Meeting report: Novel technology for advanced wound dressings — first clinical outcomes from an international multi-disciplinary perspective




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A symposium entitled "Novel technology for advanced wound dressings — first clinical outcomes from an international multi-disciplinary perspective" was hosted by Mölnlycke Health Care at the European Wound Management Association (EWMA) conference in Krakow, Poland, in May, 2018. The symposium highlighted the challenges of managing hard-to-heal, chronic wounds. The specific properties of a new technology in a novel advanced dressing were considered in light of these challenges, in particular, excess exudate management, adhesion and conformability. Real-life cases of using the dressing in different clinical settings were presented by international experts in wound management.

Speakers

***Paul Chadwick** is Honorary Consultant Podiatrist at Salford Royal NHS Foundation Trust, Salford, United Kingdom and Visiting Professor in Tissue Viability at Birmingham City University, Birmingham, United Kingdom*

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Paul Chadwick opened the session with a discussion around the current challenges in wound care, particularly in relation to the management of chronic wounds and the associated economic burden to healthcare services.

Economic challenges of wound care

Wound care places a significant burden on health budgets and resources. In the USA, Medicare expenditures related to wound care has recently been recognised to be far greater than previously estimated. For all wound types, total Medicare spending estimates ranged from $28.1–96.8 billion (Nussbaum et al, 2018). In the United Kingdom, £5.3 billion is spent on wound care, £3.2 billion of which is spent treating hard-to-heal wounds (Guest et al, 2015).

Burdensome wounds often arise out of complications resulting from misdiagnosis, delayed referral and inappropriate use of dressings, all of which contribute to delayed healing and longer hospital stays (Guest et al, 2015). Improved education for clinicians, especially generalists and patients would lead to fewer complications and less complex wounds.

Wound management — balancing moisture

A wound often becomes chronic when there is an underlying disease process, such as diabetes, the presence of a foreign body, or trauma. Failure to manage the wound results in delayed healing, secondary complications, escalating costs, and causes pain to the patient (Frykberg and Banks, 2015).

Excess exudate can delay or prevent wound healing by causing maceration and/or excoriation, and can lead to increased complications and risk of infection (World Union of Wound Healing Societies [WUWHS], 2007). Around 80% of chronic wounds have a biofilm — leading to a prolonged inflammatory phase and contributing to further exudate production (Zhao et al, 2013). However, exudate also prevents the wound bed from drying out, facilitates migration of tissue repairing cells, provides essential nutrients for cell metabolism, enables diffusions of immune growth factors and aids debridement. As such, balancing moisture levels is key to optimal wound healing (Bishop et al, 2003).

Failure to manage excess exudate also increases demand on healthcare resources, requiring more frequent dressing changes and increased clinical time. Highly exuding wounds have a negative impact on patient quality of life and are a cause of physical and psychosocial morbidity (WUWHS, 2007). Therefore, selecting a dressing that can manage high levels of exudate in a chronic wound is a positive step to promote the healing trajectory.

