

# Using a foam silver dressing to promote healing of a mixed aetiology leg ulcer

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### Abstract

Chronic leg ulceration is a problem that affects a significant number of people and costs the health care system millions of dollars per year <sup>1</sup>. To achieve optimal outcomes for the person with a chronic wound, the treatment must identify and address local and systemic factors that can impair healing.

Wound bed preparation is recognised as the foundation for effective management of the chronic wound. Wound bed preparation considers the elements of the chronic wound environment that contribute to delayed healing. One component of wound bed preparation is reduction of high wound bioburden. Silver has been used in various forms for centuries as an anti-microbial agent. In recent years, the delivery of silver for wound management has been refined and improved and ionic silver released in a controlled manner onto the wound has been found to be an efficacious treatment for high wound bioburden.

This case study illustrates the need to address systemic and local factors to achieve optimal wound healing outcomes. In particular, the efficacy of a foam dressing which releases silver (Contreet<sup>TM</sup> foam) is evaluated as part of a leg ulcer management regime.

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### Introduction

Chronic leg ulceration is a problem that affects a significant number of people and costs the health care system millions of dollars per year <sup>1</sup>. In addition, evidence suggests that the incidence of 'mixed' leg ulcers due to combined arteriovenous insufficiency is increasing <sup>1</sup>. This paper will address the management of a chronic, mixed aetiology leg ulcer within the community nursing setting and, in particular, the role a foam dressing which releases ionic silver played in promoting healing.

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### Management of chronic wounds

To achieve optimal outcomes for the person with a chronic wound, treatment must identify and address local and systemic factors that can impair healing. A model of healing which is applicable for acute wounds may not be relevant for chronic wounds <sup>2</sup>.

Wound bed preparation is recognised as the foundation for effective management of the chronic wound. Wound bed preparation considers the elements of the chronic wound environment that contribute to delayed healing. The principles of wound bed preparation are:

- Removal of non-viable, devitalised tissue.
- Restoration of bacterial balance within the wound.
- Regulation and optimisation of wound moisture (exudate) level.
- Maintaining biochemical balance within the wound <sup>3, 4</sup>.

In the presence of adequate blood supply, debridement of devitalised tissue is vital to promote wound healing. Slough and necrotic tissue provides a reservoir for bacteria, extends the inflammatory phase, is a barrier to wound contraction, and impairs epithelialisation <sup>2</sup>.

Bacterial balance is another critical component of chronic wound management because high wound bioburdens can stop the healing process and lead to infection, septicaemia and poor patient outcomes<sup>5</sup>. Regulation of wound exudate level to promote a moist wound environment can increase the rate of healing and epithelialisation<sup>6</sup>.

Finally, biochemical balance in the wound is maintained through wound bed preparation and the general principles of wound management. These include:

- Determining wound aetiology.
- Addressing any patient factors that can impair healing (e.g. diabetes).
- Implementing local and systemic management strategies to facilitate wound healing<sup>4, 6</sup>.

The use of dressings which release ionic silver is one method which can assist in achieving wound bed preparation. An appropriate silver-releasing dressing will optimise the wound moisture level and restore the bacterial balance within the wound by reducing a high bioburden.

### The case in question

'Mrs Jenkins' was an 80 year old widowed lady living alone in her own home. She was referred to the community nursing organisation in September 2001 with a non-healing right lower leg ulcer. She lived on a large block of very steep land in the foothills of Adelaide. Her passion in life was gardening and despite increasing frailty and difficult terrain, she spent many hours toiling in her ramshackle, overgrown garden. She had family in suburban Adelaide, with her son providing the most regular assistance and support. She received no additional in-home support besides community nursing. Mrs Jenkins' strong-will and personal beliefs initially made her nursing care very challenging.

On admission, assessment determined the ulcer to be primarily of venous origin and compression was recommended to Mrs Jenkins as the best treatment. At this time, Mrs Jenkins refused to agree to the treatment recommended by the nurses. She insisted on dressing the leg ulcer herself between nurses' visits. Her self-initiated treatment consisted of methylated spirits applied directly to the wound and combine wrapped around the leg. As the exudate level was high, she changed the combine a number of times a day.

