Three goals: deslough, manage exudate and promote healing

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Declaration of interest
Jacky Edwards, Julie Evans, Jemell Geraghty, Lorraine Grothier, Sharon Dawn Hunt, June Jones, Juliet Price and Julie Trudgian are all independent practitioners who received a fee for their contributions.

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Foreword: management strategies for removing slough

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The challenges posed by chronic wounds are widely documented, both in terms of the costs to the healthcare economy and the patient (Posnett et al, 2009). Ineffective wound assessment and management are significant contributors to wound chronicity. It is of concern therefore that a recent health economic analysis of wound management in the UK highlighted that wound care was often not delivered in line with best practice guidance, with up to one-third of the wounds surveyed not having their aetiology diagnosed (Guest et al, 2015). The analysis reported that approximately 2.2 million chronic wounds are managed in the NHS each year, costing approximately £4.5–5.1 billion per annum.

This suggests that, if all patients with a wound were diagnosed in an accurately and timely manner by a knowledgeable and competent health professional, there could be significant cost savings, with fewer patients with chronic wounds. However, a cost-effective approach is dependent on health professionals having or developing an understanding of the causes of chronic wounds and knowing how they can intervene appropriately. (Chronic wounds can also be referred to as non-healing, delayed healing or stalled wounds, all of which indicate that the wound is not progressing along the healing trajectory.) The health professional must establish which factors are inhibiting healing (Martin, 2013).

Slough has been identified as a major factor that prevents a wound from healing. The health professional must establish why the slough exists and take action to optimise care—for example, by applying compression therapy on a venous leg ulcer. They must also select a method of removing the devitalised tissue that will ensure the patient’s safety and is within their skills base and ability, which will depend on whether they are a specialist or a generalist.

Applying research evidence in day-to-day wound management can potentially improve patient care by standardising assessment and the planning and implementation of treatment (Ho and Bogie, 2007). However, patients must be involved in the assessment and care planning process so that they are aware of their options and can contribute to the choices made. From experience, in relation to the removal of devitalised tissue, patients are often fearful of procedural pain, while many health professionals feel they do not have the competency required to undertake certain procedures such as sharp debridement.

To address some of these issues, Urgo Medical has developed a dressing (UrgoClean) that removes devitalised tissue painlessly and safely, and can be used by health professionals of varying levels of knowledge and expertise. Supporting evidence on this product includes a randomised controlled trial involving 159 patients, which demonstrated that it facilitated faster and effective removal of devitalised tissue (Meaume et al, 2004).

This supplement describes why slough develops and the importance of its safe and timely removal. It also describes evidence-based management strategies for patients with a variety of wound types.

Chronic wound slough revisited: why its removal aids healing

In non-healing wounds, excess slough is an ideal environment for bacterial proliferation and biofilm formation. Its prompt and effective removal are required.

The management of slough remains a challenge for clinicians, particularly when it is present on chronic wounds. The recent focus on biofilms and its role in wound chronicity has intensified interest in how slough delays healing. This article describes how devitalised tissue and biofilm delay healing and identifies the need for an ongoing, timely and effective approach to their removal.

What is slough?
Slough is a stringy, viscous, fibrinous tissue that can be tenuous (tethered) to the wound bed. It comprises a complex mixture of fibrin (non-soluble fibrinogen, a by-product of the clotting cascade), white blood cells, microorganisms, debris and other proteinaceous material (Gray et al, 2010). In other words, slough is devitalised, host-produced cellular debris resulting from the process of inflammation (Enoch and Harding, 2003).

Slough in acute wounds
Slough is associated with both acute and chronic wounds, but it is only in the latter case that it delays healing (Schultz et al, 2003). The reasons for this are given below.

Neutrophils, which are the first inflammatory cells to appear in the wound, start the process of phagocytosis (ingestion of bacteria). They release free radicals and proteases into the wound, which will promote healing, provided their levels are regulated. The accumulation of neutrophils in the wound bed is, therefore, a healthy host response to tissue breakdown.

In uncomplicated (acute) wounds, neutrophils begin to degenerate and die after they have completed their work, in a process known as apoptosis (programmed cell death) (Wolcott et al, 2008). The dead and dying neutrophils become visible as slough, which is usually a creamy yellow colour. This soft slough is normally removed by the natural process of autolysis. Here, endogenous proteolytic enzymes are activated, which soften, break down and dissolve necrotic or sloughy tissue, which is then digested by macrophages.

This natural process is enhanced by the promotion of a moist wound environment (Strohal et al, 2013), which provides the optimum environment for cell and enzyme activity, and dampens down the inflammatory reaction (Junker et al, 2013). Devitalised tissue is able to liquefy in a moist environment and separate from healthy tissue.

Slough in chronic wounds
In challenging, non-healing (chronic) wounds, the orchestrated process of normal wound healing is disrupted, with excess neutrophils accumulating at the wound site (Diegelmann, 2003), resulting in a state of prolonged inflammation. A wound cannot progress into the proliferation phase of healing until neutrophils are eliminated by macrophages (Martin, 2013). Chronic degradation of the extracellular matrix ensues, with excess production of pro-inflammatory cytokines, resulting in the development of more slough. This interferes with the healing process, leaving the wound in a state of chronicity.

Chronic wound slough can be quite firmly attached, making it harder to remove (Grothier, 2015). It can be yellow, or creamy white, or grey, depending on the cellular matrix, the presence of other organisms and the hydration status of the tissue.

Difference between slough and necrosis
Slough and necrotic tissue have very different aetiologies; accordingly, their appearance and characteristics are dissimilar, posing different challenges for the clinician. Slough is a normal by-product of wound healing. In contrast, necrotic tissue is a consequence of cell death resulting from a lack of blood supply following injury, infection or underlying/untreated conditions such as...
diabetes or vascular disease (Thomas et al, 1999). Unlike slough, as necrotic tissue becomes more dehydrated, it forms a black, dry, thick and leathery structure known as eschar. Table 1 outlines the differences between slough and necrotic tissue. Further information is provided by McFarland and Smith (2014) and Wounds UK (2013).

The presence of devitalised tissue is not only distressing for patients (Wounds International, 2012), but it also impedes assessment as it can hide the true extent of the wound (Price and Young, 2013). This should be borne in mind, for example, when staging pressure damage (Brown, 2013) or determining the extent of damage in diabetic foot ulcers.

**Slough and biofilm**

Colebrook et al (1960) demonstrated that exudate and slough provide bacteria with essential nutrients for growth. In addition, the presence of slough and necrotic tissue inhibit the action of leucocytes, while also providing an ideal environment for microbial proliferation, resulting in increased bioburden and subsequent biofilm formation (Attinger and Wolcott, 2011; Percival and Suleman, 2015).

A biofilm is formed when free-living (planktonic) microbial cells form a polymicrobial colony encased within a three-dimensional sticky polymeric matrix, known as an extracellular polymeric substance (EPS). The EPS enables bacteria to attach to the wound and helps the bacteria resist invasion (Wolcott et al, 2008; Swanson et al, 2014; Percival and Suleman, 2015).

Percival and Suleman (2015) hypothesised that slough acts as a reservoir for microorganisms and biofilm formation. This impedes the healing process, causing the wound to remain in a prolonged state of inflammation, during which the blood vessels dilate, thereby increasing production of exudate and the build-up of fibrinous slough (Wolcott et al, 2008; Swanson et al, 2014; Percival and Suleman, 2015).

It is increasingly accepted that biofilms prevent chronic wounds from healing (Metcalfe et al, 2014) and that, in order to stimulate healing (Strohal et al, 2013), devitalised tissue must be removed (Ousey and McIntosh, 2010). Following debridement, the biofilm is disrupted and the number of microorganisms within it are reduced (Flanagan, 2016), enabling the healing process to resume. It is therefore incumbent on the clinician to ensure the timely removal of slough following a thorough assessment of the patient and the wound. According to Wolcott et al (2008), debridement and desloughing should not be one-off interventions, but, given that biofilms and slough both quickly reform, should be regularly conducted throughout the wound trajectory.

