in order to provide learning opportunities for the patient/caregiver when they report on meals; often, they simply lack knowledge of correct food choices.

Laboratory values for total protein, albumin, and pre-albumin are indicators for protein deficits and should be requested from the physician in a wound care patient. You can use the lab results in educating caregivers about the importance of protein to wound healing. Impaired wound healing results in patients with albumin levels lower than 2.0 and indicates compromised nutritional status (Bryan & Nix, 2015).

In diabetic patients, the ideal goal for hemoglobin A1c (HgA1c) is to remain equal to or less than 7. This blood test is done every 3 months to maintain diabetes control.

Lab Values Related to Wound Healing	
Test	Normal range
Albumin	3.4–5.4 g/dL
Total protein	6.0–8.3 gm/dL
Pre-albumin	18–45 mg/dL
HgA1c	Under 7

Source: Bryan & Nix, 2015.

Educate your patient's caregivers to report weight loss, poor appetite, gastrointestinal problems, or constipation that may interfere with eating. Ask the caregiver to keep a food diary for several days to create a detailed assessment of the patient's intake. Monitoring the patient's input and output will assist in determining if nutritional supplements should be added; this must be discussed with the physician. You can engage the patient and caregiver with questions regarding appetite and food choices to provide additional choices of protein and/or calories. A referral to a dietician for additional education and resources may be beneficial for the patient and caregiver.

Hydration

Proper hydration of the body is necessary at every stage of life. Water keeps the skin healthy, flushes toxins from the body, regulates the bowels, lubricates and cushions the joints, regulates body temperature, reduces the risk of urinary tract infection (UTI) and improves mental function. As the body ages there is a decrease in its water content due to the loss of lean muscle tissue. Inadequate hydration in older adults can lead to UTIs, pneumonia, pressure ulcers, confusion, and disorientation (Simon Foundation, 2017). Caregivers need to be educated on these facts to understand the need to assist the patient in remaining hydrated.

Provide various tips for the caregiver to increase the patient's water consumption such as keeping ice water at the bedside, lemon slices or flavors in the water, and increasing the size of the cups when taking medication to encourage more water input. Teach the patient and caregivers simple signs of dehydration (eg, yellow urine with a strong odor, dry mouth or skin). Have the patient aim for approximately six 8-ounce glasses of water per day as a basic guide. This is adjusted gradually based on the current intake of fluids (start with a small increase to promote success) and note if the patient may be on any fluid restrictions.

Cognition

Not only do we work with patients and caregivers who may be illiterate but there are also situations where we are working with cognitive impairments. Language choice then becomes especially important and we must adjust education techniques to fit the needs of the aging patients and/or their caregivers. Forgetfulness and confusion may play a part in the way patients are able to execute instructions appropriately. Your knowledge of wound prevention and treatment helps to ease a stressful situation for the patient and caregiver and to build a trusting relationship with the healthcare team.

Hygiene

Unfortunately, many people lack the basic necessities to care for their hygiene properly; when you are seeing an outpatient, be aware that they may live without running water. Even though most patients have modern amenities, washing, bathing, and showering gradually become more difficult with age. When patients lack basic hygiene, it can exacerbate the situation should any skin care problems occur. Personal hygiene and skin preservation are integral parts of the nursing practice.

Obesity is also a factor in hygiene difficulties. Both age and obesity make it difficult for patients to reach certain areas, especially feet and perineal areas. Encourage daily bathing or hygiene care as an important step for skin care, prevention, and treatment. Soap choices are related to skin health. The natural pH of healthy skin is 4.5 to 5.5, where water is neutral at a pH of 7. An acidic pH level of the skin is important for two reasons. The acidity helps the skin retain moisture and keeps the skin supple and moist; also, the acidic layer helps protect the skin against bacteria and other germs. Recommend washing with a pH balanced cleanser that is gentle to the skin without drying it or changing the proper acidic balance.

When patients wash daily, it not only allows them to feel relaxed and refreshed but also promotes circulation. Daily mouth care is equally as important because "if you look better, you feel better." In the home health setting, you may sometimes see inadequate hygiene as a major issue. The inability to sufficiently cleanse and moisturize skin can cause breakdown and injury. Assess the patient's ability to inspect all areas of the skin and the caregiver's motivation to help the patient with washing these areas.

With each visit, remind the caregiver and patient that bathing is necessary to keep our skin cells healthy, hydrated, and strong, and to keep the proper pH balance, fight infection, and regulate body temperature. Teach a basic skin care regime that includes cleansing with pH balanced products followed by topical moisturizing products to maintain and improve the skin's barrier function and integrity.

In the obese population, hygiene to areas with skin folds (eg, pannus, breasts, groin) should be cleansed daily to reduce excoriation or breakdown from moisture and friction. Obese patients must be treated with extra care because they are at increased risk for skin breakdown and delayed wound healing. Obese patients have restricted activity and impaired blood flow, with difficulty turning and repositioning, and are unable to effectively relieve pressure on body tissue, which increases the risk for pressure injuries. It is estimated that 30% of adult Americans are obese with BMI >30 kg/m (Smith & Schub, 2017).

Microorganisms grow in the moist skin folds, and skin-on-skin friction leads to breakdown. Pressure injuries develop from poorly vascularized adipose tissue and increased skin surface area (Smith & Schub, 2017). Utilize wider beds to promote ease of repositioning and low-air-loss surface to reduce pressure. Equipment such as a Hoyer lift or trapeze bars can assist patient and caregiver with repositioning and transfers. Skin folds must be inspected frequently, cleansed, dried carefully and protected with absorbent padding to control moisture and comfort.

In homes with pets, great care must be taken to keep wounds clean of animal hair and dander. Caregivers often overlook pets in the home as a source of infection. Education needs to be reiterated on the necessity of keeping the wounds clean and covered when there are pets in the home; hair and dander are possible causes of infection that can lead to hospitalization.

Did You Know. . .

> No matter how much people love their pets, they are a great risk for wound infection.

If pet hair and dander become a problem in the home, look for ways to promote a cleaner environment:

- Utilize plastic containers for storing wound care supplies.
- Do not allow animals in the room when performing a wound dressing change.
- Encourage caregivers to keep pets off furniture or tables until the wounds are healed.

People can be more concerned with the well-being of their pets than their own health. One way to discuss the importance of a clean wound is to remind the patient that, if they do require hospitalization due to an infection, their pet will be without them during the length of the hospital stay. People do not want to leave their pets alone and this discussion can encourage patient compliance. Finally, the importance of handwashing can never be stressed enough in any home and at every visit.

Incontinence

Evidence has shown a correlation between falls and incontinence. Teach your patient's caregivers ways of assisting the patient in voiding. Fifty-three percent of homebound elders are incontinent; this is the single biggest reason why older adults are moved from home into nursing home (NAC, 2014).

Inquire whether the patient has any bladder or bowel difficulties. Remember this can be a sensitive topic and very embarrassing for the patient. You may notice that pants are soiled or a diaper is used and can lead into a respectful and nonjudgmental discussion with the patient. Help them to understand that they are not alone. Offering tips to deal with this difficult situation may actually come as a relief for both the patient and caregiver. During an early visit, gently ask questions about incontinence. Instead of asking "Do you wet your pants, have accidents?" you could ask "How many pairs of underpants do you use a day?" "Do you sometimes have a little leaking with activity?"

Sometimes a patient is embarrassed to answer honestly, even though you can see stains on clothing or wet marks on chairs. Remember that it is important to maintain the patient's dignity. Never persist if it will make the patient feel embarrassed or ashamed. When you have established a trusting and protective environment the patient and caregiver may feel safe to begin sharing difficult information.

Incontinence is a physical, financial, and psychological stress for patients and caregivers. Being able to assist with it can be an enormous relief and make a positive impact by offering support. Educate all parties on the differences between stress, urge, and functional incontinence. *Functional incontinence* has to do with the environment and is the biggest factor related to home falls. Assess for any obstacles that could keep the patient from safely getting to the bathroom and the toilet.

Thorough assessment of the home will provide valuable information on patient safety. Proper lighting of hallways and rooms is an easy fix. Rugs and carpeting inhibit walkers and canes or a shuffling gait and may need to be adjusted. Suggest grab bars on the walls in the bathroom, or a raised toilet seat, to assist with easier transition on and off the toilet.

Clothing sometimes affects continence issues. Assess patients for clothes that are easy to remove should they have urge or functional incontinence. Do they have the dexterity to handle buttons or belts easily? Perhaps elastic-waist pants or Velcro shoes would be more beneficial. Proper clothing selection is a great first step to assist with ease of toileting and reduce accidents.

A bladder diary over a 3-day period is valuable for you to see how much, when, and how often the patient is going to the bathroom. Medication review can offer information on incontinence as well. For example, having cleared it with the physician, instruct the patient to avoid taking diuretics in the evening to prevent getting up in the middle of the night and risking falls in the dark.

Diet and nutritional choices effect bladder (and bowel) health. Once information has been gathered in a bladder diary, you can review nutritional choices that may increase bladder health. Food and beverages that are known bladder irritants include caffeine, chocolate, carbonated beverages, alcohol, spicy food, citrus fruits; in addition, irritation can be caused by dehydration from lack of water intake. Offer substitutes and encourage a gradual reduction in the consumption of known irritants.

These lifestyle changes may not be easy for some people. Support new decisions and act as a cheerleader to encourage progress. For patients with constipation trouble, encourage fluid, fiber, and activity to assist in peristalsis. Question caregivers about the number of times per day they change patients or their bed sheets and tell them you would like to make their life easier.

Educate the caregiver on timed voiding by taking the patient to the toilet on a timed schedule, starting with every 2 hours; the hope is the patient may respond by thinking that since they are in the bathroom they might as well void. The caregiver is then motivated to take the patient to the bathroom regularly since it decreases the amount of incontinent episodes and reduces the need to continually change the linens or clothes.

Incontinence-associated dermatitis (IAD) is a result of continued incontinence, which damages the skin top-down through inflammation caused by exposure to stool and/or urine. This can be difficult to differentiate from a Stage 2 pressure injury and calls for assessment of the patient history plus bladder and bowel habits. It is important for caregivers to understand that the risk of developing a pressure ulcer is increased in patients with IAD (Beeckman et al., 2015).

These incontinent questions are important not only for documentation purposes of the home health agency OASIS (Outcome and Assessment Information Set) but also to provide a risk assessment for skin breakdown and falls in these patients. IAD has been associated with certain clinical outcomes including pain, depression, discomfort, sleep disturbances, loss of independence, and poor quality of life. Accurate assessment will determine the plan of care for patients with IAD (Beeckman et al., 2015).

The best treatment is to change the undergarments as soon as they are soiled to prevent moisture from remaining on the skin; next, to apply a moisture barrier product containing zinc oxide. The barrier should be applied at least BID and with incontinence episodes. Once there is proper treatment to the patient's IAD skin, you should notice visible improvement and reduction in pain within 1 to 2 days. During each visit, solicit patient and caregiver feedback on the new lifestyle changes to determine if the adjustments are helping and if the caregiver and patient are in fact trying to include these adjustments in daily life (Beeckman et al., 2015).

Many caregivers think incontinence is a normal part of the aging process but this is not true. Just because patients are getting older does not mean they should be incontinent. A skilled clinician will investigate the cause of the incontinence. It could be simply that the patient is afraid to fall when getting up alone and would rather wait until help arrives. Ask the patient why they did not get up on their own. The solution could be additional strength and balance exercises to make the patient stronger and confident enough to get up independently.

Home Support System

A patient's support system—or lack thereof—can be the best or worst issue for you to work with. A positive, engaged support system can make all the difference in how patients heal, react, recover, and engage in their own health. You need to assess the support system, determine if they will do what they promise, and evaluate whether they are as involved as they claim to be and will actually help once the patient is home.

