# A prospective descriptive study of Cutimed Sorbact® used as a skin substitute for the treatment of partial thickness burn wounds

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## Abstract

**Introduction:** We used Cutimed Sorbact® as a skin substitute based on earlier observations that partial thickness burns seemed to heal underneath it without problems.
**Material and Methods:** Twenty-seven patients with superficial and mid-partial thickness burns were included. Deep partial thickness and full-thickness burns were excluded. Wound assessment was done twice a week by the first author in conjunction with the co-authors. The factors assessed included wound bed appearance, slough, pus, biofilm, granulation, epithelium, smoothness and colour.
**Results:** Most wounds appeared clean (59%), dry (51%) and pink (51%). About a third (27%) appeared healed and there was depth progression in two patients (< 10%). The dressing was not associated with any subjective noticeable pain. Complication related to the dressing at removal was minor punctate bleeding points in five patients (5/27; 18.5%).
**Conclusion:** Cutimed Sorbact® is a very cost-effective addition to the available skin substitutes in our teaching hospital. It can be classified as a bio-synthetic skin substitute with antibacterial and antiviral properties.


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## Introduction

Infection in the management of burn wounds may not only impair healing, but can lead to a rapidly spreading infection potentially increasing morbidity and prolonging hospitalization.[1] The first goal of surgical management is therefore removal of devitalized tissue by surgical debridement followed by the promotion of wound healing by early wound closure and the control of secondary wound infection.

Advances in the management of wound infection suggest that removal of bacterial infection reduces the prevalence of wound bioburden by topical antimicrobial dressings.[2] The majority of such products have a broad range of antimicrobial activity which may provide a barrier to microorganisms in wounds at high risk of infection or re-infection as well as being advantageous for localized wound infection in conjunction with systemic antibiotics.[3]

The alternative to these antimicrobial dressings containing antimicrobial agents, such as silver, honey, and iodine and wound dressings impregnated with polyhexamethylene biguanide (PHMB), is the development of non-medicated antibacterial dressings such as dialkylcarbomyolchloride (DACC) -coated dressings(Cutimed Sorbact) which reduce the wound bacterial load by a unique bacterial binding action using the principle of hydrophobicity to remove bacteria and fungi from a wound. Cutimed Sorbact® is marketed as a dressing containing antibacterial activity with a lipophilic active molecule, DACC, that binds to bacterial cell walls. By binding bacteria and fungi to the dressing, there is no disruption to the cell wall and no systemic absorption, the microogranisms are removed with the dressing and there is no cell debris left in the wound. As such it provides an attractive and viable alternative to silver, iodine, PHMB and other antimicrobial agents in wound care.[4] Cutimed Sorbact® provides a rapid and effective mode of action, where 1 $cm^2$ of dressing binds 100 000 bacteria in 30 seconds, is a broad spectrum antibacterial and antifungal, including methicillin-resistant Staphylococcus Aureus (MRSA) and Vancomycin-resistant Enterococci (VRE), with no bacterial or fungal resistance, and provides no risk of allergies, cytotoxicity and contra-indications.[5]

One of the accidental findings of a previous pilot study was that the dressing was effective on early partial thickness burns, suggesting an additional role for Cutimed as a skin substitute.[6] Based on this, it was decided to test Cutimed Sorbact's® clinical efficacy in a larger number of patients, on partial thickness burns as a skin substitute, without controls. No reports were found by an online search and company representative consults of the dressing being used previously as a skin substitute.[7-19]

The definition of a skin substitute is a temporary or permanent cover for the skin that replicates certain functions of the skin and allows the underlying wound to heal.[20] Skin substitutes can also be used as temporary cover over deeper wounds that won't heal spontaneously and later require a skin graft. There are other uses for skin substitutes, like cover over skin grafts, and some have also been used as a matrix for skin culturing.

## Material & Methods

Twenty-seven patients with partial thickness burns were included in this study. Deep partial thickness and full-thickness burns were excluded.

