Case series evaluation of a silver non-adherent dressing

Sarah Bradbury, Nicola Ivins, Keith Harding

Abstract

Aims: To evaluate the efficacy of Silvercel® Non-Adherent dressings on various wound types. *Methods:* Silvercel Non-Adherent was applied to 26 patients with either systemic or locally infected wounds, critically colonised wounds or wounds at high risk of developing infection, i.e. those with a history of recurrent infection or known associated comorbidities. The dressing was applied for up to 12 weeks or until clinically indicated. Comprehensive wound assessment was performed every 1–2 weeks. *Results:* 16 patients' wounds decreased in size, with six achieving complete healing during or within two weeks of completing the evaluation. 16 patients remained free of infection. The majority of patients experienced no pain or decreased pain. There were no reports of (visible) fibre shedding and only two patients experienced an episode of dressing adherence. *Conclusions:* Silvercel Non-Adherent dressings have the potential to affect positively the outcome of infected, critically colonised, or high risk wounds of various aetiologies when used in conjunction with standard of care, and to minimise pain at and between dressing changes.
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KEY WORDS
Silver
Non-adherent
Antimicrobial
Wound pain
Fibre shedding

Dressing adherence contributes to pain and trauma at dressing change, and dressing fibres left in wounds can potentially prolong inflammation. Silvercel® Non-Adherent (Systagenix Wound Management) is a new generation of absorbent anti-microbial dressings which has been specifically designed to minimise the pain and trauma often associated with wound dressing changes (Price, 2006; Price et al, 2008). Several studies have identified that dressing adherence is the main contributor to pain at dressing change, which has also been identified as the worst part of living with a wound (Moffatt et al, 2002; Price et al, 2006). Dressing adherence on removal can also cause localised tissue damage to the wound bed and/or surrounding skin, which can adversely affect healing by potentially re-initiating the inflammatory phase of healing at each dressing change (Hollinworth and White, 2006; Mudge and Orsted, 2010).

Some fibrous dressings, such as alginates and hydrofibers (Kaltostat® [ConvaTec], Silvercel® [Systagenix], Aquacel® Ag [ConvaTec], Sorbsan® [Aspen Medical]) have been shown to shed fibres into the wound bed (Bell and Hart, 2007; Berry et al, 1996; Odell and Lombardi, 1994; Suzuki et al, 1999). These studies highlighted that these fibres have the potential to act as an inflammatory stimulus and provoke a foreign body reaction, which could prolong the inflammatory phase of wound healing (Berry et al, 1996).

Silvercel Non-Adherent has an outer porous film layer. This property helps to prevent adherence and fibre-shedding, therefore, it is less likely to cause pain and discomfort at dressing changes, while providing antimicrobial activity and effective absorbency.

Silvercel Non-Adherent dressings are indicated for use on moderate to heavily exuding wounds that are either locally infected or at increased risk of infection. They can also be used on wounds where there is spreading or systemic infection, in conjunction with antibiotic therapy. They are suitable for use on acute and chronic wounds of various aetiologies, including leg ulcers, pressure ulcers, diabetic ulcers, donor sites, traumatic and surgical wounds. There is also a packing version of the dressing which can be used in cavities. In some cases, Silvercel Non-Adherent can be used on wounds with low exudate levels where a dressing with sustained antimicrobial activity is required, e.g. under compression, as it can be moistened with normal saline before application.

Although widespread or indiscriminate use of antimicrobial dressings prophylactically is not advocated, there is guidance to support their use in patients with a legitimate risk of re-infection, evidenced by a history of recurrent infection. Such patients may be at risk of developing cellulitis or systemic infection which has important clinical, quality of life and cost implications (Best Practice Statement, 2011).

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In a time of increasing microbial resistance to antibiotics, the use of antimicrobial dressings to prevent progression of infection or re-infection could significantly decrease the need for treatment with systemic antibiotics. There are also indications for prophylactic use in patients with an associated condition which significantly increases infection risk. For example, in the patient with diabetes, where the classic signs of infection such as pain and heat may be diminished, use of antimicrobial dressings may help to prevent progression to a limb- or life-threatening advanced infection. Some studies have also indicated a beneficial effect on healing when topical antimicrobials have been used on patients with critically colonised wounds, where delayed healing is present without the manifestation of signs of infection (Furnal et al, 2002; Jorgenson et al, 2005). Although the possibility of development of silver resistance and cytotoxicity should be considered when using silver dressings, current research suggests this possibility is limited within the clinical setting (Percival et al, 2005). The use of antimicrobial dressings should be undertaken on an individual patient risk basis, using sound clinical judgement (Cutting et al, 2007). The World Union of Wound Healing Societies consensus document (WUWHS, 2008) and the Best Practice Statement (BPS, 2011) suggest that the use of topical antimicrobial dressings should be evaluated after 10–14 days if there is no improvement in local infection, and that they should not be used indefinitely.

