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COLUMN

Consider Skin Hygiene and Care Beyond the Wound

Donald E. Mrdjenovich, DPM, CWS, FACCWS[a,*], Cynthia A. Fleck, RN, BSN, MBA, WOCN, CWS, CFCN, DNC, FACCWS[b]

[a]*Central PA Podiatry Associates, PC, 2727 Beale Avenue Altoona, PA 16601-1705, USA; and*
[b]*Medline Industries, Inc., Mundelein, IL, USA*

The wound care provider is often faced with challenges that extend beyond wound treatment. In any chronic wound treatment scenario, often dressing choice and wound bed preparation are the focus. Habitually, blinders are donned with disregard to the surrounding skin structures. It is important to consider all factors contiguous with the healing of a wound, as well as being cognizant of the patient's surrounding skin integrity. Care of the periwound skin is mandated in successful treatment of any patient with a chronic wound. Regardless of the cause of wounds and potential secondary skin breakdown, diabetes, poor circulation, or other immunologic compromising states, treatment must always include an extensive evaluation of the patient's general health. Placing the wound and skin condition in relation to the patient's overall health helps the clinician to determine the best course toward reaching the ultimate goal of cure, closure, and or palliation. Early intervention reinforces the identification of the risk factors for developing ulcers and skin complications. Noting abnormal skin conditions immediately will hasten one's success.

Many of the physiological changes that occur in the creation of the chronic wound cascade are well known. As if our dressings, application and securing methods, wraps, offloading devices, stockings, and other means by which a wound is cared for were not enough to create potential risk for surrounding skin irritation, many pathologies coexist, adding to the potential for an at-risk environment. Patients with venous insufficiency or lymphedema, for example, possess an accumulation of edema within the skin and subcutaneous tissues that stimulates production of fibroblasts, keratinocytes, and adipocytes, thus causing an increased deposition of collagen and glycosaminoglycans within the skin and subcutaneous tissues. This results in skin hypertrophy, destruction of elastic fibers, xerosis, fibrosis, and cracking of the epithelial and dermal skin layers. Further, the immune system is degraded, permitting decreased immune surveillance.[1] The result is chronic inflammation and increased susceptibility to both fungal and bacterial infections. We also see excess hyperkeratosis with diabetes patients. Additionally, neuropathic patients suffer an anhydrous state, which leads to further drying and cracking of the skin surfaces.

Hygiene of the skin is the responsibility not only of the patient and caregiver but falls into the provider's realm of responsibility to guide, supervise, and educate. Having and sharing a basic knowledge will aid in this task. The importance of hygiene cannot be overstated. The skin should be cared for at regular intervals and inspected beyond the wound's borders. One should think beyond soap and water and practice use of skin cleansers that minimize the damage to skin proteins and lipids caused by surfactants. Cleansers containing phospholipids derived from vegetable oils that contain polyunsaturated fatty acids that will not strip, dehydrate, or inflame the epidermis are preferred. The practitioner and caregiver should also avoid detergents, soaps, and cleansers containing high concentrations of sodium lauryl sulfate or ammonium laureth sulfate, which may irritate and strip skin lipids and lead to skin dehydration and xerosis.[2] Ideally, cleaning agents should be in the lowest pH (4-5.8) range. Unfortunately, providers and patients

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* Corresponding author.
E-mail address: cppadem@aol.com

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commonly use antibacterial soaps and cleansers that approach pH levels of 9.5 to 10. After cleansing the skin, good moisturizing is essential within 3 minutes of bathing. The goal is to decrease the transepidermal water loss. A wide range of moisturizing products is available, including petrolatum or mineral oil, humectants (eg, glycerin, hyaluronic acid, chiotosan, beta-glucan 1-3), emollients (eg, shea butter, cocoa butter), and nonocclusive preparations (eg, natural oils and silicone).[3]