Partial thickness burns were cleaned with Chlorhexidine and water (Hibitane®) and blisters and loose skin removed. The Cutimed Sorbact® was applied as a wound dressing. Cutimed Sorbact® was applied alone in the facial sites or fingers but secondary dressings (e.g. Telfa®/Melolin®) were applied with soft Cling® bandages to other body parts .

*Wound Assessment:* A photograph using a 5-megapixel camera was taken before each dressing and after removal of the dressing by the first author in all cases.

*Outcome Parameters:* Wound assessment was done twice a week by the first author in conjunction with the co-authors. The factors assessed included wound bed appearance, slough, pus, biofilm, granulation, epithelium, smoothness and colour. Biofilm was assessed subjectively by macroscopic appearance of the wound as shiny and slimy.

*Ethics:* The research was conducted in line with the Helsinki Ethical guidelines. All patients consented to the use of their photos for research purposes.

## Results

The demographic data of 27 patients included in this study is presented in Table 1. The average age of the patients was 34 years old. The youngest patient was 2 years old and the oldest 65 years old. The average total body surface area (TBSA) was 13.59%. The number of females was 10 and the males 17 as shown in Figure 1.

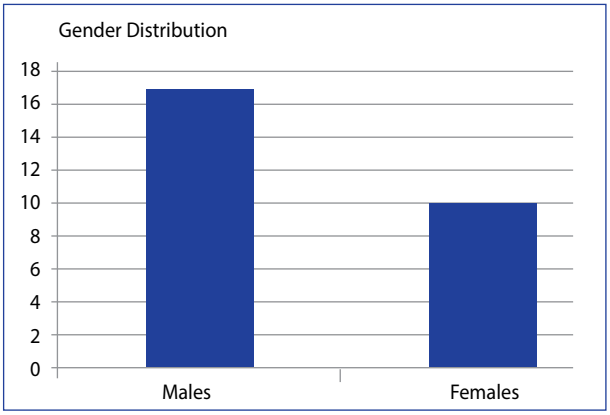


**Figure 1:** Gender distribution of patients

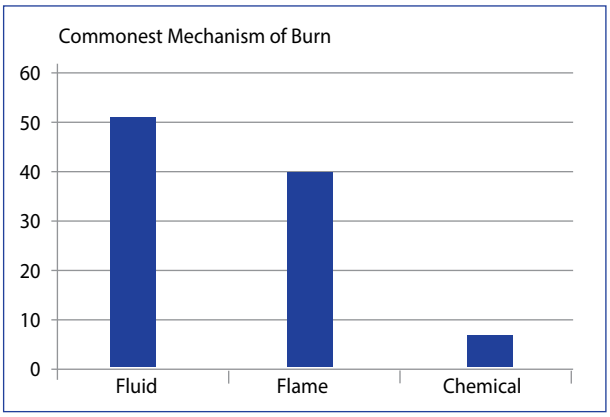


**Figure 2:** The commonest mechanisms of burns sustained

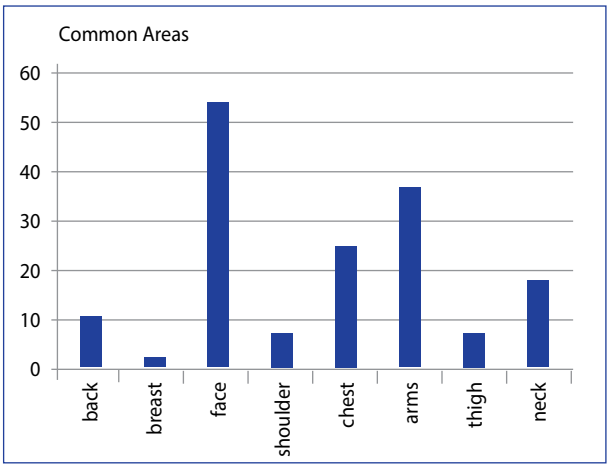


**Figure 3:** The commonest areas that were treated in the study showed the face, followed by arms then chest, neck, back, thigh and shoulder

The commonest mechanism of injury was hot water, then flame burns followed by chemical burns shown in Figure 2.