Mrs Jenkins was also regularly reviewed by the vascular clinic at a large, public hospital. The vascular clinic recommended daily treatment with Silversulphadiazine cream as Mrs Jenkins often developed wound infections due to *Pseudomonas aeruginosa*. Mrs Jenkins continued to refuse compression therapy and insisted on applying methylated spirits and her

own dressings to the ulcer. She often changed the dressing within an hour of the nurse's visit.

As Mrs Jenkins was unwilling to change her treatment, a compromise was reached. It was agreed that the community nurses would visit on a weekly basis to check the condition of the ulcer. Silversulphadiazine cream was applied during the nurse's visit as it provided some degree of antimicrobial prophylaxis, was relatively inexpensive and easy to apply. It was recognised that using Silversulphadiazine cream in this manner was of little value. However, Mrs Jenkins was accepting of this treatment. For many months Mrs Jenkins resisted the nurses' attempts to change her care to a sound, evidence-based wound management regime. During this time she developed several wound infections and was regularly on antibiotics (Figure 1).

### Assessment

In early 2003, Mrs Jenkins finally agreed to try the treatment suggested by the nurses, as she expressed being fed up with the constant leakage of exudate. Although she had previously had an assessment, a full assessment was undertaken again; sound assessment and accurate documentation is the cornerstone of wound management<sup>7</sup>. A comprehensive assessment which considers health history, mobility and sensation, self-care ability, social and psychological status as well as limb and wound appearance provides the nurse with valuable information. Findings from the assessment allowed the nurse to identify factors which could impair healing, locally and systemically, determine ulcer aetiology and formulate an individualised management plan in conjunction with Mrs Jenkins.

Mrs Jenkins' health history included multiple basal cell carcinomas, carpal tunnel syndrome and atrial fibrillation controlled with anticoagulants. She ambulated with a stick

Figure 1. Leg ulcer during self-treatment.



and maintained a reasonable degree of self-care. Limb and wound assessment revealed the classical clinical signs of venous disease including: brown staining of the gaiter area; visible and tortuous veins of the lower limbs; oedema; shallow, extensive, irregular ulceration of the gaiter area; mild discomfort; eczema of peri-ulcer skin; and a high level of wound exudate.

Ankle brachial pressure index (ABPI) was attempted using a hand-held Doppler ultrasound. ABPI is a simple, non-invasive vascular test used as an adjunct to comprehensive clinical assessment. It provides valuable information which may not be obtained by clinical examination alone<sup>8</sup>. During the procedure, the arterial blood flow in Mrs Jenkins' foot could still be clearly heard at 230mmHg pressure. These 'incompressible' arterial vessels suggested calcification of the lower limb arteries. Arterial calcification can be a feature of arterial disease, and is particularly evident in persons with diabetes.

Mrs Jenkins' individualised management plan considered all assessment findings. These indicated an ulcer of mixed aetiology with predominantly venous characteristics. The findings and meaning of the assessment were explained to Mrs Jenkins to ensure she was educated and informed and could therefore participate in decisions regarding her treatment.

### Graduated compression therapy

Graduated compression therapy is the most effective treatment for venous leg ulcers<sup>9</sup>. However, in the presence of significant arterial disease, compression therapy should not be used as it can further reduce already compromised arterial circulation<sup>10</sup>. As Mrs Jenkins' clinical signs were predominantly venous and she did not have significant risk factors associated with arterial disease, it was determined she would benefit from graduated compression therapy to promote venous return and facilitate healing.

As she had significant eczema of the peri-ulcer skin, a zinc paste bandage followed by a short stretch compression bandage was used. Zinc paste bandages are a useful treatment as they nourish the skin, reduce itch and relieve the dryness associated with venous eczema<sup>11</sup>. A short stretch bandage was chosen as a compression bandage as this has a low resting pressure, is predominantly cotton and would allow Mrs Jenkins to wear normal footwear. The ability to wear her sturdy, lace-up shoes was very important, due to the steep terrain of her yard and her love of gardening.

Mrs Jenkins was educated and informed regarding all aspects

of her treatment. Initially, nurses checked regularly on Mrs Jenkins to ensure she was tolerating the compression and not experiencing any complications. Mrs Jenkins tolerated the zinc paste bandage and short stretch compression without problem. However, despite the compression, management of exudate initially continued to be an objective. For 3 months from 23 April 2003 to 15 July 2003 a foam dressing was used as the primary wound dressing (Figure 2).

