An investigation of Cutimed® Sorbact® as an antimicrobial alternative in wound management

G Kammerlander, E Locher, A Suess-Burghart, B von Hallern, P Wipplinger

Abstract

Background: Antimicrobial dressings play a major role in the effective management of both acute and chronic wounds. The study featured in this article investigates whether the use of a new dressing, which incorporates the principle of hydrophobic interaction, offers an effective form of antimicrobial management in chronic wounds. *Aims:* This study aimed to assess the efficacy of Cutimed® Sorbact® (BSN medical Ltd, Hull) in the management of chronic wounds. *Methods:* A 116-patient multi-centre European study was used. *Results:* The study results demonstrate that 81% of patients with an infected wound received effective treatment using the new dressing. Twenty-one per cent of patients' wounds healed during the study and a further 72% showed an improvement in wound healing. Reductions in wound pain were reported and both patients and healthcare professionals reported the dressing as being easy to use. A range of secondary dressings were used during the study and no compatibility issues were reported. The principle of hydrophobicity in dressings offers an alternative to the use of established antimicrobial products. *Conclusions:* The adaptability of a bacterial binding product offers a great deal to healthcare professionals involved in the management of wounds and should be considered a welcome development *Conflict of interest:* This study was performed in response to the application and request of the Academy for Certified Wound Management and was subsequently sponsored by BSN medical GmbH (Hamburg)

KEY WORDS

Wound care
Chronic wounds
Antimicrobial dressings
Wound bed preparation
Bacterial binding
Hydrophobic interaction

The control of bacterial load as an approach to the management of chronic wounds has been known for many years (Cutting and Harding, 1994). The theory of wound bed preparation (Sibbald et al, 2000; Schulz et al, 2003) formalised the concept based on three crucial areas of management important in the management of chronic wounds: debridement, bacterial balance and moisture balance.

The antimicrobial products currently available encompass a range of techniques that use elemental approaches; these products use active ingredients like silver (e.g. silver sulfadiazine, nanocrystalline silver, silver nitrate, colloidal silver) to control bacterial load.

The bacterial binding wound dressing Cutimed® Sorbact® (BSN medical Ltd, Hull) offers an alternative approach to wound healing or the management of bioburden. This mode of action is based on hydrophobic (water repellent) interaction (*Figure 1*). Hydrophobic particles naturally aggregate in an aqueous environment, held together by surrounding water molecules. Cutimed Sorbact dressings are coated with a fatty acid derivative (dialkylcarbamoyl chloride, DACC) providing the product with strongly hydrophobic properties. As wound bacteria also have hydrophobic characteristics, they become physically bound to the dressing fibres and are subsequently removed from the wound when the dressing is changed (*Figures 2 and 3*).

This bacteria binding effect is already well established (Ljungh et

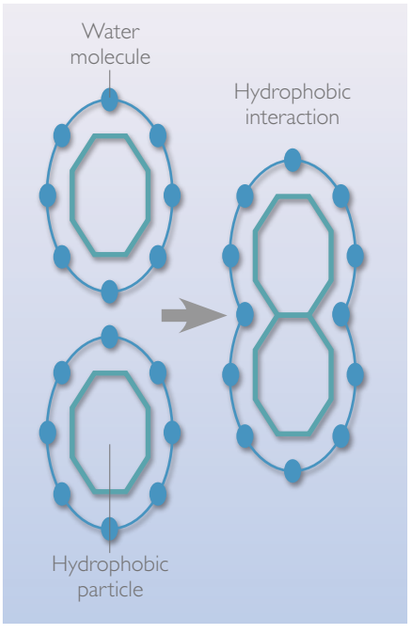

Figure 1. Hydrophobic interaction.