Wolcott (2014) also reiterated that repeated debridement makes the biofilm susceptible to the action of cleansers and antimicrobials. Wolcott et al (2008) advocated a strategy called biofilm-based wound care (BBWC), which includes debridement and the use of topical antimicrobial dressings such as those containing silver, iodine, honey and polyhexamethylene biguanide (PHMB). This process is now commonly referred to as maintenance debridement (Falanga et al, 2008; Percival and Suleman, 2015). Philips et al (2010) suggested that a decrease in slough and exudate, and concomitant signs of wound improvement, might be clinical indicators that the biofilm has been removed.

**Removal of slough**

Debridement options include sharp, autolytic, enzymatic, biosurgical and hydrosurgical (Strohal et al, 2013), although not all may be suitable for each individual wound or patient. Practical considerations include cost-effectiveness, resources, clinician knowledge and competence, time constraints, patient preference and the patient’s environment. Some options are associated with a high degree of risk: for example, sharp debridement in wounds near arteries, nerves and tendons, or in patients with

| Table 1. Characteristics of slough and necrotic tissue (Milne, 2015) |
|-------------------------|---------------------------------|-----------------------------|
| **Sloughy tissue**       | **Necrotic tissue**              |
| **Cause**               | By-product of wound healing cascade | Underlying disease, injury or infection that has disrupted blood flow and resulted in cell death |
| **Colour**              | Often pale yellow or creamy yellow | Black/dark brown/grey |
| **Description**         | Moist, viscous, tenuous, stringy | Hard, dry, thick and leathery |
| **Composition**         | White blood cells, fibroblasts and cellular components of wound healing | Cellular debris |
clotting disorders. Assessment will need to include the factors described overleaf (Wounds UK, 2013):

- Wound aetiology
- The patient’s general health and wellbeing
- Comorbidities and medication—for example, precautions must be taken when sharp debriding wounds in patients with clotting disorders
- Patient’s wishes—for example, some patients will find the thought of larval therapy unacceptable
- Mental capacity (ability to give informed consent)
- Ability to tolerate and/or adhere to the treatment plan
- Wound size and location—for example, wounds in anatomical areas that are regularly exposed to pressure are not suitable for larval therapy
- Circulation—for example, it is important to assess for the presence of ischaemia in the digits
- Condition of the wound bed and exudate levels—for example, use of hydrogels for autolytic debridement will increase exudate levels.

This will help ensure the best (and preferred) outcome is achieved for both the patient and their wound. In some scenarios, such as dry gangrene (when it is likely that the digit will autoamputate), or end of life (when patient comfort is paramount), debridement may be inappropriate.

The documented assessment should also include percentages of the type of tissue (necrotic, slough, granulation or epithelial) present in the wound bed. This will provide a baseline against which any subsequent improvement and deterioration can be measured, and help determine what action to take.

**Autolytic desloughing**

The most commonly used method of removing slough, whether loosely or firmly attached, is autolytic debridement (desloughing), which is facilitated with the use of dressings. Dressings containing naturally occurring enzymes can facilitate autolysis by maintaining the moist environment required for autolysis, while also controlling exudate and preventing maceration (Wounds UK, 2013; Smith et al, 2013). This process can be undertaken by generalist nurses, but it can take a long time to completely remove the slough. Indeed, the slowness of this process is a potential issue for chronic wounds, in which healing has already been delayed, as it increases the risk of further biofilm development and/or wound infection (Milne, 2015). Grothier (2015) provides a useful table of commonly used products that aid desloughing, along with a summary of their advantages and disadvantages.

**Mechanical desloughing**

An example of products that facilitate mechanical desloughing are dressings that can blind and trap slough within their polyacrylate non-woven fibres. These also absorb exudate while maintaining a moist wound healing environment (Meaume et al, 2014), and do not cause pain or trauma at dressing change. Other options for removing hydrated devitalised tissue, including slough, are monofilament debridement pads. Hammerle et al (2011) suggested that slough and debris bind to the fibre composite on these pads, which remove them from the wound bed and surrounding skin. The National Institute for Health and Care Excellence states that these pads quickly and painlessly remove slough (NICE, 2014).

**Living with the wound**

The patient is central to clinical decision-making, as he or she will have to live with the impact of skin breakdown and its treatment. Due to the high levels of anaerobic bacteria present within it, devitalised tissue can produce a distinctive odour (White and Cutting, 2008), which can be distressing for patients. Furthermore, autolytic desloughing can increase levels of exudate and thus malodour, adversely affecting quality of life and exacerbating the social and psychological burden of living with a chronic wound (Wounds International, 2012).

**Referral**

It might be appropriate to involve other members of the multidisciplinary team when a clinician has any concerns and/or advice is recommended (Table 2). If the clinician has any doubt about the wound aetiology or the best treatment option, advice must be sought (check local guidance about referral pathways). Likewise, caution should be exercised, and a referral made, when a patient presents with any of the issues highlighted in Table 2.

### Table 2. Examples of when to refer or seek advice

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<th>Problem</th>
<th>Wound location</th>
<th>Seek advice from or refer to</th>
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<td>Lower limb wound</td>
<td>Vascular team</td>
</tr>
<tr>
<td>Pyoderma gangrenosum</td>
<td>Any location</td>
<td>Plastics/dermatology</td>
</tr>
<tr>
<td>Malignancy</td>
<td>Any location</td>
<td>Plastics/dermatology</td>
</tr>
<tr>
<td>Clotting disorders/anticoagulant therapy</td>
<td>Any location</td>
<td>GP or doctor</td>
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Conclusion
Devitalised tissue is unsightly for patients, adversely affecting their quality of life, especially if coupled with copious exudate and malodour. Such tissue also acts as a reservoir for microbes and, ultimately, promotes biofilm formation, which can lead to wound infection, causing the patient more distress and delaying wound healing further. As always, patients must be central to any decision-making, and the impact of chronic wounds on their lives should never be underestimated. It is unequivocal that devitalised tissue must be removed from the wound on an ongoing basis until it is no longer present. This will remove a source of nutrients for bacteria, and help prevent biofilm formation and the development of infection.


Desloughing is a vital part of wound bed preparation. There are many different methods of removing slough, including mechanical desloughing and autolytic desloughing (Strohal et al, 2013). One option for mechanical desloughing is UrgoClean (Urgo Medical). This dressing not only removes slough and exudate, but also promotes a moist environment and, being low-adherent, is pain-free and atraumatic during removal (Meaume et al, 2014).

UrgoClean is available in a rope or pad format, which facilitates gentle and pain-free desloughing: it traps and binds slough within its polyabsorbent fibres and desloughing occurs when the dressing is removed from the wound in one piece. The polyabsorbent fibres gel when in contact with exudate, which enables it to bind to and vertically absorb slough, trapping it and other non-adherent and devitalised material to the wound bed.

UrgoClean’s vertical absorption makes it suitable for use on all exuding wounds, with its absorbency having been found to be similar to that of Aquacel (ConvaTec) (Meaume et al, 2014). The Technology Lipidocolloid Healing Matrix (TLC) technology promotes a moist environment that is conducive to healing and does not cause pain during removal (Meaume et al, 2002; Meaume et al, 2004; Smith et al, 2004; Meaume et al, 2005; Tan et al, 2009; Hessam et al, 2015). This is achieved by the impregnation of hydrocolloid (carboxymethylcellulose), petroleum jelly and/or paraffin and polymers into a fine polyester mesh or soft-adherent layer. As exudate is absorbed, the hydrocolloid particles become hydrated and interact with the petroleum jelly/polymers to form a lipidocolloid gel that creates a moist environment within the wound. This also protects the surrounding skin. To protect newly formed granulation tissue, the mesh has a small pore size (500µm) through which granulation tissue cannot migrate. As a result, the dressing does not adhere to the newly formed tissue, with a significantly reduced likelihood of trauma, bleeding and pain at dressing change. In addition, the mesh pores prevent any risk of occlusion and allow exudate to drain into a secondary dressing, reducing the risk of maceration of the surrounding skin.