This paper outlines a case series undertaken to evaluate the use of Silvercel Non-Adherent dressings on a variety of different wound types during routine practice.

Method

Patients were included in the case series if they presented with exuding wounds which were either systemically infected, locally infected, critically colonised, or if prophylactic use was indicated. Systemic or spreading infection is characterised by symptoms including increased pain and exudate, heat, odour and oedema in conjunction with spreading erythema, wound breakdown/dehiscence or evidence of systemic illness (pyrexia, raised white cell count/inflammatory markers, abnormal observations) (WUWHS, 2008; BPS, 2011). Local infection is diagnosed if these classical signs and symptoms are present but with non-spreading erythema and no systemic symptoms (WUWHS, 2008; BPS, 2011). Changes in the appearance of the wound bed, such as discoloured or 'beefy' red friable granulation tissue that may bleed easily and/or increased sloughy tissue may also be exhibited in either case (Cutting and Harding, 1994).

Critical colonisation was considered if there was delayed healing and/or unhealthy tissue in the absence of obvious indicators of inflammation (Gray et al, 2005). Prophylactic use was indicated where there was a history of recurrent infection, or if the wound was considered to be 'at high risk' of infection, e.g. in patients with comorbidities such as diabetes or autoimmune disease, immunosuppression, deep pressure ulcer or a cavity at increased risk of osteomyelitis, or a heavily contaminated surgical or traumatic wound (Cooper, 2004; WUWHS, 2008).

Wound assessment was performed as per local standardised criteria, which includes assessment of the wound bed, edge and surrounding skin, exudate levels and presence of odour. Wounds were measured and traced where possible, and photographs taken. Pain frequency and duration were assessed, again using local assessment criteria. Informal feedback was taken from both patients and clinicians on the use of the dressing in practice. Patients were followed up weekly for 12 weeks, or until clinically indicated. The dressing was applied with appropriate standard of care treatment for the wound type, e.g. compression, offloading footwear, or pressure-relieving devices. Wound bed preparation, such as sharp debridement, also occurred where necessary to remove devitalised tissue and promote a healthy wound base.

Results

Twenty-six patients with various wound aetiologies were included (*Table 1*). *Table 1* also indicates the types of secondary dressings or bandages used.

The patients all had chronic wounds, as commonly encountered at the authors' clinics. These wounds are difficult to heal and prone to infection, and are thus suitable for this type of dressing.

The average duration of use of Silvercel Non-Adherent dressings for this patient group was nine weeks (range 3–20 weeks). Although this may seem a prolonged length of time, the dressing

Table 1
Wound aetiology and secondary dressings

Wound aetiology (n=26)	Secondary dressing/bandage
Leg ulcer VLU (n=11) MLU (n=2)	 High compression bandage = 6 Modified compression bandage = 5 Modified compression bandage = 2
Surgical wound (n=3)	Surgipad and film dressing = 1 Adhesive absorbent perforated dressing = 1 Adhesive foam dressing = 1
Pressure ulcer (n=4) (grade 2 = 2) (grade 4 = 2)	Adhesive foam dressing = 2 Modified compression bandage = 1 High compression bandage = 1
Diabetic foot ulcer (n=6)	Adhesive absorbent perforated dressing = 1 Absorbent perforated plastic film faced dressing = 2 Surgipad = 3

was only continued where there was indication for antimicrobial therapy.

The patient who remained on the dressing for 20 weeks did so because it had a positive effect. She had a large abdominal wound (*Figure 1*) with a complex history and had failed to respond to a number of treatments, including topical negative pressure (TNP) and other antimicrobial dressings. The wound was locally infected, producing heavy amounts of exudate which the Silvercel dressing managed effectively, maintaining the integrity of the surrounding skin. After resolution of the local infection, the wound was considered to be at high risk of re-infection without the use of an antimicrobial dressing. Thus, as the wound was progressing to healing (*Figures 2* and *3*), which it had failed to do previously, the authors felt that the benefits of continued use of Silvercel Non-adherent for a prolonged time far outweighed the risks and complete healing was achieved.