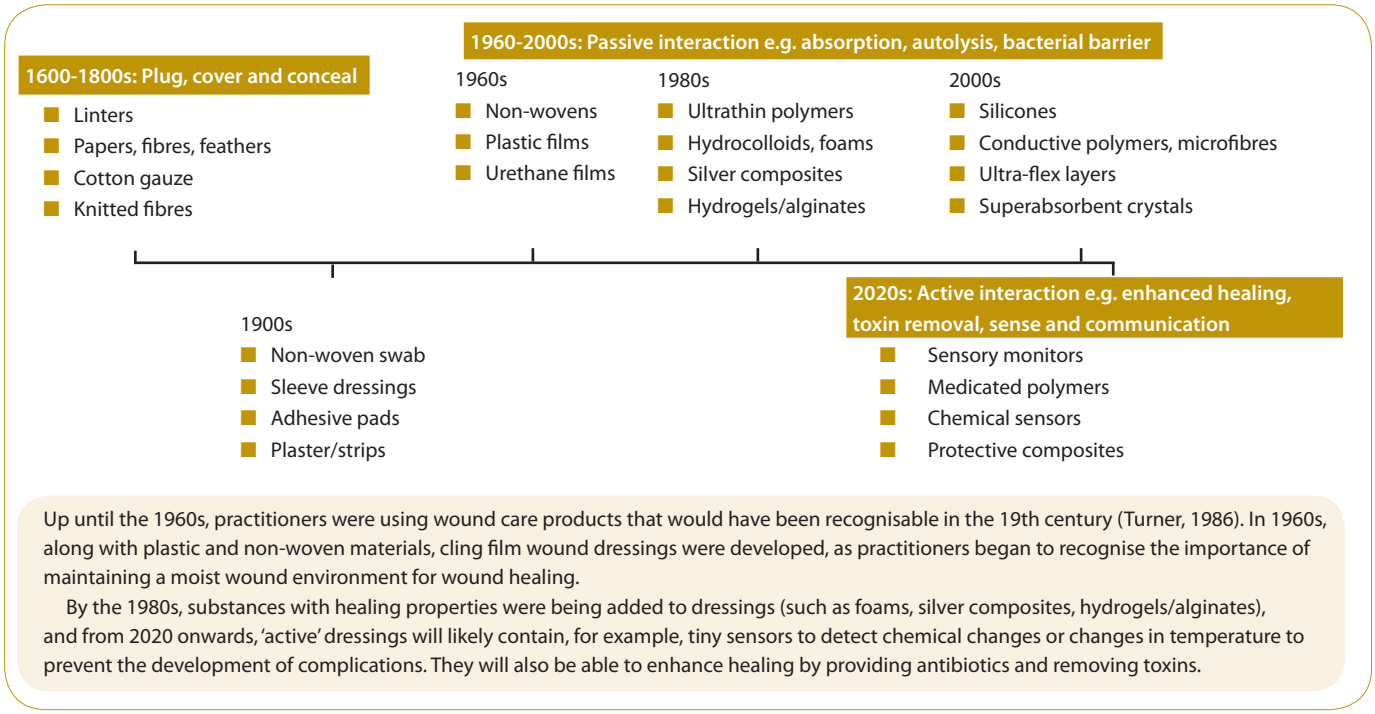


Figure 1. Short history of dressings (timeline not to scale).

Evolution of dressings

The potential dangers of an open wound were recognised centuries ago and, throughout history, wounds have been dressed in an attempt to prevent infection. By video recording, Oscar Alvarez presented a short history of dressing material development *[Figure 1]* before describing his initial experiences using a novel advanced dressing on a diverse range of wounds, specifically its use on venous leg ulcers (VLUs) under compression.

Studying the absorptive profile of Mepilex® Border Flex

Oscar's team studied the absorptive profile of Mepilex® Border Flex dressing (Mölnlycke, Gothenberg, Sweden), which is designed to absorb, channel and trap exudate (low and high viscosity) away from a diverse range of wounds.

A common, unifying hypothesis of chronic wounds is that they have a prolonged inflammatory phase. In the uninfected wound, this is often due to an imbalance of proteases, specifically matrix metalloproteases (MMPs) that break down components of the provisional matrix, thus preventing healing from taking place (Armstrong and Jude, 2002).

Levels of gelatinases MMP-2 and MMP-9 are significantly higher in VLUs than some other wounds, and an excess of MMP-9 has been shown to be deleterious to VLU healing (Lazaro et al, 2016). It is well documented that removing MMPs from the wound bed is beneficial to the healing process (Seah et al, 2005).

Oscar's team hypothesised that, as the dressing is designed to absorb, channel and trap exudate away from the wound, it could offer a possibility for reduced levels of MMP-9 near the wound contact area and, thereby, reduce infection risk.

Mepilex® Border Flex

The Mepilex® Border Flex is a five-layer absorbent foam dressing with a Safetac® wound contact layer to effectively absorb and retain exudate while keeping the wound environment moist.