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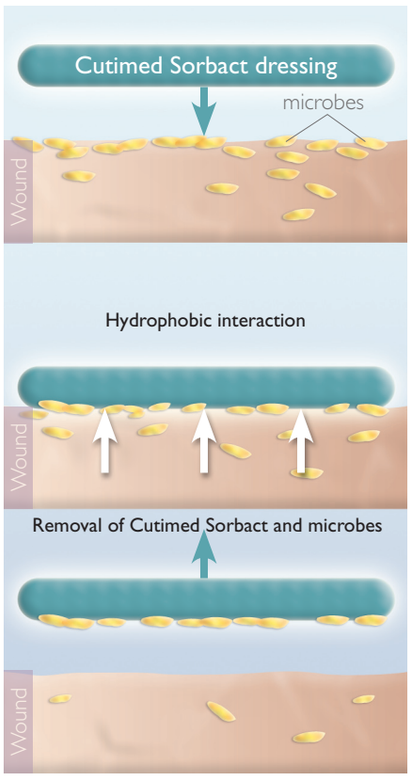

Figure 2. Hydrophobic action of Cutimed Sorbact.

al, 2006) and is of particular interest in wound care as it requires no local antiseptic or antibiotic agent to treat wounds displaying local signs of infection or critical colonisation. This is important as the wound is not charged with chemically active agents and therefore there are no risks of cytotoxic reactions or development of bacterial resistances.

Aims

This study was performed to obtain detailed information about the efficacy of Cutimed Sorbact in the management of secondary healing wounds.

Method

The study was undertaken between 2003 and 2006 in four hospitals with specialist wound healing centres in Munich and Stade, in Germany; Linz in Austria; and Kallern in Switzerland. These centres were chosen because they all have certified wound managers from the Academy of Certified Wound Management and all have the same background and knowledge regarding the treatment of chronic and acute wounds. All the healthcare professionals

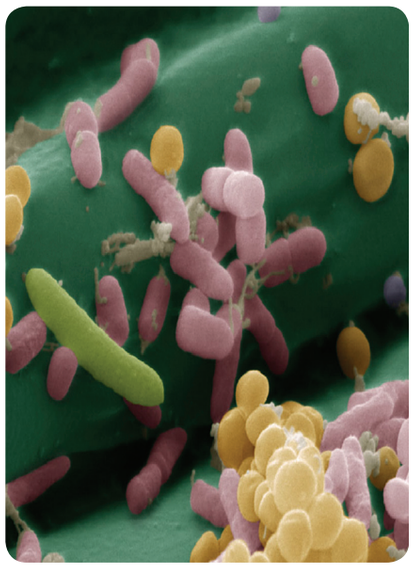

Figure 3. Electron microscope image of Cutimed Sorbact with bacteria attached.

using the product were accredited wound specialists and were briefed on the use and therapeutic indications of the dressing at the start of the study. They were instructed to use Cutimed Sorbact as part of the therapeutic regimen they would normally use for the patients involved in the study.

Patients presenting with a wound that was deemed to be at high risk of infection were asked if they wanted to take part in the study. Enrolment in the study was slow initially, but increased in pace once initial scepticism regarding the product was overcome by positive results. During the treatment, practitioners became confident that the product performed well, and more patients were recruited to the study.

In order to test the efficacy of Cutimed Sorbact, the study questioned whether it could:

- Reduce signs of perifocal inflammation
- Reduce or eliminate local infection
- Improve the course of wound healing
- Demonstrate subjective tolerability by patients
- Demonstrate broad compatibility with other wound management products
- Provide easy product handling during dressing changes.

A wide variety of wounds healing by secondary intention (aetiologies shown in *Figure 4*) were treated using the structured approach to wound management normally adopted by the participating clinics. A recognised protocol was followed based on the Wound Healing Continuum (Gray et al, 2006), with appropriate management provided dependent on the stage of wound healing. Wound healing progression was monitored as per normal practice; a standardised case report form was used to monitor and record the progress.

To assess wound healing, wounds were assigned to one of the following four groups:

- Stagnating — if the final wound assessment exhibited neither deterioration nor a marked improvement in the wound compared with the initial assessment
- Worse — if the clinical signs of inflammation had increased, sloughy layers or necrotic material had formed for the first time or the proportion of granulation or epithelial tissue was reduced
- Improved — if the clinical signs of inflammation were reduced, the wound became clean or an increased amount of granulation or epithelial tissue was observed. Successful cleaning of the wound bed followed by surgical wound closure was also classified as improved
- Cured — if the original skin defect showed complete, closed and epithelialised scar formation.

