



Non-Toxic Skin Formulation Promotes Healing of Dermatitis and Skin Injuries That Are Prone To Infection in Long-Term Care Facility Residents

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Abstract

Elderly patients in long-term care facilities (LTCFs) often exhibit skin disorders caused by multiple factors, including aging skin and co-morbidities such as obesity, diabetes, dementia, and urinary and fecal incontinence. Conditions common at LTCFs can also exacerbate skin disorders. Finally, skin conditions such as fungal dermatitis, incontinence-associated dermatitis, moisture-associated skin damage, pressure injuries, and venous ulcers often occur in bodily creases, making it difficult for clinicians to assess the areas, particularly in obese patients.

Standard remedies can be ineffective if they congeal in body folds, or aggravate moisture-related dermatitis and skin injury if they contain a moisture or zinc additive. Cleansing agents used to clean patients with fecal incontinence can dry out the skin, making the patient more infection-prone. If the patient has fungal dermatitis, dryness can impede or prevent resolution.

The two cases discussed herein demonstrate these issues and show how a novel skin care formulation used in place of standard approaches addressed the problems. The formulation is intended to restore the skin's normal pH level to support the natural antimicrobial action of the skin's outer layer, maintain the skin's permeability barrier to prevent moisture loss, reduce the bio-burden of potentially infectious skin flora, and moisturize dry skin. In the first case, a Stage 2 pressure injury closed and fungal dermatitis resolved after treatment with the formulation and Diflucan. In the second case, a venous ulcer improved markedly after treatment with the formulation following a year in which standard treatments produced no results.

Introduction

Elderly patients who reside in long-term care facilities (LTCFs) often present with a variety of skin disorders as a result of both their aging skin and co-morbidities common in their stage of life. LTCFs serve a population with high proportions of residents with medical diagnosis such as obesity, diabetes, and dementia [1,2]. In addition, more than half of LTCF residents suffer urinary and fecal incontinence [3]. This becomes problematic when combined with the Co-morbidities and pre-existing dry skin of the elderly resident.

These issues can be amplified by external factors present at some LTCFs. When a facility is understaffed, incontinent residents may lie in their urine or feces for long periods. Patients who are not incontinent but are limited to their bed may not be repositioned per standard of care. Also, patients may be non-adherent to peri-care or repositioning, since it is their right to decline care.

These factors contribute to skin conditions such as fungal dermatitis, incontinence-associated dermatitis, moisture-associated skin damage, pressure injuries and venous ulcers. Those conditions create environments that can lead to infections, making treatment a challenge. They often occur in bodily creases such as skin folds or the patient's perineal area, buttocks, or underarms. Clinicians find it hard to assess these areas, especially if the patient is obese.

Standard remedies can aggravate moisture-related dermatitis and skin injuries. Common topical treatments either have a moisture or a zinc additive that worsens the problem. Fungal powders congeal in the body's folds, making them ineffective.

These factors are illustrated in two cases discussed herein. The lead author is a nurse practitioner

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Figure 1: Stage 2 Pressure injury on left buttock and fungal dermatitis on bilateral buttock prior to treatment with skin care formulation and Diflucan. Length=1.8 cm, width=1.8 cm, depth=<0.1 cm.



Figure 2: Less than two weeks after treatment with skin formulation began, pressure injury had closed and fungal dermatitis had resolved.

with Wound, Ostomy, and Continence Certification (CWCN-AP) who serves several LTCFs in her area. Residents in these cases had been treated according to customary standards of care, but they did not respond favorably to those approaches. Typical products for cleansing incontinent residents include various chemicals and soaps that can dry out patients' skin, leading to a raised skin pH, damage to the stratum corneum, and therefore an increased chance of infection.

The author decided to substitute a novel skin care formulation (Theraworx, Avadim Technologies). The formulation is a non-toxic topical application available as a foam, spray and moisture-impregnated cloth. It is intended to restore the skin's normal low, acidic pH and maintain the skin's permeability barrier, which prevents moisture loss. Normal skin pH supports the natural antimicrobial action of the skin's outer layer (stratum corneum). It reduces the bio-burden of potentially infectious skin flora. The formulation also has moisturizing properties that appear to alleviate incontinence-related skin conditions.

Case Presentation

Case 1

The patient in this case - an 89-year old, 147-pound woman with dementia and diabetes - developed fungal dermatitis and a Stage 2 pressure injury on her buttocks. The skin issues occurred as a downstream effect of prior treatment for an infection on her right heel. A previous caregiver had ordered the antibiotic Keflex (cephalexin) to address the heel infection. The patient had been hospitalized for the infection. At the hospital, she was diagnosed with *Clostridium difficile*

(*C. diff*) from the impact of the antibiotic on her intestinal bacteria. The *C. diff* caused frequent, watery diarrhea and weakness, eventually leading to the fungal dermatitis and pressure injury.