Often with wound patients, protection from excess moisture is important, especially under dressings, wraps, or offloading devices that can cause increased moisture retention to the skin. All barrier products serve a function of guarding the skin from ultimate deleterious effects of uncontrolled moisture; however, there are several parameters to keep in mind when choosing a skin barrier. In general, skin protectants such as the petrolatum-based products require applications that are more frequent since they can easily wash off. Additionally, they create an occlusive environment, reducing the skin's ability to breathe. Zinc-based protectants last longer than petrolatum-based products and can easily be reapplied in areas where they may wash off. Keep in mind that these preparations have a tendency to dry skin excessively and should be reserved only for open, oozing, and/or denuded partial-thickness skin loss. Caution and judicious avoidance are in order in the case of zinc-based preparations on closed intact skin. Those products containing silicones (eg, dimethicone) provide longer lasting protection through multiple washings, are clear, allow the skin to breathe, and reduce transepidermal water loss, thus providing for superior protection for moisture-associated skin damage.

It is suggested that the clinician also consider the state of the skin and the stresses caused by both endogenous sources and the internal physiological changes it must endure because of aging and comorbid conditions. Skin nutrition can defend skin from dehydration, moisturize and protect it from dryness and excess transepidermal water loss, nourish each skin cell and provide a "meal," as well as offering an endermic antioxidant shield. Ultimately, replacing soaps with cleansing lotions and surfactant-free products and providing moisturizers and barriers that protect skin lipids and aid in skin integrity are the goal. Products that provide essential amino acids, vitamins, lipids, and antioxidants have been proven to reduce pressure ulcers, skin tears, and a number of other problematic skin issues.[3] The provider's goal is to protect skin from breakdown, minimize risk of dryness, and decrease potentiating skin pathogens. Moreover, one should protect the skin from environmental, chemical, and solar trauma.

Now that we know what to use, we can address why good hygiene is important in high-risk situations with the presence of diseases such as lymphedema, venous insufficiency, diabetes, peripheral vascular disease, or neuropathy. Removing debris and excess stratum corneum reduces the risk of fungal infections. Fungus can erode the skin, especially interdigitally, creating a portal of entry for bacteria. Maintaining skin flexibility, smoothness, and barrier integrity thus decreases the incidence of cracking and the potential for invasion of skin pathogens. These pathologic states, such as we see in lymphedema, result in a great culture medium for bacteria. Additionally, poor skin condition can be a source of social embarrassment, as well as rendering the patient uncomfortable or producing pain. Many of these at-risk patients may be in an immunologically compromised state, as in diabetes, which makes good skin and nail care imperative as the skin is more susceptible to trauma because of immune system depression. It is important to cleanse and thoroughly dry all crevices and between lobules of edema, fat, and interdigital skin regularly and completely. The greatest potential for management of underlying disease conditions also must be achieved. A team approach of qualified physicians, nurses, lymphedema therapists, and compression providers optimizes our strategies of care.

Furthermore, despite stellar hygiene and skin nutrition practices, tinea infections may still occur. Fungus or tinea is an ongoing threat to skin structures in the compromised patient. Untreated nail dermatophyte infections usually result in tinea infections of the skin. The most common pathogens which account for 85% of tinea infections is *Trichophyton rubrum*, this is followed by *T. Mentagrophytes* which accounts for 12% and *Epidermophyton floccosum* evident in 2-3%. *T. Rubrum* is the most common to invade the keratin of the nail. Topical treatment is the first line of defense. Castellani paint, gentian violet, benzoic acid, and undecylenic acid have historical use. Preparations of miconazole will aid in elimination of dermatophytes and candida and serve as a mild antibacterial. Tolnaftate works against dermatophytes. Butenafine and terbinafine are both fungicidal. Others that are more fungistatic, such as clotrimazole, are effective against dermatophytes, gram-positive bacteria, and mild cases of candida. Additionally, econazole, ketoconazole, oxiconazole, ciclopirox, and naftitine have a fungistatic action. There are also treatments for tinea pedis via oral preparations including griseofulvin, terbinafine, itraconazole, and fluconazole. Only griseofulvin is FDA approved for oral treatment of tinea pedis, although short-term terbinafine use off label has shown great success.[4] One would consider oral agents when patient compliance issues regarding topical agents arise or a nonresponsive moccasin distribution infection ensues. Other therapies of antifungal and steroid combinations also exist. With the use of topical steroid, there is a risk of suppressing fungus only temporarily. Reserve these combination preparations for candidiasis infections only. Anti-inflammatory antifungals are available that may also be combined with keratolytic agents. The keratolytics, urea and lactic acid, are used most commonly to effectively descale the skin.

