Use of manuka honey for autolytic debridement in necrotic and sloughy wounds

Theresa Mitchell

The scientific and clinical focus on honey which has come about in the past 30 years has led to the classification of medical grade honey and the commercial availability of highly regulated products. Medical grade honey has proven antibacterial activity, traceability of source, and lack of contaminants. It is gamma-irradiated to kill bacterial spores that may be present in raw honey (Amaya, 2015; Cooper, 2016). It is available in a wide range of products, including sterile tubes of honey ointment, honey impregnated tulles, alginates, gels and meshes.

KEYWORDS:
- Medical grade honey
- Antimicrobial agent
- Autolytic debridement
- Activon® Manuka Honey Range

Debridement of slough and/or necrotic tissue is a key element of care associated with best practice and wound bed preparation (Atkin and Rippon, 2016; Barrett, 2017), as their presence is associated with an increased risk of infection and biofilms, especially if patients are frail, elderly or have a weak immune system (Grothier, 2015; Cooper, 2016; Halstead et al, 2016). Honey is well-recognised as a safe and effective debriding agent, which possesses multifactorial antimicrobial properties (Carter et al, 2016; Cooper, 2016; Ahmed et al, 2018).

Recently, there has been increasing concern about the rising number of antibiotic-resistant pathogens, particularly meticillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa* (*P. aeruginosa*); both of which have been implicated in wound infection and an increased risk of mortality (Jenkins, 2012; Leaper et al, 2015). However, evidence, both *in vivo* and *in vitro*, suggests that Manuka honey is effective at reducing bioburden and biofilms within a wound (Maddocks 2013; Bolognese et al, 2016; Cooper, 2016; Malone and Swanson, 2017).

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WOUND BED PREPARATION

Wound bed preparation was developed and continually reviewed to deliver effective management of chronic wounds and has been accepted as best practice both nationally and internationally (European Wound Management Association [EWMA], 2004; Atkin and Rippon, 2016; Barrett, 2017).

In principal, wound bed preparation recommends that wounds are managed in two stages (Sibbald et al, 2011; Barrett, 2017).

Stage 1

Full holistic assessment is undertaken by a healthcare professional to identify and establish any underlying diseases or causes which might delay an individual's ability to heal in a normal way. This includes common chronic conditions such as diabetes, heart, vascular or lung diseases, a poor immune system, or lifestyle choice, such as smoking or obesity.

Stage 2

The second stage examines local barriers to healing within the wound itself. This involves removing non-viable tissue, such as necrosis or slough, reducing oedema, exudate and the bacterial burden, and choosing the most appropriate care pathway that will promote healing and improve patient outcomes.

As said, debridement is a key component of wound bed preparation, as it helps to improve conditions at the wound bed to encourage healing (Dowsett, 2008; Strohal et al, 2013). The most appropriate method of debridement should be identified by the healthcare professional during initial assessment, as implementing best practice in a timely manner is key.

Practice point

Debridement is an important element of wound bed preparation and is defined as, 'the removal of foreign matter or devitalized, injured, infected tissue from a wound until the surrounding healthy tissue is exposed' (Sibbald et al, 2011; Leaper et al, 2012; Madhok et al, 2013; Strohal et al, 2013).

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WHAT IS AUTOLYTIC DEBRIDEMENT?

Autolytic debridement describes a normal healing process, which makes use of the body's own selective ability to dissolve necrotic or sloughy tissue through phagocytosis. This is done by the action of macrophages and lymphocytes and provides a supportive environment without damaging healthy tissue. It is important to remember that adequate moisture is required at the wound interface to allow this process.

Manuka honey promotes autolytic debridement by drawing water from skin cells via osmosis, which rehydrates, softens and liquefies hard eschar and slough (Wounds UK, 2013; Atkin and Rippon, 2016). This is attributed to stimulation of plasmin activity in the wound, thus denaturing fibrin which attaches slough to the wound bed. This theory is based upon the known effects of plasminogen activator inhibitor (Cooper, 2016; White, 2016). This mechanism is consistent with autolysis, where the creation of a moist wound environment at the appropriate pH leads to the removal of slough (Molan and Rhodes, 2015). Some patients may experience discomfort or a drawing sensation as the osmotic pressure rises. The patient should be informed of this and the most appropriate analgesia offered.

