

Wound Bed Preparation

Christopher M. Davey, MD, CWSP

Wound assessment was discussed in last month's column. This article continues that discussion, moving on to the preparation of the wound bed.

Having completed a wound assessment, the health care provider has to decide what type of dressings and treatment are going to be used. Before a dressing can be applied, the wound should be prepared in such a way that will maximize healing potential.

The goal is to achieve at least 10% healing per week. The first step needed to measure progress toward this goal is to calculate the approximate volume of the wound. That is measured by multiplying the length times the width times the depth of the wound. These measurements must be taken initially and then each time the patient is seen. If the depth is unknown, then the length can be multiplied by the width to give an approximate area of the wound. If comparison of these measurements show that the wound is getting smaller, then the wound care plan is working and should be continued. If the wound is not getting smaller or is actually getting larger, then the care plan is not working and must be changed.

WOUND BED PREPARATION

Goal. There are 4 phases of wound healing. The goal of wound bed preparation is to advance the wound to the next phase.

Phase 1. Days 1 to 3. Hemostasis. This means stopping the bleeding and allowing clot formation.

Direct pressure for a few minutes is the easiest way to stop bleeding.

Phase 2. Days 3 to 20. Inflammation (known as the inflammatory phase). This is the phase in which new blood vessels and healing tissue form. The wound looks red and inflamed and has some drainage.

Phase 3. Days 7 to 40. Granulation

(known as the proliferative phase). The wound starts to contract and get smaller, with new skin forming at the edges. New skin looks thinner and more fragile than regular skin.

Phase 4. Weeks 6 to 100. This is a phase of scar tissue formation and tissue remodeling. If the wound is not moving to the next phase, then one has to consider the barriers to healing. These can include the following:

1. **Diabetes:** A non-fasting blood glucose level less than 140 mg/dL is considered normal. Hemoglobin A1c (HbA1c) is a measure of how well controlled glucose levels have been over the past 1 to 2 months. A normal A1c level is below 5.7%. An HbA1c over 7% is considered uncontrolled diabetes; this 7% represents an average blood glucose level of 154 mg/dL, which is too high. An HbA1c of 8% represents an average blood glucose level of 183 mg/dL, which also is much too high. If blood glucose levels are not under control with an HbA1c less than 7%, then the wound will probably not heal unless it is very superficial.
2. **Trauma.** This includes continued pressure, friction, or shear in a bedridden or wheelchair-bound patient. Pressure injuries have to be offloaded as much as possible, with every-2-hour turning in bed or every-1-hour position change in a wheelchair. Bed or wheelchair transfers have to be done carefully to minimize friction and shear. This usually means that more than 1 caregiver should be involved. Trauma also may be caused by the patient continually touching or scratching the wound.
3. **Medications.** Medications such as steroids impair healing. Chemotherapy should not be given to a patient with



FIGURE 1. A typical infected wound appearance.



FIGURE 2. Infected venous ulcer.

an active wound. Oncologists know this but sometimes do not know that the patient has a wound (eg, the wound is on the sacrum or the feet).

4. **Necrosis.** Necrotic tissue such as eschar (Figure 1) should be removed because it inhibits wound closure by holding apart the wound edges. In addition, the underside of the eschar is frequently heavily infected. The eschar can be removed by debridement.
5. **Infection.** Infection is sometimes obvious, with the classic signs of worsening swelling, localized redness, and localized pain (Figure 2). Other signs include increased drainage (especially pus or milky colored drainage), increased odor, and failure to heal. See below for more information about infection.

Dr. Davey is a mostly retired wound physician with more than 24 years of practice treating many different types of wounds at the HCA Edward White Hospital Wound and Hyperbaric Medicine Center in St. Petersburg, FL. He can be contacted at drchrisdavey@outlook.com and welcomes all feedback. The opinions and statements made here are not necessarily those of Wound Management & Prevention or HMP Global. This article was not subject to the Wound Management & Prevention peer-review process.

Dressings. The selection of dressings depends partly on the wound phase. Healing wounds need a clean and moist environment. Excessive drainage from a wound needs an absorbent dressings or vacuum-assisted closure dressings. If heavy drainage is not controlled, the peri-wound tissue will become macerated and infected, resulting in further skin breakdown.

Stages of infection. There are 5 stages of infection.

1. *Contamination.* If a wound is contaminated (i.e., the surrounding skin or wound gets dirty), it can be washed with soap and water.
2. *Colonization.* All humans are colonized with billions of bacteria on our skin and gastrointestinal tract. These bacteria are an important part of the immune system. They can be thought of as “keeping out the bad guys.” Good hygiene, such as frequent washing with soap and water, is important to try to prevent progression to stage 3.
3. *Critical colonization.* This is the stage in which bacteria have increased in numbers beyond what is normal or desirable. The “magic number” is

a bioburden of greater than 10,000 colony-forming units (CFU)/g, but clinicians usually do not have that information. Wounds get critically colonized quickly and easily. Patients with a heavy bioburden can easily pass infection on to others, such as family members or health care workers. Treatment is with topical antimicrobials, such as mupirocin ointment, or impregnated silver dressings, which have “AG” included in their name (e.g., Mepilex AG).

4. *Clinical infection.* This is a clinical diagnosis, which usually means that an infecting organism is causing disease. This means that an organism is causing damage to the patient. Around the wound (peri-wound), there is often cellulitis, which is visible skin inflammation. This can be treated the same as critical colonization with the addition of an oral antibiotic, such as penicillin or cephalosporin.
5. *Sepsis.* This is the most serious stage of infection, which can kill a patient. It requires urgent hospitalization for intravenous (IV) antibiotics and fluids.

The risk of dying of septic shock increases by about 10% every hour that the patient goes without IV antibiotics.

Infection is usually thought of as referring to pathogenic bacteria, but it could also mean viruses, fungi, parasites (eg, worms), or insects (eg, ticks or lice). Infection is likely in any wound that is not healing well, even if none of the classical signs of infection are absent. In general, all chronic wounds (more than 30 days old) are infected.

The next article in this series will discuss debridement techniques. ■

RECOMMENDED READING

- Baranoski S, Ayello EA. *Wound Care Essentials: Practice Principles*. 5th ed. Wolters Kluwer; 2020.
- European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline*. EPUAP/NPIAP/PPPIA; 2019.
- Sibbald RG, Elliot JA, Persaud-Jaimangal R, et al. Wound bed preparation 2021. *Adv Skin Wound Care*. 2021;34(4):183–185. doi:10.1097/01.ASW.0000733724.87630.d6