A wound was considered infected if the typical local infection signs, and possibly signs of a spreading infection, were observed. The evaluation presented in this paper used the following signs of clinical infection:

- Skin irritation
- Redness
- Infiltration
- Swelling
- Pain
- Exudate
- Odour.

In the worst cases wound swabs were taken for analysis.

The condition of the peri-wound skin was also observed. Patients enrolled

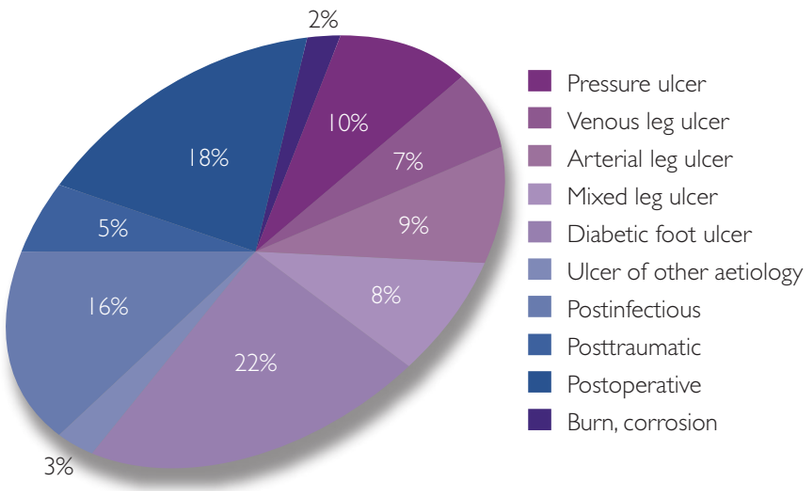

Figure 4. Aetiologies of the wounds included in the study.

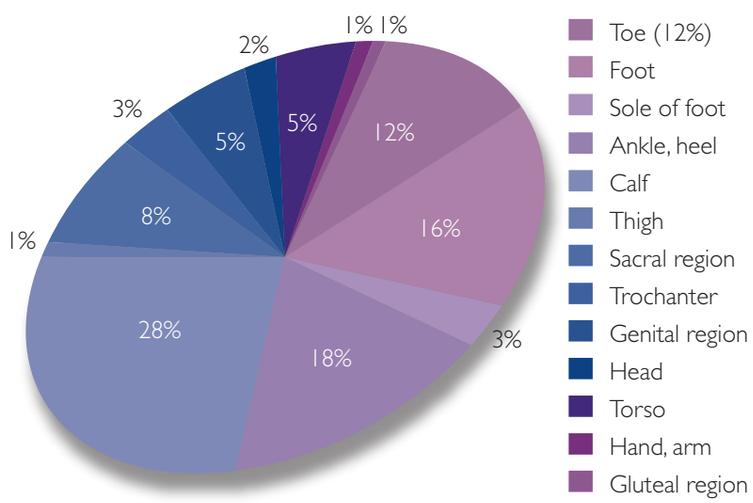

Figure 5. Positions of wounds included in the study.

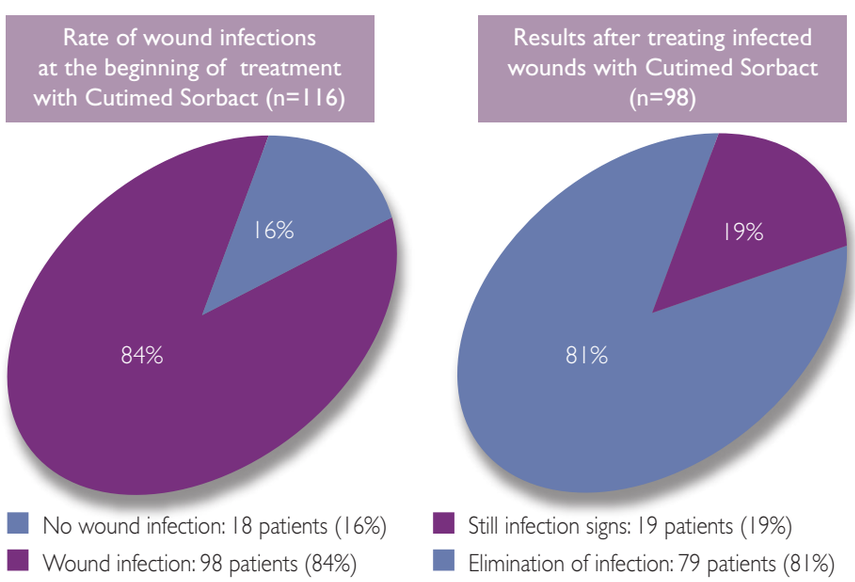

Figure 6. Number of wound infections at the start and end of treatment.

in the study with a systemic infection (an infection in addition to the local wound infection) were treated with antibiotics according to normal practice. This group accounted for less than 10% of the study.