UrgoClean can be used on all sloughy wounds including leg ulcers, pressure ulcers, diabetic foot ulcers and traumatic wounds. For desloughing, it should be changed every 1–2 days. After the slough has been removed, it can be left in place for up to 7 days depending on the exudate level and condition of the wound bed.

Evidence base
Published, peer-reviewed evidence supporting the efficacy of UrgoClean comprises a randomised controlled trial (RCT) (Meaume et al, 2014) and a non-controlled clinical trial (Meaume et al, 2012). The studies are briefly summarised below and in Table 1.

Randomised controlled trial: venous leg ulcers
This compared the efficacy, safety and acceptability of UrgoClean with Aquacel in a sample of 159 patients with venous or mixed aetiology leg ulcers from France, Germany and UK (Meaume et al, 2014). The results showed that UrgoClean was superior to Aquacel in terms of its ability to facilitate desloughing, despite being comparable in terms of efficacy and safety.

Patients with venous or mixed aetiology leg ulcers of at least 3 months’ duration covered with ≥70% slough were randomly allocated to receive UrgoClean (n=83) or Aquacel (n=76) for 6 weeks. At baseline, patient demographics and wound characteristics were comparable in the two groups, with the exception of gender distribution and status of the peri-wound skin. All patients wore compression therapy.

Patients were assessed weekly during the 6-week treatment period. Eighty-four per cent (n=134) completed this follow-up period. The percentage reduction in wound surface area was similar in both groups: 34.1% for UrgoClean versus 34.4% for the control group (intention-to-treat analysis). However, the reduction in the percentage of the wound covered with slough was significantly higher in the UrgoClean group than in the control group (65.3% vs. 42.6%; p=0.013). The UrgoClean group also had a significantly higher percentage of desloughed wounds (defined as 30% of the wound surface area covered with slough) compared with the control (52.5% vs. 35.1%; p=0.033).

Both dressings had a similar safety profile.
Clinical trial: pressure ulcers and venous leg ulcers

An earlier, but non-comparative, evaluation found that use of UrgoClean markedly reduced slough in a sample of 44 patients with either chronic venous leg ulcers or category III or IV pressure ulcers (Meaume et al, 2012).

At baseline, the mean wound duration was 8.3 ± 6.4 months for the venous leg ulcers and 2.9 ± 3.0 months for the pressure ulcers. The mean wound surface areas for the two groups were 11.9 ± 11.3cm² and 12.5 ± 10.7cm² respectively. The mean percentage of sloughy tissue covering the wound bed was >70% in all patients.

Following 6 weeks of treatment with UrgoClean, the amount of sloughy tissue present had decreased by means of 75% and 89% in the venous leg ulcers and pressure ulcers, respectively. Six wounds healed completely over 6 weeks. Dressing was rated as ‘very easy’ to use, with ‘very good’ conformability, and was widely reported as ‘painless’ on removal. Good tolerability and acceptability

Conclusion
These studies, one of which is a robust RCT, provide strong evidence that UrgoClean desloughs wounds quickly and effectively. Additional advantages are that it absorbs slough and promotes healing. In short, not only will it help remove slough and absorb exudate, thereby protecting the peri-wound skin, but it will also create a moist environment that promotes healing. The rest of this supplement comprises individual cases showing how UrgoClean has been used to achieve good patient outcomes and an improved quality of life.


A 62-year-old male was referred to the tissue viability team with a dehisced surgical wound following a laparotomy, small bowel resection, drainage of an intra-abdominal abscess and relocation of an ileostomy. There were issues with nutrition postoperatively in terms of reduced appetite, but these were quickly resolved. His bloods were within the normal range. The patient’s medical records showed he had Crohn’s disease for over 30 years, but was not on immunosuppressants. In addition, he had type 2 diabetes for over 15 years, which was well controlled with daily doses of metformin.

The condition of the wound
At the initial presentation on the third postoperative week, his midline abdominal wound measured 16x14 cm (length x width). The wound bed was mainly covered with adherent sloughy tissue, and healthy bowel was exposed at the right wound margin. The wound was colonised, but there were no local signs of infection: no malodour or erythema and the surrounding skin was generally healthy. Moderate to high amounts of gelatinous, fibrous, yellow exudate required daily dressing changes; soft silicone and Hydrofiber dressings had been used previously. There were no complaints of pain at dressing change. Inflammatory markers, such as C-reactive protein (CRP) and white cell count, were within normal range.

The treatment objective was to reduce slough and promote granulation tissue formation through moisture and exudate management, and to protect the exposed bowel. Secondary outcome measures were to ensure/maintain patient comfort and to reduce the frequency of dressing changes.

Outcomes
Figure 1 shows the wound during the first application of UrgoClean. Figure 2 shows the same wound one day later, when it was assessed in order to determine its progress and exudate levels. After one week’s treatment the wound had reduced in size to 15x12.5 cm (a reduction of 16.29%) and the wound bed looked considerably cleaner, with a visible reduction in slough (Figure 3). The remaining exposed bowel appeared more flattened and healthy. The patient reported that the dressing changes were comfortable.
CASE STUDY

Why did you use UrgoClean?
The team wanted to consider another topical option for desloughing the wound bed. We had not used UrgoClean before and were keen to assess how it would manage such a wound.

How does it compare with other methods of removing slough?
After one day of use, there was a notable reduction in sloughy tissue, and this was visible again after one week’s application. UrgoClean is a welcomed addition to the range of dressings that can be used to deslough wounds. Like any wound dressing, one size does not fit all; therefore, UrgoClean should be assessed and implemented in line with the individual patient and his or her wound characteristics.

What were the main clinical challenges?
One of the challenges was managing the sloughy tissue with the UrgoClean regimen alongside the exposed bowel, as the small area of bowel had a tendency to bleed when in contact with dressings. The team therefore covered the exposed bowel with a soft silicone dressing. This dressing combination proved effective in this individual case.

What did the patient think of the treatment?
The patient was impressed with the treatment and noticed the visible reduction in sloughy tissue. We encouraged him to be actively involved with his wound management, which he was glad to do. He was happy that the dressing facilitated his discharge home.

Would you use this again?
Yes, it is worth considering all options. This was a good result for the time scale involved.

Pressure damage on the elbow

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A 32-year-old man was admitted to an acute renal ward for investigation following a recent increase in fatigue, weight loss, weakness and decrease in nutrition. He had had a kidney transplant 12 months previously. He also had diabetes, which was poorly controlled and malabsorption syndrome. At present, he was anaemic and had a long-standing diabetic foot ulcer and extensive moisture lesions on his buttocks.

This case describes bilateral elbow pressure damage, first observed when the patient was admitted to hospital. The patient said the pressure damage had occurred when sleeping in a chair at home for over 15 hours, as, on waking, he noticed there were painful red/purple blisters on both elbows. Both pressure ulcers (PUs) assessed as EPUAP/NPUAP category III.

Figure 1. The wound at the first assessment
Following a kidney transplantation, malnutrition and anaemia, the patient was prescribed immunosuppressants, which are associated with poor wound healing (Maroz and Simman, 2014). It was vital to debride the injured tissue promptly in order to promote healing and reduce the risk of infection.

**The condition of the wound**
This case focuses on the PU on the left elbow. At the first assessment, it measured 8x5cm and had a central island of thick, dry, adherent slough measuring 6.5x4.5cm, resulting in 73% of the total wound bed being visually obscured (Figure 1). The wound and surrounding skin appeared oedematous and erythematous. There was also moderate exudate, which needed to be managed in order to protect the peri-wound tissue.