Anxiety, stress, financial strain, and burnout are all issues that vary with support system and caregivers. Common feelings are:

- How am I going to be able to do this at home?
- How am I going to afford this?
- Who is going to help me if I need to ask questions?

As healthcare providers, we must give patients as many resources as possible so they can thrive once discharged from the hospital. Conduct a review of existing resources including home health support, wound center referral, WOC (wound, ostomy, continence) nurse, physical therapy, occupational therapy, and others that may apply. Providing an array of resources to caregivers opens up opportunities to succeed.

Not everyone learns by the same teaching methods. It is important to deliver messages in several ways to family, friends, and patients. It will take several educational sessions to provide enough information for the caregivers to feel satisfied and confident that they can care for their loved one at home. Most people will only retain a small portion of the information they receive in the hospital due to stress and overwhelming emotions, along with the unexpected change in their lifestyle that have just been presented to them.

Home care, outpatient services, and long-term care providers build off of what the acute care facility has begun, so determining how these caregivers learn best and respond to unforeseen situations leads to quality patient outcomes. Break down instructions into sixth-grade language and keep it simple to avoid overwhelming your hearers.

Other factors include determining support system capacity to follow written instructions and physician orders, noting forgetfulness, ensuring adequate vision to help with wound dressings and dexterity to perform duties required. Finally, be sure the support system is motivated to help the patient and remain with them throughout the healing journey. If a caregiver is not motivated, the patient will have a high likelihood of failure, readmission, infection, or deterioration. Your backing is just as important for the support system as it is for the patient.

Pressure Injuries

Professional caregivers must be educated in skin risk assessment and prevention no matter which healthcare setting they work in. We need to be able to teach patient caregivers about the necessity of pressure injury prevention and that their taking a proactive approach to skin care assessment can save many hardships in the future. When looking at risk factors—whether in the home, long-term care, or acute care—we have an important responsibility to educate and instruct patient caregivers on behaviors that prevent skin breakdown.

Pressure injuries are an enormous healthcare concern. Pressure injuries involve breakdown of the tissue from compression to the area, usually over a bony prominence and its outer surface. The effect of constant pressure results in **ischemia** (cell death, tissue necrosis). In long-term care facilities, 2.2% to 23.9% of patients develop pressure injuries (Schub et al., 2016).

With pressure injuries, the best prevention consists of diligent repositioning and off-loading. It is the constant pressure causing inadequate tissue perfusion to these areas that cause damage and breakdown, leading to a pressure injury. The patient's comorbidities may come into account in pressure injury development if the patient is at an increased risk; thus, not all pressure injuries are avoidable, but quality patient care provides the best patient outcomes.

Assessment and Risk Factors

Pressure injuries are seen on pressure points on the body, mainly bony prominences. Providing the educational tools properly to assess patients at risk for skin breakdown is an asset to any healthcare team. The biggest risk factor for a patient's developing a pressure injury is the inability to move and/or reposition. Bedbound and wheelchair bound patients have the greatest risk since they often do not have the ability or strength to reposition their weight off of the areas of pressure.

The Braden Score, developed in 1987 by Bergstrom and Braden, is an important and commonly used risk assessment tool for accurate assessment of skin breakdown. While the Braden Score is used more often in the acute care environment, it can be utilized in any clinical situation. Following the Braden Score, areas of risk include existing pressure injuries, fragile skin, pain to areas exposed to pressure, and extremities with impaired blood flow from vascular disease, smoking, or diabetes (Bergstrom et al., 1987).

When assessing a new patient, and with each ensuing visit, you need to review mobility status, cognition, activity level, moisture risk related to either incontinence or surface, nutritional intake, advanced age, comorbidities, and medications. Young patients can be at great risk for skin breakdown both in the home and the long-term setting based on a multiple of these factors. Constant evaluation of the environment and caregiver capabilities are beneficial in maintaining patient skin integrity. Instruct caregivers to inspect daily all areas that come into contact with a device (splint, oxygen tube, bedpan) for signs of breakdown.

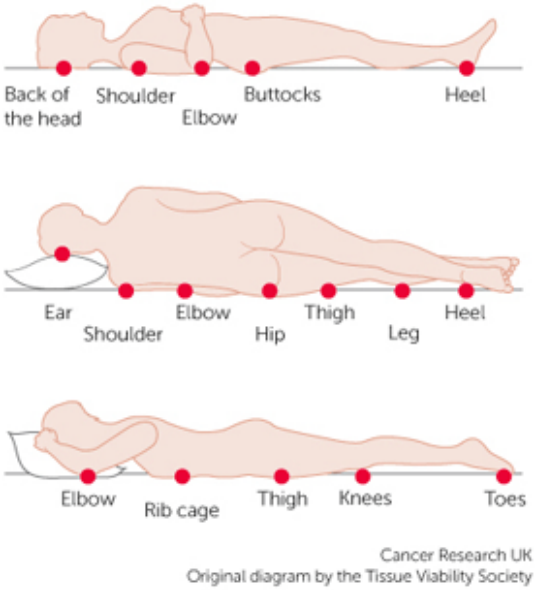
Signs of breakdown can be new area of pink or redness, tenderness, temperature change, or a boggy feel. Your ability to engage and motivate prevention techniques by the caregiver impacts the patient's overall health and future risk of breakdown. Empowerment of the caregiver is a key prevention strategy. With every visit, continue to motivate, educate, and reevaluate the patient and caregivers' understanding of the risk factors and offer prevention techniques.

Prevention

Pressure injury prevention starts with the knowledge to identify areas at risk for pressure injuries and skin breakdown. See diagram below.

Pressure Injury Points

Identifying areas of pressure can easily be taught to all patient caregivers. The areas at greatest risk for pressure injury development are the sacrum and heels. Areas often overlooked include ankles, ears (from oxygen tubing), elbows, and between the knees on patients who keep their legs closely together in bed. The only skin issues that are staged are pressure injuries. Skin breakdown on non-pressure sites is not staged and is described as either partial or full thickness injuries. Prevention techniques that you can easily teach caregivers include reduction in shear, friction, and moisture and an increase in activity and mobility.



Source: Tissue Viability Society, 2017.

Repositioning and off-loading are vital in pressure injury prevention. Concentrate on off-loading to the sacrum and heels with pillows, wedges, or heel lift boots. If additional areas become affected from increased pressure be sure to instruct the caregiver on positioning the patient off of these areas as well. As a general rule for the caregiver, instruct to reposition the patient every two hours while in bed; this can be extended during caregiver nighttime sleep hours. Repositioning does not need to be an extreme change every time. Small adjustments, or boosting in bed, also assist in changing pressure locations. If it will assist the caregiver, make a turning schedule to help them remember when and how to position the patient throughout the day. This may seem like a small detail but it can reduce caregiver stress and encourage compliance.

When a patient is sitting in the chair, encourage reposition every hour. If the patients are able to reposition themselves while in the chair, encourage a shift in weight every 15 minutes. These weight shifts will offload the pressure and support proper circulation to pressure points, thus reducing skin breakdown.

Shear, Friction, and Moisture

Shear, friction and pressure all contribute to skin breakdown. **Shear** occurs when the skin remains in place and the underlying bony structures move against it and in the opposite direction, causing pressure to the bony prominences. It is an interaction of both gravity and friction against the skin. Areas of shear demonstrate a deep, undermining wound (Livingston, 2009).

Friction occurs when the skin slides against the linens or any other object/equipment causing skin breakdown. Look for areas of rough, red skin with superficial damage. Also, observe how the skin of the patient moves across a surface when repositioning or during transfers. Friction is due to mechanical force on the skin and can be present with shear. Prevention and treatment for areas of friction or shear include lowering the head of the bed to less than 30 degrees to prevent the patient from sliding against the sheets or added unnecessary pressure to pressure points.

Moisturize all bony prominences daily to assist with ease of moving across linens. Instruct caregivers on proper lifting, boosting and transferring patient to avoid dragging the body when repositioning. If the patient is able to utilize an overhead trapeze, request one from the physician to encourage patient involvement in repositioning and to assist the caregiver.

Moisture issues develop either from microclimate problems (too hot or cold in bed) or from incontinent episodes. Urine and/or fecal incontinence causes skin breakdown easily if the elements remain against the skin for a period of time. Moisture issues are not only uncomfortable and disturbing to the patient, but also lead to increased linen changes, laundry costs, purchasing of additional products, and caregiver time and stress (Beeckman et al., 2015). Se the Linen Management section for more information on moisture.

Activity and Mobility

One of the most important topics about which you can educate caregivers is patient mobility—encouraging caregivers to continually reposition and off-load all bony prominences. These are the biggest steps in prevention. If patients cannot move themselves, there will be constant pressure on the main prominences. If the caregiver is not moving the patient often enough, educate on the risk of skin breakdown, what it can lead to, and the benefits of repositioning.

Utilize physical therapy and occupational therapy to assist the patient and caregiver in range-of-motion (ROM) exercise and proper lifting and repositioning techniques to keep the caregivers safe. Physical therapy can work on safe transports, transition to bed and chair, out of bed, and standing to get to the bathroom. Mobility and activity combat constipation. Repositioning can lead to release of gas and stool, which will assist in patient comfort. Assess the home for ease of access to the bathroom and recommend accessories to help decrease fall risks.

Stretching and movement of the joints when repositioning is helpful to increase circulation and prevent stiffness. Encourage strengthening to reduce the risk of falls, decompensation, contraction, and stiffness. Balance, incontinence, falls, decreased strength, pressure injuries, and IAD may be inter-related and will all benefit greatly from the assistance and guidance of physical therapy and occupational therapy. Utilize these beneficial resources in caregiver and patient education.

Positioning Devices

There are many ways we can encourage patients and caregivers to assist in prevention. If you cannot get patients moving more—or at all—they need assistance. Selection of an appropriate pressure reduction surface is beneficial to both bedbound (mattress surface) and wheelchair (seat cushion) patients.

Medicare regulations have made it harder to supply patients with durable medical equipment than in the past. Prevention is not typically supported, and this is particularly true in bed support surfaces and cushions. Support surface selection must include certain elements of the patient's overall status, such as mobility, conditions related to skin, lung function, weight, and level of independence (Beddoe & Mennella, 2016). Availability of durable medical equipment companies varies state by state; reimbursement has decreased, and many companies have closed as a result.

Discuss with a social worker or case manager the patient's eligibility for certain pressure reduction surfaces. There will be times that support surface eligibility is out of your hands, but knowing when and how to order is beneficial. The benefits of certain support surfaces has a tremendous impact on how we can care for our patients, but eligibility factors that come into play can be a great struggle for all parties involved.

Pressure reduction surfaces are designed to redistribute body weight over the contact areas of the body. There are numerous mattresses, bed systems, and mattress overlays that are acknowledged to promote pressure redistribution. There are also support surfaces that are designed to provide the appropriate microclimate of patient skin temperature and moisture (eg, the Low-Air Loss Mattress).

Note: Become aware of the type and age of a positioning device in the patient home because there may be a better product available.

Types of Support Surfaces

Availability of support surfaces in the home vary greatly from what the patient may have utilized in the hospital. A hospital bed or mattress for the home requires a physician prescription. Guidelines categorize support surfaces as Groups 1 through 3. Group 3 provides the greatest level of support and redistribution. The following box explains the Medicare policy regarding pressure reducing support surfaces.

Categories of Support Surfaces

Group 1
Support surfaces are generally designed to either replace a standard hospital or home mattress or as an overlay placed on top of a standard hospital or home mattress. Products in this category include mattresses, pressure pads, and mattress overlays (foam, air, water, or gel).