Wound size

Sixteen patients progressed towards healing, which was evident by a decrease in wound size. Three went on to heal completely a week after stopping the dressing and achieved complete wound closure.

In six patients, the wound size increased. Two of these patients developed infection that needed to be treated with systemic antibiotics and so were withdrawn from the study. One patient experienced maceration to the surrounding skin and a deteriorating wound bed, possibly contributing to the increase in size. For two patients, the wound size only increased marginally: one asked to stop the dressing as she was experiencing pain, the other was unable to attend podiatry appointments regularly for debridement, which potentially contributed to the increase in size. One patient experienced discomfort on application which, coupled with the increase in size, could indicate sensitivity to the dressing and thus the treatment was withdrawn.

One patient was lost to follow-up after admission to hospital for surgical debridement with an infected diabetic foot ulcer and cellulitis.

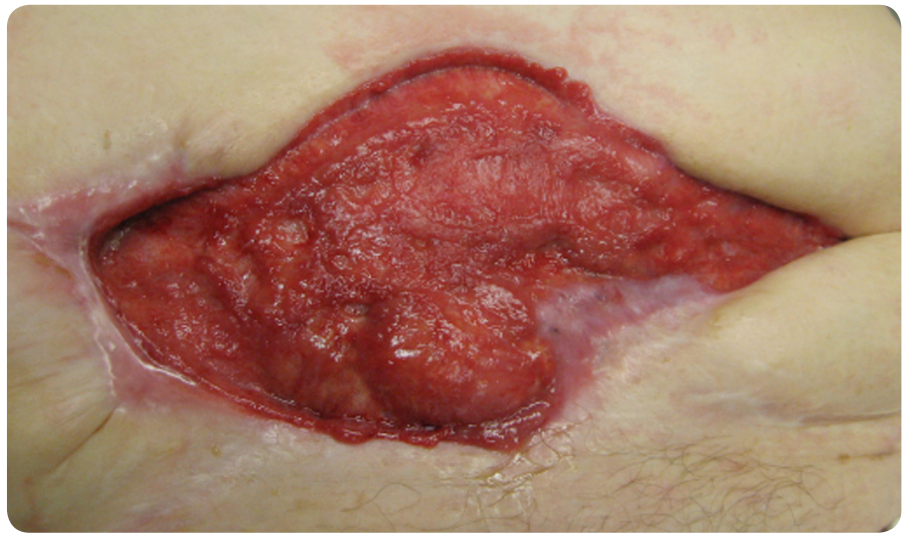

Figure 1. Locally infected abdominal wound at presentation.

Wound infection

Of the 26 patients evaluated, only two had overt wound infection requiring systemic antibiotics when Silvercel Non-Adherent was initially applied. Eight patients required an antimicrobial dressing for signs of local wound infection, six patients for the treatment of critical colonisation, and ten patients because they met the criteria for patients at high risk of wound infection.

One patient with an infected wound achieved complete wound closure after five weeks of treatment with the Silvercel Non-Adherent dressing (*Figures 4* and *5*). The second patient with an infected wound required antibiotics because there were signs of continued infection. However, during this time she experienced a significant decrease in wound size (74%), and found that the wound pain and tolerance of compression therapy was much improved while using the dressing (*Figures 6* and *7*). The patient's wound has now completely healed.

Of the 24 patients without systemic or spreading infection at the start of the study, nine (37%) developed infection while using Silvercel Non-Adherent dressings and required systemic antibiotics. Six patients (25%) required alternative treatment, including surgical debridement, but three continued with Silvercel Non-Adherent together with antibiotics, with resolution of infection and improvement in the wound condition and size. Five of these patients had the dressing initially applied for local infection (including one diabetic foot ulcer), one for critical colonisation and three for high-risk wounds (one grade 4 pressure ulcer and two diabetic foot ulcers).

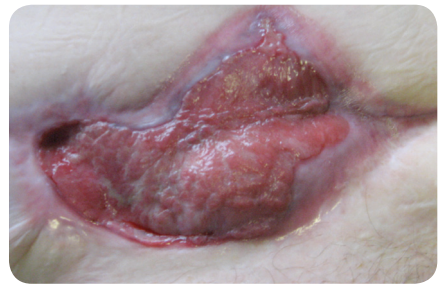

Figure 2. Abdominal wound after 12 weeks of treatment.

