The Application of Modern Dressings to Buruli Ulcers: Results from a Pilot Implementation Project in Ghana

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Abstract. Buruli ulcer (BU) is a tropical, infectious skin disease. The resulting ulcer can take a long time to heal, and a high standard of wound care is essential. Currently, the only dressing used for BU wound care is gauze, and its removal causes pain and bleeding. We performed a pilot implementation project using HydroTac[®] (HARTMANN, Heidenheim, Germany), a modern dressing combining foam with a hydrogel component. For future BU treatment, we recommend to use a more absorbent dressing than the HydroTac dressing used in the current project. However, we show that modern dressings can be applied to BUs and that HydroTac dressings yield clean, healing wounds, and prevent the pain and bleeding associated with gauze dressings. Wound care is a vital but to date neglected aspect of BU management.

Buruli ulcer (BU) is a neglected tropical disease caused by *Mycobacterium ulcerans*. It is currently most prevalent in west and central Africa.¹ Typically, BU starts as a small nodule that progresses into a discharging ulcer with necrotic slough and undermined edges over the course of several weeks. BU is most endemic in remote rural areas in west Africa, where health-care services are limited, and there is often a delay in seeking treatment.²

Although an effective treatment with antimicrobials has been introduced more than a decade ago, the healing process is slow, with a median time to healing of 18–30 weeks in small lesions.³ Large scars and contractures may result in functional limitations.^{4,5}

A high standard of wound care reduces the burden on both the patient and the health-care system, as it shortens the time it takes for a wound to heal and prevents secondary infections of the wound. A guideline on BU wound care is provided by the World Health Organization (WHO) in a manual on prevention of disabilities.^{6,7}

A recent survey of BU wound care practices in Ghana and Benin found that gauze was the only dressing type that was used.⁸ Though substantially cheaper, gauze has several disadvantages over more modern dressings, as it adheres to the wound bed and disturbs dermal regeneration upon removal causing pain during wound dressing.^{9,10} In addition, it does not create a moist environment and cannot remain on the wound for more than 1 day, which for many BU patients means a daily loss of productivity of several hours (including walking to the health-care center, waiting) that can be devastating to the household economy.¹¹ Conceptually, modern dressing materials such as a foam dressing would be better suited to maintain a moist environment, can stay on the wound longer, and reduce pain and bleeding.^{12,13} In the current pilot project, we evaluated the use of a hydrofoam dressing for BU wounds in a rural health-care center in an endemic location.

All BU patients visiting the Ananekrum Health Center for wound dressing were included. During the project period (March–April 2012), their wounds were dressed with a hydro-

foam dressing and a compression bandage. The Ananekrum Health Center was chosen as it was the principal center for providing outpatient care for BU in an endemic, rural community (Asante-Akim North Municipal District, Ashanti region, Ghana).

After discussions with wound care specialists at our institution, we chose to use HydroTac[®] dressings (Hartmann, Heidenheim, Germany), which are absorbent foam dressings with an additional hydrogel layer, making it suitable for both moderately discharging and dry wounds and, hence, for the various stages of a BU. After removal of the previous dressing, the wound was cleaned by moderate-pressure irrigation with normal saline and dressed with hydrofoam at a size cut to overlap the wound edges about 1 cm. No other topical solutions were used. Dressings were removed only if strikethrough of the dressing with exudate was visible.

All wounds were photographed and measured by circumference of the wound on an acetate sheet at first presentation and subsequently once a week. Wounds were measured after removal of the old dressing and cleaning. At the end of the project, patients were asked what they liked and disliked about the foam and gauze dressings, and encouraged to grade both the foam and gauze dressings on a scale of 1–10.

This pilot project took place as part of capacity strengthening efforts for BU management in the framework of a randomized controlled trial. It was carried out to explore options for improved standards of wound management and assessment. The protocol was approved by the Ghana Health Service Ethical Review Committee (Reference 01/03/11). All participants provided verbal and written informed consent, and for children under the age of 18 years, informed consent was also obtained from one of the parents.

A total of 13 patients were included in this pilot project. The mean age was 15 years. Eleven ulcers were located on one of the extremities, one on the chest, and one on the abdomen. All patients had either begun or completed antimicrobial therapy for BU, none had undergone surgery, and all patients had been using gauze dressings before the start of the pilot project. Patients were dressed with the HydroTac dressings for an average period of 4 weeks. At presentation to this project, 12 patients had a WHO category I lesion (< 5 cm in diameter) and one patient had a WHO category III lesion (> 15 cm in diameter). The average wound surface was 19.8 cm² with a standard deviation (SD) of 13.1 cm².