Group 2
Support surfaces are generally designed to either replace a standard hospital or home mattress or as an overlay placed on top of a standard hospital or home mattress. Products in this category include powered air flotation beds, powered pressure reducing air mattresses, and non-powered advanced pressure reducing mattresses.

Group 3
Support surfaces are complete bed systems, known as air-fluidized beds, that use the circulation of filtered air through silicone beads. (These can be difficult to receive since the bed and frame are extremely heavy and require adequate structural support in the home).
Source: CMS, 2010. [https://www.cms.gov/Medicare/MedicareContracting/ContractorLearningResources/downloads/JA1014.pdf]

For patients who would benefit from a support surface, you must review guidelines for the level of skin breakdown. Just because a patient has skin breakdown does not mean they will qualify for a support surface. There must be a significant amount of skin breakdown for the patient to receive a support surface. The following box is a Medicare guideline for determining which support surface a patient is eligible for based on the degree of skin breakdown.

Medicare Coverage of Specific Groups of Support Surfaces

Group 1

Covered if the patient is completely immobile. Otherwise, patient must be partly immobile, or have any stage pressure ulcer and demonstrate one of the following conditions: impaired nutritional status, incontinence, altered sensory perception, or compromised circulatory status.

Group 2

Covered if the patient has a stage II pressure sore located on the trunk or pelvis, has been on a comprehensive pressure sore treatment program (which has included the use of an appropriate group 1 support surface for at least 1 month), and has sores that have worsened or remained the same over the past month. Also covered if the patient has large or multiple stage III or IV pressure sores on the trunk or pelvis, or if patient has had a recent myocutaneous flap or skin graft for a pressure sore on the trunk or pelvis and has been on a group 2 or 3 support surface.

Group 3

Covered if the patient has a stage III or stage IV pressure ulcer, is bedridden or chair-bound, would be institutionalized without the use of the group 3 support surface, the patient is under the close supervision of the patient's treating physician, at least 1 month of conservative treatment has been administered (including the use of a group 2 support surface), a caregiver is available and willing to assist with patient care, and all other alternative equipment has been considered and ruled out.
Source: CMS, 2010. [https://www.cms.gov/Medicare/MedicareContracting/ContractorLearningResources/downloads/JA1014.pdf]

There will be times a patient may be eligible for a support surface but, based on their insurance situation or benefits available, it will be extremely difficult to receive the appropriate device. This is an upsetting situation for you to explain to the patient and/or caregiver. Unfortunately, in these situations you can only offer emotional support and encourage meticulous wound prevention and healing methods for the patient.

The most common support surface recommended by a home care agency for a wound care patient is from group 2. These surfaces include powered air flotation beds, powered pressure-reducing air mattresses, and non-powered advanced pressure-reducing mattresses. Since all support surfaces have different properties, you need to review the choices considering exclusion criteria and patient weight.

Always check whether patients "bottom out" on their current surface in chair or bed. **Bottoming out** refers to a situation wherein a patient has less than 1 inch between the surface and their body and thus is not getting adequate support from the surface. You can check for bottoming out by placing a hand under the support surface and feeling the amount of thickness of the surface to the patient. If there is not enough support, a new surface is needed.

Did You Know. . .

> It is important the caregiver and patient understand that a support surface does not eliminate the need to regularly reposition the patient.

Proper positioning for patients with prolonged sitting time is equally as important as for those who are bedbound. The sacrum and heels become very vulnerable in patients who sit for long periods of time. If a patient spends time in a wheelchair, perform a sitting assessment to determine optimal seat height, width, and depth, as well as armrest and backrest height. Utilize physical therapy expertise with this; for example, a higher backrest is better for older adults and immobilized patients (Caple & Pravikoff, 2016).

Again, reinforce to reposition weight hourly if patients cannot move themselves, and encourage a regular 15-minute weight shift if patients are able to perform on their own. Approximately half of wheelchair users develop pressure injuries (Caple & Pravikoff, 2016).

Discuss skin assessment daily with patient and caregiver for early identification of skin breakdown or irritation. Work with physical therapy for strengthening exercises that support proper posture and mobility. Poor posture will cause abnormal redistribution of body weight that will increase tissue compression (Caple & Pravikoff, 2016). Note the type of chair cushion the patient has been using. A gel cushion is a great option if the patient currently is not using one. A gel cushion can be used on the patient's favorite chair in the home and for their wheelchair.

A "donut" cushion is no longer an acceptable option and should be discarded. These cushions may off-load pressure to the middle of the sacrum and coccyx but they also increase pressure to other areas of the body, which can lead to breakdown on other parts of the skin. A gel cushion that is square in shape will best redistribute weight throughout the sacrum.

Linens

Linen usage impacts both patient care and financial issues—to the facilities or home. There is a common belief by caregivers that the more linens and padding under the patient the better. In fact, the more linens the more increase in the microclimate under the patient, and also the risk of inhibiting the effectiveness of the pressure redistribution mattress (Williamson & Sauser, 2009).

For bedbound patients, keep the head of bed no greater than 30 degrees (except when eating and drinking) to prevent sliding down in the bed and creating friction and shear. It can be helpful to place a pillow under the knees to assist in preventing sliding down in bed. Ensure there are no creases in the linens that can cause injury to the skin. Reinforce repositioning in bed every 2 hours during waking hours.

Avoid plastic incontinence pads that can increase heat and moisture to the skin. Manage sweating with cotton products and check the temperature of patients' skin to feel if they are becoming too hot and moist.

The number of linens involved makes a big difference in whether the skin breaks down or remains intact. Too many linens and heat becomes an issue with moisture and, when too cold, there is a reduction in perfusion and not enough oxygen is available to the skin/wound site.

Avoid Too Many Linens!

When a proper support surface is utilized, too many linens will negate the effectiveness of the surface. However, the caregiver should ensure to pad between bony prominence and bed railings if the patient is positioned near the side.

Staging

The staging classification system from the National Pressure Ulcer Advisory Panel (NPUAP) reviews six categories of skin breakdown and recently added two new categories in 2016. Pressure injuries are the only wounds that are staged. It is also important to note that **pressure injury staging is never reversed** as the wounds go through the healing process. For example, a Stage 3 is not documented as a Stage 2 once it becomes shallower and smaller. It simply is documented as a "Healing Stage 3."

Stage 1: Non-blanchable Redness

Stage 1 pressure injury develops as an area of non-blanchable redness to a pressure point. Our patient population has a variety of skin tones so you need to be aware of skin color changes on high-risk patients. When inspecting dark skin, moistening the skin assists in identifying changes in color. There are no open areas with a Stage 1 but the change in coloration is the beginning of skin breakdown and indicates the patient is at risk for further breakdown.

It is important to assess any new skin changes during each visit and to ask the family caregiver if they have noticed any changes since your last visit. New skin changes, especially non-blanchable redness, can be the first sign of increased pressure. Education to family caregivers on pressure points and proper off-loading will prevent deterioration to these patients. Instructions on positioning, off-loading, shoe choices, wheelchair, and bed cushions are all part of pressure injury prevention methods.

Stage 1 Pressure Wound

Source: Courtesy of S. Dean, Woundscope.

As we look to prevent breakdown, the beginnings signs of a Stage 1 pressure injury on a bony prominence can be prevented with turning, repositioning, off-loading, and investigation of any areas that show possible breakdown. These areas can present as soft, firm, painful, and warm or cool compared to the periwound.

The best treatment begins with encouraging prevention techniques. Reposition the patient off the pressure area at least every 2 hours. This can easily be done using pillows under the back or buttocks and floating the heels (keeping heel pressure off the bed or padding the foot rest of a wheelchair). Off-loading these pressure areas is an effective technique; moisturizing bony prominences to reduce shear and friction and prevent dry cracked skin is also an important step. When pressure is removed from the area, the redness will begin to reduce in appearance and size, and to heal.

Stage 2: Partial Thickness Wound

Stage 2 is a partial thickness wound over a pressure point that is superficial with no damage noted to the dermis. There is no slough or necrotic tissue and the wound bed is either red, pink, or pale. An area of pressure with a clear serum blister, either intact or ruptured, is also classified as a Stage 2. If the blister is intact, protect the area from further pressure or trauma to allow the area to begin healing. If the blister has ruptured, treat with the appropriate dressing to encourage a moist healing wound environment and continue providing off-loading and repositioning.

A patient can develop blisters on pressure points from footwear. Question the patient and caregiver about current footwear and inspect the shoes to see if there are areas that show worn marks or drainage that align with the injury to the feet. Sometimes the patient or caregiver is unaware it is the footwear causing the problem.

Stage 3: Full Thickness Wound, Shallow

Stage 3 is a full thickness wound in which slough or necrotic tissue may be present but do not obstruct the depth of visualizing the wound bed. There can be undermining or tunneling. While subcutaneous tissue may be visible, there is no muscle, bone, or tendon visible. The depth of a Stage 3 wound varies based on the anatomic location. For example, wounds of the nasal bridge, ear, occiput, or malleolus will be shallow due to a lack of subcutaneous tissue. On the other hand, areas with a great amount of adipose tissue (eg, sacrum, heels) can have great depth. Treat with off-loading and repositioning plus topical wound treatment, which will promote a moist wound-healing environment as well as adequate exudate management.

Stage 3 Full Thickness Wound

Note: the marking on the skin indicates presence of undermining. Source: Copyright Medetec.co.uk.

Stage 4: Full Thickness Wound, Deep

Stage 4 is also a full thickness wound; however, now muscle, bone, or tendon is visible. Assess for undermining and tunneling that may occur. Patients with Stage 4 pressure injuries require increased nutritional support; they also qualify for pressure reduction devices. Work with the caregivers in the home to review the patient's plan of care and goals of wound healing.

An **Unstageable pressure injury** is one in which an area of yellow slough, or black soft or hard eschar, does not allow the base of the wound to be visualized; the depth of the wound cannot be determined, so it cannot be staged. If the plan of care is aggressive, it requires sharp debridement by a physician in the wound center or; or, if less aggressive, use of an enzymatic debriding agent—or allowing the body to do autolytic debriding. When the base of the wound is exposed, the area can then be appropriately staged.

A **deep tissue injury (DTI)** appears as an area of purple discoloration on a pressure point; an intact blood-filled blister on an area of pressure is described as a deep tissue injury. Appropriate off-loading and repositioning as necessary will hopefully allow the injured area of tissue to evolve into healthy tissue and begin to heal. A DTI may become less purple and begin to disperse in color. Educate the patient and caregiver to monitor the area to deter additional breakdown to occur and report any signs of further deterioration.

A DTI can appear up to 72 hours after the initial injury. Accurate assessment and history are key components of determining the start of the wound development. Question whether patients have fallen in the last several days and if they had remained on the ground or in the same position for several hours before someone was able to help them. If the patient has and remained on the ground for an extended period of time, deep tissue injuries may develop in different areas; for example, if a patient had fallen and was lying on the left side for many hours, you or the caregiver may notice that areas on the lateral knee, ankle, elbow, and hip all have purple areas indicating deep tissue injury.

After determining the patient sustained a fall and was on the ground, the wound etiology will be clearer and treatment options and education will be more accurate. It is important to determine the difference between a bruise and a deep tissue injury. Bruising to our skin goes through multiple color changes as it heals from yellows to purples, while a deep tissue injury will remain purple throughout the healing process and will only get a lighter color.