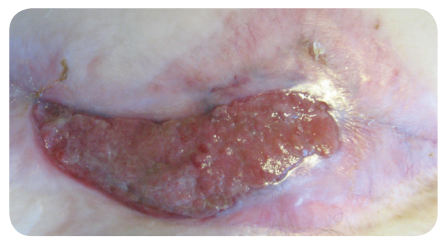

Figure 3. Abdominal wound after 20 weeks of treatment.

Fifteen patients (63%) remained free of infection while using Silvercel Non-Adherent dressings.

Wound pain

Wound pain was assessed using the

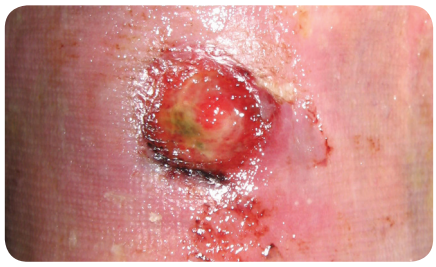

Figure 4. Infected wound at presentation.

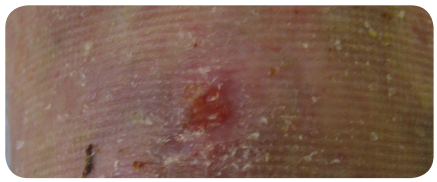

Figure 5. Infected wound after five weeks of treatment with Silvercel Non-Adherent dressing.

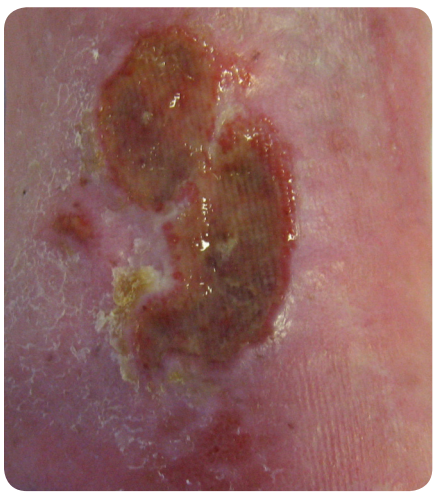

Figure 6. Infected venous leg ulcer at presentation.

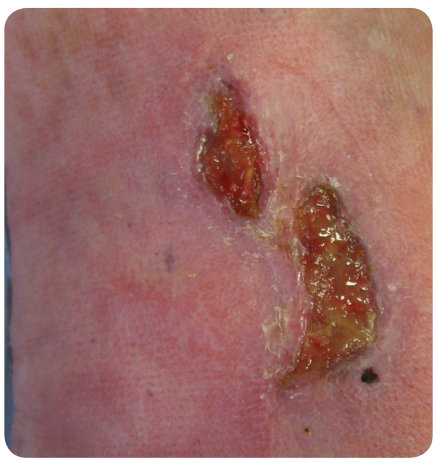

Figure 7. After 12 weeks of treatment with Silvercel Non-Adherent dressing.

standardised local assessment criteria outlined in *Table 2*.

Table 2
Wound pain assessment tool

Frequency of wound-related pain	Severity of wound-related pain
None	Mild (patient able to tolerate)
Intermittent (between dressing changes)	Moderate (patient able to tolerate with analgesia
At dressing change	Severe (patient unable to tolerate even with analgesia)
Continuous (between dressing changes)	Non-evaluable

Three patients experienced increased pain when using Silvercel Non-Adherent which led to discontinuation of the dressing (*Figure 8*). One patient complained of increased discomfort on application, one generally increased pain when using the dressing and another reported burning when the dressing was applied. Nine patients experienced a decrease in wound pain during wear time of the dressing (*Figure 8*).

Six patients reported their wound pain had either significantly decreased or completely remitted during the evaluation, to the extent that they no longer required analgesia for wound pain.

Exudate management and surrounding skin

Exudate levels were recorded as none, light (strikethrough onto secondary dressing), moderate (showing through secondary dressing), heavy (strikethrough onto bandage or outer dressing), or copious (strikethrough with maceration/excoriation of the surrounding skin). Assessment of exudate was also made with consideration of the frequency of dressing changes being performed.

Figure 9 indicates the number of patients with each level of exudate at the beginning and end of the evaluation, with *Table 3* displaying the number of patients who experienced increasing, decreasing or unchanging levels of exudate throughout the course of the evaluation.