Tolerability by patients was determined using pain assessment. This was documented at every dressing change (n=1150) using a visual analogue pain scale extending from 0–10 (0 being no pain; 10 being severe pain). This parameter could not be established in one of the patients due to unconsciousness.

Another pain-related question put to the patients (n=115) concerned any subjective sensations felt directly after the application of Cutimed Sorbact at each dressing change. The feel of the dressing was rated as 'neutral', 'unpleasant, 'pleasant', or 'very pleasant'.

The secondary dressing used to maintain the optimum wound environment was also noted. Wound managers were left to choose the secondary dressing (e.g hydrogels, alginates, hydrocolloids) that would be most suitable for the wound (e.g. based on the level of exudate).

At every dressing change practitioners were asked to comment on the handling and application of the product. They could rate it as 'very good', 'good', 'satisfactory' or 'unsatisfactory'. Additional comments were also encouraged.

Results

A total of 116 patients were enrolled in the study. The profile of these patients was as follows:

- Mean treatment period: 37 days (range = 4–134 days)
- Mean age: 63 years (range = 27–95 years)
- Mean age of the wound at start of treatment: six months (range = 1 day–54 months)
- Gender distribution: 54 women, 62 men
- Recorded dressing changes: 1,150
- Mean frequency of dressing change: 2.5 per week
- Wound aetiologies and locations are shown in *Figures 4* and *5*.

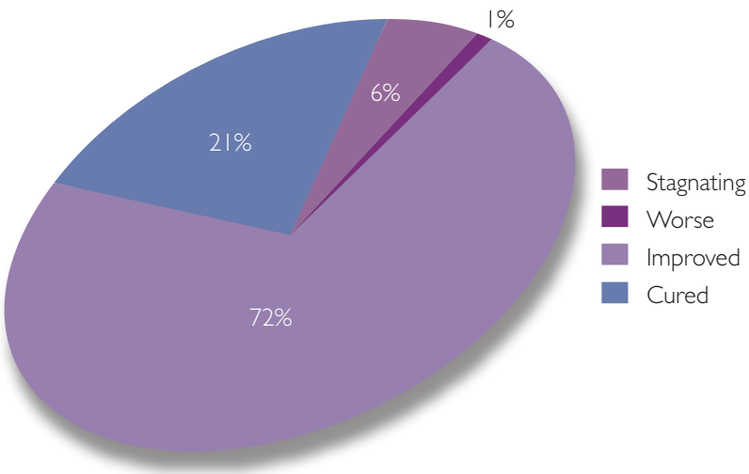

Figure 8. Final outcomes of the wound healing process.

