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Wound Bed Preparation

It's About TIME

Wound care has progressed rapidly during the last 20 years. If clinicians and their patients are to fully benefit from the sophisticated therapies currently available, as well as those currently under development, a greater understanding of the basis of proper wound care is essential. Unless the wound is properly prepared, neither conventional nor advanced therapies (eg, gene therapy, recombinant growth factors, or bioengineered skin grafts) will prove as effective as they can be.

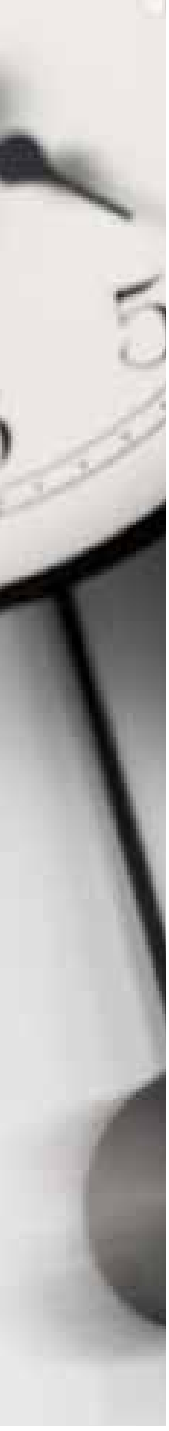
The overall goal of wound management is to achieve a stable wound with good granulation tissue development and an adequate blood supply. Only in that setting can complete wound repair occur. Wound bed preparation utilizes the TIME system for wound management and advanced wound care products to provide clinicians with the tools necessary to systematically approach and achieve these goals.

The European Wound Management Association's position document[1] on wound preparation emphasizes the importance of integrating TIME with holistic, effective, and accurate patient and wound assessments. Typical assessment questions that should be answered in order to start the process of wound bed preparation include the following:

- Is the wound bed clean or is there necrotic tissue to be removed?
- Are there any clinical signs that there is a problem with bacterial bioburden?
- Does the wound environment seem dry, and is there risk for desiccation of cells?
- Is absorption or drainage the objective of topical therapy?

The goal of managing moisture imbalance through the use of appropriate dressings and compression therapy, when indicated, is to restore cell migration and to avoid maceration of the wound bed and surrounding healthy tissue.

This is the fifth of 12 supplements that discuss various aspects of the TIME principle.



The Problem — How to Address Exudate in Chronic Wounds

Because of their inflammatory nature, chronic wounds frequently produce a substantial amount of exudates; eliminating exudate is an important part of wound management. Thus, exudate control is important for wound bed preparation, yet its role is still under-emphasized.

Chronic wound fluid is biochemically different from acute wound fluid. Copious production of chronic wound fluid inhibits wound healing and can cause periwound maceration. The presence of chronic wound fluid leads to the breakdown of extracellular matrix proteins and growth factors, prolongs inflammation, inhibits cell proliferation, and leads to the degradation of tissue matrix.[2,3] Therefore, in order for effective wound bed preparation to occur, the buildup of chronic wound fluid must be managed appropriately to prevent negative biochemical actions from occurring.[4]

The Solution — Keeping the Wound Moist and Well-Dressed

Increased exudate production is part of the normal inflammatory phase of healing. The permeability of blood capillaries increases, causing protein-rich fluid to seep into interstitial spaces. This increased production of fluid facilitates wound cleansing as it washes across the surface of the wound and provides the optimal, moist, local environment required to maximize healing.[5] Moisture balance at the wound-dressing interface is a key factor in optimizing tissue repair; eliminating excess wound exudate in chronic wounds is an important part of wound bed preparation.[6]

Benefits reviewed. The benefits of moist wound healing have been recognized for decades. Winter[7] discovered that, when compared to a dry wound, collagen synthesis and granulation tissue improved, cell migration and epithelialization occurred faster, no formation of crust, scabs, and eschar occurred with a moist wound environment. Additional benefits of a moist wound environment include reduced infection rates, diminished pain, and improved healing time.[8]

As clinicians began to understand the benefits of moist wound healing, occlusive dressings (used to retain wound moisture) became a popular treatment choice. However, because evidence exists that chronic wound fluid contributes to impaired healing, absorptive dressings may be a better choice for chronic wound management.[9]

Ultimately, the clinician must select a dressing to appropriately manage moisture balance in the wound, but the underlying etiology of excessive wound exudate should be addressed. Common etiologies for increased exudate include infection/inflammation, edema, and the debridement process.

Cleansing. Appropriate cleansing can help remove cellular debris and bacteria from the wound and, therefore, reduce excess exudate. Flushing the wound using pressures of 4 to 15 lb per square inch (PSI) may be ideal. A 35-cc syringe with a 19-gage catheter tip will provide approximately 8 PSI.[10] Additionally, edema, compression therapy should be initiated (when not contraindicated) to improve venous return and to reduce edema; therefore, reducing the amount of exudate from the wound.

Debridement. Debridement of necrotic tissue also often results in increased exudate levels, requiring careful dressing selection based on the amount of wound exudate. No single dressing is appropriate for all wounds, so choosing the right dressing can prove daunting.

Dressings. The ideal dressing should maintain a moist environment, facilitate autolytic debridement, be conformable for the range of use needed (such as filling tunneling, undermining, or eliminating dead space with sinus tracts), come in numerous shapes and sizes, be absorbent, provide thermal insulation, act as a bacterial barrier, reduce or eliminate pain at the wound site, not cause pain on dressing removal, and be cost-effective.[12]

Saline. Normal saline-moistened gauze or wet-to-dry dressings, although not uncommon, can increase costs, infection rates, and painful, traumatic dressing changes.[13] When used to maintain a moist wound environment, normal saline dressings must be changed frequently, resulting in increased use of supplies and nursing time.