The dressing was used on five patients with mild exudate on initial application — three had venous or mixed leg ulcers that required an antimicrobial dressing which would maintain its absorbency underneath compression bandaging for up to a week. Two had chronic non-healing surgical wounds which required an atraumatic antimicrobial dressing.

One patient with a pressure ulcer

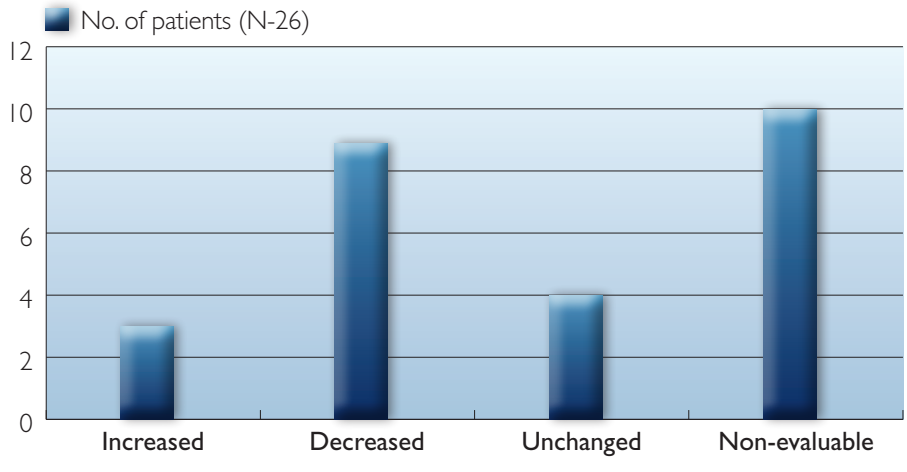

Figure 8. Changes in wound pain during wear time of Silvercel Non-Adherent dressings.

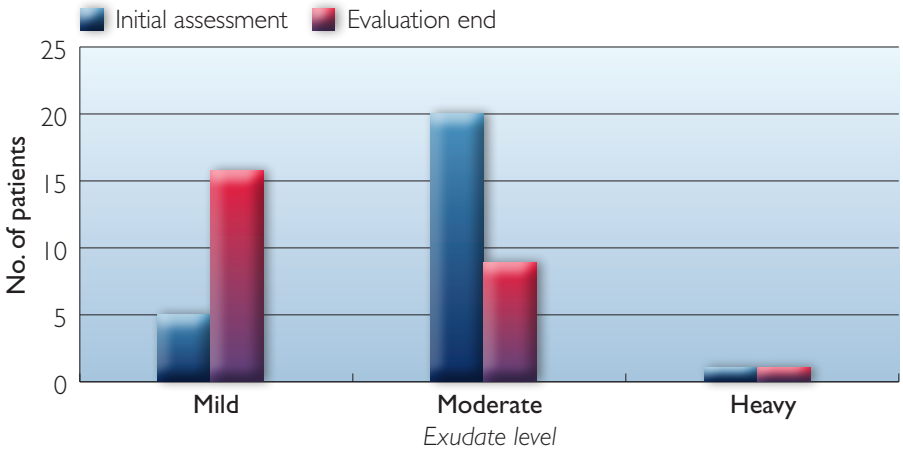

Figure 9. Changes in level of exudate.

required the treatment to be withdrawn due to persistent maceration, despite unchanging levels of exudate. The surrounding skin of another patient deteriorated, becoming excoriated and fragile — this was the same patient who experienced increased discomfort on application, suggesting a possible sensitivity which necessitated withdrawal from treatment. Five patients experienced intermittent episodes of slight maceration or eczema, usually when exudate levels were temporarily increased or if using an adhesive secondary dressing. These were resolved by increasing dressing change frequency, treatment of the surrounding skin with either a steroid ointment or protective barrier film, or review of the secondary dressings.

Discussion

Overall, use of Silvercel Non-Adherent dressings in conjunction with appropriate standard of care resulted in 73% (n=19) of patients progressing towards, or achieving complete epithelialisation of their chronic wounds during the evaluation. However, 37% developed an overt infection. The risk of wound infection is increased in patients where there is a deficient immune response, such as the elderly and those with auto-immune diseases, or those requiring immunosuppressant medications (Cooper, 2005). Poorly controlled diabetes mellitus, impaired circulation and social factors also increase risk. Complex wounds often do not respond to conventional treatments in a timely manner. The persistent loss of skin barrier function and the development of longstanding chronic wounds increase exposure of the wound to pathogens, increasing the risk of infection (Hunt and Hopf, 1997; Kingsley, 2001; Ferreira et al, 2006). The patients included in this case series were at increased risk of infection, as they were complex in terms of their wounds and/or underlying diseases — these being the types of patients referred for specialist management. In view of this, the fact that 15 complex patients (63%) did not develop any signs of wound infection would, in the authors' clinical experience, seem an overall positive result.

