Wounds UK

Suprasorb X+PHMB made easy

PRODUCTS FOR PRACTICE

Introduction

Infection is a significant problem for people with wounds and can result in delayed healing. For patients with an infected wound or those at high risk of a wound infection, knowledge of the available treatment options is vital when selecting an appropriate dressing. This article focuses on the use of Suprasorb X+PHMB in the management of critically colonised or infected wounds.

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WHAT IS SUPRASORB X+PHMB?

Suprasorb X+PHMB is a topical antimicrobial wound dressing for use on lightly to moderately exuding infected or critically colonised wounds (Kingsley et al, 2009). It may also be used where wounds have been identified through a systematic assessment to be at greater risk of infection (Dissemond et al, 2011). The wound dressing combines the antimicrobial properties of polyhexamethylene biguanide (polyhexanide, PHMB), with the ability to maintain a moist wound healing environment.

HOW DOES SUPRASORB X+PHMB WORK?

Moisture management and bacterial control are two of the fundamental issues in wound management (Fumarola et al, 2010). Suprasorb X+PHMB is composed of 4% cellulose and 96% water, which allows it to absorb exudate or donate moisture to manage exudate levels. The dressing also provides a carrier for PHMB (0.3%), which exerts its antimicrobial effects both within the dressing, but also at the wound-dressing interface (Gray et al, 2010).

What is PHMB?

PHMB is a broad spectrum antimicrobial agent that has been used commercially for over 60 years in a number of products, including contact lens solutions and swimming pool cleaners (Moore and Gray, 2007). It has been used in wound dressings as an alternative to silver or honey.

PHMB works by:

- Inhibiting bacterial cell metabolism
- Binding to the bacteria's phospholipid (outer) membrane.

The positively-charged PHMB molecules attach to the outer membrane of the negatively-charged bacterial cell, causing areas of dysfunction and allowing PHMB to penetrate the inner membrane. The cell increasingly is unable to control normal transmembrane ion exchange, leading to increased fluidity, permeability, loss of integrity and cell death (Gilbert, 2006; Hubner and Kramer, 2010).

Safety and efficacy of PHMB

PHMB is considered to be practically non-toxic and is well tolerated with no systemic uptake detected and no reported chronic health effects. Tests of biocompatibility for PHMB (which measures its antimicrobial activity in relation to its cytoxicity) have shown that PHMB results in less damage to healthy cells than other antimicrobial agents such as chlorhexidine and povidone iodine (Hubner and Kramer, 2010).

PHMB has demonstrated good antimicrobial efficacy and has been found to block *Pseudomonas aeruginosa*-induced infection (Cazzaniga et al, 2000) and prevent its degradation of wound fluid and skin proteins *in vitro* (Werthen et al, 2004). It can also kill a diverse range of bacteria and fungi (Lee et al, 2004).

PHMB-containing wound dressings have been shown to be active against biofilms (Seipp and Korber, 2008; Lenselink and Andriessen, 2011) and multi-resistant pathogens including methicillin-resistant *Staphylococcus aureus* (MRSA) (Eberlein and Wild, 2008; Wild et al 2008) and vancomycin-resistant enterococci (VRE) (Shah et al, 2009).

What is HydroBalance technology?

Suprasorb X+PHMB is made up of a unique structure composed of biosynthetic HydroBalance fibres. These fibres are the products of a cellulose fermentation process using *Acetobacter xylinium*, which produce fine cellulose fibrils, providing an exceptionally large surface area. This allows the dressing to regulate the absorption and donation of moisture at the dressing interface (Alvarez et al, 2004). Surplus exudate is taken up from the wound into the dressing, while moisture is released from the dressing into the wound. Different levels of absorption and donation can be exerted within the same wound, removing exudate from one area while releasing moisture to drier areas.

PHMB is not bound to the fibres of the dressing and is free to be released into the wound and periwound tissues. The presence of fluid in the dressing means that antimicrobial activity is possible even on dry wounds (Gray et al, 2010).

Role in pain management

Pain is a common experience for patients with infected wounds (Mudge and Orsted, 2010). The moist wound environment afforded by the HydroBalance technology creates a cooling effect at the wound surface, which has been shown to reduce pain significantly (Alvarez et al, 2004). Mosti et al (2008) and

Galitz et al (2009) also found that the use of Suprasorb X+PHMB saw a decrease in patient-reported pain at dressing changes, with significant reductions ($p<0.05$) in visual analogue scores after the first day. PHMB has also been found in laboratory studies to inhibit formation of reactive oxygen species (Gilliver, 2009). This suggests additional anti-inflammatory properties, which may play a role in pain management.

WHEN IS SUPRASORB X+PHMB INDICATED?