If the patient has recently been discharged from the hospital after surgery and has suddenly developed a deep tissue injury, discuss with the caregiver, physician, or acute care facility the length of operating room time and the positioning on the operating table. A surgery longer than 4 hours puts patients at increased risk of developing pressure injuries. With a DTI, it is necessary to reduce any continuous pressure to these areas. Moisturize all bony prominences daily to reduce shear and friction, reposition and pad or protect the area as needed. If the area remains under pressure the wound will evolve into greater tissue damage and could open, revealing more structures.

What is the stage of the following wound? (Blood-filled blister)

Answer: Deep tissue injury (DTI).

Staging a Deep Tissue Injury (DTI)

Stage 1 vs. DTI = red vs. purple

Clear blister vs. blood-filled blister = Stage 2 vs. DTI

A **mucosal membrane pressure injury** may not be seen much in the home care or long-term settings but you should be instructed on identification. These injuries result from tubing or a device resting on the mucosal membranes in the mouth. Since the anatomy of the mouth is different than the tissues of the skin, these injuries are not staged. Simply state the injury as a *mucosal membrane pressure injury* and document which part of the mouth has been damaged. Prevention and treatment include relocation of the tubing daily to help reduce pressure to the area of the mouth where it has been resting.

Medical device–related pressure injuries occur when any medical device has been applying pressure to the skin for a prolonged period of time and has injured the tissue. This can be from a Foley catheter, oxygen tubing, telemetry box, splint, brace, or any other object that applies continuous pressure to the skin. Many times these injuries do not occur on a pressure point on the body, rather developing from pressure from the device. This is a new category and is staged according to the depth of tissue damage. Accurate observations from the caregiver and attention to any device on the skin will easily prevent these injuries. Treatment includes removing the device from the area and selecting a wound healing product based on the level of tissue damage to promote healing.

Treatment

Patient history and wound etiology guide treatment choices. If the wounds have developed from prolonged sitting in a wheelchair, it is important to educate the caregiver and patient to reduce time in the wheelchair until the wound is healed. Patients may not want to remain longer in bed while the wound is healing, which makes wound healing education your top priority. If patients do not understand how the wounds will heal and the importance of off-loading pressure, they will not understand the reason for the instructions.

With all wounds, a moist wound healing environment is necessary, along with the off-loading of pressure to the injured tissue. Patients need to know that a wound heals from the bottom up and recognize factors that delay the healing. When a wound has depth, the area must be gently packed to encourage growth from the bottom skin layers and prevent premature closure of the roof of the wound.

Present the reason for keeping the wound open and healing from the bottom to prevent making an incubator for more infection. When the top layer of skin closes before the wound bed has adequate time to heal, the open space left beneath the top skin layer will act as an incubator for a possibility of a new infection. Wound packing is a difficult task for many caregivers and product selection must be based on the ability of the caregiver and the number of times per week the wound will need to be changed.

Treatment options are discussed with the patient’s primary care physician; however, physicians not skilled in wound care often rely on the knowledge of the nursing team for an appropriate recommendation. When determining best treatment methods in home care, long-term care and assisted living, the first thing to review is the assistance the patient will have with dressing changes. If the physician wants a daily dressing change but you are aware this would be impossible, based on the support system and patient capabilities, discuss this with the physician so a different product can be utilized.

Treatment selection should focus on providing a moist wound healing environment, adequate exudate management, and comfort to ensure compliance and ease of patient use both physically and financially. There will be instances when a physician prescribes wound dressings that cannot be managed by the patient either from physical difficulties or financial difficulties. Here again, you need to bring this to the physician's attention and offer alternatives.

Numerous products are available for the long-term and home care environment that will promote wound healing without the need for daily changes. Many of the current products have the capability to remain in place for up to 7 days, provided the drainage is controlled. Your greatest contribution as a clinician is to understand how the products are designed to be used.

Product formulary will vary based on the facility and agency of the clinician, but a basic understanding of product usage is advantageous for the clinician and their patient. For example, many foam dressings can remain in place for 3 to 5 days and some up to 7 days, depending on the amount of drainage. An *alginate dressing* is designed to stay in place for 48 hours, and changing the dressing more often is a waste of product, time, and money. Having basic product knowledge can save both patient and agency time and money as well as added stress.

Many laypeople feel the need to visualize the wound daily or to "keep it open to air" to let it heal. These are old methods that will not promote rapid wound healing. It has been proven through research that our skin cells heal more quickly in a moist environment. Explain to the patient and family that, from years of research, we have learned that our skin cells will "swim together faster than they can run," which is why we now keep the wound covered and encourage moisture in the wound bed.

Case: Amy

Amy, an 84-year-old female, who ambulates with walker on occasion, usually sits at home in her chair most of the day watching television. She can use the commode independently but also wears incontinent diapers because she has several accidents throughout the day. Her nutrition is questionable based on body weight of 110 lbs and 5 feet 6 inches tall. She is alert and oriented x 2, pleasantly forgetful, and lives with her spouse who is also 84 years old and cares for her as best he can.

She has developed a pressure injury to her left hip. The wound size is approximately 8 cm x 4 cm. Wound bed with 50% black eschar, 40% yellow and 10% pink, slight odor, periwound pale attached, rolled edges, and Amy complains of tenderness to the area but has difficulty to fully assess due to mild forgetfulness. The wound has a small amount of serous/purulent drainage and her husband has been using a large ABD pad to "protect" the area. The patient has no allergies and, surprisingly, does not have any other comorbidities besides macular degeneration and dementia.

What is the stage of the wound at right? Should any referral be made? What are the first steps in treatment? What assessment should be made in the living environment and what products should you recommend?

Wound Showing Black Eschar

Source: T. Sbriscia.

The wound is **unstageable**, based on the degree of black eschar and that we cannot visualize an accurate wound depth. The clinician can use a cotton swab to palpate the wound bed to determine if the area of black eschar is loose or if there are any pockets or tunneling. This patient definitely needs a referral to a wound center physician as soon as possible to reduce the risk of infection and to remove all devitalized tissue.

The first steps in the home are to assess for signs of infection based upon the purulent drainage and the appearance of the wound. Question the patient and caregiver regarding fever, chills, increased drainage, when the odor was first noticed, and, of course, how long the wound has been present.

Assess the patient's favorite chair and see if it is possible to determine where the pressure is coming from. It could be the chair or it could also be that the patient always sleeps on her left side. Review the support surfaces of the bed and chair. Discuss with the patient and spouse how the wound most likely started and begin educating on how to reduce pressure to the hip and what adjustments need to be made.

Since the patient is forgetful, assess the ability of the caregiver and write down simple and detailed instructions to help guide him with the treatment process. The patient will most likely need sharp debridement to remove the dead tissue in the wound bed. Review the patient's nutritional status to support wound healing and encourage supplements if appropriate. Lab work can be prescribed by the wound center for albumin, pre-albumin, and total protein. Chances are the patient was started on an oral antibiotic and the wound was cultured at the wound center. Based on the outcome of the wound care center and the amount of debridement performed by the physician, a topical enzymatic debriding agent can be used daily if there is devitalized tissue remaining in the wound bed.

The patient has assistance from her spouse at home for daily dressing changes, so this will begin as the best treatment option. Observe the spouse performing wound care and instruct as needed. This wound may have depth post debridement. Ensure that the caregiver is willing to gently pack the wound and choice a secondary dressing that provides adequate moisture control based on the amount of wound drainage.

Amy will continue with weekly visits to the wound center to monitor the wound progression and the clinician can also recommend physical therapy to assist in strength training that will help her to reposition herself in her chair and in bed.

Investigate the cause of her occasional incontinent episodes. Since the patient is on very little medication, the cause could be functional and the patient is forgetting to use the bathroom throughout the day. Discuss a timed voiding program with the spouse, encouraging him to remind Amy to use the bathroom every 2 to 3 hours to help reduce accidents.

Monitor Amy's food intake and hydration and offer suggestions as needed in protein and water consumption. Provide and reinforce wound prevention techniques for the caregiver and encourage him to report any skin changes to you as soon as possible to help reduce re-injury or the formation of a new injury.

Additional Treatment Options

There are products to encourage a moist wound healing environment and there are products that support wound debridement, and some will do both. Products that encourage debridement, when necessary, are an added benefit for the patient. The body has an amazing ability to heal itself provided it receives help from its host.

When assessing a wound for appropriate product selection, determine if there will be debridement, and what type will be most beneficial. In **autolytic debridement**, the body uses its own enzymes to liquefy necrotic tissue. A dressing can be used to cover the wound and allow the cells in the body to liquefy the necrotic tissue and essentially dispose of the dead tissue, allowing the new tissue to begin to form. Dressings that assist in autolytic debridement typically remain in place for 3 to 7 days depending on the product and manufacturer guidelines. For healthy people, this occurs naturally in all wounds.

In patients with various comorbidities and conditions that affect the immune status, this will not occur as easily. **Enzymatic debridement** (utilized in the Amy's case study) is a chemical debridement where enzymes are introduced to the wound bed allowing the dead necrotic tissue to be broken down and the wound bed cleansed. This agent is applied topically and daily and works faster to eliminate necrotic tissue than autolytic debridement.

Sharp debridement is done by a physician or qualified nurse practitioner. The practitioner can use a blade, scissor, or curette to remove necrotic tissue selectively. This method is fast and efficient and usually requires pain medication or topical analgesia. An unstageable wound with large amounts of yellow or black necrotic tissue will benefit greatly from sharp debridement because it could take topical products too much time to penetrate and debride a large amount of tissue.

The longer a wound remains open, the greater the risk of infection. A wound with necrotic tissue poses a likely source of infection to the patient. Educate caregivers on identifying necrotic tissue and to alert you of any changes between visits. Sharp debridement can be done at the bedside in the acute care setting, but most often will be done at a wound center on a weekly basis to remove necrotic tissue and encourage new tissue growth.

Finally, **mechanical debridement** is done manually by either removing a dry dressing that has become attached to the wound bed or with forceful irrigation to the wound bed. This is a non-selective technique that can remove both healthy and unhealthy tissue and can be painful for the patient. This type of debridement is best for wounds that have only a moderate amount of necrotic debris.

* * *

Treatment options and choices vary with each individual patient. Provide a thorough assessment, ask many questions of the patient and caregiver and collaborate with other healthcare providers to ensure the best plan of care for each patient. Treatment options can change during the healing process and reassessment must be ongoing. Educate the patient and caregiver during the treatment and healing process and provide a supportive environment.

Venous Insufficiency Ulcers

In patients with venous leg ulcers, education in prevention is just as important as education during treatment. Once a patient develops a wound related to venous insufficiency, it will take compliance and effort from the patient and caregiver to reduce the risk of reoccurrence. The patient needs to be aware that they do have control over this situation and, with some work and guidance from you, future wounds and complications can be avoided.

Assessment and Characteristics

Thoroughly examine and assess the patient while going through patient history with the caregiver, who is present if possible. These wounds can be chronic for decades and can lead to social isolation and depression if the patient does not feel they can adequately manage the draining wounds. Review with your patient and caregiver a comprehensive history, starting with family history of venous disease, varicose veins, lifestyle behaviors (sedentary), obesity, advanced age, trauma, surgery or fractures, multiple pregnancies, deep vein thrombosis, or pulmonary edema. In a healthy individual, normal blood flows from the superficial venous system to the deep venous system, assisted by unidirectional values and calf muscle contraction. Calf muscle pump dysfunction and/or incompetent valves in the venous systems leads to a reduction in sufficient venous blood flow.

