Wounds UK
VOLUME 9 | ISSUE 4 | NOV 2013

octenilin® range made easy

Introduction

Most wounds contain microorganisms, yet the majority are not infected. The potential for bacteria to produce harmful effects is influenced by the ability of the patient's immune system to combat the bacteria as well as the number and type of bacteria present. Biofilms are also known to play a role in chronic inflammation and delayed wound healing. This Made Easy focuses on the importance of topical wound management, including regular cleansing and debridement, in wounds at risk of infection and summarises the clinical efficacy of octenidine (octenilin® range, schülke).

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UNDERSTANDING TOPICAL WOUND MANAGEMENT

Wound infection can delay healing and lead to serious medical complications. Combined with debridement, regular wound cleansing is a critical first step to preventing infection in wounds and has become a basic principle in modern wound management, where it forms part of the process of wound bed preparation (Schultz et al, 2004). These actions help address the barriers to healing by removing any bacteria and debris from the wound surface, such as exudate and devitalised tissue, loose debris (including microorganisms) and any dressing material residues. This can promote an optimal environment for healing and facilitate wound assessment by optimising visualisation of the wound bed.

The role of wound irrigation solutions

Wounds are cleansed using a variety of methods and solutions. Although tap water has not been found to increase the risk of infection (Fernandez et al, 2010), consideration should be given to the use of sterile solutions (eg sterile saline) and to specially-designed wound irrigation solutions, which have the potential to improve outcomes through their additional actions.

Most wound irrigation solutions contain surfactants that reduce the surface tension of the medium in which they are dissolved, thereby increasing the ability of the solution to spread over the wound surface and penetrate wound coatings, lifting bacteria and debris and suspending them in the solution. Such solutions may also help to disrupt and remove bacterial biofilms in the wound (Harbs and Siebert, 2007; Vasel-Biergans and Probst, 2011; Lessing and McNulty, 2012; Cutting and Westgate, 2012; Kramer et al, 2013). Biofilm communities (clusters of cells encased in a protective matrix of polysaccharide polymers) develop on the surface of wounds and may contribute to chronicity. The protective matrix acts as a thick, slimy barrier, making it very difficult for antimicrobial agents to penetrate it. This highlights the importance of topical approaches — treatments should aim to disrupt the biofilm through regular and repeated debridement and vigorous wound cleansing (Phillips et al, 2010).

The addition of a preserving agent enhances the shelf-life of these solutions and supports the prevention of bacterial contamination of the wound.

The role of wound gels

Wound hydrogels have a high water content (usually between 30–95%) and can donate moisture to the wound surface. This provides a moist wound environment that supports autolysis by loosening necrotic or sloughy tissue. As hydrogels are hypotonic, they osmotically enhance the diffusion of patient-derived proteolytic enzymes and growth factors into the wound. In addition, the moistening properties of hydrogels reduce the possibility of dressings adhering to the wound surface and minimise the risk of pain and trauma at dressing changes (Dowsett and Newton, 2004). In burn wounds hydrogels also have a cooling effect (Burd, 2007).

WHAT IS OCTENILIN® WOUND IRRIGATION SOLUTION?

octenilin® wound irrigation solution is a colourless, alcohol-free solution intended for cleansing and moisturising chronic skin wounds and burns. The solution can also be used to loosen encrusted dressings at dressing changes.

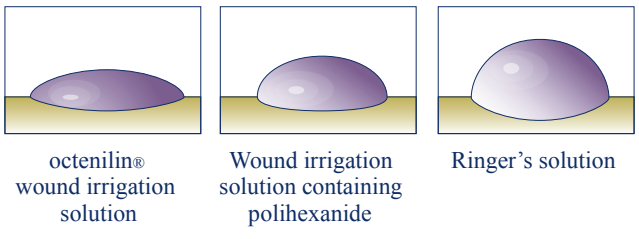


Figure 1: The low surface tension of octenilin® compared to other common wound irrigation solutions, demonstrates its ability to spread over the wound surface

It is a water-based solution containing the preservative, octenidine dihydrochloride. In addition, it contains ethylhexylglycerin, a surfactant-like molecule that reduces the surface tension of the solution, enhancing its wetting behaviour.

The surface tension of the octenilin® wound irrigation solution is determined by the pendant and sessile drop methods on human skin and is 30.6 mN/m — this is less than half of the surface tension of Ringer's solution (71.7 mN/m) and only about two thirds of the surface tension of a polyhexamethylene biguanide/polyhexanide (PHMB) wound irrigation solution (44.4 mN/m) (Cutting and Westgate, 2012) (Figure 1).

Due to its low surface tension, octenilin® wound irrigation solution reaches even small fissures and wound pockets that saline and Ringer's solution cannot reach.

WHAT IS THE EVIDENCE FOR OCTENILIN® WOUND IRRIGATION SOLUTION?