Suprasorb X+PHMB is indicated for use on lightly or moderately exuding, superficial and deep, critically colonised and infected wounds (Kingsley et al, 2009). These may include chronic ulcers such as diabetic foot, venous leg and pressure ulcers, partial thickness wounds, surgical wounds and skin donor/recipient site wounds. It has also been used as a safe antimicrobial alternative in the management of children with epidermolysis bullosa (Denyer, 2009) and in paediatric lacerations (Elzinga et al, 2011).

Topical antimicrobials play a significant role in the prevention and management of infection. It is important that clinicians recognise and differentiate the signs and symptoms of localised, spreading and systemic infection in different wound types (EWMA, 2005).

Early recognition of wounds at risk (W.A.R.) of infection is essential to avoid delayed healing and to prevent serious infections from occurring (Dissemond et al, 2010). Host susceptibility, high numbers of bacteria in the wound and presence of devitalised or sloughy tissue can increase the risk of infection (EWMA, 2004).

A checklist in the form of a score for at risk wounds has been created based on a clinically-orientated risk assessment using specific patient circumstances. A W.A.R. score of 3 or more points indicates that the wound has a greater risk of infection and local antimicrobial treatment with a topical antimicrobial such as PHMB is justified (Dissemond et al, 2011).

HOW TO APPLY SUPRASORB X+PHMB?

1. Prepare the wound

Thoroughly cleanse the wound according to local protocols. Ensure the surrounding skin is clean and dry.

2. Apply the dressing

Select an appropriately sized dressing. Remove the protective film from both sides and apply either side down. If required, the dressing and the rope may be cut to size with sterile scissors, or folded to conform to the shape of the wound. The dressing should overlap the wound by 2-3cm. Apply a suitable secondary dressing as indicated by the level of exudate. Film dressings are recommended as a first choice, particularly when there are low levels of exudate.

Tip: When using the rope, gently place it into the wound, layering by folding it onto itself. In cavities, ensure that 2-3cm of the rope dressing is secured outside of the wound for easy removal. Do not pack the material too tightly within the wound. Cover the rope with an appropriate secondary dressing

Tip: When using the sheet dressing, gently smooth the dressing in place and allow it to conform to the shape of the wound

HOW FREQUENTLY SHOULD THE DRESSINGS BE CHANGED?

All wounds should be checked at regular intervals to monitor for improvement or deterioration. More frequent review is advised for infected wounds and daily dressing changes performed as appropriate. For wounds that are at risk of invasive infection (i.e. critically colonised), the frequency of changing Suprasorb X+PHMB sheet or rope dressing is dependent on the status of the wound bed and can range between 2–7 days.

Tip: When removing Suprasorb X+PHMB sheet dressing lift one edge and gently peel the dressing from the wound. Should the dressing dry out, rehydrate the dressing with saline 30 minutes before removal

WHEN SHOULD SUPRASORB X+PHMB BE DISCONTINUED?

As with all topical antimicrobial treatments, therapy should be reviewed after two weeks with the decision to continue

Case report: Suprasorb X+PHMB

Figure 1: On presentation

Figure 2: 16 weeks post angioplasty

A 90 year old female patient with arterial leg ulcer on the lateral aspect of the shin was admitted to the community hospital. Initially a tendon excision was considered as the leg was thought unsalvageable. However, the patient underwent angioplasty to improve the blood flow to the leg (Fig 1)

Treatment

The treatment aims were to prevent infection, maintain tendon health and close the wound by granulation. Suprasorb X+PHMB was applied as the primary dressing to cover the exposed tendon, wound and immediate periwound skin. A fibrous dressing was applied to the superficial ulcers.

Outcomes

Following successful angioplasty, there was evidence of good granulation and the wound healed over a period of 16 weeks (Fig 2). No infection occurred and no antibiotics were administered. The patient was able to return to independent living. It was felt that Suprasorb X+PHMB had provided an appropriate antimicrobial barrier, helping to prevent complications such as infection and promote wound healing in this patient.

Table 1 Summary of clinical studies using Suprasorb X + PHMB.