Venous leg ulcers typically develop above the medial aspect of the leg, superior to the medial malleolus and are usually surrounded with brownish staining or discoloration called *hemosiderin staining*. The discoloration comes from a decrease in the ability of the veins to effectively circulate blood back up through the legs due to incompetent valves or calf muscle pump dysfunction. As the body gets older and there is a decrease in the veins' ability to circulate properly, the valves do not have the capability to pump blood back up to the heart effectively. This causes iron deposits to be left behind in the lower legs (due to gravity) which evidences as discoloration of the skin. Once the skin becomes discolored, it cannot be reversed. Many patients and their caregivers ask about the discoloration and it is important to educate on the circulation insufficiency and, most of all, the appropriate preventive and treatment measures.

Examine the entire leg from knee down to medial malleolus. The wound edges in **venous leg ulcers (VLU)** will be irregular and the wound bed can be found with ruddy red, yellow adherent slough or granulation tissue. Undermining and tunneling are uncommon. Normal palpitation to both dorsalis pedis and posterior tibial pulses is common but can vary based on the level of edema present.

Moderate to large amounts of exudate are common and can cause maceration to the peri-wound or leave crusty and scaling skin. Peri-wound appearance depends on the patient's ability to cleanse the area and perform effective hygiene. Edema is commonly noted with venous insufficiency and the patient may develop blisters to the lower extremities from swelling. Once the blisters open, a wound will be present. Venous ulcers with large amounts of exudate can be difficult for the patient to control. Lack of proper management of these wounds, which can cause odor or wet clothing, can lead to self-isolation—not leaving the house for fear of being embarrassed.

Edema and Elevation

Education on elevation, decreased salt intake, proper compression treatment, and edema management will assist in reducing drainage from the wound. One way we explain this to our patients and caregivers is with an analogy. With an increase in swelling or edema in the legs, the fluid in the body is going to try to exit any way it can. The easiest place for this to occur is often the legs. Gravity pulls the fluid into our legs during the day as we are walking and standing. Edema typically worsens with prolonged standing and diminishes with elevation. When the fluid finds an area on the skin of the legs that is not as strong as the others, it will create and opening (wound) for the fluid to exit, like water coming out of a faucet. The longer the area (faucet) stays open, the greater the risk for infection. Without proper edema control, the wound will not heal because the fluid will continue to leak out of the open areas, making it impossible for the skin to heal.

This is an important factor of education with elevation and edema control. Decreasing the amount of edema in the legs, by turning off the faucet, will control drainage and allow proper healing to begin. The combination of compression, elevation, proper nutrition, and medical intervention (such as diuretics as per physician order) all need to be discussed with the caregivers and healthcare team to provide a complete plan of care to assist in wound healing.

It is important the fluid leave the body for the patients overall health; with the assistance of a diuretic, the patient can urinate out the excess fluid to begin wound healing. There must be complete education to the patient and caregiver on the benefits of taking the diuretic as prescribed by the physician, since this medication can cause fear of having an incontinent episode when out of the house. A diuretic can be seen as a necessary evil by most patients, but based on the patient's comorbidities and medications, the level of edema will affect the wound treatment plan and may require medical intervention to address the swelling. That said, elevation and behavioral changes for edema control are the first steps to encourage wound healing.

Testing and Diagnosis

Once the appropriate professional has reviewed the patient history and assessed the wounds, proper treatment can be determined. An **Ankle Brachial Index (ABI)** is a noninvasive vascular screening test to identify peripheral arterial disease by comparing systolic blood pressures in the ankle to the higher of the brachial systolic blood pressures. This is the best estimate of central systolic blood pressure.

The purpose of the ABI is to support the diagnosis of vascular disease by providing an objective indicator of arterial perfusion to a lower extremity. Indications for an ABI are to rule out **lower extremity arterial disease (LEAD)**, establish diagnosis of arterial disease in patients with suspected LEAD, and determine if there is adequate arterial blood flow in the lower extremities prior to compression to assess wound healing.

If the blood flow is normal in the lower extremities, the pressure at the ankle should be equal or slightly higher that the arm pressure with an ABI of 1.0 or more. An elevated ABI (>1.3) might be due to calcification of medial arteries at the ankle in patients with diabetes, renal failure, and rheumatoid arthritis.

Ankle Brachial Index	
ABI	Perfusion status
> 1.3	Elevated, incompressible vessels
> 1.0	Normal
< 0.9	LEAD
< 0.6 to 0.8	Borderline
< 0.5	Severe ischemia
< 0.4	Critical ischemia, limb threatened

Source: Quick Reference Guide for Lower Extremity Wounds: Venous, Arterial, and Neuropathic (www.wocn.org).

Treatment

Based on patient results of the ABI, you can decide the best treatment option to reduce edema, control drainage, and promote wound healing. Patient education is again an important portion of patient success. Adequate compression, based on the patient ABI results, is a starting point in the treatment process. If the patient is being treated at a wound center because of the need for wound debridement, edema management, or advanced care modalities, compression wraps can begin. Compression is either 2- or 4-layer, based on physician order and patient history and testing results.

Compression wraps are typically done weekly by a trained clinician in order to provide accurate compression. Standard compression therapy is between 30 and 40 mmHg; the level of required compression depends on the physician order and patient comorbidities (www.wocn.org, 2013). Compression wraps can be used initially for patients who will have difficulty in applying stockings depending on hand dexterity, ability to reach feet, and risk of falls while applying stockings daily.

If compression wraps are not necessary, the patient can be introduced to **compression stockings**, which will aid in treatment as well as preventing wounds in the future. Compression stockings are an option for edema control as long as the patient and/or caregiver is physically able to apply and remove the stockings daily. Compression stockings must be worn daily to help prevent further wound development by reducing swelling. Certain stockings will require calf measurements that can be done either in the office or in the patient home.

Stockings should be replaced every 3 months to provide optimal compression strength. Education on compression therapy benefits should be provided with each visit to encourage patient and caregiver compliance. Skin must be assessed by the patient or caregiver daily with the removal of compression stockings. **Do not allow the patient to sleep in compression stockings,** as this can lead to breakdown should the stockings be too tight; besides, the skin should be allowed to rest while in bed.

The stockings are to be put on immediately upon waking at or before getting out of bed when swelling is at its lowest. During the day, from gravity, the legs become more swollen and stockings are more difficult to apply. Assess the ability of the caregiver and patient to apply stockings. There are several options of stockings where a zipper or Velcro may be easier for patient compliance and should be discussed with the physician if a regular stocking is too difficult for the patient to apply.

Compression pumps are utilized if stockings are not a viable option to promote reduction in edema. Compression pumps require a physician order and are used 1 to 3 times a day. They pump the fluid up out of the legs so it can be urinated away. Accurate assessment of patient compliance will determine which is the appropriate option for a successful patient outcome.

Treatment and education are based on comorbidities that can possibly delay wound healing, compliance, and awareness of any medications that will interfere with healing (eg, steroids, immunosuppressive agents). Lifestyle changes should be reviewed for weight management and exercise to help prevent reoccurrence. Proper nutritional instructions to reduce salt and increase protein can be given in literature form to remind the patient and caregiver of healthy choice. Smoking cessation education is beneficial as smoking affects proper circulation throughout the body and delays healing.

The patient should avoid constricting garments and crossing legs, which affects circulation, as well as high heels that will reduce venous return. Encourage calf muscle exercises to promote circulation and strength, Maybe as simple as walking around the block once a day. Instruct patient and caregiver on signs and symptoms of infection with open wounds and the importance of calling the appropriate healthcare provider if an infection occurs.

Encourage patient compliance by discussing the benefits of edema control with wound healing and that we must reduce the swelling. With compression therapy, most of all, always receive cardiac clearance from the patient's primary or cardiologist.

Topical wound care is performed according to the wound bed appearance, with treatment that will be best for the patient and caregiver to perform effectively. Utilize a wound care center if debridement is required. With large draining wounds, peri-wound protection must be included as part of the care plan to keep the wound size from increasing and damaging more tissue.

The goals for venous insufficiency patients are to maintain intact skin, reduce pain if present, and reduce edema with effective lifestyle changes to prevent future complications. Involvement of the patient and caregiver in the treatment process can encourage confidence in future self-management and prevention measures. Remember that some of these patients have been dealing with these wounds for many years and will require a great deal of encouragement as they may already feel defeated by having the wounds for so long.

Case: Paul

Paul is a 54-year-old male school teacher with chronic left lateral leg VLU. He stands on his feet all day at school, leading to moderate serous drainage. The original injury occurred several years ago after a bicycling accident and the wound never has seemed to heal. Paul wears compression stockings daily and when active. He has no other comorbidities except high blood pressure. No allergies, and only med is Lopressor. He is very active in sports and has been to several other wound centers, but with no success.

Wound measures 5 cm x 4 cm x 0.3 cm, hemosiderin staining noted to BLE, peri-wound with mild maceration from drainage, wound bed 60% yellow clough and 40% red tissue. Wound has been stagnant for some time. Mild/moderate edema noted, pulses palpable. The patient has been using an alginate dressing or ABD pad daily and PRN for several years with no change in wound size.

What do you want to do first?

Venous Leg Ulcer

Cleanse the wound and culture to check for any underlying infection. Referral to wound center will be beneficial for debridement to clean the stagnant wound and encourage new tissue growth. ABI testing will determine if patient is compressible. Patient has not been interested in compression wraps in the past. Educate the patient on the benefits of compression wraps—that there is an increase in pressure weight compared to stockings. Edema control will be necessary to begin the wound healing process. Topical treatment must encourage a moist wound healing environment and also manage exudate to prevent peri-wound maceration.

Source: Copyright Medetec.co.uk.

Paul has now been seeing a wound care clinic for weekly debridement and has been treated for several weeks with compression wraps that have an alginate dressing applied to the wound bed to assist in drainage reduction. His wound size has gradually decreased over the last several weeks with compression wraps, and this positive observation has encouraged Paul to try several more weeks of wraps thanks to the encouragement and continued education of the nursing staff.

Now with the wound bed 100% clean and with a decrease in drainage, an alginate dressing can still be used to absorb drainage and protect the peri-wound. When the physician believes the patient can be discontinued on compression wraps, Paul must continue using his compression stockings daily to assist in edema control and prevent future complications.

Diabetic Foot Ulcers

Approximately 85% of all amputations are preceded by a diabetic foot ulcer and more than half of these amputations could have been prevented with proper footwear and effective nail and foot care (Mutch & Dewar, 2015). The importance of patient education cannot be stressed enough in reducing the risk of amputation. Patient and caregiver compliance for prevention is the main defense against amputation. Multiple areas to assess in the diabetic patient include glucose control, smoking, obesity, impaired vision, sensation in the extremities, foot deformity and callous formation, arterial insufficiency, and poor footwear that does not provide adequate support or protection.

A diabetic foot ulcer is caused either by peripheral neuropathy or by peripheral vascular disease resulting from diabetes mellitus (Schub & Schub, 2017). A diabetic foot wound presents on the plantar surface of the foot or toes and results from walking on a foot with lack of sensation. Ulcers can also develop as blisters from poorly fitted shoes, walking barefoot, or walking on a hot surface that results in a burn. The wounds can be partial or full thickness and infections are commonly noted.

These patients usually do not have feeling in their feet due to neuropathy, and may have had the wound for a long time before it was noticed or acknowledged. Diabetic foot wounds are the most common complications of diabetes mellitus, affecting 15% of diabetics at some point in their life (Schub & Schub, 2017). The ulcers usually start small but over time and with lack of care, become larger, and often are surrounded by dry and cracked skin. A surrounding callous may have built up as the body tries to protect itself and the wound.

Assessment and Characteristics

Diabetic peripheral neuropathy is a result of nerve damage caused by high blood sugars that effect the nerves of the legs and feet. High blood sugars interfere with the ability of the nerves to transmit signals to each other. Patients often feel tingling, numbness, or pain starting in their legs and feet, and it can lead to their hands. Neuropathic changes associated with diabetes affect sensation, balance, and gait.