MANUKA HONEY'S ANTIMICROBIAL ACTIVITY

As bees have different nutritional behaviour and collect nourishment from various plants, honeys have different compositions (Oryan et al, 2016). Manuka honey is derived from honey bees that forage on the nectar of Manuka bushes (*Leptospermum scoparium*), which are indigenous to New Zealand and Australasia. Honey has a complex chemistry which is dependent on its source and processing techniques. As with all honeys, Manuka honey can restrict microbial growth due its acidic pH, osmotic effect of sugars, and production of hydrogen peroxide (H_2O_2) by peroxidase. Some non-peroxidase substances also support antibacterial activity, including flavonoids, phenolic acids, and lysozyme (Ahmed et al, 2018).

The unique property of Manuka honey is attributed to the content of methylglyoxal (MGO) — termed the Unique Manuka Factor (UMF). Manuka honey is assigned a rating based on quantification of the presence of MGO (Amaya, 2015; Cooper, 2016; Rabie et al, 2016). The activity of Manuka honey is not inhibited by catalase, whereas peroxide activity is (Molan, 2009). The level of MGO correlates to the level of antimicrobial activity and is measured as non-peroxide activity (NPA). An NPA rating of 10 or more is considered suitable for medical use, for example, Activon® Manuka Honey (Advancis Medical) is guaranteed to have a minimum NPA of 10 and is usually higher. There is extensive and well-established evidence for Manuka honey's antimicrobial activity *in vitro*, including antibiotic-resistant species (Bolognese et al, 2016; Malone and Swanson, 2017).

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Indeed, Manuka honey has been shown to be clinically effective in reducing bioburden and inhibiting bacteria, including resistant strains such as antibiotic-resistant MRSA and vancomycin-resistant *enterococci* (VRE) (Gottrup et al, 2013). It has also been found to prevent biofilm formation in a wide variety of wound types in both adults and neonates (White, 2016). Additionally, Manuka honey has been found to be effective against organisms such as *P. aeruginosa* and *Escherichia coli* (*E. coli*), which are known to be involved in malodour (Cooper, 2016; White 2016).

REDUCING MALODOUR

Wound odour can have a significant impact on the quality of life for patients with chronic wounds leading to embarrassment, isolation and depression (Grothier, 2015; Dickinson, 2016; Jones, 2018). Malodour is due to ammonia, amines and sulphur compounds, which are produced when infecting bacteria metabolise amino acids from proteins in the serum and necrotic tissue (Molan, 1999; Cooper, 2016). Some common wound pathogens have distinctive odours, for example, *P. aeruginosa* produces a fishy smell, and MRSA a cheesy smell (Cooper, 2016). However, sugars, such as those found in Activon® Manuka Honey, change the way in which bacteria metabolises, resulting in less odorous wounds (Akhmetova et al, 2016).

MANUKA HONEY AS A DEBRIDING AGENT

Honey has been shown to be an effective antimicrobial debriding agent on a variety of different wound types, including burns, leg ulcers, pressure ulcers, diabetic foot ulcers and fungating wounds.

THE EVIDENCE

A recent 15-day evaluation by Barcic et al (2014) compared a chemical debriding agent against three different commercially available honey products in 20 patients presenting with diabetic foot ulcers, which had 100% fibrous sloughy tissue. Patients were divided into four groups. The chemical group had daily dressing changes, as per manufacturer's directions, and the other three groups were changed every three days. The rate of debridement varied between each group. The chemical agent was the slowest, with 90% of devitalised tissue still present at the end of the study. While the honey products did debride the foot ulcers, only one

Practice point

Manuka honey can directly affect bacterial cells embedded in a biofilm and exhibits antiadhesive properties against common wound pathogens (Bolognese et al 2016, Maddocks 2013).

achieved 100% debridement. This was the honey which contained 100% pure medical grade Manuka honey with no additives or preservatives.