The patient reported that his elbow was only painful at dressing change and when repositioning himself. Wound swabs taken on admission did not identify any pathogens indicative of localised infection.

Following the assessment, it was decided to use UrgoClean as a topical desloughing agent. It was held in place with a secondary adhesive bordered foam dressing. The dressing was changed on day 5, when rehydration of dry eschar was observed. There was also evidence that the edge of the slough had been debrided, and there was a significant reduction in the oedema and erythema present.

**Outcome**
After 2 weeks of treatment, the wound had reduced to 5x4cm (a reduction of 50%) and there was loose slimy fibrinous slough, which could easily be removed with irrigation alone (Figure 2). There were islands of new granulation tissue within the slough and signs of epithelialisation at the wound edge. Meanwhile, an area of deeper sloughy tissue, measuring 1.5x1.5cm (category III), was covering 11% of the overall wound bed. (Unfortunately, the wound depth is not known.)

On day 25, the wound had reduced to 4x3cm (equivalent to 70%), with further evidence of loose wet fibrinous slough, while there were new areas of granulation tissue and epithelialisation at the wound edge (Figure 3). The area of deeper sloughy tissue now measured 1x1cm and covered 8% of the overall wound bed.

This is an example of the timely desloughing of a category III PU over a 25-day period. The UrgoClean dressing appeared to promote continued growth of granulation tissue. Other contributing factors were the patient’s improved nutritional status and the ferrous and blood transfusions for his anaemia.

**Reference**

**Why did you use UrgoClean?**
The dressing was chosen because it had previously been found to facilitate effective and timely autolytic debridement in our hospital.

**How does it compare with other methods of removing slough?**
Only UrgoClean was used as a desloughing agent on this wound, so I am unable to compare its effectiveness with other products.

**What were the main clinical challenges?**
The main clinical challenge was to select a product that could manage moderate exudate levels, was comfortable to wear and could conform to the joint region of the elbow. UrgoClean appeared to meet this challenge effectively. The other clinical challenge was to address the patient’s systemic problems, which were also delaying healing.

**What did the patient think of the treatment?**
The patient was very interested and involved in his treatment options. When asked, he commented that he did not have pain at dressing change, and was happy that his wounds were improving and had remained free of infection, which had been a concern for him.

**Would you use this again?**
Yes.
This case study describes an 86-year-old woman with three chronic painful, sloughy, mixed-aetiology ulcers on the lower limb. Her medical history included adenocarcinoma of her lung, for which she was receiving palliative therapy and nutritional support (she weighed 53kg). The ulceration, which had been present for over 4 years, had resulted in poor mobility and a low mood, while the patient's opioid dependency was causing her to experience increasing confusion. She was referred to a hospital vascular unit by the community hospice team.

Diagnostic arterial duplex identified mild calcification of the vessels in her right leg and significant stenosis in the left leg. The patient underwent angioplasty to increase the arterial flow to her foot, which was moderately successful, and foam sclerotherapy to treat the venous incompetency in her saphenous veins. Despite this, her bilateral lower limb ulceration deteriorated and the pain increased.

The condition of the wounds
The left lateral malleolus ulcer measured 110 x 130 mm. It was completely covered with thick viscous exudate and slough, with no signs of epithelialisation. The exudate had an offensive smell (Figure 1).

The left medial malleolus ulcer measured 25 x 25 mm. It too was completely covered with thick viscous slough (Figure 2).

The right lateral gaiter ulcer measured 75mm at the widest and 65mm at the shallowest width. The length was 70mm. Again, slough completely obscured the wound bed (Figure 3). The peri-wound skin was dry and desiccated in areas and wet in others.

The ulcers underwent sharp debridement but this was painful and the slough quickly recurred. Larval therapy was then attempted; again, it was effective in the short term, but the thick, obdurate slough reformed a few days after the therapy was stopped.

Both lower legs and ankles were oedematous, and the increasing pain required high levels of opiates, further exacerbating the patient's confusion and poor mobility. The current dressing regimen (a superabsorbent Hydrofiber dressing and a retention bandage) was unable to manage the increasing exudate levels, which contributed to the patient's low mood. Daily dressing changes were required, but the pain at dressing change was causing anxiety. She felt out of control and in a spiraling cycle of dependency, in which she required more opioid analgesics to control the pain and was unable to sleep at night.

The slough in all three ulcers was adherent, stringy and difficult to remove, even with a fine monofilament pad. The patient experienced significant pain during wound cleansing; she was prescribed oramorph for this but could not tolerate it. The wounds were showing signs of critical colonisation. Maceration of the peri-wound skin was contributing to the patient's pain and distress, and causing the wounds to increase in size.

Treatment goals, which were agreed with the patient, were to reduce the amount of slough and the size of the ulcer, and to improve the condition of the wound bed. A dressing was required that was atraumatic on removal, and could manage the exudate more effectively, help reduce the pain levels and improve the patient's quality of life.

Previously, the management of oedema had been poor, with fluid caused by the venous disease leaking onto the peri-wound skin. The secondary treatment goals were to:
- Reduce the level of exudate
- Apply compression to the right leg if possible
- Treat the venous disease provided that the pain and all other symptoms were under control.

A new treatment protocol was implemented comprising UrgoClean, a superabsorbing pad (Zetuvit, Hartmann), K Soft (Urgo Medical) and K Lite (Urgo Medical) as a retention bandage.

Outcome
Two days after application of UrgoClean, the condition of the wound bed had improved in all three lesions:
CASE STUDY

Left lateral malleolus ulcer: buds of granulation tissue were apparent across the wound bed, and the quantity and thickness of the slough had reduced. There were also signs of epithelial tissue (Figure 4).

Left medial malleolus ulcer: there was a reduction in slough at the edges of the wound, and granulation tissue was beginning to form. The peri-wound area was looking healthier (Figure 5).

Right lateral gaiter ulcer: the slough had reduced and there was an improvement in the integrity of the peri-wound skin. This was surprising, as the removal of slough would stimulate the inflammatory response and an increase in tissue oedema would have been expected. The dressing managed the increased leakage well (Figure 6).

For the patient, the most important difference was the reduction of pain at dressing change. She now consented to the application of a reduced compression bandage (KTwo, Urgo Medical) on her right lower leg. The dressing regimen described above was used on both legs for a total of 9 days, with dressing changes every 4 days.

On day 9, all three ulcers had improved:

- The left lateral malleolus ulcer had reduced in size to 100 x 70 mm, with a 40% reduction in wound...
volume. There was healthy granulation tissue all over the wound bed and epithelial buds in the centre and on the medial edges. All of the peri-wound skin had improved. There was no evidence of infection or colonisation (Figure 7)
- The left medial malleolus ulcer: measured 20x20mm, and there was a 20% reduction in wound volume (Figure 8)
- Lateral right gaiter ulcer: overall, this had reduced in size by 20% and now measured 75mm at the widest aspect, 55mm at the shallowest width and 70mm from margin to margin. There was also a significant reduction in the depth of this wound. The wound bed now comprised 100% granulation tissue. The peri-wound was healthy and there was now minimal exudate (Figure 9).

The percentage of granulation tissue continued to increase until the patient was discharged back to the care of her community and hospice care team. Her quality of life had improved.

Why did you use UrgoClean?
The main treatment aim for this patient was to remove the slough as quickly and painlessly as possible, as it was obscuring the wound bed in all three ulcers. The slough was aiding bacteria proliferation and preventing angiogenesis and granulation tissue formation.

How does it compare with other methods of removing slough?
This patient had previously had several attempts to remove the slough on her ulcers. These had only been effective temporarily and had caused significant pain.