The reduced surface tension of octenilin® wound irrigation solution may also remove established biofilms. Laboratory testing has demonstrated it to be effective against *Staphylococcus aureus* biofilms grown for 24 hours on a polystyrene surface — an exposure time of five minutes was sufficient for almost complete removal (Cutting and Westgate, 2012). A further investigation against *Pseudomonas aeruginosa* biofilms grown for seven days demonstrated biofilm removal of about 33.3% after a contact time for 60 minutes (Harbs and Siebert, 2007). Due to the higher tenacity of *Pseudomonas* and its biofilms these results were to be expected and demonstrate the necessity to perform repeated treatments to manage a bacterial biofilm successfully (Phillips et al, 2010).

octenilin® wound irrigation solution has also been shown to prevent the growth of a bacterial biofilm. For *Staphylococcus aureus* a complete growth inhibition on a polystyrene surface was seen up to three hours after coating with octenilin® wound irrigation solution for one minute (Cutting and Westgate, 2012).

WHAT IS OCTENILIN® WOUND GEL?

octenilin® wound gel is a hydroxyethylcellulose-based hydrogel containing octenidine dihydrochloride as a preservative to inhibit and kill bacteria absorbed by the gel matrix from the wound. It is a colourless gel that can be used alone or in combination with the irrigation solution to loosen difficult-to-remove wound coatings, moisten dry wounds and prevent further bacterial contamination of the wound.

EVIDENCE FOR OCTENILIN® WOUND GEL

In a placebo controlled, double-blind, randomised controlled study, the safety and efficacy of octenilin® wound gel was demonstrated in patients with superficial wounds requiring skin transplantation (Eisenbeiss et al, 2012). The site of split skin excision was treated with either octenilin® wound gel or a placebo gel for three days. At the end of the treatment period the percentage of patients with a bacterial count >300 cfu on the wound surface was higher in the placebo group than in the octenilin® wound gel group. In addition, there was no delay in wound epithelialisation seen in the octenilin® wound gel treated wounds, demonstrating good tissue tolerance of the product.

Recently, a prospective open label study was conducted to compare the efficacy of octenilin® wound gel alone, in combination with secondary foam dressings, and wound-phase adapted dressings (including alginate or foam/silver for infected wounds) in chronic venous leg ulcers (Strohal et al, 2013). Patients receiving the hydrogel either alone or combination, had pain-free dressing changes and noted a cooling effect. Both hydrogel groups showed a significantly faster decrease of the wound area compared to the wound-phase adapted dressings group. This study also showed that the overall costs per patient were about 27% lower in the octenilin® group (Strohal et al, in press).

HOW SAFE IS OCTENILIN®?

The active ingredient, octenidine dihydrochloride, has been demonstrated to be well-tolerated and does not induce resistance (Hübner et al, 2010). Although, *in-vitro* testing showed it to have a relatively high cytotoxity (similar to chlorhexidine), the preservative is not absorbed percutaneously, forms stable complexes with surface cells, and does not cause systemic effects or interfere with the healing process (Hübner et al, 2010).

WHEN IS OCTENILIN® INDICATED?

octenilin® wound irrigation solution and wound gel can be used to cleanse and moisten all wound types, including burns, pressure ulcers, leg ulcers and any type of skin wound (see Case study 1 and Table 1). The wound irrigation solution can help to loosen encrusted dressings and prepare the wound bed at dressing change. It can also be used to clean the skin and entry site around percutaneous devices (see Case study 2).The gel can be used alone or in combination with the wound irrigation solution. Application of the gel to the wound bed can further encourage autolysis by creating a moist wound environment to soften and remove necrotic and sloughy tissue.

Contradindications

octenilin® wound irrigation solution and wound gel should not be used if allergies to any of their contents are known or suspected. They should only be applied externally and are not indicated for use on exposed joints and cartilage, in abdominal and thoracic cavities, in the eye or the middle and inner ear.

HOW TO APPLY OCTENILIN®

The solution is easy to use and can be dispensed directly from the bottle to gently irrigate the wound or applied as a soaked swab to the wound. It can also be used for soaking a compress and left on the wound for 5–10 minutes to loosen wound debris. The gel can be applied in a thin layer to the wound bed and covered with a simple primary dressing and left *in-situ* for up to three days.

CASE STUDY 1: Using octenilin® in practice: Open head wound following skin biopsy

An 89-year-old male presented with a head wound following excision biopsy of a skin lesion. The wound measured 4.5cm x 6.5cm (Figure 1). The district nursing team were informed to wash the wound daily with Hibiscrub. This skin cleanser contains 4% w/v chlorhexidine gluconate in an aqueous base and has been proven to have a broad spectrum of activity with a persistent and residual effect for up to six hours. However, due to concerns of using this product on an open wound, octenilin® wound irrigation solution was selected.