Hydrogel. When moisture is needed in a dry wound, a hydrogel may be a more appropriate choice. Unlike normal saline and gauze dressings, which must be changed three or four times per day, hydrogel dressings can provide enough moisture to allow for once-a-day dressing changes. Further, when using wet-to-dry dressings (intended for debridement), any healthy tissue in the wound can be traumatized when the dressing is removed. Often, to prevent pain, clinicians will wet the dry dressing before removal and, therefore, negate the debridement purpose of wet-to dry.

Gauze. Gauze does not absorb as much exudate as many of today's advanced dressings; it allows for rapid fluid evaporation and a decreased wound temperature, which can contribute to delayed healing.[13]

Today, advanced dressing technology helps manufacturers design dressing products that can absorb and retain exudate while maintaining an optimal level of moisture at the wound surface without allowing lateral transfer of fluid onto the surrounding skin. This is a complex undertaking, as dressings must be able to maintain optimum moisture levels under compression, shear, and friction forces.6 Common dressing categories and their absorption levels are illustrated in Figure 1.

While foam dressings were once considered only for wounds with moderate to large amounts of exudate, some hydrocellular polyurethane (foam) dressings, such as Smith & Nephew's Allevyn brand, allow the clinician to choose from a variety of products based on the amount of wound exudate, rate of desired absorption, wound size, and anatomical site. Allevyn dressings are designed from two unique technologies: triliminate and bilaminate, which contain polyurethane foam matrices of fine, interconnecting cells with superabsorbent particles. The

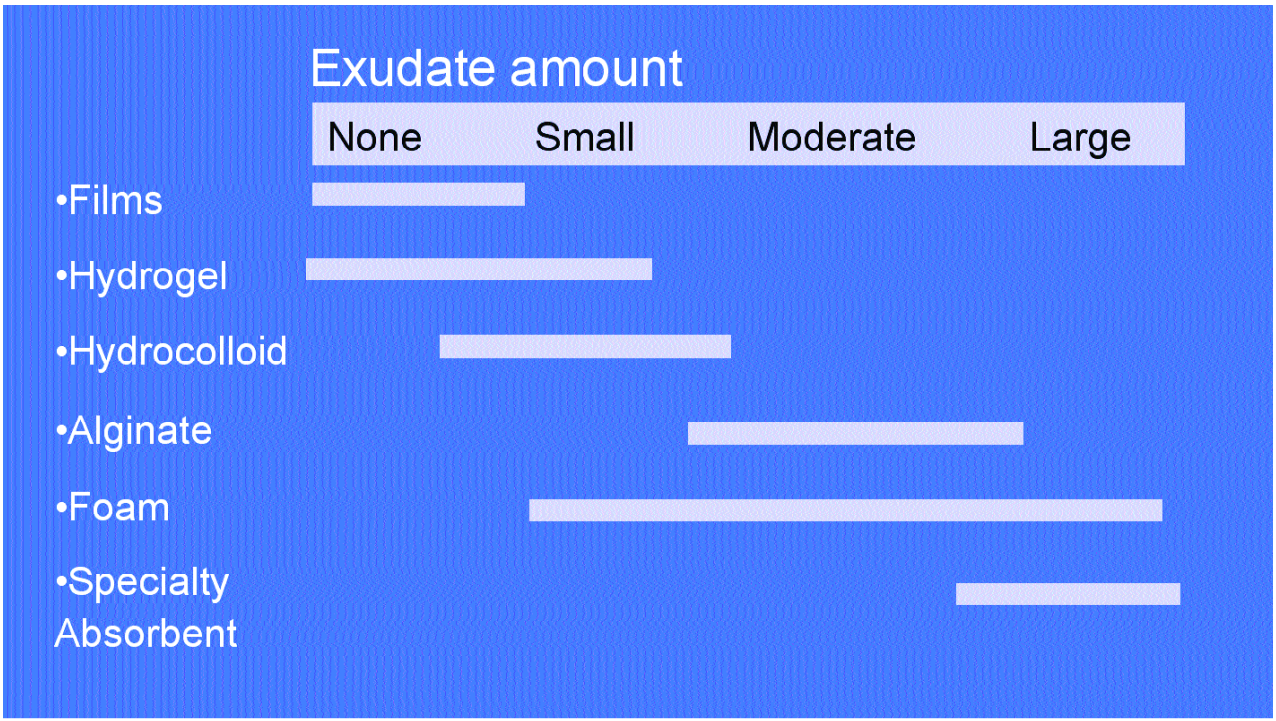


Figure1. Managing Moisture Imbalance.

bacteria-proof and waterproof. Allevyn products are available as nonadhesive, self-adhesive (low tack), or adhesive (stronger adhesive), and may be selected based on the characteristics of the wound and periwound skin.

Conclusion

Maintaining moisture balance is a key component of the TIME principles of wound bed preparation. However, achieving optimal moisture balance alone may not result in wound closure. The clinician must perform a comprehensive assessment and address underlying wound etiology as well as factors that contribute to delayed healing. Additionally, other components of the TIME principles must be considered: debridement of necrotic tissue (T), management of infection/inflammation (I), and treatment for a non-advancing or undermined wound edge (E).

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