The dressing is designed to conform to the body contours, offering optimal flexibility to challenging or difficult areas. In combination with Flex® technology (Y-shaped cuts in some of the layers of the dressing), the dressing can stretch and conform, which is especially beneficial for application on joints and other bendable areas. Additionally, its shape was created to minimise peeling and increase adhesion.

Mepilex Border Flex absorbs wound exudate 'up' and into its spreading layer, distributing the wound fluid evenly across its surface and away from the wound. The absorptive layer retains

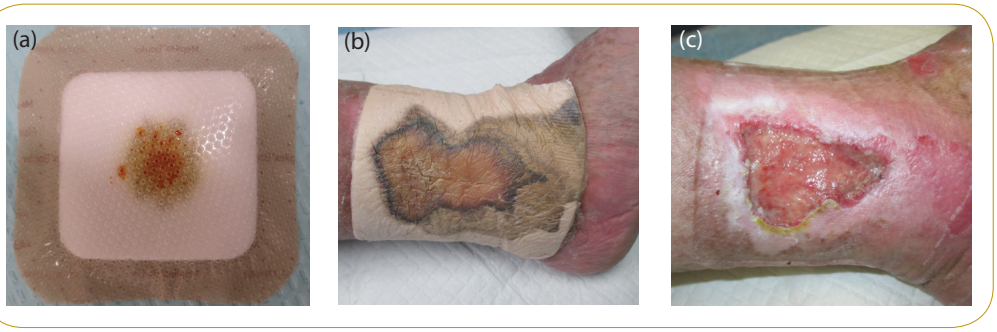


Figure 2. For optimal absorption capacity for Mepilex Border Flex, the wound area should be <60% of the wound contact layer surface area (Figure 2a). Beyond 60% (Figure 2b), maceration to the periwound skin can occur (Figure 2c). Photographs courtesy of Oscar Alvarez.

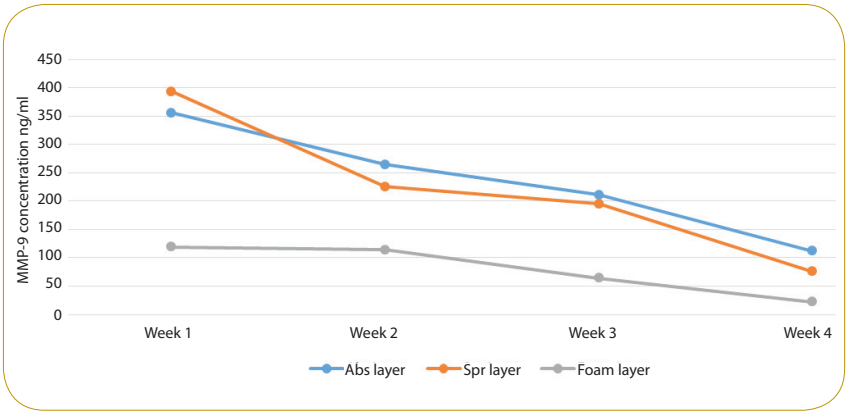


Figure 3. Tracking matrix metalloproteases (MMP)-9 concentrations from exudate in different layers of the Mepilex® Border Flex (Abs=absorbent; Spr=spreading).

exudate, keeping the wound environment moist while the Safetac wound contact layer helps to seal the wound margins, so that exudate does not spread to the surrounding skin. This creates optimal conditions for healing and wound closure.

Study design

A case series and pilot evaluation were conducted involving 10 patients with VLUs treated with Mepilex Border Flex and standard compression therapy. All patients had adequate arterial circulation (ABI >0.75), no signs of infection, and all wounds were <25cm^2. Assessments were carried out weekly for 4 weeks, including monitoring of wound fluid volume and MMP-9 concentration. Healing rates were calculated using photo-digital planimetry software.

Results

Mepilex Border Flex was found to be effective in absorbing exudate away from the wound and wound margins in an inward and outward direction through the dressing, without swelling like similar dressings available. Mepilex Border Flex also offered a benefit in terms of patient comfort.