Reference	Title	Type	Main findings
Mosti et al (2008) Peer-reviewed poster presentation. Wounds UK, Harrogate	Successful therapy of critically colonised or locally infected wounds with a new HydroBalance biocellulose-based wound dressing with polihexanide on outpatients	Case series of 11 patients with critically colonised or infected venous leg ulcers treated with Suprasorb X+PHMB	7/11 patients healed in 13.4 weeks. 3/11 underwent successful skin grafting. Patients reported a mean reduction in pain scores at dressing change from 7.3 to 2.8 visual analogue scale within 3.4 weeks
Wild et al (2009) Peer-reviewed poster presentation. EWMA, Helsinki, 2009	Prospective, randomised study for eradication of MRSA with polyhexanide containing biocellulose dressing compared with polyhexanide wound solution	Prospective randomised controlled trial in 30 patients with pressure ulcers contaminated with MRSA. Suprasorb X+PHMB n=15; Prontosan-soaked gauze (controls) n=15	Suprasorb X+PHMB eradicated MRSA in 13/15 patients after one week and in all patients after two weeks. In the control group, 6 patients had the pathogen eradicated in one week and 10 patients in two weeks. Suprasorb X+PHMB also promoted greater granulation tissue formation
Galitz et al (2009) *EWMA J* 9(2):171	Polihexanide versus silver wound dressings: first interim results of a controlled, randomized, prospective multicenter study	Prospective comparative trial comparing effects of Suprasorb X+PHMB with standard silver dressing on pain and bacterial burden in 37 patients with critically colonised/ infected wounds	Both dressings reduced overall wound pain, although greater reductions were reported for patients treated with Suprasorb X+PHMB ($p<0.05$) after the first dressing change
Carvosi et al (2006). Peer-reviewed poster presentation, EWMA, Prague	Experience in US with Suprasorb X + PHMB: an antimicrobial wound dressing.	Multicentre evaluation of Suprasorb X+PHMB in 50 patients with 79 infected wounds of varying aetiologies	80% of the wounds healed or achieved clinical improvement. All wounds showed continuous autolytic debridement and pain reduction
Elzinga G et al (2011) *J Wound Care* 20(6):280-4	Clinical evaluation of a PHMB-impregnated biocellulose dressing on paediatric lacerations	Evaluation of the tolerability and reduction in pain levels, associated with the use of Suprasorb X+PHMB on paediatric heel lacerations(caused by bicycle injuries) in 20 patients	The mean time to complete wound closure was 12.95 days. Significant reduction in mean VAS score on day 14 ($p<0.003$). At the second visit (after 3 days) 17 of the 20 children were reported to be free of pain. No cases of local infection were noted
Cossu et al (2009) Peer-review poster presentation, EWMA, Helsinki	Use of a cellulose-based wound dressing in scleroderma patients	Case series of 8 patients with 27 infected scleroderma ulcers treated with standard therapy and Suprasorb X+PHMB	There was a reduction in pain from first application. There was complete healing of all newly formed ulcers in 4-15 weeks and 4/12 refractory ulcers healed in 15-19 weeks.
Davis C (2006) Peer-review poster presentation. SAWC, Tampa	Evaluation of pain control and healing rates using an advanced cellulose dressing with 0.3% PHMB	Case series involving 4 patients with wounds that had not responded to silver dressing	2/4 wounds showed clinical signs of infection. Three wounds healed and pain levels reduced in all four wounds
Bruckner et al (2008) Oral presentation. Wounds UK, Harrogate	Evaluation of cellulose and polyhexamethylene biguanide (Suprasorb X+PHMB) in therapy of infected wounds.	Descriptive study of 40 patients with hard-to-heal wounds and signs of critical colonisation or local infection were treated with Suprasorb X+PHMB	32/40 patients had increased granulation tissue (12% vs 79% at 27 days. The dressing was associated with low pain scores measured by visual analogue score
Nielsen AM (2010) Oral presentation, EWMA, Geneva	A comparative retrospective clinical study between two dressings for surgical use	Retrospective study in 60 patients comparing Suprasorb X+PHMB (group A) and a hydrophobic dressing with dialkyl-carbamoyl-chloride (group B)	Both dressings performed well. Pain levels were reduced in patients in group A
Piatkowski et al (2011) *Burns* 37(5):800-4	Randomized controlled single center study comparing a polyhexanide containing biocellulose dressing with silver sulfadiazine cream in partial thickness wounds	Prospective RCT in 60 patients treatment with Suprasorb X+PHMB (group B) and silver sulfadiazine cream (group A)	Patients in group B had faster pain reduction than group A, with a comparative cost saving of 95,20 euros for a 10 day treatment for group A

treatment based on individual patient assessment. When there is a deep infection suspected, systemic antibiotic therapy must be considered (Best Practice Statement, 2011).

WHEN IS SUPRASORB X+PHMB CONTRAINDICATED?

Suprasorb X+PHMB is not indicated for full thickness burns, cartilage injuries or for intraocular applications. It should not be used in patients with a known sensitivity to PHMB.

WHAT IS THE EVIDENCE FOR USE?

The clinical effectiveness of Suprasorb X+PHMB has been reported through a number of clinical trials (Table 1) and numerous case studies (Glover and Wicks, 2009 ; Gray et al, 2011).

AVAILABILITY ON DRUG TARIFF

Suprasorb X+PHMB is available on prescription in a range of sizes (5cmx5cm; 9cmx9cm; 14cmx20cm), including a rope dressing (2cmx21cm) for cavity wounds.

Summary

Suprasorb X+PHMB combines a broad spectrum of antimicromicrobial activity and low cytotoxicity with an ability to absorb and release moisture to maintain an optimum moist wound healing environment. This has been shown to reduce wound pain during treatment and provides an alternative option to silver or honey when treating patients with an infected wound or patients who are at risk of infection.

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