Table 3
Changes in level of exudate

Exudate level	Number of patients (n=26)
Increased	1
Decreased	12
Unchanged	13

Of the 37% (n=9) patients who developed infection while using the dressing, three had complex diabetic foot wounds. It is acknowledged by the American Diabetes Association (ADA) that both systemic antibiotics and topical agents may be insufficient to manage infection in the diabetic foot (ADA, 2003), as was in evidence here. Despite this, two of these wounds were decreasing in size before requiring surgical intervention for associated problems. Thus, the dressing appeared effective at both managing and preventing infection in a large group of complicated patients, and both clinician and patient feedback was generally positive.

The majority of patients who experienced pain between dressing changes either reported their pain was unchanged or decreased. In terms of frequency, there is a larger shift towards patients experiencing no pain from the beginning (38%) to the end (54%) of the evaluation. For severity, less patients were experiencing moderate and severe pain and more experiencing mild or no pain at the end of the evaluation compared to the start. All these changes in wound-related pain are mainly due to resolution of infection and progression to healing. In the authors' opinion, this could be attributed to the use of Silvercel Non-Adherent dressings and their multi-purpose design.

Patients generally found the dressing comfortable to wear, and clinician feedback indicated that the dressing was easy to apply and remove, minimising trauma to the wound bed and pain or discomfort for the patient. Two patients experienced an episode where the dressing adhered, but soaking with water or normal saline resolved this without damage to the wound bed. As an anti-microbial dressing was still required and the patients were comfortable with the dressing, it was moistened with saline before reapplication to prevent further adherence, rather than being discontinued. No further problems were reported in either case. There were no reports of dressing fibres or debris remaining on the wound bed after removal.

The dressing coped efficiently with varying levels of exudate, with the integrity of the surrounding skin being well maintained. Almost half the patients evaluated experienced a decrease in exudate levels while wearing the dressing, which could be due to management of microbial activity and a decrease in wound size, again factors which could be attributed to the dressing itself. The dressing was effective at maintaining absorbency of exudate when underneath different forms of compression therapy, as well as in the case of large abdominal wounds or

pressure ulcers when used in conjunction with an absorbent secondary dressing.

Conclusion

While acknowledging the limitations inherent in a case series, such as lack of control of external bias and internal validity, or no comparative data group, such evaluations can provide interesting clinical data on complex patient groups who are unsuitable for inclusion in rigorous trials. Information relevant to situations commonly encountered in routine clinical practice do emerge. Without making claims regarding treatment efficacy, the findings of this series of case studies evaluating Silvercel Non-Adherent dressings were positive in management of potential and actual wound infection.

Clinician feedback indicated that the design of the dressing with its non-adherent film layer addressed the issue of dressing adherence and fibre shedding, thus minimising pain and discomfort for the patient at and in between dressing changes. This was supported by pain assessments (outlined in *Table 2*) performed at each weekly or fortnightly assessment and patient comments. Reduced analgesia requirements and complete resolution of pain for some patients was a significant outcome, considering pain at dressing change has been identified as an important contributor to reduced quality of life in patients with wounds (Doughty, 2003).

In view of the complex nature of the patient group evaluated, the outcomes regarding healing and reduction in wound size were encouraging. This was also the case for the prevention and management of wound infection, as the patients were specifically chosen if wound infection was a particular problem and contributing to delayed healing. The fact that 16 patients remained free of infection and did not require treatment with systemic antibiotics is a consideration in an era where increasing antibiotic resistance is encountered. The prophylactic use of an antimicrobial dressing proved to be beneficial and judicious for this patient group, although it is acknowledged that prophylactic use of silver dressings is not appropriate for all patients and awareness of possible resistance needs to be maintained. The deterioration of some wounds with regards to size and infection is not uncommon when evaluating wounds of this nature, and reflects the common occurrences encountered in clinical practice. WUK

Key points

- Dressing adherence may contribute to pain and trauma at dressing change.
- Silvercel Non-Adherent has been designed to minimise dressing adherence and fibre shedding.
- Silvercel Non-Adherent effectively managed infection, exudate and wound-related pain for various wound types in the majority of patients evaluated.

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