The average time to application of the dressing was less than one day after the burn (17/27 = 0.7 days). The commonest sites chosen were the face, neck and forearms or hands shown in Figure 3.

The clinical assessment data for the application of the dressing are presented in Table 2. The assessment included

**Table 2:** Clinical data assessment

| Age | Sex | TBSA% | Mechanism | Injury date | Dressing date | Days after injury | Areas |
|---|---|---|---|---|---|---|---|
| 24 | F | 15 | Hot H20 | 08-01-2014 | 09-01-2014 | 1 | back, shoulder |
| 32 | F | 12 | Hot H20 | 10-01-2014 | 10-01-2014 | 0 | back, chest, breast |
| 28 | F | 13 | Hot H20 | 12-01-2014 | 13-01-2014 | 1 | arm, chest, thigh |
| 56 | M | 2 | Hot H20 | 26-01-2014 | 27-01-2014 | 1 | face |
| 36 | M | 2 | Flame Explosion | 25-01-2014 | 27-01-2014 | 2 | forearm |
| 65 | M | 8 | Hot H20 | 30-01-2014 | 31-01-2014 | 1 | face, neck, arms |
| 27 | M | 7 | Hot H20 | 17-02-2014 | 17-02-2014 | 0 | forearms |
| 23 | F | 8 | Hot H20 | 19-02-2014 | 20-02-2014 | 1 | face, chest, neck, shoulder |
| 26 | M | 7 | Flames | 26-02-2014 | 28-02-2014 | 2 | forearm |
| 39 | M | 1 | Chemical | 24-02-2014 | 28-02-2014 | 4 | hand |
| 25 | M | 18 | Hot H20 | 09-02-2014 | 12-02-2014 | 3 | forearm |
| 33 | F | 20 | Flame | 28-04-2014 | 28-04-2014 | 0 | face, chest, forearm |
| 16 | M | 13 | Flame | 02-05-2014 | 02-05-2014 | 0 | face |
| 47 | M | 20 | Hot Fluid | 03-05-2014 | 03-05-2014 | 0 | face, hest |
| 29 | M | 45 | Flame | 02-05-2014 | 02-05-2014 | 0 | face |
| 26 | F | 55 | Flame | 05-05-2014 | 05-05-2014 | 0 | face |
| 59 | M | 11 | Flame | 04-05-2014 | 04-05-2014 | 0 | forehead, forearm |
| 37 | M | 6 | Chemical | 18-05-2014 | 18-05-2014 | 0 | face, neck |
| 15 | M | 8 | Hot H20 | 15-05-2014 | 15-05-2014 | 0 | thighs, leg, abdomen |
| 21 | F | 10 | Hot H20 | 01-06-2014 | 02-06-2014 | 1 | face, chest , neck |
| 55 | F | 10 | Hot H20 | 01-06-2014 | 02-06-2014 | 1 | face, neck |
| 24 | F | 15 | Flame | | | 0 | face |
| 63 | M | 20 | Flame | 09-07-2014 | 10-07-2014 | 1 | face, hands |
| 28 | M | 7 | Flame | 13-07-2014 | 13-07-2014 | 0 | face, chest |
| 22 | M | 13 | Flame | 08-07-2014 | 08-07-2014 | 0 | face, hands |

the recording of pain for which patients were interviewed. The following pain assessment score was used: no pain = 0; pain requiring non-opiates like paracetamol = 1; pain requiring opiates = 2. Another factor assessed was the need for a pus swab by visual site inspection The number of days before a dressing change was required was also noted. Any wound complications were noted. At the final assessment of the wound the following was checked: cleanliness of the wound, dryness of the wound, progression of the depth of the burn, colour of the wound and the resulting healing of the wound.