Assess the patient's ability to feel sensation in their feet using the monofilament test—or lightly touching the patient's feet while their eyes are closed—to quickly determine sensation. Many wounds results from trauma to the foot of which the patient is unaware. The source of the trauma could be as simple as a small pebble in the shoe, stepping on a nail, or simply wearing shoes too small or too big. A lack of daily foot inspection with the lack of sensation can result in the formation of a new wound.

When a callus develops, it is acting as the body's natural way to protect itself by making the skin stronger around the injury. However, these callus areas can lead to the development of more wounds. An area of callus can become sharp and hard enough to cause damage to surrounding tissues. With lack of care, the callus tissue can become so hard that it is as if a small stone is under the skin; naturally, this can begin to damage the surrounding skin. It is imperative the callus be removed by a podiatrist skilled in wound care to help prevent further injury or tissue breakdown. Most calluses develop around a wound to help protect the area. Often, areas of undermining or tunneling occur under the callus.

Treatment

Diabetic wounds can quickly become larger and deeper in patients with neuropathy. All diabetic patients should have a hemoglobin A1c (HgA1c) drawn to assist in diabetic management and patient education.

Diabetic foot wounds must be palpated to determine the depth of the wound, tunneling, undermining, and whether the area palpates to bone. Always palpate the wound with a swab to determine the level of tissue damage. When the callus is debrided, the wound itself may become larger; this is not necessarily a bad thing because with the dead skin cells removed there is room for the new skin cells to begin to grow and heal the wound.

Educate the patient that new healthy skin will not, and cannot, grow if dead skin cells are blocking the area. Explain this benefit of wound debridement in simple language: "Removing the old tissue will allow room for the new skin cells to grow." Or offer the analogy of a flower growing through a sidewalk. The flower (new skin) will never be able to grow properly unless we remove the sidewalk (dead skin) and give it room.

Diabetic foot wounds often present with signs of infection; often it is not until diabetic patients experience symptoms of infection that they seek medical attention. If there is purulent drainage from the wound, perform a wound culture (if available) to help in selecting the appropriate antibiotic. An x-ray of the injured foot will help rule out osteomyelitis. Some physicians may request an MRI or CT scan in addition. Frequently the patient is unsure of when the wound first developed, or they do not feel comfortable telling the clinician when the wound occurred.

Patient and Caregiver Compliance

The patient and caregiver need to be aware how serious an infection is and that it can lead to the risk of amputation without compliance to a proper plan of care. Ideally, the goal for HgA1c is under 7.0 and this value can be used to encourage patient compliance in tracking progress, or the lack thereof.

Diabetic foot ulcers are very complex, for the reason that many diabetics with wounds are often non-compliant. Blood glucose control education must be constantly reiterated to caregivers and patients to assist with progressive wound healing. If the patient does not have a history of compliance with their medication or blood glucose control, education on the effects of wound healing should be done each visit and literature can be given as well. Encourage achieving a blood glucose control value of under 150.

A simple explanation to encourage compliance is to inform the patient that the body's healing processes diminish when proper blood glucose is not managed. Explain that the body is focused more on combating the high blood sugar than healing the wound. Wound healing for diabetic patients requires as much effort on the patient's part as on the clinician. Without patient assistance, healing will not occur. It is important to make patients aware that they must do their part in helping their body heal; they must take responsibility for caring. As healthcare providers, we do our part, but patients must do theirs.

We may only see patients once or twice a week and we cannot control what they are doing when we are not in the home. Look for triggers to encourage accountability from the patient. For example, they may want to go the beach or into the pool but the wound is not healing; encourage them to assist in the process so they will be able to swim in the near future. Goal setting can help encourage patient and caregiver compliance. Patient and caregiver buy-in will make the wound healing process more productive and effective. Caregivers and patients must be aware of this and reminded at each visit.

Nutrition is an important factor for basic blood sugar control and for wound healing. A diabetic educator referral is valuable to assist with healthy nutritional choices, possibly carbohydrate-counting lessons, and education on protein choices for wound healing. Encourage visits to the eye doctor, to assess the effects of diabetes on vision, and to the endocrinologist for emphasis on overall health and the necessity for blood sugar control through appropriate medication. Smoking cessation should be a topic for all members of the household. People with diabetes who smoke are more likely than nonsmokers to have trouble with insulin dosing and with controlling their disease (CDC, 2017).

Off-Loading and Footwear

Patients and caregivers must be educated on the importance of off-loading to allow the new skin cells to heal the wound without continued trauma to the area. A basic surgical shoe may be all that is required to assist in keeping pressure off the wound area. Alternately, an orthotist can properly measure and fit for specially made shoes to ensure adequate off-loading. These require a doctor’s prescription and having obtained assurance that the patient is willing to wear the shoe. To prevent any future complications, encourage regular visits to a podiatrist trained in wound care for nail trimming and foot assessment as well as reassessment of off-loading shoes.

Be sure to question patients about how often, indeed whether, they are wearing their off-loading device. Inspect the device or shoe for signs of wear and tear. When a patient is not wearing the required off-loading device or shoe, there will be a delay in wound healing, and additional wounds may develop.

Adhering to basic hygiene and behavioral changes will assist the patient and caregiver in prevention. Feet should be washed daily! Encourage keeping the toes clean and with no debris in between. Patient or caregiver is to perform a daily foot examination between toes, check socks to look for draining blisters, and check foot temperature as a sign of infection. Patient should always wear shoes, never walk barefoot, even in the house, and check water temperature before entering the tub.

Patients should not cut a callus—and must trim nails carefully if they do it at home. While it is important to wear socks, avoid tight-fitting socks that may impact circulation. When buying shoes, ensure the shoe is a proper fit and inspect feet daily for any injuries. A mirror can be used to inspect bottoms of feet and between toes if the patient lives alone.

When buying new shoes, the patient should not wear them later in the day because feet swell as the day wears on. When patient have purchased new, properly fitted shoes, instruct them not wear the new shoes for more than two hours and not to wear the shoes without socks.

During the winter months, encourage the patient and caregiver not to use heaters or heating pads. With lack of sensation in the feet, it is easy to cause a burn without the patient being aware of the damage. This is seen quite commonly during cold months; unfortunately, some patients do not know they are being burned until they smell the skin burning.

Overall, education on blood glucose control, lifestyle changes, off-loading, meticulous wound care and weekly wound care center visits must be emphasized with each visit and given consistent reminders.

Education for diabetic patients must be tailored to the individual patient and the support system needs and priorities. Our patients may not develop the skills to prevent a DFU or its complications but education can aim toward early problem identification and seeking of help from a healthcare professional.

Discuss and set goals, review them at every visit, look for barriers to patient and caregiver learning, and use multiple teaching tools to assist with education. Continually emphasize the importance of basic foot care and daily foot inspection. You can ask the patient and caregiver what-if questions to assist in building problem solving skills. For example: What if you find a callus on the bottom of your foot? What if you notice blood on your sock at the end of the day?

Use questions to encourage teachable moments. Supplying the patient and caregiver with community resources to provide additional educational outlets and support groups can also encourage interaction with others in the community and provide needed social support.

Case: John

John is a 63-year-old male who has neuropathy in both feet, healing open blister with callus buildup from ill-fitting shoes on plantar aspect of right great toe. The open wound measures 1.7 cm x 1.5 cm with a moderate amount serosanguinous drainage, no odor, no complaints of pain, no feeling to the area, foot/leg warm but not hot, and slight temperature difference from left leg. Patient states he does not walk barefoot but has worn-out slippers at the bedside. He has seen the wound center doctor in the past but his insurance changed over the last several months so it has been difficult to be consistent. John lives alone and his blood sugar has not been well controlled lately. The patient has an appointment this week in the wound center to see a physician for callus debridement but when you arrive at John's home the wound appears to be infected.

What are your first steps? Cleanse wound with normal saline, measure and assess the wound bed. Palpate the wound to determine depth—see if it palpates down to bone or is undermining. Cleanse thoroughly, take wound culture (if available). Inform patient this is to ensure appropriate antibiotics are prescribed if infected. If there are signs of infection and wound palpates to bone, send patient to emergency department. (This wound bed is clean with no s/s infection.)

The sooner the patient is seen, the greater the possibility to reduce the chance of amputation. When the patient arrives to the ED: clean and culture, begin IV antibiotics, and suggest an x-ray (and possibly MRI) of the foot to rule out osteomyelitis. In this case, topical treatment can be done to assist in preventing infection as the wound bed is clean.

Diabetic Foot Ulcer

Source: T. Sbriscia.

Check if patient has allergies to silver. If not, utilize an antimicrobial product (silver alginate) to cover the open wound and absorb drainage. Patient must be seen by a podiatrist with wound training. Debridement of callus is needed and further treatment to assist in wound closure. If osteomyelitis is present, further treatment will be discussed with patient. Education for patient and caregiver will be to review appropriate off-loading and the necessity to prevent further damage, provide the proper foot wear and instructions, and encourage blood glucose control to assist in healing.

John's case is common in the diabetic population and can be difficult because patient compliance has been dictated in part by his insurance situation. Education for this patient includes recognizing warning signs of infection and complications to prevent amputation—regardless of his insurance status.

Arterial Insufficiency

Arterial ulcers have certain characteristics clinicians can easily identify. Inadequate blood supply is a main cause of non-healing wounds. Arterial wounds usually appear on the distal part of the leg over the lateral malleolus, mid-tibial, between or tips of toes, or over phalangeal head (Wound, 2013).

Assessment and Characteristics

These wounds typically have a "punched out" appearance and are pale, dry, or necrotic. Pulses are reduced or absent and the skin may feel cool or cold to touch. Risks factors for peripheral arterial disease include hypertension, diabetes, trauma, advanced age, smoking, and hyperlipidemia. Pain is often associated with these wounds; it is referred to as *intermittent claudication* or "rest pain." Pain occurs during activity such as walking and subsides during periods of rest.

When the leg is elevated, the patient can experience an increase in pain due to the decrease in blood flow to the limb. Most of the time, the patient feels a relief in pain when the legs are in a chair position and gravity pulls blood to the lower extremities. Light exercise, while it can be painful, is also a source of treatment for this pain by conditioning the muscles to use oxygen more efficiently.

Arterial Insufficiency Wound

Source: Copyright 2003, AAWC.

Treatment

Treatment options for these wounds requires re-vascular intervention and studies to identify blood flow problems in the veins. Wound center or vascular referrals are necessary in combination with topical wound treatment to prevent infection until increased circulation can be achieved. Angioplasty or operative interventions are designed to increase the blood flow required for wound healing.

These wounds will not heal without appropriate interventions, and this can be difficult for patients and caregivers to comprehend. Debridement is not an option if there is insufficient blood flow. Not only will these arterial wounds not heal effectively but the risk of infection will also increase with an increase in wound size.

If revascularization is not an option, amputation will be the next possible step. Patients and caregivers may postpone having testing done for fear of the results. Clinicians need to encourage early interventions and testing to prevent further pain, complications, and the risk of amputation. Wound care with arterial wounds begins with controlling diabetes, encouraging ambulation, and teaching smoking cessation and topical wound care to prevent infection and additional pain.

Make sure patients protect their limbs from future trauma and begin to focus on the appropriate plan of care. Once adequate blood flow is established, if that is still possible, wound treatment should include a moist healing environment and infection control. It is necessary for patient and caregivers to realize that without sufficient blood flow to the extremities, wound healing will not occur. There are many times when caregivers and patients do not comprehend the reason behind the plan of care simply because they do not understand wound healing starts on the inside with adequate blood supply.