The granulation tissue in the wound bed appeared dull, suggestive of localised infection. octenilin® wound irrigation solution was introduced to reduce the bacterial burden and promote wound healing. Within four weeks of using octenilin® , the wound had reduced in size to 3.5cm x 5.0cm and there was 100% granulation tissue.

Unfortunately, further skin lesions developed as this was a poorly differentiated squamous cell carcinoma with infiltration through the reticular dermis to the subcutis. octenilin® wound irrigation solution was able to reduce levels of bacteria in this patient, but due to his underlying condition the wound did not go on to heal fully.

Figure 1: Head wound on presentation

Table 1: Clinical indicators for using octenilin®

				
Leg ulcers are slow healing wounds due to their associated underlying aetiology. All of the above ulcers show signs of critical colonisation/localised infection with the following signs and symptoms: increase in odour, serous exudate, friable and discoloured granulation tissue and an increase in adherent slough. Wound healing is also delayed. octenilin® wound gel is indicated to encourage debridement and reduce levels of bacteria, to help prepare the wound for healing.				This patient with diabetes had an amputation of his second toe. In patients with type 2 diabetes there is a substantial delay in wound healing and the patient is at high risk of infection. Once a diabetic foot ulcer is infected the risk for subsequent amputation is greatly increased. Cleansing with the octenilin® wound irrigation solution is indicated for this patient to manage the levels of bacteria.

Tip: Watch the application video at http://vimeo.com/74369280

How frequently should octenilin® be used?

octenilin® wound irrigation solution should be used at each dressing change to loosen dressings and remove any debris and residue in the wound bed. Where there is necrotic or sloughy tissue present, the gel can also be used to clean the wound bed. The interval for dressing change depends on the dressing used and level of exudate.

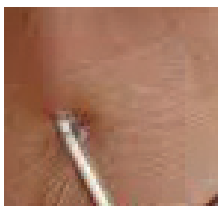
WHEN SHOULD TREATMENT WITH OCTENILIN® BE DISCONTINUED?

octenilin® has been shown to be well-tolerated (Kramer et al, 2013; Eisenbeiss et al, 2012) and can be used for repeated, long-term application. It should be discontinued when the treatment goals have been achieved, ie the wound bed is clean and showing signs of granulation tissue formation. Where there are no signs of improvement after two weeks' use, octenilin® should be discontinued and a full reassessment of the wound and the patient undertaken.

CASE STUDY 2: Using octenilin® in practice: long-term Hickman line

A female patient with a long-term Hickman line *in-situ* for continuous intravenous drug therapy was known to have chronic colonisation with *Staphylococcus aureus*. Before the introduction of octenilin® wound irrigation solution, surface wound swabs cultures demonstrated heavy growth of *Staphylococcus aureus*.

Eleven days after the introduction of octenilin® wound irrigation skin cleansing to the line entrance site, the surface wound swab culture demonstrated a light growth of *Staphylococcus aureus*. No other changes had been made to the treatment regimen, ie no dressing product changes or antibiotic therapy had commenced.



An example of a Hickman line in-situ

CASE STUDY 3: Using octenilin® in practice: Debridement of necrotic heel ulcer

An 95-year-old female patient with peripheral arterial occlusive disease (POAD) and type 2 diabetes, presented with a pressure ulcer on the right heel. Because of the poor general condition of the patient, octenilin® wound gel was used to soften and dissolve the necrotic eschar covering the wound bed, avoiding the need for surgical debridement.

Day 1: There were extensive necroses with surrounding fibrin coating on the right heel at the start of therapy (Figure 1).

Day 10: The surrounding skin was less irritated due to the skin care regimen put in place at the time of treatment. There was some softening of the necroses with the application of octenilin® wound gel (Figure 2).

Day 20: The necrotic eschar covering had dissolved and the fibrin coating could be removed easily (Figure 3).

4 weeks: There was complete detachment of the necroses and fibrin coating with evidence of formation of granulation tissue in the wound bed. The wound had also reduced in size (Figure 4).

Figure 1: Day 1

Figure 2: Day 10

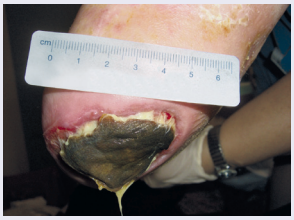


Figure 3: Day 20

Figure 4: At 4 weeks

SUMMARY

octenilin® wound irrigation solution and wound gel can help to support the topical management of wounds. Used in conjunction with regular debridement, octenilin® can cleanse and moisten chronic skin wounds and burns by optimising the wound bed for healing. It may also have a role in the management of biofilms when combined with regular debridement.

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Supported by schülke UK

To cite this document: Braun M, McGrath A, Downie F. octenilin® range made easy *Wounds UK* 9(4). Available from www.wounds-uk.com/made-easy