What were the main clinical challenges?
To rapidly remove the slough from the wound bed and to improve the patient’s mobility and quality of life by reducing the pain and oedema in her legs.

What did the patient think of the treatment?
The patient was very impressed with the treatment. Her leg ulceration was the main cause of her anxiety and pain; she was much less worried by and bothered about the symptoms of her lung cancer. After the first dressing change of UrgoClean, she slept for a full night without pain and her mood immediately lifted. She reported that her dread of pain at dressing change was causing loss of sleep, and that this fear had disappeared.

Would you use this again?
Yes. Before this evaluation, I had minimal experience with the product. UrgoClean will be added to the trust’s wound care formulary.

Infected abscess on the neck

SHARON DAWN HUNT LEAD ADVANCED NURSE PRACTITIONER, GENERAL PRACTICE, WELLWAY MEDICAL GROUP AND INDEPENDENT SPECIALIST IN WOUND CARE

This case describes the management of a large infected abscess on the back of the neck. The patient was a 38-year-old male farmer, who was a single parent of four children following the death of his wife at a young age five years before. He was normally fit and well, with no medical history of note.

The patient presented at his local GP surgery with a large ‘spot’ that had developed on the back of his neck over a 4-week period (Figure 1). He had been self-caring, having applied over-the-counter antiseptic lotion and basic adhesive plasters to the wound. He had been changing the plasters up to three times a day. He was now seeking advice on how to manage the pain, malodour and increased swelling. The pain was so severe (visual analogue score (VAS) of 9/10 (where 0=no pain and 10=worse possible pain) that it was affecting his head and neck movements, resulting in him taking time off work. His main concern was the loss of income and the potential impact of this on his family. The practice nurse referred
him to the surgery’s advanced nurse practitioner, who specialises in tissue viability and skin care.

**Condition of the wound**

There was a large infected skin abscess on the posterior lateral aspect of the patient’s neck (Figure 1). The wound, which had a small puncture in its centre, was producing thick white and green slough and malodorous serous exudate on the skin. There was widespread erythema spreading down to the right scapula, which resulted in pain when he moved his right shoulder and arm (no oral or intravenous antibiotics were used as the patient was allergic to most of them). In addition, a 3 cm protrusion above the skin was restricting movement of the head and neck. The treatment goals were to manage the exudate, protect the peri-wound skin, and improve mobility in the head and neck.

The advanced nurse practitioner cleansed the wound using an aseptic technique, and incised and drained the abscess. The wound was covered with UrgoClean (rope) and Mepilex Border (Mölnlycke Health Care) and left to heal by secondary intention. The practice nurse changed the dressing every 72 hours.

**Outcome**

After 7 days of treatment, the abscess was level with the skin, thereby enabling full movement of the head and neck (Figure 2). The patient’s VAS pain score had reduced to 3, and there was no malodour. The exudate was now haemoserous and of low volume. The practice nurse continued to change the dressing twice weekly in the surgery. The patient returned to work on day 14.

*Why did you use UrgoClean?*

We use this dressing in our practice on a day-to-day basis, and so have confidence in it, having seen its impact on patients’ wounds. Our patients also like the product.

*How does it compare with other methods of removing slough?*

It works well on sloughy wounds, especially on those that are wet and sticky. It absorbs a lot of exudate and so protects healthy skin and surrounding tissues. It is also easy to remove.

*What were the main clinical challenges?*

High exudate levels and the need to pack this deep wound. UrgoClean rope was used for this.

*What did the patient think of the treatment?*

This patient liked the dressing: it was comfortable when packed into the cavity, absorbent and prevented skin maceration.

*Would you use this again?*

Yes. And the patient is happy to continue wear the dressing until the wound heals.
Full-thickness flame burns

JACKY EDWARDS BURNS NURSE CONSULTANT, BURN CENTRE, UNIVERSITY HOSPITAL OF SOUTH MANCHESTER, MANCHESTER

This case describes a frail 85-year-old woman with scoliosis of the spine, chronic obstructive pulmonary disease (COPD), hypertension and transient ischaemic attacks. She smokes 30 cigarettes per day and lives alone, but is visited by carers four times a day.

The patient sustained 9% total body surface area (TBSA) full-thickness flame burns to her thighs, abdomen, chest and chin when she dropped a cigarette onto her nightdress. She threw a cup of water over the burnt areas and went to bed without seeking help. Her injuries were seen by her carers the next day.

Full-thickness burns involve the epidermis, dermis and, sometimes, underlying fat, muscle and bone (Papini, 2004). Management comprises tangential excision of the dead tissue and skin grafting (Papini, 2004).

The patient was admitted to the regional burn centre. Her burns required surgical excision, but she repeatedly declined this as she was frightened of the outcome. A psychologist tried to allay these fears, but she continued to refuse. There was no option but to manage the burns conservatively. Standard therapy for burns is debridement with Flamazine (Smith & Nephew) to prevent infection (Edwards, 2012). Figure 1 shows the burns after 5 days of treatment with Flamazine.

Condition of the wound

As the burns on the patient’s abdomen, chest and chin were more superficial, they healed with conservative treatment. However, those on her thighs were deeper, covering approximately 4–5% TBSA. As she continued to refuse surgery, she was offered larval therapy, which is used widely to debride burns in elderly patients (Edwards, 2006). She consented and tolerated two applications. The larvae removed the outer slough but left a sloughy base over all the areas, which needed to be removed (Figure 2).

As Mrs B would not tolerate the larvae any longer due to pain, it was decided to start using UrgoClean. This was covered with burns gauze and bandages.
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Why did you use UrgoClean?
The patient declined surgery and could not tolerate further larval therapy. UrgoClean seemed a good way of removing the remaining slough; we had used it before with good effect but not on such a large area.

How does it compare with other methods of removing slough?
It is very effective, but in this case we would have preferred surgery to reduce the length of stay and prevent infection as the wound would have healed more quickly. However, compared with other methods of autolytic debridement, UrgoClean is very quick, effective and well tolerated by patients.

What were the main clinical challenges?
Like all hydrocolloids, there can be some initial malodour when UrgoClean is used. This results from the carboxymethyl cellulose (CMC) impregnated within the TLC healing matrix. We needed to apply a charcoal dressing over it to ensure patient adherence. Also, the burns over both thighs were quite large (approximately 4–5% TBSA) so the dressings had to be cut to fit.

What did the patient think of the treatment?
The patient found the treatment comfortable and less painful than the larval therapy, although she did comment on the odour generated. She tolerated five dressing changes with UrgoClean.

Would you use this again?
Yes, we have used it many times since this case, and find it very useful for debriding small areas or post-larval therapy. It is very effective and, as long as the staff are aware of the potential odour issue, is well received.

Outcome
The patient tolerated the dressing well. It was applied five times over 12 days, when the wound bed started to granulate. The dressing was replaced with UrgoStart, which was easy to use and, as dressing changes were reduced, this enabled earlier discharge. Figures 3 and 4 show the burns after three and five applications of UrgoClean.

Complex venous leg ulcer

JEMELL GERAGHTY LEAD NURSE, TISSUE VIABILITY, ROYAL FREE LONDON NHS FOUNDATION TRUST

A 49-year-old woman with a venous leg ulcer (VLU) on her lower left leg was referred to tissue viability from A&E by the vascular team. The patient had a history of deep vein thrombosis, varicose veins and deep venous insufficiency. Clinical presentations included pain, heat, erythema, elevated levels of C-reactive protein (CRP) and a raised white cell count (both being inflammatory markers). The ulcer, which was of 3 years’ duration, had occurred spontaneously. Due to the associated pain and reduced mobility, she was unable to work.

A number of different compression regimens had been used previously with varying results. These were inelastic and elasticated compression bandaging, and multi-layer elastic and short-stretch inelastic systems. The patient reported that the nurses’ bandaging skills and consistency in application varied. In addition, she had self-treated with household disinfectant and a jar of honey, as well as medical iodine solutions. The ulcer had never fully healed.