A multi-centred retrospective study examined the safety and efficacy of Manuka honey in 115 neonates and paediatric wounds all requiring debridement (Amaya, 2015). Neonatal and paediatric skin tends to be very fragile, and premature babies have immature immune systems and impaired thermoregulation, putting them at higher risk of infection when necrotic or sloughy tissue is present. In addition, there is a risk of percutaneous absorption of topical agents used in some dressings (King et al, 2014). Successful debridement was achieved in 86.0% (104 wounds), and 77.7% wounds (94 wounds) were successfully closed using non-surgical intervention. Silicone foam was used as a secondary dressing. A transient stinging sensation on application was reported in two patients (1.7%). There was no evidence of wound infection during this study. The author concluded that Manuka honey was a safe and effective treatment option in this group of patients (Amaya, 2015)

Biglari et al (2011) undertook an observational study of 20 patients with spinal cord injuries who had category III and IV chronic pressure ulcers. All patients were treated with Manuka honey to support autolysis of necrotic and sloughy tissue, and reduce wound bacterial load. After just one week of treatment, all swabs were void of bacterial growth, and after a period of four weeks, 18 patients (90%) showed complete wound healing after a period of four weeks (Biglari et al, 2011).

Dunford et al (2004) examined 40 patients with leg ulcers that had not responded to 12 weeks of compression therapy. Manuka honey dressings were applied to the ulcers for the 12-week study period. Overall, malodour, pain and wound size decreased. The average rate of reduction in wound area was 5.46%. At first assessment (after two weeks of treatment), the average score for odour had decreased from 1.58 ± 0.90 to 0.69 ± 0.79 (on a scale where 3 indicated severe odour), with 11/26 (42%) having no odour, thereby improving the patients' quality of life.

Practice point

Using honey to treat wounds is an ancient global remedy that has been handed down through the ages (Irish, 2011; Cooper, 2016).

Figure 1.
Activon Tube.

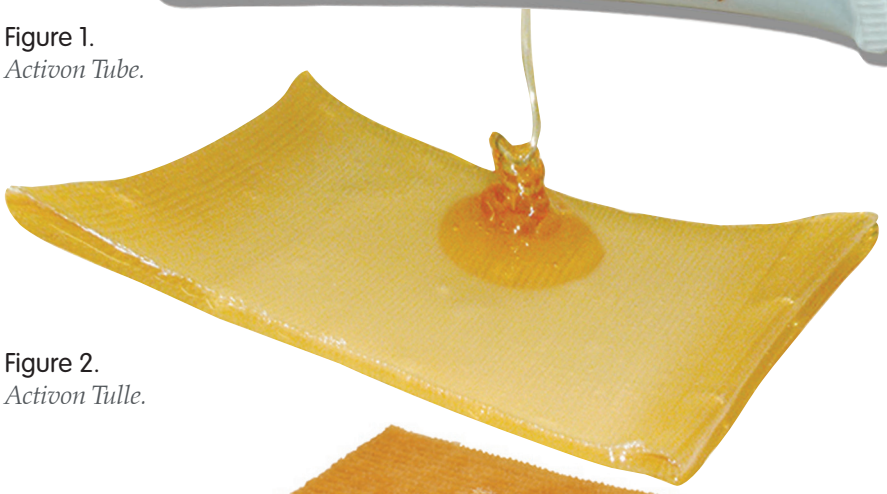

Figure 2.
Activon Tulle.

Figure 3.
Algivon plus Manuka honey.

A case study of a 90-year-old patient who had been admitted to a local community hospital with a wound on the plantar aspect of her right foot associated with erythema and cellulitis also found that using honey as a first-line antimicrobial dressing had positive outcomes (Lloyd-Jones, 2012). Investigations confirmed that the patient had an infection of unknown aetiology and intravenous (IV) antibiotics and analgesia were prescribed and non-weight bearing was recommended. Following referral to the tissue viability team, the wound measured 16cm long x 8cm wide, with evidence of skin flap, necrosis and sloughy tissue. Activon Tulle (mesh impregnated with medical grade honey) was applied as a primary dressing to reduce the haemoserous exudate and malodour and support autolytic debridement. Within two weeks, the wound and infection had improved significantly, and honey dressings were changed to hydrofiber. However, the following week, the wound had deteriorated with friable granulation and an increase in exudate volume. Honey dressings were reapplied, thus supporting the effectiveness of honey as a first-line antimicrobial agent (Lloyd-Jones, 2012)

A recent pilot study on seven patients with facial burns treated with Manuka honey measured healing time, bacterial growth, patient satisfaction and costs (Duncan et al, 2016). Healing time was consistent with, or better than standard treatment, with a mean healing time

Practice point

Key benefits of medical grade honey are:

- Broad spectrum antimicrobial activity
- Provides a moist wound environment
- Supports autolytic debridement
- Reduces malodour produced by some bacteria
- Anti-inflammatory
- Reduces interstitial oedema.