Topical treatment should be done to encourage wound healing and prevent infection until revascularization can be performed. Encourage the patient to seek vascular intervention as soon as possible instead of waiting for future appointments. Patient and caregivers may be afraid to hear study results but teach them that earlier intervention means quicker healing and reduces the risks of complications that could lead to amputation.

Dry stable black eschar in a non-infected ischemic wound (commonly called “nature’s band-aid”) should be maintained and not debrided until vascular intervention can increase perfusion status. Treatment goals should be to continue infection treatment, prevent additional trauma and injury, promote wound healing, reduce pain, and preserve the limb (Wound, 2013).

Surgical Wounds

According to the CDC, a surgical site infection typically occurs less than 30 days after the procedure. Each year, 1 in 20 surgical patients experience a surgical site infection. Patients with **surgical site infection (SSI)** have a significant risk of morbidity and mortality related to the infection. The most common early sign of infection is an increase in wound drainage. This is seen between 10 and 14 days post operatively (Molnlycke , 2016). The most common comorbidities implicated with a SSI are diabetes and obesity.

With diabetic patients, post operative glucose control and compliance greatly impacts wound healing rates. A glucose level over 110 is the biggest risk factor associated with SSI (Molnlycke, 2016). Educate the patient and caregiver that slight redness around the wound edges can be expected for the first few days after surgery. However, they should call the physician immediately if they see redness spreading greater than 2 cm around the incision site or an increase in pain, purulent drainage, or swelling (Moinlycke, 2016).

The original surgical dressing is generally first changed by the surgeon, and this should occur in the acute care setting. Surgical incisions are recommended to be covered with a sterile dressing for the first 24 to 48 hours post operatively (Bryan & Nix, 2015). A post operative wound dressing that allows for early bath or shower encourages early mobilization, an important post operative goal. Post operative patient and caregiver education focuses on proper dressing changes, wound cleansing, and instructions on infection prevention.

The area must be assessed with each visit for clean, dry, intact suture line and no evidence of dehiscence or infection. Wound dehiscence can be noted if the wound edges fail to join or the integrity of the sutures is compromised. This should be reported to the physician as soon as possible to prevent further complications. The patient, family and caregivers must be educated during the visit on signs and symptoms of infection and the importance of hand hygiene to assist in ideal wound healing without infection.

Signs and symptoms of infection include an increase in drainage, odor, pain to the area, redness, fever, chills, warmth, and delay in wound healing. Pain is an important and under-utilized symptom that signals wound infection. In patients who are nonverbal or with cognitive impairments, facial expressions or flinching with palpation or dressing change can indicate increase in pain to the area. Facial and body expressions are extremely important pain indicators for clinicians during all wound care procedures. If the patient does not or cannot verbally tell us, their body language will.

There are several ways in which surgical wounds can be closed; either by primary intention, with sutures or staples, or left open to heal by secondary intention. **Primary intention** allow the wound edges to heal by alignment and held together in their original position, mostly by surgical incisions. This technique allows rapid healing with less scarring (Smith & Pravikoff, 2016). **Secondary intention** leaves the wound open and the edges apart. This occurs commonly in wounds that have infection and require additional treatment to heal. Secondary intention usually results in more scarring because it requires formation of larger amounts of new tissue. In any wound, the strength of scar tissue is never more than 80% of the tensile strength of the original tissue (Bryan & Nix 2015). **Tertiary intention** can be used when the wound is left open to allow further treatment of the wound surface. The wound is closed after the initial healing has taken place and the risk of infection has decreased (Smith & Pravikoff, 2016).

Dressing instructions will be given by the surgeon. Always ensure that the instructions include providing a moist wound environment and observe the patient and caregiver performing wound care correctly. Discuss adding protein to the diet and always review signs and symptoms of infection as well as the importance of hand hygiene.

Advanced, Palliative, and Hospice Care

Advanced therapies include skin grafts, sharp debridement, compression therapy, and hyperbaric oxygen therapy. A referral to other wound care experts can lead to new ideas and options for the patient of which you may have not been aware of or have accidently overlooked. Collaboration with other professionals cannot be stressed enough for our wound care patients. Referral to a wound, ostomy and continence (WOC) nurse has also shown to increase positive patient outcomes through cross collaboration.

Negative Pressure Wound Therapy (NPWD)

A device offering negative pressure wound therapy (NPWT) can be utilized on various types of wounds. The purpose of the device is to prevent infection, increase healing rates, promote skin growth stimulation, reduce edema, and help draw the edges of a wound together to promote closure. A negative pressure device will allow the wound to heal from the bottom up in an effective manner. The clinician must check with the facility to review the manufacturer guidelines of NPWT, depending on which device is available.

Wound Care Centers

Referrals to the wound care center should never be overlooked. The more collaborative is the approach in wound care, the more the patient is likely to heal and enjoy an increased quality of life. Wound care center referrals and/or vascular referrals can decrease risk of readmission and infection as well as provide an additional specialist to assess the patient and provide education. Referrals can be used when: the wounds are stagnate, they increase in size, there is possibility of infection, there is patient noncompliance, and advanced therapies are required that are not available in home care or assisted living.

Palliative and Hospice Care

With the patient population living longer, we need to be vigilant in starting the end-of-life discussions with physicians as there is deterioration in the patient. These discussions with patient and caregivers, when necessary, can be the very difficult. Many skin changes appears at life’s end, and caregivers are not always ready to accept changes to their loved one. When dealing with skin changes to the body, caregivers can be very aggressive in insisting a very small red mark is a tragedy, when in fact the reality is the patient’s heart is beginning to fail.

For caregivers, it is easier to notice changes on the skin because it is a visible organ. When the patient experiences heart or respiratory issues, the caregiver may not seem as concerned because those organs are "invisible." As trained healthcare professionals, we know a skin injury is not as critical as heart and respiratory failure unless the skin is the source of infection or sepsis. Truth be told, "No one is concerned about a toe if the heart and lungs are not working properly."

It is important to determine the plan of care with the patient, physician, and caregiver because this will determine whether aggressive or palliative wound treatments are suggested and will dictate what wound products are used. Having a patient on palliative care or hospice care guides treatment goals simply to prevent infection and provide comfort. If the internal organs of the patient's body are not functioning properly a wound will not heal. In palliative and hospice care, we work toward preventing infections, treating odor, and controlling drainage. Skin changes at life's end can result from compromised tissue perfusion, decreased tolerance to external insults, severe malnutrition, anemia, hypotension, and vasopressors.

In treating the wounds of palliative patients, position them for comfort and document whether the patient cannot be turned due to pain. Discuss the goals with the patient, caregivers, and physician. In tissue with poor perfusion, the ability to tolerate pressure becomes limited. Repositioning either more or less often may assist in obtaining comfort. Pain management during palliative care requires close work with the physician to assist in patient comfort during life transition.

At the end of life, skin has less blood supply because the body is directing blood toward the vital organs (heart, lungs, and brain)—meaning less oxygen reaches the skin and there is a decrease in perfusion that will lead to increased risk of breakdown. The most common place for skin breakdown near the end of life is seen directly above the buttocks. Some of these wounds may not be preventable even with the best quality care. The patient pain level and quality of life dictates wound care goals, with the objective to keep the patient comfortable and respect their wishes.

Palliative or hospice care should never be a last-minute conversation. As our society is living longer, these discussions can and should occur before there is an increase in suffering. Of course, we all want a physician who will do everything to heal and correct the situation. These conversations are crucial to have when developing a plan of care for the patient to ensure the plan aligns with the wishes of the patient. The clinician will do what is possible to promote comfort and ease into the next transition of life no matter what comes. These decisions are the patient's and the caregiver should respect their wishes and carry out the request.

Documentation and Measuring

Proper and accurate documentation protects you in the event there may be skin breakdown or a caregiver challenges the accuracy or occurrence of education. Documentation protects your licensure and provides the caregiver with assurance that all appropriate steps have been taken to provide high-quality patient care, should it come in question.

Did You Know. . .

Partial thickness and *full thickness* are used to describe any wound that is not a pressure injury.

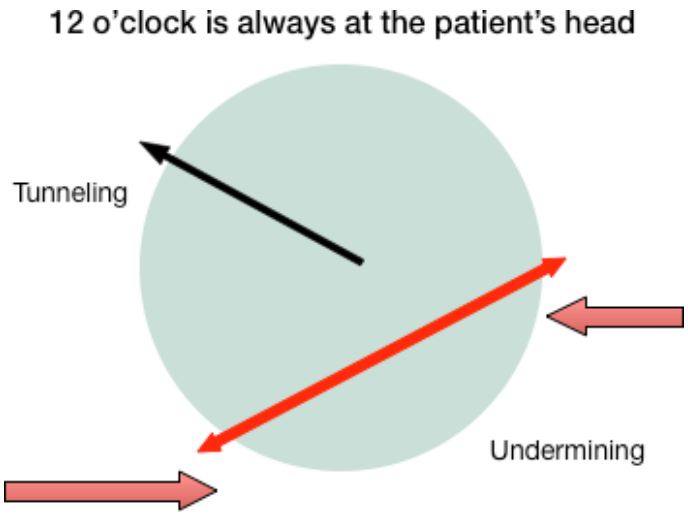
Such wounds can occur from a skin tear, trauma, surgery, or an unknown reason. Partial thickness wounds show tissue loss that extends below the epidermis and into but not through the dermis. They are shallow and usually heal by epithelialization. Partial thickness wounds are moist and painful because of the loss of the epidermal covering and the resultant exposure of nerve endings (Bryan & Nix, 2015). A full thickness wound exhibits tissue loss that extends below the dermis and into the subcutaneous tissue and fascia, possibly exposing the bone. These wounds usually heal by granulation, contraction, and re-epithelialization. Treatment of both wounds depends upon the depth of damage, drainage, risk of infection, and wound bed appearance.

Documenting Wound Etiology

If you are unsure of wound etiology, document it as partial or full thickness and treat according to tissue damage until identification of the wound cause is determined, which will assist in classification.

When documenting a wound, start with the location of the wound as defined by the anatomical man. If the wound is a pressure injury, describe the stage of the wound. Then describe the wound bed as to granulation tissue, slough, black eschar, epithelialization, and so on. The color of the tissue in the wound bed should be included: pink, red, yellow, or pale. The size of the wound, measured most often in centimeters, is then documented, with the length always going head to toe and the width always hip to hip. Do not measure the wounds at their greatest lengths and widths (as was done in the past). Measure perpendicularly (straight up and down and side to side) based off the patient's head, feet, and hips.

Depth of wound is determined by inserting a moist swab into the wound at a 90-degree angle until the tip touches the base of the wound. Mark the point on the swab when it is level with the wound surface to determine depth. To measure undermining and tunneling, which can be seen in Stage 3 and Stage 4 wounds, the face of the clock is used to assist in description. For example, a wound can be described: wound bed 3 cm x 4 cm x 4 cm with undermining from 3 to 7 o'clock with greatest depth of 3 cm at 4 o'clock. Tunneling noted at 10 o'clock of 6 cm.



Wound description would say: Wound bed with undermining from 3 to 7 o'clock with greatest depth at 10 o'clock with depth of 6 cm.

The type and amount of exudate must be included in documentation (serous, serosanguinous, purulent) as well as any odor present.

Peri-wound assessment documentation consists of excoriation, tenderness, edematous, induration, erythema, rash, and maceration. Assessment of the periwound allows clinicians to decide if breakdown is likely to occur and to help prevent further complications. Wound edges can be documented as attached, detached, rolled, intact, thickened, or punched out. The appearance of the wound edges alerts you as to whether continuous pressure or trauma is being applied to the wound.