Oscar's team also found that the optimal absorptive capacity of Mepilex Border Flex for VLUs under compression is achieved when the wound exudate area is <60% of the contact pad surface area. Beyond 60%, excess fluid accumulation and periwound maceration begins to occur *[Figure 2]*. When the wound exudate area was <60%, Mepilex Border Flex remained in situ and under compression for a week. Oscar suggested that, if the wound area covers more than 60% of the wound contact layer, a larger sized dressing should be selected.

Additionally, when analysing MMP-9 accumulation at each dressing layer, Oscar's team found that the lowest MMP-9 concentration was at the foam layer, which is next to the wound contact layer *[Figure 3]*. The highest levels of proteolytic enzymes were found in the spreading layer and absorptive layers of Mepilex Border Flex, furthest away from the wound and at the edge of the dressing.

Real-world evidence for Mepilex Border Flex

Next, Edna Frenthoff presented real-world experience of Mepilex Border Flex *[Box 1]*. The WZ®-WundZentrum centres have treated more 20,000 patients since 2008, and have developed thorough protocols and guidelines for optimal wound management.

The centres conducted an observational study of Mepilex Border Flex between September 2017 and January 2018 across 12 centres, involving 443 patients with 567 wounds of various aetiologies. During the treatment period, the average wound size decreased by a mean of 0.7cm, representing a 30% decrease. Dressings were changed on average twice-weekly (range 1–7 days). More than 88% of patients experienced no pain during dressing changes. Other reported benefits are shown in *Box 2*.

Box 1. Real-world experience of Mepilex Border Flex at the WZ®-WundZentrum centres. Case studies courtesy of Edna Frentoff.

Box 2. Reported benefits of Mepilex Border Flex observed in the study at WZ®-WundZentrum centres in Germany.

- Measurable increase in patient quality of life – dressing was comfortable and did not "roll off" as much as some previously used dressings
- High conformability
- Easy to apply to the body contours and stayed in place better than some previously used dressings
- Reliable absorption and retention of wound fluid
- Sufficient protection against microorganism
- Shower proof
- Could be worn with orthopaedic shoes or under compression
- Easy to use for those patients who wanted to do dressing changes themselves.

Case 1: Pilonidal cyst.

A 28-year-old male patient attended the clinic with a pilonidal cyst to the gluteus maximus, which presented a very challenging location for treatment. The wound measured 19.83cm^2 (Image a) and required dressing changes three to four times per week due to the high levels of exudate. Treatment included active wound cleansing, and a wound filler of reinforced alginate dressing impreganted with 100% Manuka honey, which helped to debride the wound. Mepilex Border Flex was applied as a secondary dressing to absorb the exudate, and conform to this challenging location. After 2 months following this wound management regimen, the wound healed (Image b).

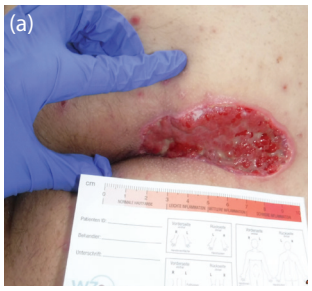


Image a. Day 1.

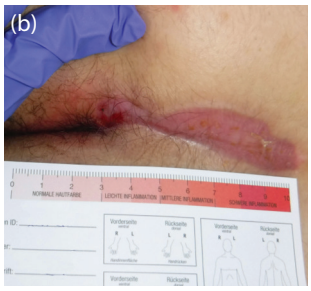
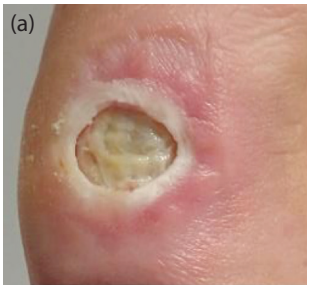


Image b. Day 56.

Case 2: Diabetic foot ulcer to the lateral side to the left foot.