(Cooper and Gray, 2012; Bolognese et al 2016; Carter et al, 2016)

of 8.1 days. None of the patients were given antibiotic treatment, with wound culture results yielding no abnormal bacterial growth and, overall, patient satisfaction was high. Average hospital-based cost of treatment was $26.15 per patient. This study suggests that Manuka medical grade honey is a clinically and economically valuable treatment for partial-thickness facial burns. (Duncan et al 2016)

Furthermore, a Cochrane review concluded that honey appeared to promote healing in partial-thickness burn wounds and infected post-operative wounds more quickly than antiseptics, such as silver sulphadizaine or gauze (Jull et al, 2015).

ACITVON® HONEY RANGE

The Activon Manuka Honey product range provides healthcare professionals with a choice of dressings so that they can select the most appropriate for their patients

Practice point

When considering the use of honey to support autolytic debridement, always apply an appropriate secondary dressing to manage the volume of exudate being produced, as this will increase following initial application. This is both to be expected and a natural part of the healing process.

Activon® Tube

As with all products in the Activon Manuka Honey range, this contains 100% Manuka honey. Activon® Tube can be applied to any type of wound, especially if there is necrotic or sloughy tissue present, and is particularly useful for cavity wounds, such as pressure ulcers or contaminated postsurgical wounds where multiresistant strains of bacteria are present (Biglari et al, 2011; Cooper, 2016; Jull et al, 2015). A secondary dressing will need to be applied depending on the volume of exudate present. Activon Tube can also be used to top up other dressings in the Activon Manuka Honey range, where the honey has been washed away by wound fluid.

Activon® Tulle

Activon® Tulle is a knitted viscose mesh impregnated with 100% Manuka honey. It is ideal for shallow wounds that need debriding to reduce the risk of bacterial colonisation in vulnerable adults or children, as well as wounds, such as skin tears and partial-thickness burns (Amaya, 2015; Cooper, 2016; White, 2016).

Algivon®

Algivon® is a soft alginate dressing impregnated with 100% Manuka honey. The alginate fibres allow a slower release of honey into the wound than viscose mesh and net-impregnated dressings. Algivon should be used on wounds with a moderate-to-high volume of exudate, such as sloughy wounds, or infected, wet wounds, such as chronic venous leg, pressure or diabetic foot ulcers (Halstead et al, 2016; White, 2016).

Algivon® Plus

This is a reinforced, soft alginate dressing impregnated with 100% Manuka honey. The reinforced alginate allows for one-piece dressing removal and a slower release of honey into the wound than honey-impregnated viscose mesh and net dressings. It is available as a pad or ribbon with a probe. Algivon® Plus should be used on wounds which are producing a moderate-to-high volume of exudate, such as sloughy or infected, wet wounds. Algivon Plus Ribbon is suitable for cavities or sinuses, such as pilonidal sinuses, pressure ulcers or dehisced surgical wounds (Molan and Rhodes, 2015; Halstead et al, 2016).

Actilite®

Actilite® is a viscose net dressing coated with 100% Manuka honey and Manuka oil. It can be used on shallow wounds with a low volume of exudate to clear infection or reduce bacterial burden. It has been found to be particularly useful for immunocompromised patients (Molan and Rhodes, 2015; Cooper, 2016).

CONCLUSION

When following the principals of wound bed preparation, medical grade Manuka honey is a valuable treatment choice. Debridement is seen as a key component of wound bed preparation, in that it quickly removes devitalised tissue and thereby reduces the risk of infection, as well as improving visibility of the wound bed to aid assessment.

Medical grade Manuka honey is seen as an effective agent for

Revalidation Alert

Having read this article, reflect on:

- Why debridement is a key component of wound bed preparation
- The role that medical grade Manuka honey can play in autolytic debridement
- The key benefits of using medical grade Manuka honey products as part of care pathways for patients with wounds.

Then, upload the article to the free JCN revalidation e-portfolio as evidence of your continued learning: www.jcn.co.uk/revalidation

autolytic debridement (Blaser et al, 2007; Molan, 2005), as a result of its high osmotic properties (Cooper et al, 2001), and thus should be considered as part of the community nurses' wound care armamentarium. JCN

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