Honey: the bees' knees for diabetic foot ulcers?

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Abstract

Aim: To trial medical-grade honey wound dressings on dry, clinically infected diabetic foot ulcers in an acute high-risk foot service (HRFS).

Method: Five clinicians trialled medical-grade honey wound gel and medical-grade honey alginate on appropriate diabetic foot wounds and completed a simple evaluation form for each application including patient tolerability.

Results: *Clinician ease of use*, *Clinician overall satisfaction* and *Patient comfort* was rated as "high" in the majority of applications (66–93%).

Conclusion: Honey wound dressings did not lead to deterioration in diabetic foot wounds and were rated highly by clinicians and patients with regards to ease of use, overall outcome and tolerability.

Introduction

The point of product saturation in the wound dressing market has certainly been reached. Each year, new dressing products become available, most of which claim to be: (a) superior to currently available dressings of the same type; or (b) are a new type of dressing, designed to fill a current void in the existing range. To prevent inappropriate use of wound care products, many services now restrict the range of products that are available for staff use. However, it is worthwhile considering additional or alternative wound dressings that may benefit particular wound types that are not catered for within an existing range. It was this situation that led to the introduction of medical-grade honey wound dressing products in an acute, multidisciplinary high-risk foot service (HRFS).

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The vast majority of patients attending the HRFS at The Royal Melbourne Hospital attend for treatment and management of acute diabetic foot complications including foot ulcers and gangrene. Wound management in the clinic aims to hasten and facilitate healing by promoting a moist wound environment and keeping local bacterial load to a minimum [1]. Patients with wounds are generally seen in the HRFS on a fortnightly basis where the wounds are debrided and an appropriate wound care plan implemented.

Low exuding and dry, clinically infected foot wounds are treated frequently in the HRFS with clinicians identifying a shortfall in antimicrobial dressings suitable for these wounds. Such wounds require supplementary moisture from the wound dressing to assist in autolytic breakdown and enable sharp debridement.

Topical antiseptics acknowledged for use in the management of wound infection include silver, iodine, honey, chlorhexidine and hydrogen peroxide [2]. To date, the strongest evidence for active antisepsis from wound dressings is from some of the

silver dressings [2]. Antimicrobial wound dressings available in the HRFS were limited to silver alginate, silver tulle dressing, silver-coated barrier dressing and cadexomer iodine paste. In the HRFS, silver alginate is generally favoured for use when exudate levels are moderate or high as this dressing has an absorptive capacity whilst having an antimicrobial effect. The silver-coated barrier dressing is favoured for low to moderately exuding wounds and for use in cavities as pieces of the dressing remain intact when packed or wicked into a cavity or sinus. The silver tulle dressing contains a significantly lower concentration of silver and is most frequently used as a contact layer on wounds that are suspected to have a lower bacterial burden. Previously, cadexomer iodine paste was considered the most appropriate antimicrobial dressing in the HRFS that was suitable for use on sloughy, infected wounds with insufficient exudate levels for the use of silver dressings. Cadexomer iodine paste can assist with autolytic debridement but does not provide additional moisture to a dry wound. In addition, cadexomer iodine is not suitable in patients with thyroid dysfunction or severe renal impairment [3]. As a fitting alternative, the introduction of medical-grade honey dressings was considered for use on low exuding and dry, clinically infected diabetic foot wounds.

Medical-grade honey from the plant species *Leptospermum scoparium* is highly bactericidal for multiple strains of resistant organisms often found in diabetic foot ulcers [4-6]. Medical-grade honey is effective against methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, *Pseudomonas* species as well as fungi [6-10]. The mechanisms for bacterial destruction include dehydration of bacteria via hyperosmolar activity of honey, and enzymatic production of hydrogen peroxide at a level that is toxic to bacteria but not to human tissue [4,6]. As well as decreasing local bacterial load, medical-grade honey in certain preparations will maintain wound moisture and, therefore, assist in debridement. There is also an anti-inflammatory effect advantageous for chronic wounds stuck in a destructive inflammatory process [6,11]. No significant adverse effects from topical honey wound dressings has been reported, nor is the use unsafe for patients with diabetes mellitus or organ failure [6,12]. Some reports suggested a stinging sensation could follow application; however, this was considered to have little consequence in our population because of the coexistence of peripheral neuropathy.

A honey wound gel from the approved *Leptospermum scoparium* species was selected for trial, intended to provide a moist wound environment, assist in autolytic debridement and to be antibacterial. A honey-impregnated alginate dressing was also selected to trial on infected foot ulcers with higher levels of exudate as an alternative to silver alginate. The aim of the project was not to conduct a randomised controlled trial. Rather, the aim was to investigate the benefits of medicated honey wound dressings in regard to:

- Clinician ease of use.
- Clinician satisfaction with clinical outcomes.
- Patient comfort.
- Patient ease of use was also recorded if the patient applied the dressings themselves at home between clinic appointments.