A summary of the wound factors assessed after application and removal, of the dressing and their incidence (as a %) is shown in Figure 4. In Figure 4, it can be observed that most wounds appeared clean (59%), dry (51%) and pink (51%). About a third (27%) appeared healed and there was depth progression in 2 patients (< 10%). The dressing was not associated with any subjective noticeable pain and therefore the pain assessment was stopped after 12 patients. The average days after application for removal of the Cutimed Sorbact® dressing was day 4 (112/26) as shown in Figure 5. The only complications related to the dressing were at removal where there were punctate minor bleeding points in 5 patients (5/27; 18.5%) It also appeared that in 2 patients there was progression of depth of the burn from partial to full-thickness areas (2/26; 7.6%). One patient developed an otitis externa unrelated to the dressing.

The average days after application for removal of the Cutimed Sorbact® dressing initially was early (3.5 days) and as confidence grew, it was left on longer (average days for the

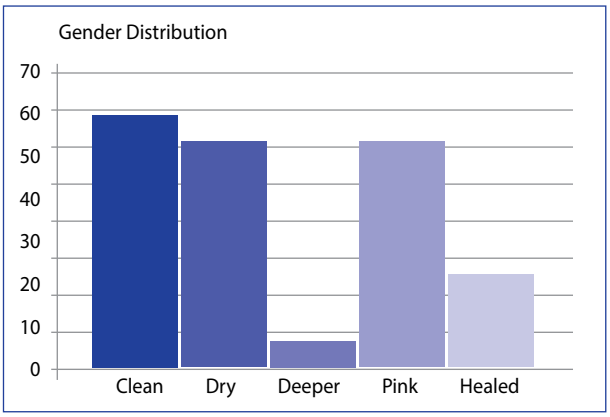


**Figure 4:** The wound factors assessed and their incidence (%) is shown after dressing removal

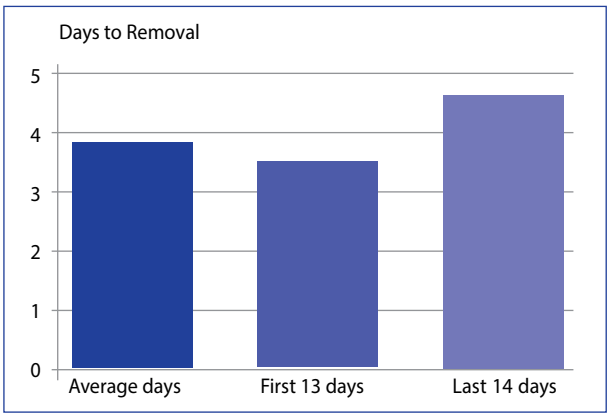


**Figure 5:** The average days for removal of the dressings (blue); the average in the first 13 days of the study (red) and the last 14 days (green) is also shown

**Figure 6:** Patients with Cutimed Sorbact® before complete removal of the dressing

**Figure7:** Patient one week later after removal of the Sorbact

last patients increased to 4.5 days). The longest duration for leaving it on a partial thickness burn was not known because a psychiatric patient was lost to follow-up with the dressing in place for longer than 11 days.

Clinical results before and after are shown in Figure 6 and Figure 7.

## Discussion

Based on the initial 2013 findings of the Cutimed Sorbact® pilot study, it seemed possible that Cutimed Sorbact® could be used as a skin substitute.[6] The appearance of the Cutimed Sorbact® wounds of clean (59%) was a relatively consistent finding. The dryness (51%) upon removal of the dressing was probably related to the hydrophobicity of the dressing and the fact that in many patients it was the only dressing on the area (mostly in faces where it was left open) allowing it to dry out more. The pink (51%) appearance, which was also a common finding, was an encouraging observation showing good early epithelialization. The depth progression in 2 patients (< 10%) cannot be directly related to the use of the Cutimed Sorbact®, because of the relatively small incidence and the multiple factors that do affect depth progression.

