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# Management of Chronic Wounds—2018

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**Tissue repair** following a wound occurs along a spectrum ranging from underhealing, as occurs in chronic wounds, to overhealing, as is seen in fibrosis.[1] In the United States, it is estimated that as many as 4.5 million people have chronic wounds, resulting in substantial economic and psychosocial costs. Various pathologic states result in chronic wound development, including arterial or venous insufficiency, diabetes, undue skin pressure, presence of a foreign body, and infection.[2]

In this JAMA Clinical Update, chronic wound management in the ambulatory setting is reviewed, highlighting evidence supporting a diverse array of treatment options (**Figure**).[2-4]

## Dressing Selection

Wound dressings are selected based on clinical assessment of the patient's wound. The goals for dressing management for chronic wounds include the following: (1) maintaining a moist wound environment; (2) preventing or treating infection; and (3) minimizing skin irritation or friction between the wound and clothing or devices such as wheelchairs. Dressings may also deliver debriding or antimicrobial agents.[3] The vast market of available dressings, combined with a general lack of high-quality evidence justifying their use, can make dressing selection a challenge.[2-4] This does not diminish the usefulness of specific dressings, and clinicians often rely on experience and anecdote when objective evidence does not exist. For example, choose an absorbent dressing such as an alginate for wounds with heavy exudate, or a moisturizing dressing such as a hydrogel for dry wounds. Ideally, selected products are easily accessible, familiar, cost-effective, and conform with patient preference.[2]

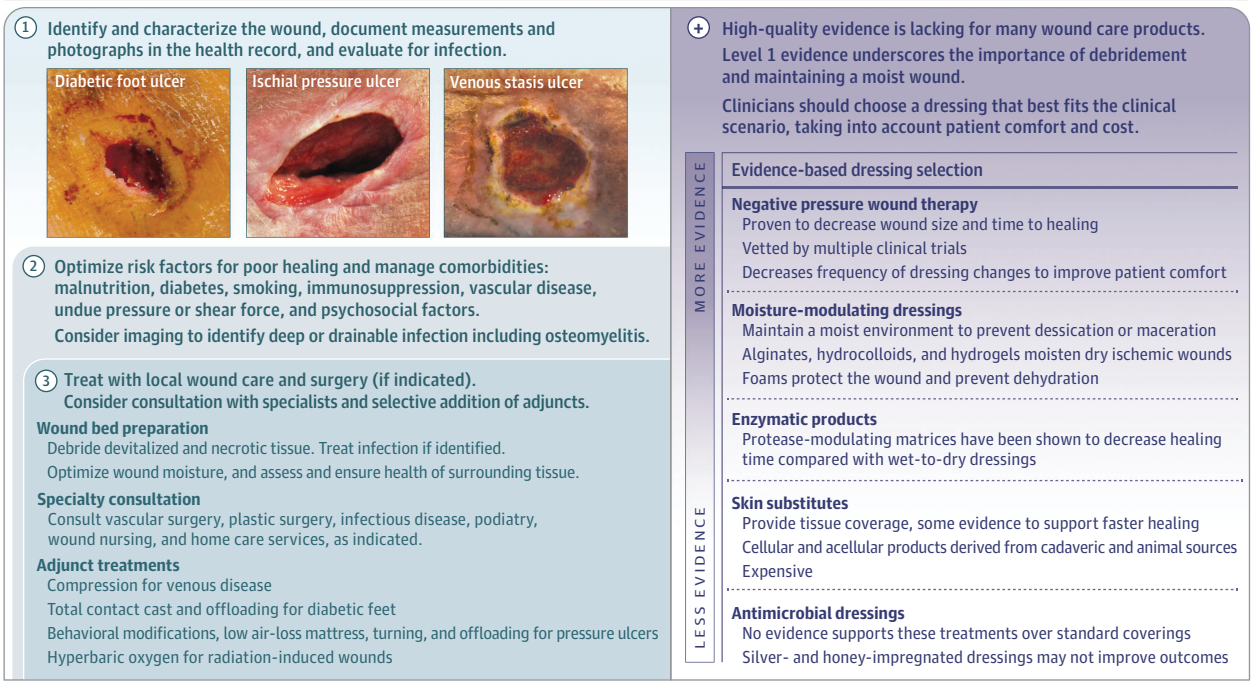
## Standard Gauze

Sterile gauze dressings are the standard to which other wound care products are compared.[4] Wet-to-dry packing consists of moistened gauze placed into the wound with changes at least once daily, which provides debridement. This technique is widely used but can result in a dehydrated wound bed, preventing granulation and matrix regeneration. Dry wounds are painful, increasing patient discomfort. If wet-to-dry packing is used, it should not be in contact with the adjacent intact skin around the wound because it causes maceration of healthy tissue, enlarging the wound.[3]