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Over the project period, there was a mean (SD) weekly decrease of 9.3% (14.7) in ulcer surface. Two ulcers consistently increased in size over 4 weeks with means of 3.6% and 10.0%, respectively (i.e., at a weekly average of 1% and 2.5%). On average, the dressings had to be changed every 2 days. Wound observation generally showed clean wounds with reddish granulating tissue (Figure 1). No signs of secondary wound infection were observed in any of the ulcers. BUs tend to produce a non-smelling exudative fluid or pus. We observed that the number of days a HydroTac dressing could remain on the wound was limited by the absorbent capacity of the dressings. In addition, as the absorbent capacity was not optimal, the wound environment would tend to be “wet” rather than “moist,” and as a result in some ulcers a slight amount of maceration could be seen on the edges (Figure 2).

Four patients that were 9 years or younger did not fully understand the questions and were excluded from the analysis. The remaining nine patients gave a mean score of 8.5 to the HydroTac and 4 to the gauze dressings. The comments most often heard were that “it is less painful when removing,” “it is comfortable,” “it drains the pus,” and “I only have to remove it once every 3 days now.”

Most participants were children who work and play in muddy or dusty environments. The original plan was to attach the dressings using Hydrofilm® (Hartmann), but this had to be replaced by locally bought plaster and bandages, as it was not adhesive enough (Figure 3).

The HydroTac dressings could be easily cut into the desired size, allowing the team to economize the volume of dressings used.

We describe a pilot project of using modern dressings in the care for BU. As the average time to healing is long, we

FIGURE 2. Maceration of the lower borders of a Buruli ulcer on the abdomen.

did not expect to see any wounds heal during the project period. However, we did measure a steady decrease of wound surface and observed clean, granulating wounds.

Modern dressings prevent the pain and bleeding associated with the removal of dried-out gauze, which is the current most frequently used method of dressing for BUs. As a consequence, patients highly preferred these dressings to the gauze. In addition to increased comfort, it is likely that the lack of frequent disturbance of the wound bed contributes to an increased rate of healing.

We opted for the HydroTac dressing, as we believed it would be suitable for both the purulent, discharging phase and the red and dry phase of BUs. However, its absorbent capacity appeared to be largely insufficient for discharging BUs. We recommend that when choosing a dressing for BU, there should be a focus on absorbent capacity like a regular foam dressing without a hydrogel component. Waterproof films, such as the Hydrofilm, do not appear to be adhesive enough in the rural, muddy environment where our patients typically reside, and therefore bandages and plaster should support the dressing.

Modern dressings are inevitably more expensive than gauze dressings. However, these costs could be offset by a

FIGURE 1. Clean, granulating Buruli ulcer on the elbow.

FIGURE 3. Failed adhesion of the Hydrofilm® after 1 day on a Buruli ulcer on the abdomen.

reduction in the frequency of dressing changes, hence reducing the amount of staff time and disposables used. In addition, they might result in a shorter time to healing. Less frequent dressing changes also result in less time-consuming visits to the health-care facility and hence less disruption of daily activities. Future research should focus on cost-effectiveness of modern dressings versus cheap and local alternatives such as gauze with petroleum jelly or shea butter.

In a currently ongoing clinical trial in Ghana and Benin, the highly absorbent, fiber-based Drawtex® (Beier Drawtex Healthcare, Centurion, South Africa) has been selected as dressing material. Data on the time to healing using this modern dressing are eagerly awaited. Research on the treatment of BU has traditionally focused on antimicrobial therapy. In this light, it is encouraging that the University of Yaoundé in Cameroon has recently launched a diploma course on advanced wound care,¹⁴ largely based on experiences gained in the treatment of BU. We believe that wound care is a vital but to date neglected aspect of BU management. Much can be gained, both in terms of patient comfort and time to healing, with studies that aim to optimize wound care and by teaching and training staff in wound care management.

In this pilot implementation project of modern dressings for BU, we observed that they are easily applicable, result in clean, healing wounds, and prevent the bleeding and pain associated with gauze dressings.

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