A 73-year-old male patient with a diabetic foot ulcer, measuring 1.11cm^2 (Image a), to the lateral side to the left foot attended the clinic every second day. Treatment included cleaning the wound with a wet dry/phase (a wet compress with a cleansing solution applied for 10–15 minutes, followed by a dry compress to minimise maceration for 5 minutes). The wound was debrided, packed with a hydrofiber wound filler and a protective cream applied around the wound edge to minimise maceration (Image b), before being dressed with Mepilex Border Flex.

After 3 months of treatment with this dressing regimen, the wound reduced in size, measuring 0.39cm^2 (Image c). Mepilex Border Flex continued to be used to protect the wound as it conformed well to the body contours. Surgical debridement of the wound was continued to stimulate granulation (Image d) and healing.



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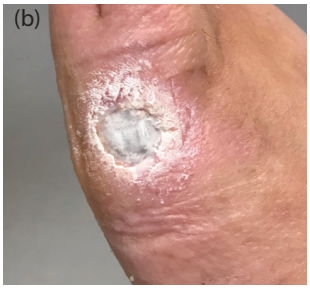

Image b. Day 1: After initial therapy of cleaning, debridement and filling with hydrofiber filler.

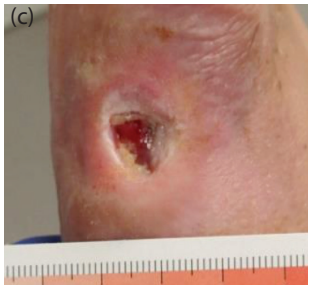

Image c. Day 109 (15 weeks and 4 days).

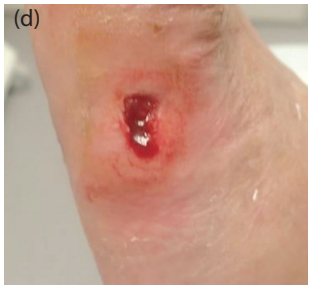

Image d. Day 127 (18 weeks and 1 day).

Box 3. Case studies courtesy of Samantha Haycocks.

Case 1: Diabetic foot ulcer following blister.

A 73-year-old male patient with type 2 diabetes and neuropathy, but good palpable foot pulses, was on holiday abroad when he developed a large blister on his big toe. The blister had burst, exposing the distal phalanx. X-ray showed he had osteomyelitis, so antibiotics were prescribed.

On presentation (Image a), he had been using a non-adherent absorbent dressing, which required daily changes. The dressing would often move and did not cover the whole wound. When Mepilex Border Flex was applied it conformed very well to the toe and did not require cutting, as is sometimes required with other dressings.

Over the next 2 weeks later (Image b), Mepilex Border Flex had consistently remained *in situ* despite high levels of exudate. The patient was able to complete his own wound care and found the dressing easy to use. By week 4 (Image c), the wound was on a healing trajectory — epitheialised tissue was developing from the edges, and there was a decrease in slough and an increase in healthy granulation tissue on the wound bed.

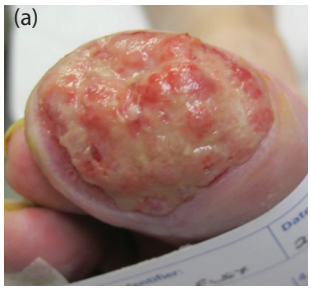

Image a. Day 1.

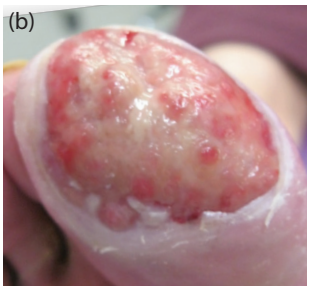

Image b. Day 14.

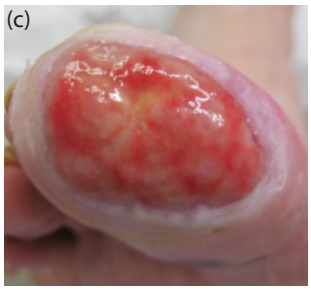

Image c. Day 28.

Case 2. High-exuding diabetic foot ulcer under the fifth metatarsal.