Describe any signs or symptoms of infection and notice if the area is painful to the touch or if there is generalized pain. Note and describe edema and, when the wound is on the lower extremity, assess bilateral pulses with palpation. The more thorough your documentation, the better you help other healthcare providers understand the cause and progression, or deterioration, of the wound.

It is important to update your education for the caregiver, observe how patient and caregiver interact during the visit, answer any questions asked, examine shoe and cushion selection, and note any new incidents that occurred since the last visit or assessment. Wound care is problem solving, and the more pieces of the puzzle you provide, the more complete picture you give as a basis for prevention and treatment.

Summary

Collaboration on wound healing with multiple disciplines benefits patients in many ways. Registered nurses, physical therapists, occupational therapists, social workers, case managers, and nutritionists are valuable resources that help guide wound prevention and healing.

As the population ages, there is a decrease in independent functioning and ability to accomplish activities of daily living. Mobility and activity are areas that continue to keep the skin healthy. Limited range of motion, difficulty in ambulation, inability to reposition self, and risk of falls are all enemies to the skin.

Continual support from multiple disciplines and a collaborative approach are the best defenses against skin breakdown. Many interventions come from brainstorming with the patient and family as well as other healthcare professionals. If patients are unable to reposition themselves at home, physical therapists can educate caregivers on ways to reposition the patient without injuring themselves. Without a healthy and dedicated caregiver, the patient will not remain healthy at home.

Treatment selection for healing can vary based on the healthcare professionals' knowledge, skills, and behaviors. The more often we reach out to other disciplines, the more it empowers us by increasing competency and confidence, which leads to higher quality patient care. Effective and appropriate product selection is valuable in both long-term care and home care since it can reduce the number of agency visits and, thus, cost to the patient.

Wounds should always be decreasing in size. As a general rule—no matter what area of practice, acute care, home care, or long-term care—if there is not a reduction in size of an acute wound by 40% percent after 4 weeks, re-evaluate the treatment plan and discuss other options. For a chronic wound, if there is no change in size after 6 weeks of therapy, the treatment plan *must* be changed (Livingston, 2009).

Continual education to the patient and caregiver on the stages of wound healing may solicit information about what is occurring when you are not there. Tell the patient that a stagnant or deteriorating wound is an indication that there is a problem. An open discussion with the caregiver and patient can lead the patient to admit they are not wearing their off-loading shoe all the time or the caregiver to disclose not repositioning every 2 hours.

Since you understand the wound healing process, and when it is not occurring, you need to relay this information to the patient and determine why progress has slowed or stopped. Encourage the patient and caregiver to be part of the problem-solving process; allow them to understand they are a valuable piece of the puzzle.

Wound care is a unique and complicated specialty that offers the privilege of working with many disciplines and caregivers. Wound care is a difficult topic that can either intimidate or empower a caregiver. You continually touch the lives of wound care patients and caregivers, which gives you the ability to improve their quality of life. Being able to provide support and education for patients, caregivers, and fellow professionals is a rewarding experience. There will always be a new product to learn and a new skill to master.

Encouraging and empowering caregivers is vital to patients' progress toward healing and independence. Simple conversations ease anxiety and promote interaction between the patient and caregiver. Successful patient outcomes require a team approach with all disciplines and family members working together toward the goal stated by the patient. Different patients will have different goals for their wound care. Your ability to adjust wound care education to meet the needs of the caregiver and patient will result in the best patient outcomes.

Wound care is a valuable and necessary skill. Aim for improving quality of life and you can never go wrong!

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Post Test

Use the answer sheet following the test to record your answers.

1. Educating a patient who has a wound:

    a. Is always focused completely on the patient alone.
    b. Requires a team of professionals.
    c. Must include the caregiver.
    d. Can be done in one visit if the patient is reliable.

2. Comprehensive wound assessment:

    a. Includes psychosocial issues.
    b. Is solely to determine the dimensions of the wound.
    c. Does not need to include the caregiver.
    d. Does not need to include the family.

3. Preventing and treating wounds is much like:

    a. First aid.
    b. Creating a medical plan and then enforcing it.
    c. Triage.
    d. Solving a puzzle.

4. The average wound care patient has **three** comorbidities:

    a. True
    b. False

5. Nutrition is concerning to wound healing and:

    a. You want to control weight gain while the patient is in your care.
    b. Brochures about food choices are usually ignored.
    c. Proper nutrients are essential to feeding new skin cells.
    d. Asking the patient about nutrition often results in defensiveness.

6. Hygiene is essential to wound healing, yet obstacles exist. Which one of the following is NOT a deterrent to daily hygiene:

    a. Caregiver competence and dedication to patient cleansing.

b. Obesity that presents with skin folds that patients may overlook.
c. Patient inability to reposition and avoid skin breakdown.
d. Patient unable to do, or forgetful about, daily mouth care.

7. Incontinence is a normal part of the aging process:

a. True
b. False

8. The acidic layer of healthy skin helps to protect against:

a. Poison ivy.
b. Bacteria and moisture loss.
c. Bug bites.
d. Temperature changes.

9. Patients and caregivers should be taught the signs of dehydration, one of which is:

a. Sleepiness.
b. Yellow skin tone.
c. Clear pale urine.
d. Concentrated yellow urine.

10. An indication of impaired wound healing is an albumin level below:

a. 8.0
b. 6.0
c. 4.0
d. 2.0

11. Having staged a pressure injury, and later noticed that the would appears to have improved, you:

a. Do nothing because staging is never reversed.
b. Report the needed change to your supervisor.
c. Change the staging to reflect the present situation.
d. Change the staging and note the change.

12. There are four numbered stages of pressure wounds, and there is one more:

a. Stage 4X.

b. Unstageable.
c. Immeasurable.
d. Profound.

13. All wounds require the following for healing:

a. A bandage.
b. A dry environment.
c. Skin cover as soon as possible.
d. A moist environment.

14. Additional treatment options to aid in healing include debridement. Which one of the following is NOT a type of debridement:

a. Autolytic.
b. Necrotic.
c. Sharp.
d. Enzymatic.

15. The best estimate of central systolic blood pressure is the:

a. Right knee pressure.
b. Great toe (right) flex index.
c. Ankle brachial index.
d. Left knee pressure.

16. The goals for venous insufficiency patients are to:

a. Remain supine and elevate leg until swelling reduces.
b. Exercise gently and improve diet.
c. Reduce ambulation and soak to decrease edema.
d. Reduce pain and edema through lifestyle changes.

17. Standard compression therapy begins at:

a. 10–20 mmHg.
b. 30–40 mmHg.
c. 45–60 mmHg.
d. It must be calibrated for each patient.

18. Patients who have diabetes must be taught to examine their feet regularly because:

a. They are more susceptible to athlete’s foot.
b. They have balance problems when wearing shoes.
c. The soles of their feet may become callused.
d. Diabetes-associated neuropathy may destroy feeling in their feet.

19. Angioplasty is the best intervention for:

a. Venous leg ulcers.
b. Arterial leg ulcers.
c. Diabetic foot ulcers
d. Pressure injuries.

20. In arterial ulcers, elevation exacerbates pain:

a. True
b. False

21. A surgical site infection typically occurs less than 30 days after the procedure. Each year, what ratio of surgical patients experience an infection at the site of their surgery?:

a. 1 in 10?
b. 1 in 20?
c. 1 in 50?
d. 1 in 100?

22. When a surgical wound is closed by sutures of staples, the method is called:

a. Primary intention.
b. Secondary intention.
c. Tertiary intention.
d. Standard procedure.

23. The goals of palliative care are to heal wounds and encourage daily ambulation:

a. True
b. False

24. Documentation of undermining and tunneling in the wound can best be done referencing:

a. The face of a clock.
b. The anatomical man.

c. The points of the compass.

d. The globe of the world.

25. Treatment should be adjusted if no progress in healing is seen after four weeks for an acute wound and, for a chronic wound:

a. 5 weeks.

b. 6 weeks.

c. 7 weeks.

d. 8 weeks.

Answer Sheet

Wound Care: Moving Toward Healing

Name (Please print your name): _____

Date: _____

Passing score is 80%

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____

Course Evaluation

Please use this scale for your course evaluation. Items with asterisks * are required.

- 5 = Strongly agree
- 4 = Agree
- 3 = Neutral
- 2 = Disagree
- 1 = Strongly disagree

* Upon completion of the course, I was able to:

a. Identify at least 5 treatment elements that contribute to increased wound healing.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

b. Name 6 factors that must be included in a comprehensive wound assessment.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

c. Properly identify various stages of pressure injuries, discuss at least three prevention techniques used in the home care setting, and identify 5 possible areas of pressure.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

d. Discuss the characteristics of venous insufficiency ulcers and list 2 benefits of edema control.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

e. Discuss at least three educational topics that will assist in wound prevention in diabetic patients and identify three characteristics of a diabetic foot wound.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

f. Describe arterial wound characteristics and the primary risk factors and intervention to assist in wound healing.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

g. List signs and symptoms of infection and identify topics to educate the patient and caregiver on surgical site wound healing.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

h. List at least 2 referral resources that promote effective wound healing and discuss the goal of palliative wound treatment.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

i. List 4 things to include in wound description and documentation.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

j. State an accurate time frame for reevaluation of acute and chronic wounds.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

* The author(s) are knowledgeable about the subject matter.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

* The author(s) cited evidence that supported the material presented.

○ 5 ○ 4 ○ 3 ○ 2 ○ 1

* Did this course contained discriminatory or prejudicial language?

○ Yes ○ No

* Was the course free of commercial bias and product promotion?

○ Yes ○ No

* As a result of what you have learned, do you intend to make any changes in your practice?

○ Yes ○ No

If you answered Yes above, what changes do you intend to make? If you answered No, please explain why.

* Do you intend to return to ATrain for your ongoing CE needs?

○ Yes, within the next 30 days.

○ Yes, during my next renewal cycle.

○ Maybe, not sure.

○ No, I only needed this one course.

* Would you recommend ATrain Education to a friend, co-worker, or colleague?

- Yes, definitely.
- Possibly.
- No, not at this time.

* What is your overall satsfaction with this learning activity?

5 4 3 2 1

* Navigating the ATrain Education website was:

- Easy.
- Somewhat easy.
- Not at all easy.

* How long did it take you to complete this course, posttest, and course evaluation?

- 60 minutes (or more) per contact hour
- 50-59 minutes per contact hour
- 40-49 minutes per contact hour
- 30-39 minutes per contact hour
- Less than 30 minutes per contact hour

I heard about ATrain Education from:

- Government or Department of Health website.
- State board or professional association.
- Searching the Internet.
- A friend.
- An advertisement.
- I am a returning customer.

- ○ My employer.
- ○ Other
- ○ Social Media (FB, Twitter, LinkedIn, etc)

Please let us know your age group to help us meet your professional needs.

- ○ 18 to 30
- ○ 31 to 45
- ○ 46+

I completed this course on:

- ○ My own or a friend's computer.
- ○ A computer at work.
- ○ A library computer.
- ○ A tablet.
- ○ A cellphone.
- ○ A paper copy of the course.

Please enter your comments or suggestions here: _____

_____

_____

_____

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Please print and answer all of the following questions (* required).

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* City: _____ * State: _____ * Zip: _____

* Country: _____

* Phone: _____

* Professional Credentials/Designations:

_____

Your name and credentials/designations will appear on your certificate.

* License Number and State: _____

* Please email my certificate:

○ Yes ○ No

(If you request an email certificate we will not send a copy of the certificate by US Mail.)

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5 contact hours: $29

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Address (if different from above): _____

* City: _____ * State: _____ * Zip: _____

* Card type:

○ Visa ○ Master Card ○ American Express ○ Discover

* Card number: _____

* CVS#: _____

* Expiration date: _____