Depth progression of the burn wound could have happened as a result of contributing factors like latent heat in the tissue, local edema or constriction with bandages. The Cutimed Sorbact® dressing upon application and during its use was not associated with any subjective noticeable pain and therefore the pain assessment was stopped after 12 patients (and previous 13 patients in the pilot study). It is possible that with a more sensitive and elaborate pain scoring system low levels of discomfort could be recorded as lower levels of pain. There was some minor discomfort, not perceived as pain by the patients, associated with the removal of the dressing, if it was very dry. Other authors have also described some minor discomfort with removal of the dressing in some patients.[17]

There were no significant complications. The minor bleeding points in 5 patients (5/27; 18.5%) were of no serious clinical consequence because it only required temporary pressure and cleaning of the wound.

It has been demonstrated in an in vitro wound healing model that Cutimed Sorbact® has some paracrine effects that help cell differentiation and accelerate wound healing.[18] Even though it looks like a simple green piece of gauze, it is an advanced wound care product. The first author had a lot of experience using Suprathel® and therefore decided to compare that experience with Cutimed Sorbact®.

Cutimed Sorbact® has some similarity to Suprathel® which has antibacterial properties. Upon removal of the dressing, most of the exudate and surface bacteria are stuck to the dressing and the wound bed is clean.[21-23] Suprathel® is a lactic acid polymer skin substitute for the treatment of dermal wounds. It is used especially with the wound care of scalds and burns, abrasions, as well as split-thickness skin graft donor sites. It represents an absorbable, synthetic wound dressing with properties of natural epithelium.

Some of the differences of Cutimed Sorbact® in comparison to Suprathel® would be the exact mechanism of action.

Cutimed Sorbact® is a bacterial adhesive via the lipophilic DACC molecule versus Suprathel's® bactericidal effect associated with its low pH of 5, 5 in vivo.[24] Cutimed Sorbact® doesn't stick to itself and it is extremely cheap and therefore highly cost-effective. The characteristics for the ideal skin substitute were described as:

- Able to resist infection
- Able to prevent water loss
- Able to withstand the shear forces
- Cost effective
- Widely available
- Long shelf life and easy to store
- Lack of antigenicity
- Flexible in thickness
- Durable with long-term wound stability
- Can be conformed to irregular wound surfaces and
- Easy to be secured and applied.[19]

Cutimed Sorbact® fits the above criteria with the added benefit of being a low-maintenance dressing. This means that it is the best skin substitute in our hands based on the above criteria for an ideal skin substitute.

Since the cost of skin substitutes has been high and we have had to use them sparingly considering budget sizes, it has been a welcome relief to have found an affordable and cost-effective skin substitute. Most burns occur in third world countries or poor societies where the cost of modern skin substitutes are not affordable and thus these people may suffer even more suboptimal outcomes. Cutimed Sorbact® would be a welcome tool to have in those poorer communities where an affordable skin substitute may be invaluable.

## Conclusion

Cutimed Sorbact® is a very cost-effective addition to the available skin substitutes we use in our teaching hospital. It can be classified as a bio-synthetic skin substitute with antibacterial and antiviral properties. If it remains cost-effective, it will revolutionize the primary care of burns, especially in resource limited third world countries.

