# The Management of a Neuropathic Diabetic foot Ulcer using ActivHeal® PHMB Foam

**Donna Welch, Advanced Podiatrist Diabetes, Humber NHS Foundation Trust, Trust Headquarters, Willerby Hill Beverley Road, Willerby, HU10 6ED**
**Rebecca Forder Clinical Research Manager Advanced Medical Solutions Ltd, Premier Park, 33 Road One, Winsford Industrial Estate, Winsford, Cheshire, CW7 3RT**

## Background:

Diabetes related foot ulceration is a serious complication of Diabetes mellitus. The international working group on the Diabetic Foot (IWGDF,2014) has reported that as many as 50% of people with diabetes will have significant peripheral neuropathy and 'at risk' feet. Nerve dysfunction in people with diabetes can affect three different types of nerves in the lower legs and feet, namely the sensory nerves, motor nerves and autonomic nerves. Sensory neuropathy (loss of sensation) is a major risk factor for developing Diabetic foot ulcers; approximately 45-60% of diabetic foot ulcers are due to sensory neuropathy (Frykberg et al, 2006). The loss of protective sensation can increase the risk of trauma or injury to the foot from ill fitting or inappropriate footwear as a result of Sensory Neuropathy (Bergin et al, 2013). Approximately 50% of all Diabetic Foot ulcers occur on the plantar surface (sole) of the foot (Bus et al,2011). The prevention and effective management of wound infection is a high priority for clinicians as infection is a significant problem and can result in delayed healing.
PHMB has been used for a number of years as an antiseptic agent however it has been recently added to wound care products. PHMB works by inhibiting bacterial cell metabolism and binding to the bacteria's phospholipid (outer) membrane. (Kingsley & Kiernon, 2012). The case study will explore the management of a Neuropathic diabetic foot ulcer using the ActivHeal® PHMB Foam.

## Introduction:

Advanced Medical Solutions Ltd has launched an antimicrobial foam into the ActivHeal® range as ActivHeal® PHMB foam. The products are available as adhesive and non adhesive. The dressing is three layer construction, and each layer contributes to the overall performance of the dressing. The wound contact layer side of the dressing has clear perforated film. The contact layer prevents adherence of the dressing to the wound bed by preventing growth of granulating tissue into the dressing, thus reducing trauma to the wound bed on dressing removal. The polyurethane foam pad contains the antimicrobial substance Polyhexamethylene Biguanide (PHMB), which kills and inhibits the growth of bacteria. The PHMB is released in the presence of wound exudate and is effective against a broad spectrum of micro organisms (gram +, gram -, fungi and yeasts) that are frequently associated with bacterial colonisation and infection of wounds. The topmost layer of the dressing is a waterproof polyurethane film which provides an effective bacterial barrier function, whilst simultaneously allowing the transpiration of exudate. The ActivHeal® PHMB foam is indicated Diabetic foot ulcers, leg ulcers, pressure ulcers and post operative wounds.

## Method:

A 54 year old male patient with type 2 Diabetes poorly with a HbA1c 122 mmol/mol. The patient presented with a right foot plantar superficial neuropathic ulceration. The patient had previously been supplied with footwear by orthotist however had chosen to wear own shoes. After walking a significant amount the patient developed a blister 1 week prior to attending the diabetic foot clinic. A full assessment was undertaken.

## Results:

Initial assessment found the pulses to be palpable, and sensation absent to 10g monofilament. The ulcer measured 2.3cm x2.0cm and a confirmed surface area to be 4.6cm$^{2.}$ (Picture 1) The ulcer had 10% slough and 90% granulation to base, macerated callus to margins extending to 1$^{st}$ and 2$^{nd}$ toe cleft and moderate exudate levels. The foot showed signs of infection including heat, erythema and the patient had a raised temperature and feeling feverish. No pain was reported due to Neuropathy.
The ActivHeal® PHMB Foam was selected to assist in reducing the wound bioburden and reduce signs and symptoms of infection as well as manage and absorb levels of exudate, maintain a moist wound environment, and promote healing. The patient was also commenced on oral antibiotics to avoid admittance to hospital.

Patient presented in clinic wearing his therapeutic footwear. Patient reported no issues with the slippercast but was now able to get his shoe on as his foot was less swollen. Significant progress was then noted in the wound, with the wound reducing in size.

The ulcer measured 2.2cm x 2.2cm . Visatrak* confirmed the surface area to be 3.6cm$^2$, 21.8% reduction in surface area. The patient reported feeling much better and found the dressing comfortable and easy to apply and remove, causing no trauma to the surrounding skin. The ulceration showed signs of improvement with no maceration to the surrounding tissue and 10% slough and 90% granulation tissue. (Picture 2). No clinical signs of infection were noted, and further antibiotics were not clinically indicated. The patient agreed to continue with the ActivHeal® PHMB Foam dressing.

The patient continued to be satisfied with the comfort of the dressing. The ulcer continued to improve and now measured 2.2cm x 1.6cm with a surface area of 3.2cm$^2$a further 11.2 % reduction in surface area. Wound bed still contained 10% slough, overlying granulation tissue,( Picture 3).The ulcer margins and surrounding skin appeared less macerated and healthier. No signs of infection were present and further antibiotics had not been required.

Significant progress was then noted in the wound, with the wound reducing in size and showing wound progression.
The patient reported less leakage and was satisfied with the dressing. He was pleased that he could see the progression of the ulcer and that it had reduced in size, 1.0cmx 1.5cm. (Picture 4) Visatrak confirmed a further 19.9 % reduction in just 6 days and the ulcer now had a surface area of 1.7cm$^{2.}$ The inter-digital area had dried out and was now intact.

Picture 1

Picture 2

Picture 3

Picture 4

## Conclusion:

The ActivHeal® Foam with PHMB was found to be an appropriate dressing in the management of a mildly infected diabetic foot ulcer with moderate exudate levels. The dressing produced very positive patient outcomes. The ease of applying a single dressing rather than an antimicrobial primary dressing with a secondary foam dressing was advantageous and enabled the patient to self care, not only reducing costs of dressings but reduced health professional appointments. PHMB is a highly effective and safe antimicrobial agent which can be an efficacious alternative to other antimicrobial wound care products. The dressing was able to provide effective exudate handling, whilst maintaining a moist wound environment, delivering antimicrobial efficacy and wound progression with a reduction of 53% in surface area from initial assessment to week 5. The case study illustrates the importance of a holistic approach when caring for a patient with a challenging wound and ensuring that the correct diagnosis is made based upon a thorough assessment ensuring good clinical outcomes for the patient.

**References:**
Bergin,S. Nube,V. Alford,J. Et al (2013) Australian Diabetes Foot Network: practical guideline on the provision of footwear for people with diabetes. Journal Foot Ankle Res. 6 (1): 6.
Bus,S. Haspels,R. Busch-West-Broek,T. (2011) Evaluation and Optimisation of Therapeutic footwear for Neuropathic Diabetic foot patients using in shoe Plantar pressure Analysis. Diabetes Care.
Fryberg,R. Zgonis,T. Armstrong,D. Et al (2006) Diabetic foot disorders: a clinical practice guideline. Journal Foot Ankle Surg. 45 (5 Suppl) S1-65.
International Working Group on Diabetic Foot (2014) Diabetic Neuropathy. Available at : http://bit.ly/1FqhFoq.
Kingsley,A. Kieron,M. (2012) Suprasorb X and PHMB Made easy. Wounds UK. Feb,2012.

activheal