A 54-year-old male, who had previously had a femoral popliteal bypass and an amputation of his first right toe that year, developed a diabetic foot ulcer under the fifth metatarsal, which was a small sinus lesion but very deep at 5cm (Image a). The wound produced a high level of exudate, requiring daily or twice-daily dressing changes. He had ongoing osteomyelitis and was awaiting surgery as antibiotics were not working. While awaiting surgery, Mepilex Border Flex was used as part of the dressing regimen to manage the exudate. Dressings were changed at each of the clinic visits, and in between visits, dressings were changed at the discretion of the patient, usually every 2 days.

In the first week of using Mepilex Border Flex, the dressing only required changing once every other day, twice by the patient and once in the clinic, where the wound was debrided. After 4 weeks the wound had considerably reduced in depth and the wound bed comprised of epithelialised tissue (Image b).

Mepilex Border Flex was efficient at managing the high volume of exudate, allowing for a decrease in the number of dressing changes compared to the previously used dressing. The patient reported that the dressing was easy to apply and conformed well to the foot.

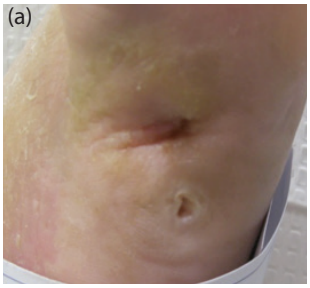

Image a. Day 1.

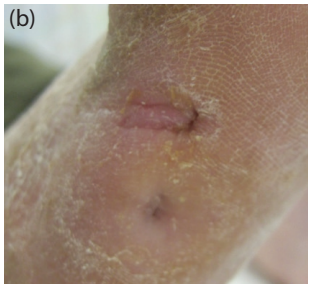

Image b. Day 28.

Key points

1. Excess exudate production is detrimental to wound healing. In such cases, selecting a dressing that assures an ideal moist healing environment, with optimal exudate management and retention, remains *in situ* to maintain undisturbed healing and conforms to body contours would be appropriate
2. Mepilex Border Flex is a five-layer absorbent foam dressing with a Safetac® wound contact layer to effectively absorb and retain exudate while keeping the wound environment moist
3. For chronic, highly exuding wounds, clinical experience of Mepilex Border Flex demonstrates it to be a safe and effective option for treating a variety of hard-to-heal, complex wounds, in various clinical settings.

A clinical perspective: using Mepilex Border Flex on diabetic foot ulcers

Samantha Haycocks described a case study series evaluation of Mepilex Border Flex, which investigated the clinical and cost-effectiveness of the dressing to build an evidence base for prescribing formularies.

Each case study evaluation was conducted over a period of up to 4 weeks. Photographs were taken and baseline and progressive wound and dressing characteristics were recorded, such as ease of use, ability to stay in place, ease of removal, exudate handling capacity and pain or skin damage at dressing change. Two case studies are presented in *Box 3*.

Mepilex Border Flex was found to conform to difficult anatomical locations, without the need to alter or cut the dressing, and stayed in place once applied. The dressing absorbed exudate well in all cases, and was easily removed without causing any pain or tissue damage.

Patient-reported outcomes were equally as positive. Several patients were able to apply the dressing themselves and reported finding it 'extremely' easy to apply. All patients said they found the dressing really comfortable and no one reported pain on use, although it is important to note that all had neuropathy. Two patients reported that previous pain experience at night had resolved while they were using the Mepilex Border Flex.

Conclusion

Choosing an appropriate dressing following a thorough wound and patient assessment can reduce the risk of complications, promote a good healing environment, alleviate patient discomfort and control healthcare costs. For chronic, high-exuding wounds, it is useful to have a dressing that assures an ideal moist healing environment, with optimal exudate management and retention, remains *in situ* to maintain undisturbed healing and conforms to body contours. Clinical experience using Mepilex Border Flex demonstrates it to be a safe and effective option for treating a variety of hard-to-heal, complex wounds, in various clinical settings. WINT

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