On admission, the vascular team prescribed a 5-day course of intravenous (IV) penicillin, as recommended by microbiology. A routine Doppler showed the ankle brachial pressure index (ABPI) was 1.0. A venous duplex revealed deep venous incompetence, which was consistent with the patient’s history of deep vein thrombosis.

Condition of the wound

A tissue viability assessment found that the medial and lateral aspects of the left malleolus were ulcerated. The medial malleolar ulcer measured 8.5 x 6 cm and there was a mixture of slough (40%) and granulation tissue (60%) on the wound bed. There was moderate exudate, but no malodour or surrounding erythema, and the bacterial colonisation was local to the wound bed, with no acute presentation of infection or cellulitis. The colonisation was confirmed by a routine wound swab undertaken by the nursing staff before the specialist assessment.

The lateral malleolar presented two ulcers:

- The first, which measured 4.5 x 2.5 cm, was heavily colonised; the wound bed was covered with a heavy layer of slough, and there was moderate yellow exudate but no malodour

Figure 1a. The medial malleolar ulcer at admission
Figure 1b. The lateral malleolar ulcer at admission
Figure 2a. The medial malleolar ulcer on day 7
Figure 2b. The lateral malleolar ulcer on day 7
Figure 3a. The medial malleolar ulcer on day 10
Figure 3b. The lateral malleolar ulcer on day 10
The second, which measured 1.5 x 1.5 cm, was superficial. The exudate level was low and the majority of tissue in the wound bed was granulating.

The treatment goals were to reduce the lymphatic congestion and oedema. Additional aims were to reduce the amount of slough and promote granulation tissue formation. There was also a need to ensure comfort, promote sustained dressing wear, reduce dressing-change frequency and help the patient manage her wound. The team wanted to talk and listen to the patient about the impact of the ulcer on her life and how they could work together to achieve positive, structured wound-care outcomes.

Figure 1a and b shows the presentation of the ulcers at admission. At the first assessment, the main ulcer had a gelatinous film of fibrous sloughy tissue, which dominated most of the wound bed. It appeared to be dormant and chronic in nature. To reduce the bacterial load, the wound bed was soaked with a wound irrigation solution containing polyhexanide (PHMB). It was then irrigated with warm normal saline, as recommended in UrgoClean’s instructions for use. To keep the skin supple and intact, the surrounding skin was washed and moisturised with an emollient. UrgoClean was then applied and covered with compression bandaging. The team aimed for reduced compression, working up to the optimal 40 mmHg when the patient could tolerate it. The compression was worn throughout the treatment period. Figure 2 shows UrgoClean shortly before a dressing change, illustrating its absorbent properties.

Outcome

By the second assessment one week later, there was no reduction in ulcer size, but there were encouraging signs of increased granulation tissue formation (approximately 5–10%) (Figures 3a and b). Nevertheless, the tissue viability team requested that the granulation tissue continued to be monitored for any changes, such as in colour and texture, that might indicate the need for a topical antimicrobial. Some maceration was noted on the surrounding skin, due to gravitational positioning and the patient’s increased mobility, so a skin barrier protective spray was used when required. Exudate management was monitored at dressing change and a skin barrier applied when needed.

Figures 3c and d show the wound bed just 10 days after treatment.

The patient was reassured and motivated by the specialist intervention she received for her chronic wound. This gave her a great boost and a newly formed trust to revisit the issues around consistency of application; she was engaging once more in her care. The treatment goals were to encourage granulation in an otherwise static and non-healing VLU. Although still in its early stages, the wound improved after 10 days of treatment with UrgoClean and compression bandaging, after which she was discharged back into the community.

Why did you use UrgoClean?

Chronic leg ulcers are extremely challenging and this patient had tried almost every possible topical regimen. The patient had not always been concordant with her compression bandages, so our priority was to get this right. We were continually negotiating with her, explaining that compression is the first-line treatment. She was keen to try UrgoClean and was encouraged by the results. However, this is still a work in progress.

How does it compare with other methods of removing slough?

I was pleasantly surprised at how much exudate UrgoClean absorbed. I would say minimal to moderate levels, with regular dressing changes, as needed.

What were the main clinical challenges?

The main challenge was to maintain the patient’s momentum. She wanted to see visible results fast, and we had to balance this somewhat unforeseeable expectation with realistic outcomes. The important challenge was to maintain her positive attitude about us working in partnership together, and to promote concordance and wellbeing.

What did the patient think of the treatment?

She was encouraged by the visible results, which really lifted her mood.

Would you use this again?

Yes, I think UrgoClean has a place in the management of sloughy wounds, depending on the wound bed presentation.
Complex rheumatoid venous leg ulcer

JEMELL GERAGHTY LEAD NURSE, TISSUE VIABILITY, ROYAL FREE LONDON NHS FOUNDATION TRUST

This case study describes a 66-year-old woman with a long-standing history of severe rheumatoid arthritis (RA), which had resulted in a fixed ankle joint, with no rotation or dorsal flexion of the foot during movement/walking. The patient also had a chronic venous leg ulcer (VLU) on the lateral aspect of her lower left leg, to which the RA had been a contributing factor. She attended a combined nurse and consultant vascular leg ulcer clinic for her wound care. The ulcer had deteriorated due to inappropriate application of reduced compression bandaging in the community, which had resulted in tissue trauma and exposed tendon on the anterior tibial aspect of the leg (Figure 1). The community team were unsure whether to continue using compression and so stopped, which resulted in the limb and forefoot becoming oedematous.

Overall, the patient had experienced long-standing poor health, although she coped well with this. Her appetite and mood were low at times, and she admitted to not eating well simply because she did not feel like it. This had resulted in weight loss and muscle wasting. Nevertheless, she remained bright and optimistic. She received support from her friends and was determined to maintain her independence.

The patient was prescribed methotrexate for the RA, which was regularly reviewed by the rheumatology team. She also had chronic anaemia, for which she was taking iron tablets and received intermittent blood transfusions when indicated by haemoglobin checks. The anaemia was regularly assessed by her GP.

The condition of the wound

The ankle brachial pressure index (ABPI) was always within normal range and an arterial duplex scan showed triphasic flow in all main vessels. The traumatic wound measured approximately 20x14 cm and its surface was completely covered with yellow gelatinous slough. The exposed tendon was moist and viable in places. There was heavy exudate but no
real malodour or signs of acute infection, although
devitalised tissue was present. The surrounding skin
was fragile and macerated in places.

Following assessment by a vascular consultant,
the patient underwent an arterial duplex of
the left lower limb, which found no significant
stenosis of the main vessels in the leg. It was
decided to restart her reduced compression
bandages in order to reduce the oedema. Routine
bloods, including full blood count, indicated that
the patient was anaemic and required a blood
transfusion. All other observations were normal
and the patient reported feeling well overall,
despite the anaemia.

The main treatment goals were to reduce the
oedema and deslough the wound as much as
possible while keeping the tendon moist and
attempting to salvage as much viable tendon
as possible.

UrgoClean was applied over a 5-week period.
Throughout this time, the wound was irrigated with
a polyhexanide (PHMB) solution before dressing
application. The dressing was changed every
alternate day, when it was soaked for 10 minutes
and rinsed off with warm normal saline, as stated
in the manufacturer's instructions for use. Given
the dressing-change frequency, no absorbent
secondary dressing was required.

An elastic multi-layer reduced compression
bandaging system was used. This applied 17mmHg,
which was tolerable for the patient. The wound was
not sharp debrided at this time, and UrgoClean was
the main dressing of choice for the duration for this
5-week period.

**Outcome**

Although the wound dimensions did not change
during the 5-week period, the condition of the wound
bed improved considerably, with visible healthy
granulation present over the tendon and surrounding
tissue. *Figures* 1–4 illustrate the improvement in the
wound bed over the tendon during this period.