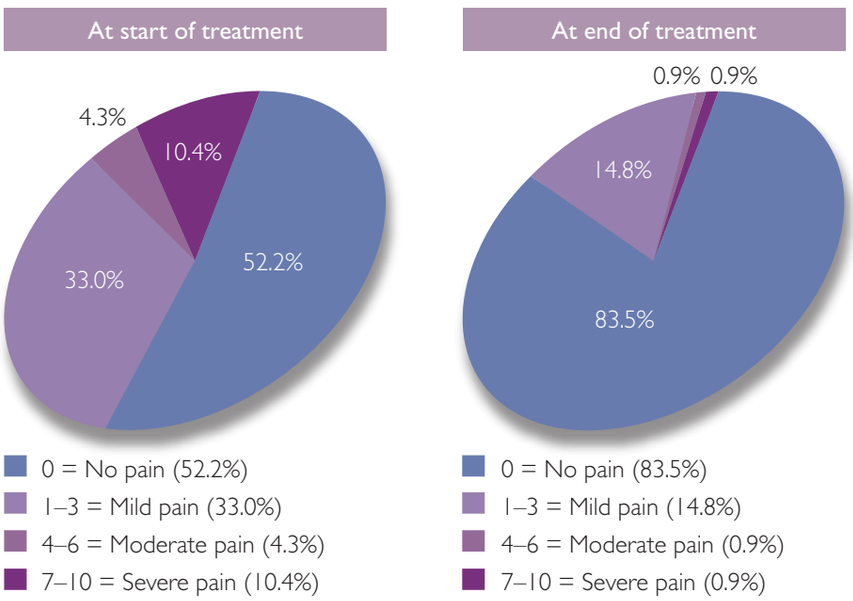

Figure 9. A comparison of pain levels at the beginning and end of treatment.

- Concomitant diseases included, diabetes (39%), peripheral arterial occlusive disease (PAOD) (39%), chronic venous insufficiency (CVI) (9%), hemiplegia (7%), paraplegia (2%), renal insufficiency (3%) and cardiac failure (2%).

Results for infected wounds

The author divided wounds into infected and non-infected rather than into critically colonised and infected. Based on normal clinical criteria for the centres, a wound was considered infected if local signs were observed at the initial assessment. In 98 (84%) of the 116 documented wounds, a wound infection was diagnosed at the start of treatment. One patient developed a wound infection, not present at enrolment to the study, during the course of treatment. There were no incidents of a recurrence of a successfully treated wound infection. Less than 10% of the patients suffering from wound infection received additional antibiotic treatment (*Figure 6*).

Of the infections present at the start of treatment (n=98), the following outcomes were observed:

- In 79 patients (81%), the wound infection was successfully treated
- In 19 cases (19%), the wound infection was not completely cured at the end of the documented treatment period.

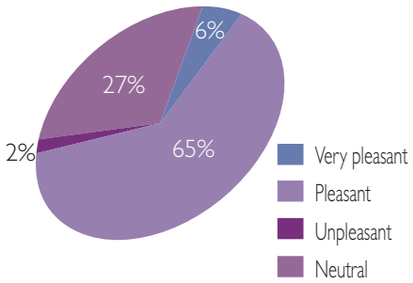

Figure 10. Patients' subjective assessment of the application of Cutimed Sorbact.

Results for the wound healing process

To evaluate the clinical efficacy of Cutimed Sorbact as an antimicrobial wound dressing, the documented treatment courses and final outcomes were assigned to one of four groups with the following results (*Figure 8*):

- Stagnating – seven cases, 6%
- Worse – one case, 1%
- Improved – 84 cases, 72%
- Cured – 24 cases, 21%.

Results for wound pain

Pain can occur as a symptom of a wound infection but can also result from inadequate local treatment. A comparison of the pain data generated in 115 patients at the beginning and end of treatment revealed a marked improvement in pain symptoms during the course of therapy (*Figure 9*):

- 0 (no pain): 52.2% (beginning); 83.5% (end)
- 1–3 (mild pain): 33% (beginning); 14.8% (end)
- 4–6 (moderate pain): 4.3% (beginning); 0.9% (end)
- 7–10 (severe pain): 10.4% (beginning); 0.9% (end).

Results for patients' subjective perception after application of the wound dressing

Some antiseptics such as silver dressings or highly absorbent wound dressings can cause unpleasant sensations or pain. However, patients identified the dressing as pleasant or very pleasant with no pain, burning, skin irritation or negative sensations) in 71% of cases and in only 2% of cases was the dressing identified as 'unpleasant' (*Figure 10*).

There were no instances reported by patients of any undesirable side-effects of the various dressing combinations.

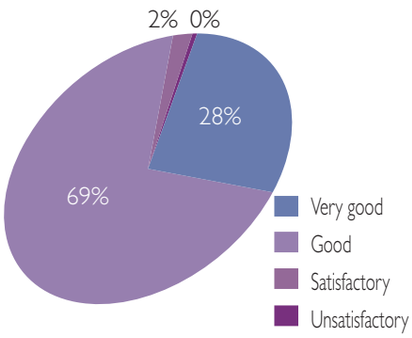

Figure 11. Product handling as assessed by clinicians.