An additional condition that may coexist as a risk factor for skin integrity compromise is hyperhidrosis, or excess

perspiration. This may occur naturally for the patient or may result from climate, excess bandaging, and/or less frequent dressing changes. Available therapies include powders, solutions, and injectables. When using powder products, avoid cornstarch-based powders that can feed bacteria. Talc or microporous cellulose has increased absorption capacity. Solutions of aluminum chloride antiperspirant are available in both over-the-counter and prescription strength. These products are usually used 3 nights a week at bedtime. Formaldehyde 10% solution is available by prescription. One must use caution with these solutions, avoiding occlusion, which may cause excess irritation. Injectable preparations are available and reserved for severe cases of excess perspiration. An example of this type of preparation is botulinum toxin type A injections for recalcitrant cases.[5] Concomitant topical solution, iontophoresis, or surgery may be required.

Other, more pragmatic recommendations can be made for those patients suffering from increased hyperhidrosis due to the required wearing of custom-molded or therapeutic shoe gear or compression hosiery, and to even those who require extensive multilayer wraps. These recommendations include decreasing microbes by changing or laundering stockings daily. The practice of washing stockings in mild bleach or using stockings or liners with silver, which possesses both antifungal and antibacterial properties, can also be helpful. One caveat, however, is to avoid washing any silver garments in bleach as bleach can reduce the efficacy of the silver. Rotate shoe gear daily, especially during the summer. This can be difficult for those patients with custom-molded shoes or a pair of therapeutic extradepth shoes. These patients may consider investing in commercially available UVC products as a germicide. These devices sanitize and deodorize shoes. After 45 minutes, 99.9% of microorganisms (*T. rubrum* and methicillin-resistant *Staphylococcus aureus*) are destroyed. Finally, chemical spray sanitizers should be avoided since they may accumulate within the shoes and irritate skin.

Regardless of the cause of wounds or skin breakdown, management should include an extensive evaluation of the patient's general health, age, gender, weight, presence of any open wounds, breaks in the skin or infections, integrity of the skin, and vasculature. Multiple influences factor into the success of treatment strategies. Factors deserving of equal attention include socioeconomic status, nutrition, compliance issues, and history of amputation or osseous malformations that require prosthetic or custom devices. When treating the wound and surrounding skin, the focus is to decrease bioburden. With the use of quality skin care products and inspection of the skin frequently, care and hygiene practices should encompass cleansing with soap and surfactant-free cleansers, moisturizing with nutrient-based breathable products that are cosmetically pleasing and promote patient adherence and use, protecting skin with silicone-based barriers, and primarily reducing transepidermal water loss to increase the skin's integrity. Practicing prudent monitoring for fungal and/or bacterial infection, with early intervention to treat and resolve the potential elements for recurrence, will offer great success. Considering the wound and skin condition in relation to the patient's overall health helps the clinician to determine the best course toward decreasing potential skin issues and reaching the goal of cure.

You are a vital part of the team in preventing wounds and skin at risk that will not heal.

References

1. Szuba A, Rockson SG. Lymphedema: anatomy, physiology and pathogenesis. Vasc Med. 1997;2(4):321–326.
2. Fleck C, McCord D. The dawn of advanced skin care. Extended Care Product News. September 2004.
3. Fleck C. Wound prevention. In: Norman RA, editor. Preventative Dermatology. New York, NY: Springer, 2010. p. 254–259.
4. Takiuchi I, Morishata N, Hamaguchi T, et al: Treatment outcomes and relapse with short-term oral terbinafine (250 mg/day) in tinea pedis. Jpn J Med Mycol. 2005;46:285–289.
5. Benohanian A. Treatment of recalcitrant plantar hyperhidrosis with type-A botulinum toxin injections and aluminum chloride in salicylic acid. Dermatology Online Journal. February 28, 2008;5.