## Negative-Pressure Wound Therapy

Wound vacuum devices deliver negative-pressure wound therapy (NPWT). These devices are composed of a sterile foam dressing that covers the wound, which is then enclosed by an occlusive film that adheres to the adjacent, normal skin. Suction is applied to the dressing and a drainage tube connects to a portable vacuum canister. High-quality evidence has shown that NPWT reduces wound exudate, debris, and bacterial contamination while increasing vascular perfusion and granulation of the wound base.[3] A meta-analysis of randomized trials showed that NPWT, compared with standard wound care, was associated with decreased wound size (relative change ratio,

Figure. Chronic Wound Management



0.77 [95% CI, 0.63-0.96]) and shorter time to healing (ratio of median time to healing, 0.74 [95% CI, 0.70-0.78]).[5]

## Advanced Dressings

Many advanced wound dressings are available, but little high-quality evidence supports their use.[4]

Dressings such as alginates, foams, hydrocolloids, and hydrogels are intended to maintain a moist wound environment. Alginates and foams absorb excess exudate, while hydrocolloids prevent tissue dehydration. Hydrogels hydrate dry wounds and absorb exudate in overly moist wounds. Limited evidence suggests that patient comfort is improved with these moisture-modulating dressings.[2-4]

Topical antimicrobial agents are used in wound management as are iodine and silver-based preparations that have antimicrobial properties.[4] Silver agents may lower bacterial contamination in a wound but inappropriate extended use may impede healing.[2] Little evidence supports use of other antimicrobial agents such as honey and methylene blue over standard dressings. Another approach to reduce wound bed inflammation uses protease-modulating matrices such as oxidized regenerated cellulose.[2-4]

Achieving tissue coverage can be a challenge in chronic wound management. Skin substitutes provide temporary wound coverage but are generally used in specialty wound care settings given their costs and specific indications.[6] Porcine collagen products, composed of acellular dermal matrix, extracellular matrix, or both products, have progressed from use solely in burns to widespread application. Human-derived products include cadaver acellular dermal matrix and allogenic fibroblasts. Combination materials often use a bovine collagen matrix underlying human epidermal cells, and one such formulation is approved for venous and diabetic foot ulcers.[2,6]

## Adjuvant Wound Therapies

Key adjunctive wound therapies are recommended based on high-quality evidence. Compression therapy is the mainstay of treatment for venous stasis ulcers, with 8 randomized clinical trials showing improved time to healing with compression vs no compression treatment.[7] Prior to initiating compression therapy, arterial disease must be evaluated to ensure adequate circulatory inflow.[2] To prevent pressure ulcers and promote their healing, patient repositioning and pressure offloading is recommended, although no high-quality comparative trials exist to support this recommendation.[3] A meta-analysis of clinical trials suggested that foam alternatives (such as egg crate foam overlays) to standard hospital mattresses was associated with reduced the incidence of pressure ulcers in at-risk patients (relative risk [RR], 0.40 [95% CI, 0.21-0.74]).[8] A meta-analysis of hyperbaric oxygen therapy trials demonstrated an increased rate of diabetic foot ulcer healing (RR, 2.35 [95% CI, 1.19-4.62]), a finding that was not sustained at 1-year follow-up, and there was no significant reduction in the rate of major amputation. Short-term studies of venous ulcers (60 days) and mixed ulcers (30 days) treated with hyperbaric oxygen therapy demonstrated reduction in ulcer area compared with conventional therapy (mean difference, 33% [95% CI, 18.97%-47.03%] for venous ulcers; mean difference, 61.88% [95% CI, 41.91%-81.85%] for mixed ulcers), but the long-term benefits of hyperbaric oxygen therapy for these lesions is not known. The uncertain benefits, limited availability, and cost of hyperbaric oxygen therapy may limit its usefulness for managing chronic wounds.[9] In contrast, there is good evidence to support the use of hyperbaric oxygen therapy to decrease mucosal defects (RR, 1.30 [95% CI, 1.09-1.55]) and reduce wound dehiscence (RR, 4.23 [95% CI, 1.06-16.83]) in osteoradionecrosis.[10]

There was moderate-quality evidence from 3 trials that complete mucosal cover of exposed bone was more likely to be achieved in patients with osteoradionecrosis when hyperbaric oxygen therapy was administered (RR, 1.30 [95% CI, 1.09-1.55]) and from 2 trials that wound dehiscence was less likely following operations to repair mandibular osteoradionecrosis with the addition of hyperbaric oxygen therapy (RR, 4.23 [95% CI, 1.06-16.83]).

In summary, effective care for chronic wounds requires a multimodal approach, including wound bed optimization, management of chronic medical conditions, and consistent follow-up. Advanced wound therapies, such as NPWT, can benefit some patients, but evidence to support the use of one specific advanced dressing type over another is limited. Cost-effectiveness is a key consideration given the expense of many advanced dressings. However, some of these products decrease dressing change frequency and may improve healing, which can lead to overall cost reductions.[3] Dressing selection can generally be based on wound assessment, physician and patient familiarity with the products, availability, and affordability.


### ARTICLE INFORMATION

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