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## References

1. Church D, Elsayed S, Reid O, et al. Burn wound infections. Clin Microbiol Rev. Apr 2006; 19(2):403-34.
2. World Union of Wound Healing Societies. Wound Infection in Clinical Practice: An International Consensus. MEP Ltd: London, 2008. Available from: http://www. woundsinternational.com.
3. Vowden P, Vowden K, Carville K. Antimicrobial dressings made easy. Wounds International. 2011;2(1). Available from: http://www.woundsinternational.com
4. Butcher, M. DACC antimicrobial technology: a new paradigm in bioburden management. J Wound Care (Suppl). 2011.
5. Powell G. Evaluating Cutimed Sorbact: using a case study approach. Br J Nurs (Tissue Viability Suppl). 2009;18(15):S30-36.
6. Kleintjes WG, Schoeman D, Collier L. A Pilot study of Cutimed Sorbact versus Acticoat versus Silverlon for the treatment of burn wounds in a South African adult burn unit. Wound Healing Southern Africa 2015;8(2):22-9.
7. Friman G. A new hydrophobized wound dressing (Sorbact®) in the treatment of infected wounds. Current Therapeutic Research 1987;42(1).
8. Ljungh A, Yanagisawa N and Wadstrom T. Using the principle of hydrophobic interaction to bind and remove wound bacteria. J Wound Care. 2006;15(4):175-80.
9. Wadstrom T, et al. Hydrophobized wound dressing in the treatment of experimental Staphylococcus aureus infections in the young pig. Acta Path Microbiol Immunol Scand Sect B. 1985;93:359-63.
10. Wadstrom et al. Treatment with hydrophobized dressing hastens healing of infected wounds. J Sw Med Assoc. 1986;83:2548-50.
11. Meberg A, Schoyen R. Hydrophobic material in routine umbilical cord care and prevention of infections in newborn infants. Scand J Infact Dis. 1990;22:729-33.
12. Kammerlander G, et al. An investigation of Cutimed Sorbact as an antimicrobial alternative in wound management. Wounds UK. 2008;4(2):10-8.
13. Von Hallern B, et al. Removal of wound bacteria from infected and colonized wounds with Cutimed Sorbact. Medizin & Praxis Special. 2004.
14. Skinner R, Hampton S. The diabetic foot: managing infection using Cutimed Sorbact dressings. Br J Nurs. 2010;19(11):10-23,S30,S32-6.
15. Derbyshire A. Innovative solutions to daily challenges. Br J Community Nur. 2010;Suppl:S38,S40-45.
16. Gentili V, Gianesini S, Balboni PG, et al. Panbacterial real-time PCR to evaluate bacterial burden in chronic wounds tested with Cutimed Sorbact. Eur J Microbiol Infect Dis. 2011;31(7):1523-9.
17. Nielsen AM, Andriessen A. Prospective cohort study on surgical wounds comparing a polyhexanide-containing biocellulose dressing with a dialkyl-chloridecontaininghydrophobic dressing. Adv Skin Wound Care. 2015;25(9):409-13.
18. Falk P, Ivarsson ML. Effect of DACC dressing on the growth properties and proliferation rate of cultured fibroblasts. J Wound Care. 2012;21(7):327-8,330-2.
19. Jeffrey SL. Non-adherent and flexible – using Cutimed Sorbact as a filler and liner with NPWT. J Wound Care 2014;23(5)Suppl:S3-15.
20. Ahmad Sukari Halim, Teng Lye Khoo, and Shah Jumaat Mohd. Yussof. Biologic and synthetic skin substitutes: An overview. Indian J Plast Surg. 2010 Sep;43(Suppl): S23–S28,
21. doi: 10.4103/0970-0358.70712; PMCID: PMC3038402 Rahmanian-Schwarz A, Beiderwieden A, Willkomm LM et al. A clinical evaluation of Biobrane(®) and Suprathel(®) in acute burns and reconstructive surgery. Burns.(Epub 17 Aug 2011)2011;37(8):1343-8. doi: 10.1016/j.burns.2011.07.010
22. Schwarze H, Küntscher M, Uhlig C, et al. Suprathel, a new skin substitute, in the management of donor sites of split-thickness skin grafts: results of a clinical study. Burns. (Epub May 2007) 2007;33(7):850-4.
23. Rajab TK, Wallwiener C, Wallwiener M, et al. Cost analysis of Jelonet versus Suprathel in the management of split-thickness skin graft donor sites. Burns.( 4Oct )2008;34(1):151.
24. Uhlig C, Rapp M, Hartmann B et al. Suprathel-an innovative, resorbable skin substitute for the treatment of burn victims. Burns. (2 Nov )2007;33(2):221-9.