It is important to note that the healing was
attributable to a variety of factors including the
topical regimen. These included an improvement
in the patient’s nutrition and wellbeing, regular
haemoglobin checks and monitoring by the
rheumatology team. Regular compression
applied consistently by health professionals also,
undoubtedly, facilitated healing.

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**Why did you use UrgoClean?**

We needed a non-invasive topical regimen that
would quickly deslough this extensive chronic
ulcer, thereby optimising healing over the tendon.
We were attempting to avoid sharp or surgical
debridement as this could put the tendon at risk.
UrgoClean was an option at the time and both the
patient and the clinical team were keen to try it.

**How does it compare with other methods of
removing slough?**

We were pleasantly surprised with the result
achieved. Although the dressing regimen was only
a part of the overall treatment plan, there is no
doubt that, for this particular patient, the results
were good.

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**What were the main clinical challenges?**

The main challenge was managing the heavy
gelatinous exudate at the start of the treatment
period. As well as using PHMB soaks, we gently
removed all excess slough that would come away
during the cleansing process. UrgoClean both
trapped slough and absorbed the exudate within
the dressing under reduced compression.

**What did the patient think of the treatment?**

We were all encouraged by the healing of such a
difficult and extensive wound.

**Would you use this again?**

Yes, UrgoClean has a place in the treatment
of chronic venous leg ulcers with complex
contributing pathophysiology, depending on the
condition of the wound bed.
An exuding, painful postoperative wound

SHARON DAWN HUNT, LEAD ADVANCED NURSE PRACTITIONER, GENERAL PRACTICE, WELLWAY MEDICAL GROUP AND INDEPENDENT SPECIALIST IN WOUND CARE

This case study describes a 52-year-old woman with a non-healing minor postoperative wound. She lived at home with her disabled husband, who she cared for, and her 18-year-old daughter and 10-year-old son. She worked part-time as a cleaner in a local hospital, but was on long-term sick due to her wound. She lived in a village and relied on her car to do her shopping, and to take her husband to his day centre and younger child to school.

The patient has type 2 diabetes, which is managed with metformin. She had a normal body mass index, was a non-smoker and was very...
active due to her family commitments. During the past 10 years, she had occasionally required counselling and medication for depression, but her mental health was good within the period covered in this evaluation.

**The condition of the wound**

The patient attended her local surgery for an annual check-up, during which a vigilant practice nurse noticed an active lesion on her right lower anterior pre-tibial region. Following a biopsy, it was diagnosed as a basal cell carcinoma and the patient underwent minor surgery to remove it. The wound, which was left to heal by secondary intention, deteriorated. The treatment protocol comprised wound cleansing with normal saline, followed by application of AQUACEL (ConvaTec) and Allevyn Gentle (Smith & Nephew), which a district nurse changed every 48 hours. On the eighth postoperative day, both the patient and the practice nurse became concerned about the strong malodour and increase in exudate levels. The practice nurse therefore sought advice from the surgery’s advanced nurse practitioner, who specialises in tissue viability and skin care. UrgoClean contributed to slough removal by absorbing and trapping slough debris from the wound. Figure 1 shows the wound on day 0, when the wound duration was 6 weeks. It measured 8 x 10 x 0.3 cm (length x width x depth) and comprised two large craters that were sloughy and were producing high levels of malodourous exudate. The peri-wound skin was macerated and the patient’s visual analogue scale (VAS) pain score was 7 (where 0=no pain and 10=worse possible pain). The patient was unable to drive because of the pain and leakage of exudate. She reported that her leg felt weaker and struggled to press the accelerator pedal to drive. A wound swab result was positive for Staphylococcus aureus, and the patient was prescribed flucloxacinil 500 mg four times a day for one week. The wound swab result was negative on day 8.

**Outcome**

The treatment goals were to manage the exudate and promote healing, so that the patient could start driving again. The secondary objective was to ensure atraumatic dressing application and removal. The advanced nurse practitioner cleansed the wound with saline, and applied UrgoClean and Allevyn Gentle as a secondary dressing. The district nurse changed the dressings every 72 hours. Figures 2 and 3 show the wounds on days 3 and 7, respectively. The wound had reduced in size and a small island of tissue had formed between the two craters. The exudate level was now moderate. As the peri-wound skin was still excoriated, the secondary dressing was changed to Mepilex Border (Mölndlycke Health Care). The patient’s VAS pain score reduced to 5, but she was still unable to drive and so continued to receive home visits from the district nurse.

On day 14, the wound was much improved, with low levels of serous exudate, and the peri-wound skin was healing (Figure 4). The patient’s VAS pain score had reduced to 3 and was now able to drive to the GP surgery for care, so no longer required district nurse home visits. Furthermore, her visits to the practice nurse care reduced to twice a week.

On day 21, there was a significant reduction in wound size, which now measured 4 x 6 x 0.2 cm (length x width x depth), a 30% reduction in wound volume (Figure 5). The exudate level was now low, the peri-wound skin had healed and the wound was pain-free. The patient had resumed her normal activities and returned to work on reduced hours. At the time of writing, she was still on this dressing regimen and the wound was expected to heal.

**Why did you use UrgoClean?**

It was found to be effective in previous evaluations and so is a trusted and well-used dressing in my tool box of products. It assists wound bed preparation, is atraumatic during application and removal, and reduces dressing-change frequency.

**How does it compare with other methods of removing slough?**

In our experience, it quickly and effectively debrides non-viable tissue and excess fluid, including slough. It is easy to use and our patients are happy with the results.

**What were the main clinical challenges?**

Exudate management, odour control, pain and delayed healing.

**What did the patient think of the treatment?**

The patient thought it soaked up the wound fluid well, was comfortable when mobilising, did not cause pain during removal and reduced the number of dressing changes needed.

**Would you use this again?**

Yes, I am still using UrgoClean.
Reperfusion injury in the lower limb

JULIE TRUDGIAN, LEAD NURSE, TISSUE VIABILITY, ROYAL CORNWALL HOSPITALS NHS TRUST

A 72-year-old man with a 12-year history of type 2 diabetes mellitus developed an ulcer on the heel of his left foot and the outer aspect of his right foot. His glycaemic control was poor and there was evidence of neuropathy and ischaemia. A multidisciplinary approach was required: the diabetes specialist nurses provided support with his glycaemic control, the diabetes specialist podiatrists managed the wounds on his feet and a vascular surgeon assessed his circulation. As his poor arterial circulation was significantly impairing wound healing, an angioplasty was performed to reduce sclerosis and improve the blood supply to his feet and lower limbs. This was successful. Following surgery, the podiatrists noted immediate evidence of granulation tissue formation and the presence of epithelial tissue.

Returning the circulation to an ischaemic limb can have detrimental effects, particularly in patients with microvascular injury. The patient developed ulcers on the tibial crest of both lower legs due to reperfusion injury. Improving the blood supply to an ischaemic area increases movement of fluid across the tissues, which activates endothelial cells and results in an inflammatory response. Leucocytes adhere to cell walls, inhibiting the circulation and releasing toxic chemicals including proteases and reactive oxygen species (Eltzchig and Collard, 2004). The ensuing injury can be extensive and located away from the site of ischaemia (Kalogeris et al, 2012).

Condition of the wound
In this case, the right leg was particularly bad with several large ulcers, which were producing serous exudate but were largely covered in thick fixed slough. There were also smaller ulcers, as well as superficial damage to the peri-wound skin, which was stained, friable and at high risk of further breakdown. There was no evidence of infection and pain was not an issue.

The podiatry team initially used a hydrogel dressing, held in place with padding and crepe bandages, to deslough the ulcers. Both offloading and elevation were implemented. Despite this, the wounds on his right leg were slow to heal and, after 4 weeks, the podiatrist contacted the author for advice (Figure 1).