On 15 July 2003 it was noted that the wound had an offensive odour, had developed bright green, slimy exudate and had increased in size. These findings indicated that Mrs Jenkins had developed a local wound infection, probably due to *Pseudomonas aeruginosa*. As she was otherwise well, clinical assessment suggested that a topical anti-microbial agent should adequately control this localised infection. Treatment with a dressing which releases ionic silver was chosen (Figures 3 & 4).

### The role of silver in wound bed preparation

Silver has been used in various forms for centuries as an anti-microbial agent. In recent years, the delivery of silver for wound management has been refined and improved. Ionic silver released in a controlled manner onto the wound has been found to be an efficacious treatment for high wound bioburden<sup>12</sup>.

Whilst there are many different dressings which contain silver, there are variations amongst them. Armstrong states that: "The antimicrobial efficacy and safety of these wound dressings is determined by the concentration of silver and its bioavailability in a solution"<sup>13</sup>. Therefore, knowledge of each product, the concentration of silver released and how it has performed in independent, clinical trials is vital prior to choosing a particular dressing with silver.

**Figure 2. Leg ulcer 2 May 2003 during treatment with foam dressing and graduated compression therapy (published with permission RDNS – SA Inc).**



**Progress**

The author had recently been provided with a number of samples of a new silver-releasing dressing, Contreet™ foam, manufactured by Coloplast. This dressing was chosen as it would meet the objectives of Mrs Jenkins’ wound management which were to:

- Manage the high level of exudate.
- Reduce the high bioburden.
- Ensure ease of use.
- Ensure infrequent dressing changes.

Contreet dressings release silver ions onto the wound dependent on the amount of wound exudate and bacteria within a wound. As the exudate level increases, more silver ions are released from the dressing<sup>14</sup> and, depending on exudate level, Contreet will remain effective against bacteria for up to 7 days<sup>15</sup>. Exudate is bound within the matrix of the foam dressing. This made Contreet foam dressings an appropriate choice for use under compression therapy.

**Figures 3 & 4. Leg ulcer 15 July 2003** (published with permission RDNS – SA Inc).



Within 48 hours of the first application of Contreet foam dressing in conjunction with continuation of the short stretch compression bandage, a significant improvement had occurred in the appearance of Mrs Jenkins’ ulcer. The exudate was no longer green, the appearance of the wound tissue had improved and no odour could be detected (Figures 5 & 6).

Contreet foam dressings were continued as a primary wound dressing, with zinc paste bandage over the eczematous areas and short stretch compression bandages. The dressings were changed twice a week by the community nurse. In 2 months of continuous use of Contreet foam dressings and compression, the ulcer had almost healed (Figures 7 & 8).

**Discussion**

Continuous application of graduated compression therapy can heal 40-80% of venous leg ulcers in 12 weeks<sup>16</sup>. Whilst the commencement of graduated compression therapy did improve Mrs Jenkins’ wound, it was slow to reduce in size.

**Figures 5 & 6. Leg ulcer 17 July 2003; within 48 hours of treatment with Contreet™ foam dressing and graduated compression therapy** (published with permission RDNS – SA Inc).



This was most likely due to the high bioburden within the wound. Once this was addressed with the use of an anti-microbial dressing, healing progressed rapidly. This illustrates the need to address systemic and local factors which can impair wound healing. Anti-microbial dressings are a valuable adjunct to wound management as they can assist clinicians to attain optimal wound healing conditions.

### The future

It is planned to continue compression therapy and Contreet dressings until healing occurs. Given that Mrs Jenkins has experienced repeated wound infections (and she continues to garden), silver-releasing dressings will provide antimicrobial prophylaxis. Mrs Jenkins is aware that a lifetime of graduated compression will be necessary to manage her venous insufficiency and minimise ulcer recurrence. It is planned to

**Figures 7 & 8. Leg ulcer 26 September 2003 with continued treatment with Contreet foam dressing and graduated compression therapy (published with permission RDNS – SA Inc).**



fit Mrs Jenkins with graduated compression hosiery once her ulcer has healed.

### Conclusion

Chronic wound management can be a nursing challenge. A sound knowledge and skill base is necessary to ensure appropriate interventions are implemented which will lead to healing. With an understanding of the pathophysiology of chronic wounds and by using the principles of wound bed preparation, nurses can promote leg ulcer healing.

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