Methodology

Four podiatrists and one registered nurse working in the HRFS were involved in the trial which run over a six-month period. All wounds were distal to the ankle, in patients who had diabetes. Clinicians involved were advised to use the honey dressings only on wounds displaying signs of clinical infection including local erythema, heat, oedema and/or purulent exudate [13]. Application for honey wound gel was indicated on low exudative or dry wounds and the honey alginate on wounds with higher levels of exudate. A foam was used as a secondary dressing for all applications, although the particular foam may have varied between patients.

A simple evaluation form was completed for each wound on each patient when a honey dressing was applied by a clinician (Figure 1).

Results

A total of 65 feedback forms were completed between December 2008 and May 2009 for applications of medicated honey dressings on 38 wounds of 34 patients. The wound gel was used more frequently, accounting for 41 (63%) of applications, compared to 24 (37%) of applications with honey alginate.

On the whole, feedback was positive for "Clinician ease of use", "Clinician overall satisfaction" and "Patient comfort" (Table 1). In particular, clinicians commented on reduction in malodour and slough with use of the honey dressings. "Clinician overall satisfaction" was recorded as *low* for six applications, with comments indicating the dressing may not have been appropriate for the particular wound. For example, *low* satisfaction was recorded with application of honey wound gel to an ischaemic toe.

Table 1. Feedback regarding "Clinician ease of use", "Clinician overall satisfaction" and "Patient comfort".

	Honey wound gel n= 41			Honey alginate n=14		
	High	Medium	Low	High	Medium	Low
Clinician ease of use	35 (85%)	6 (15%)	0	13 (93%)	1 (7%)	0
Clinician overall satisfaction	27 (66%)	10 (24%)	4 (10%)	10 (71%)	3 (21%)	1 (7%)
Patient comfort	36 (88%)	4 (10%)	1 (2%)	13 (93%)	1 (7%)	0

Table 2. Feedback regarding "Patient ease of use".

	Honey wound gel n= 2			Honey alginate n=6		
	High	Medium	Low	High	Medium	Low
Patient ease of use	12 (100%)	0	0	4 (67%)	1 (17%)	1(17%)

Figure 1. Evaluation form.

Medihoney trial 2008–2009

Patient label

*a) Today's date ____/_____/_____

*b) Site of wound _____

*c) Dressing (tick): Medihoney wound gel Medihoney alginate

Podiatrist feedback (please circle)

*a) Ease of use ☺ 😐 ☹

b) Overall satisfaction with outcome of use ☺ 😐 ☹

Comments: _____

_____

Patient feedback (circle response that best reflects patient response)

a) Overall comfort of dressing ☺ 😐 ☹

a) Ease of use ☺ 😐 ☹ NA

Comments: _____

_____

_____

_____

"Patient comfort" was reported as *high* for 88% of honey wound gel applications and 93% of honey alginate applications, despite documented warnings of possible local stinging and burning sensations. Only one patient reported *low* "Patient comfort" with application of honey wound gel with no additional comments provided.

A small number of patients who assisted in wound dressing changes at home were able to provide feedback regarding "Patient ease of use". Each of the 12 patients who applied the honey wound gel reported "Patient ease of use" to be *high*. The honey alginate appeared to be less easy to use (Table 2).

No adverse reactions were reported during the trial.

Discussion

Introduction of the honey wound gel proved to be an appropriate method of managing dry, sloughy, infected wounds on the diabetic foot. From the outset of the trial it was deemed preferable that additional dressing choices were not added to the available stock in the clinic. Given the results of the trial and previously mentioned limitations of cadexomer iodine paste, it was removed from the clinic stock. Furthermore, although not an original aim of the project, introduction of the honey wound gel proved to be an opportunity for cost saving of approximately 40% compared to the cadexomer iodine paste.

In contrast, the honey alginate dressing was not considered superior to the silver alginate. Despite there being no scope for the honey alginate to replace any of the pre-existing range, the decision was made to continue to have this dressing available as clinicians felt the honey alginate had a greater capacity to break down adherent slough in moderately exuding, infected wounds than the silver dressings.

The scope of use of medical-grade honey on a range of wound bed types including slough, granulation tissue and exposed bone and tendon makes it ideal for diabetic foot ulcers as they can vary greatly in presentation and alter significantly over time. Additionally, medical-grade honey dressings have the capacity to be left in situ for seven days. This is often favourable for patients who are unable to self-care between clinical appointments.

Unfortunately there is a shortfall in randomised control trials for the use of medical-grade honey on diabetic foot ulcers. Although the antimicrobial properties of honey have been demonstrated in the laboratory, *in vivo* evidence is scant, particularly in comparison to literature on silver antimicrobial dressings [5,11].

Further research is warranted into the effectiveness of medical-grade honey on diabetic foot ulcers. Whilst silver dressings are currently the favoured option for these wounds, there have been some reports of organism resistance to silver and no reports of resistance to medicinal honey [10]. Furthermore, *in vitro* evaluation suggests silver may be cytotoxic to epidermal cells during processes required for wound healing that go undisturbed by medicinal honey [14].

The trial of medical-grade honey wound dressings was achievable due to the simple feedback forms that encouraged clinicians to consciously consider different variables regarding the use of the dressing.

Due to the favourable outcomes of the trial, both the honey wound gel and the honey alginate dressing are available for ongoing use in the HRFS.

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