After the patient was transferred to an LTCF, she came under the lead author's care. Use of Keflex was discontinued. Also discontinued was use of ineffective barrier creams. To treat the dermatitis and pressure injury, the novel skin formulation as a foam (three pumps of the dispenser) was applied to both buttocks, every four hours due to the severity of both skin issues. Compared to the creams, which create a thick white paste on the skin and interfere with visualization, the novel formulation is clear and allows for easy assessment

Because the patient still had *C. diff*, the author ordered use of the skin care formulation, as foam, for cleansing as well as to promote healing. To assist with the healing of the fungal dermatitis, the author also ordered use of the antifungal agent Diflucan (fluconazole). The dermatitis cleared quickly, less than two weeks after the start of treatment. It is the lead author's previous experience that Diflucan in combination with barrier creams has normally taken much longer to resolve similar cases, compared to the relatively quick improvement this patient experienced.

Pressure injury measurement when treatment began was: Length = 1.8 cm, width = 1.8 cm, depth = <0.1 cm. Less than two weeks after start of treatment, the pressure injury had closed and the fungal dermatitis had resolved.

Case 2

The patient, a 62-year-old, 281-pound male, had a chronic venous ulcer on his right lateral lower leg. He had a variety of co-morbid conditions contributing to or complicating the venous ulcer. He was a Type 2 diabetic with peripheral neuropathy, anoxic encephalopathy, lymphedema, and urinary incontinence. The patient was also bipolar and his behavioral issues played a role in aggravating his wound. Due to his mental state and the neuropathy, he did not always notice when he urinated so urine often ran down his leg and onto the ulcer, placing him at risk of infection for *E. coli* and other bacteria. The patient would also remove his dressings and refused treatments such as compression stockings that could control swelling.

The patient had been seen by a hospital-based wound clinic, which treated the ulcer with silver foam and compression wraps. The patient had also been placed on oral antibiotics periodically over the past year. In the author's opinion, this was a mistaken response by his medical provider to the redness of his affected leg. The condition was interpreted as evidence of cellulitis in a unilateral extremity when in fact it was venous dermatitis, which also causes redness.



Figure 3: Venous ulcer prior to treatment with skin care formulation. Length = 12 cm, width = 3.5 cm, depth = 0.1 cm, wound bed tissue type = 90 % pink granular with islands of epithelialization and 10 % yellow slough. Wound edges exhibited dried serous drainage.



Figure 4: After 14 ½ weeks of treatment with the skin care formulation, the size of the venous ulcer had decreased substantially. Length = 4.5 cm, width = 1.0 cm, depth = <0.1 cm, wound bed tissue type 100% red granular. Treatment regimen continued.



Figure 5: After six months of treatment with the skin care formulation, the wound had improved markedly. It measured approximately 0.1 cm by 0.2 cm with 100% red granular wound bed tissue type.

The lead author took over the case in October 2015. The ulcer had heavy serous drainage. The chronic drainage in combination with the venous dermatitis put the patient at high risk for chronic fungal growth on his leg. The author attempted standard venous ulcer wound treatments such as antimicrobial foam, collagen, and compression but they failed to produce results.

In late April 2016, treatment was switched to the skin formulation in spray form, applying the spray to the ulcer three times a week.

The spray was applied to the wound. Then a collagen dressing was placed on the wound bed and covered with bordered foam and a compression bandage.

As of this writing in October 2016, the venous ulcer has improved markedly. It measures approximately 0.1 cm by 0.2 cm with 100% red granular wound bed tissue type. Before treatment with the skin formulation, it was 12.0 cm by 3.5 cm. The wound bed tissue type was 90% pale pink granular tissue and 10 % yellow slough. Prior to use of the new skin formulation, the wound size had remained the same for over a year.

Discussion

Diabetes and obesity along with the circumstantial factors at LTCFs can combine to cause and complicate skin disorders and injuries such as the fungal dermatitis, pressure injury, and chronic venous ulcer described here. If a cleansing agent used to clean a patient with fecal incontinence dries out the skin, the patient will be more prone to infection via bacteria entering any skin cracks that result. If the patient has fungal dermatitis, the dermatitis will be slower to resolve or may not improve at all because of the dryness.

In both of these case reports, we see an example of a non-toxic formulation apparently contributing to treatment success in part because it does not present these intrinsic concerns. It moisturizes instead of drying skin out when used to clean. It can be applied more efficaciously than creams or powders on chronically wet skin.

In addition, the novel formulation offers some positive properties that the products it replaces do not share. In Case 1 involving a very difficult case of fungal dermatitis, it provided a natural antimicrobial effect and a clear view of the wound. In Case 2, the formulation's silver antibacterial ability to reduce the biofilm that had caused the wound to stall (stop healing) - and to also offset the *E.coli* from his urine - showed efficacy above all other standard treatments already tested.

The cases discussed herein suggest that a more natural treatment approach – one that has positive healing properties and avoids counterproductive side effects-- may be appropriate in these clinical settings.

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