Furthermore, Cutimed Sorbact did not cause discolouration in any of the wounds and no product-specific odour was reported during the course of treatment.

Results for product handling

Depending on the type of wound treated, the healthcare professionals had various product variations at their disposal (e.g. absorbent pads, swabs, round swabs, ribbon gauzes — all part of the Cutimed Sorbact range). Suitable variations were chosen according to patients' individual wound (location, depth, topography, area). In 97% of cases the dressing change was rated as 'good' or 'very good'. This demonstrates that healthcare professionals were extremely satisfied with the handling characteristics of the dressings (*Figure 11*).

Results for compatibility

During the study, and according to the stage of wound healing, Cutimed Sorbact was combined with other dressings where necessary. Depending on the degree of exudate present, amorphous hydrogels, alginates, hydrocolloids, foam dressings, TenderWet® (Hartmann, Heywood), film dressings or absorbent swabs were all used together with Cutimed Sorbact. Participating clinicians rated hydrogels as the best combination. Ointment dressings were not used as fatty substances can inhibit the bacterial binding effect of Cutimed Sorbact.

Discussion

In this study, Cutimed Sorbact was tested under the day-to-day conditions normally found in the participating clinics. The outcomes measured covered the many parameters used by healthcare professionals to choose products, as well as those related to clinical efficacy.

Despite initial scepticism, Cutimed Sorbact achieved a good level of efficacy as an antimicrobial product within a phased programme of wound care. Using Cutimed Sorbact in this study, 81% of wounds showing signs of infection at the start of treatment were healed and in 93% of cases there was an improvement in wound healing or a complete cure.

This study aimed to test whether Cutimed Sorbact could reduce signs of perifocal inflammation, reduce or eliminate local infection, demonstrate subjective tolerability by patients, demonstrate broad compatibility with other wound management products and provide easy product handling during dressing changes. These were all achieved or exceeded during the study. In particular, the consistently easy handling convinced healthcare professionals of the versatility and value of this alternative to current antimicrobial dressings.

Recommendations

The study found that it is important to choose a secondary dressing or fixative that keeps the wound moist to avoid possible sticking to the wound by the dressing.

Conclusion

Antimicrobial dressings play a major role in the effective management of both acute and chronic wounds. This study demonstrated that Cutimed Sorbact is a cost-effective alternative to commonly-used antimicrobial products and as the dressings are available in different shapes and sizes, flexible treatment of various wounds is possible.

Cutimed Sorbact uses a natural approach to wound healing, with no chemically active agents, using only the physical principle of hydrophobic interaction. There are no known side-effects, allergy risk, cytotoxicity, or risk of bacterial and fungal resistance. The simplicity and adaptability of this bacterial binding product should be considered a welcome product development. WUK

Key Points

- A 116-patient multicentre assessment looked at the efficacy of Cutimed Sorbact as an antimicrobial dressing.
- Cutimed Sorbact binds and removes bacteria without charging the wound with a chemically active agent.
- The evaluation considered the dressing's ability to reduce inflammation, eliminate local infection and improve the course of wound healing. It also examined how well the dressing was tolerated by patients and its ease of use for clinicians.
- The study found that 81% of the patients with an infected wound received effective treatment. Twenty-one per cent of all the wounds healed during the study and 72% showed improvements. There was a marked improvement in pain symptoms and the majority of patients were very positive in their evaluation of the product. It was also well received by clinicians with 97% rating it as 'good' or 'very good'.

References

Cutting KF, Harding KG (1994) Criteria for identifying wound infection. *J Wound Care* **3**(4): 198–201

Gray D, Cooper P, Timmons J (2006) *Essential Wound Management. An Introduction for Undergraduates.* Wounds UK, Aberdeen

Schulz G, Sibbald RG, Falanga V et al (2003) Wound bed preparation: a systematic approach to wound management. *Wound Rep Regen* **11**: 1–28

Sibbald RG, Williamson D, Orsted H, et al (2000) Preparing the wound — Debridement, bacterial balance, and moisture balance. *Ostomy Wound Manag* **46**: 14–35

Ljungh A, Yanagisawa N, Wadström T (2006) Using the principle of hydrophobic interaction to bind and remove wound bacteria. *J Wound Care* **15**(4): 175–80