The leg wounds were irrigated with warm saline and an emollient was applied to the friable dry skin. UrgoClean pad was used to deslough the wounds, and was kept in place with padding and crepe bandages. While there were skin changes indicative of venous incompetence, due to the ischaemia and risk of small vessel disease, compression was avoided and the patient was advised to elevate his legs as much as possible.

Outcome
The dressings were changed twice in the first week. Figure 2 shows the improvement at the first dressing change. The slough reduced rapidly: it was lifting as the UrgoClean was removed to reveal healthy granulation below. The condition of the peri-wound skin improved and the smaller lesions on his leg healed or reduced significantly in size. Dressing changes were painless and there was no inflammation or trauma to the wound or surrounding skin (Figure 3).

UrgoClean continued to be used with weekly dressings until complete healing occurred in...
CASE STUDY

6 weeks. The dressing continued to lift the slough and control the exudate. In addition, the wounds responded well to the Technology Lipidocolloid Healing Matrix (TLC) technology on the dressing surface and improved. There was no evidence of maceration. The patient found the dressings comfortable and was very pleased with the result. He was able to function independently again. While the multidisciplinary team approach enabled him to obtain the systemic conditions for healing, this was aided by the desloughing properties of UrgoClean.


Efficacy of UrgoClean: a 3-year audit

JULIE TRUDGIAN, LEAD NURSE, TISSUE VIABILITY, ROYAL CORNWALL HOSPITALS NHS TRUST

In 2013, an evaluation of UrgoClean pad and rope, undertaken in the Royal Cornwall Hospitals NHS Trust, found that these products compared favourably with other absorbent dressings. They were added to the formulary and seven products, including alginate and Hydrofiber dressings, were removed (Trudgian et al, 2014). The change was successfully implemented and well received by staff. However, the long-term impact of such initiatives is sometimes difficult to determine. Three years on, a review of this change was undertaken to identify if predicted cost-savings and patient outcomes have been achieved.

Method
The Royal Cornwall Hospitals NHS Trust has approximately 700 beds. It covers the county of Cornwall, and employs approximately 1000 nurses including 45 staff nurses who have taken on the tissue viability link role. (Led by the tissue viability team, the link practitioners support the care of patients in their clinical areas and take part in various projects including audits and product evaluation.)

In 2012–2013 tissue viability link practitioners undertook a robust evaluation of UrgoClean to determine its suitability for inclusion in the wound care formulary (Box 1; Trudgian et al, 2014). The dressing was used on heavily exuding wounds, those with stringy soft slough, and chronic wounds that were not progressing towards healing. Parameters assessed included wound size and appearance, exudate management, pain and patient acceptability. Both patients and staff rated the product highly and nurses felt the dressing outperformed the alginate and Hydrofiber dressings previously used: exudate was well controlled and static, and chronic wounds were healing. Financial modelling demonstrated a potential saving of £3712.04 for the year, while Urgo Medical provided education and guidance on the best use of the dressing. It was agreed to replace seven alginate and Hydrofiber dressings in the trust with two: UrgoClean pad and rope.

The transition to UrgoClean was unexpectedly painless. This was due to the methodology used, support from the Urgo Medical team and the efficacy of the dressing itself. UrgoClean is now one of the most frequently used products in the trust.

The next step was to determine whether the cost savings and healing outcomes predicted 3 years earlier had been realised, and what the longer term impact of the change in formulary had been. To answer these questions, a review of the value of UrgoClean was undertaken. This comprised:

- **Staff opinion**
  A questionnaire was piloted to determine whether staff understood the action of UrgoClean and how they rated its performance. This would also allow the author to examine practice and ensure the dressing was used correctly. Questionnaires were sent to link practitioners, who discussed the dressing use with their teams before completing the forms

- **Cost analysis**
With support from the NHS Supply Chain, the number of dressings used over a 12-month period was identified and a price comparison was carried out against the alginate and Hydrofiber dressings. Dressing were matched on size and absorbency

**Clinical case studies**
The author explored her use of UrgoClean and clinical experiences of patients.

**Results**

Questionnaire
Link practitioners used the questionnaire to gain opinions of all nurses in their sphere of practice. The podiatry team are not part of the link group and therefore were excluded from the evaluation, even though UrgoClean is used on diabetic foot ulcers and their opinions may have been valuable. Thirty link practitioners returned the questionnaires, gaining responses from at least 10 nurses in each clinical area, resulting in a total of 314 completed questionnaires. The questionnaire results demonstrated that UrgoClean was used on a variety of acute and chronic wounds and nurses continue to have a good understanding of its indications, with 100% confirming it can be used on sloughy wounds and 88% identifying its ability to absorb exudate. Eighty-two percent felt that it was more effective than a Hydrofiber dressing, suggesting that the results achieved by Meaume et al (2014) are replicable in practice. The nurses also felt UrgoClean outperformed all other dressings designed for sloughy and exuding wounds. Over half of those questioned (58%) recognised its ability to stimulate healing, but only 23% felt this would lead to early discharge from an acute care environment. It can be argued that the nurses were not focusing on the significant benefits of the dressing in achieving healing, such as reduced length of stay and improved patient wellbeing.

**Cost analysis**
A total of 2285 UrgoClean dressings were used in the trust during a 12-month period (2014–2015). A cost comparison considering dressing type and size revealed a cost saving of £5524.50 for UrgoClean against Hydrofiber and alginate dressings for this period. This was greater than the predicted annual cost saving. Dowsett (2015) highlights the importance of wear time when considering cost, as this influences the amount of dressings used and the extent of nursing interventions required. If the questionnaire had considered wear time, speed of healing, nursing time and use of additional resources, the calculated cost saving might have been higher.

The high usage of UrgoClean within the trust demonstrated staff confidence in the product and its effectiveness. The questionnaire revealed that 40% of staff felt UrgoClean could be used on infected wounds. While bacteria can become trapped in the dressing fibres, there is little evidence to support the product’s use on these wounds. A training need for staff was identified and this is being addressed with support from Urgo Medical.

**Clinical case studies**
UrgoClean is the most frequently used dressing within the organisation, with over 2000 dressing used per annum. This is unsurprising given the dressing’s ability to deslough wounds, manage exudate and stimulate healing. The author frequently reassesses her use of dressings to ensure their suitability for wounds and to achieve the desired clinical outcomes. UrgoClean remains high on the list of effective dressings as illustrated by the clinical case study described above.

**Conclusion**
This review has highlighted the value of UrgoClean, in terms of cost, staff and patient acceptability, and clinical effectiveness, within the author’s trust, 3 years after its addition to the wound care formulary. The results show it is still of considerable value and can stimulate healing in a range of complex wounds. Further work exploring its ability to reduce nursing time and accelerate healing would be of value and add to the body of research supporting its efficacy.


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**Box 1. Process for evaluation of wound products**

In order to be considered for inclusion in a formulary, a product must be assessed as worthy in all of the following procedures:

- Review and critique of evidence to support the product
- Informal review by the tissue viability team
- Trial of the product by the tissue viability team on up to five patients
- Evaluation by tissue viability link practitioners for up to 4 weeks per patient
- Review of evaluation outcomes by the tissue viability team and link practitioners
- Report for medical devices team
- Final decision on formulary inclusion
An expert choice in desloughing

SAFE
One-piece removal aids painless dressing changes\(^1\)

EFFECTIVE
Unique slough-trapping fibres provides 50% more effective desloughing when compared to a Hydrofiber dressing\(^2\)

UrgoClean is indicated for sloughy wounds and is available in a pad and rope including a probe

1. Kelly J, McGrath A and Wildman S. Br J Community Nurs 2013;Suppl:S42;S44-9

Take on the challenge of sloughy wounds today and order your free sample pack at www.urgoclean.uk.com

Please read the product pack insert carefully before use

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