

Honey of a Wound: The Use of Medical Honey to Heal Diabetic Foot Ulcers in a Low-resource Environment

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The following is a case report of two First Nations clients from remote, fly-in communities in northwest Ontario that illustrates the efficiency of medical honey and simple dressing methods in healing diabetic foot ulcers. Remote communities face significant health challenges, including limited access to specialty wound care and dressing supplies. In this case, the dressing choice, which can be administered at home or at a remote nursing station, resulted in complete closure of two serious foot ulcers.

Diabetes care can be accessed at Sioux Lookout Meno Ya Win Health Centre (SLMHC) in Sioux Lookout, Ontario. The hospital provides primary and preventative health care for a region that extends from Hudson Bay to Lake Superior. This vast area encompasses approximately 360,000 square kilometres of land and has the lowest population density in Ontario. More than two-thirds of the residents (77.8%) identify as First Nations people.¹ Most of the communities are accessible only by airplane or winter road. Type 2 diabetes has reached epidemic levels in First Nation populations, in which adults are three times more likely to have type 2 diabetes than non-indigenous Canadians.^{2,3} Two registered nurses at SLMHC provide wound care for the population of 29,000. Many of our clients arrive by plane from more than 300 kilometres north of SLMHC.

Clinical methods need to be practical and easily managed in our environment, where, due to



transportation limitations, we can only follow up with most patients every two weeks. Nursing station nurses and/or family members perform dressing changes and treatment in the interim. We have achieved success using medical honey as a diabetic foot ulcer (DFU) healing agent. Natural honey is a viscous, supersaturated sugar solution derived from nectar gathered and modified by the honeybee.⁴ Medical honey is natural honey gamma-irradiated to eliminate any *Clostridium botulinum* contamination. Honey is acidic (pH of 3.2–4.5), and its antimicrobial properties have resolved MRSA and *Staphylococcus aureus* infection in wounds.^{5,6} The anti-inflammatory effect of honey results in reduced wound exudate, edema and scarring.⁷ Our methods promote ease of dressing changes, wound closure and client stated satisfaction.

Adding Honey to the Mix

The key features of our wound care method are the use of medical honey, conservative sharp wound debridement (CSWD) and simple wound coverings. The dressing components are inexpensive, and the nurses in the diabetes programs are

qualified to perform CSWD. The use of medical honey at SLMHC was initially promoted in 2008 and implemented hospital-wide in 2010.

Two Cases

Two First Nations clients were asked to participate, and signed consents were obtained. Ethical approval was received by SLMHC Research Review and Ethics Committee. Names have been altered for confidentiality.

Lydia

“Lydia” is a 55-year-old First Nations woman with a right plantar DFU complicated by Charcot foot. She lives in a fly-in-only community north of SLMHC. Lydia has type 2 diabetes, hypertension and hyperlipidemia. She was experiencing pain and edema in her right foot with increased symptoms on ambulation. The doctor’s examination at the remote nursing station found a large mid-plantar callus, mild diffuse erythema of the forefoot and back pain. Oral clindamycin was prescribed.

Wound management began at SLMHC in November 2015. The callus was reduced with CSWD, revealing a diabetic foot ulcer 1.9 cm (length) x 0.9 cm (width) x 0.3 cm (depth). Local wound care included cleansing with normal saline, applying a small amount of honey and covering with an absorbent pad dressing (9 cm x 10 cm) secured with tape. A high, post-op, closed-toe offloading shoe was provided. Lydia returned home with orders for dressing changes every two days at the nursing station. With each return trip to SLMHC, CSWD was performed if required. Dressing supplies were sent home with Lydia each time. The wound on Lydia’s right Charcot foot was healed in March 2016.

Successful resolution of her DFU was achieved through early detection of a serious wound, timely retrieval of the client from a remote community, specialized wound care in a rural hospital and consistent follow-up. Lydia’s attendance at regular dressing changes and diligent offloading of the foot were significant contributions (see Figures 1 and 2).



Figure 1: “Lydia” – Before



Figure 2: “Lydia” – After



Joseph

“Joseph” is a 64-year-old First Nations man with a left first metatarsophalangeal joint ulcer. He lives in a community north of SLMHC. Joseph has type 2 diabetes, hypertension and peripheral neuropathy. Management of Joseph’s DFU began in February 2016. The wound was covered by a substantial callus over a pad of exposed fat and granular dermis. After CSWD, the wound measured 5 cm (length) x 3 cm (width) x 0.3 cm (depth). A cut-to-size piece of povidone-iodine-impregnated dressing was applied to the open area for two weeks, after which a thin application of medical honey was substituted. The choice of using 7 mm compressed felt to offload the plantar surface or a high, post-op, closed-toe offloading shoe was client-driven. The dressing was changed every two days at the remote nursing station. Joseph attended our wound clinic every second week as per travel allotment policy. CSWD was performed if required. Healing was evident at each visit, with the wound closing in April 2016.

How Honey Works in Wounds

The knowledge that *Klebsiella* and *Enterobacter* bacteria have been shown to be resistant to silver-impregnated dressings may indicate a need to return to natural antibacterial products that promote wound healing.^{8–10} Honey is a traditional medicine used since ancient times, and its place in the history of human healing practices is readily accepted by our clients.^{6,8} The antimicrobial properties of honey include high sugar concentration, low pH, the presence of hydrogen peroxide, methylglyoxal, antimicrobial peptide bee defensin-1 along with oxidase, and other compounds such as polyphenols and flavonoids from plant nectar.^{6,12,13}

The high sugar/low moisture content of honey causes osmotic stress to microbial cells. Low pH is unfavourable for the growth of many microorganisms. No bacteria are known to be completely resistant to the effects of honey.^{6,12,13} Research by Camplin and Maddocks did identify some honey resistance by *Pseudomonas aeruginosa* in biofilm.¹³ This illustrates the importance of periodic wound culturing to appropriately identify any pathogens in a wound. The authors’ advise, “where recalcitrant or chronic, infected wounds are present it remains vital to ensure that topical treatments such as manuka honey are appropriately applied for a suitable length of time in combination with other antimicrobials where necessary to ensure that infection is resolved and the likelihood for resistance is minimised.”¹³

Bowling et al. state that “the risk of MRSA infection and bacteremia in patients with colonized ulcers is recognized.”¹⁴

Topical honey use has no known systemic effects.

Conclusion

Our clients often welcome the possibility of returning home with a dressing routine using simple, effective supplies. Sood et al. observe that “there is an overwhelming amount of wound dressings available in the market [which] implies the lack of full understanding of wound care and management ... honey can inhibit biofilms of

Self-care at Home

Each client and/or escort/family member is shown how to apply the dressing during the initial visit. Then the client is asked to demonstrate to the nurse how to apply the material to the wound. The client is given the time to reapply the dressing until comfortable with the process. Due to the simplicity of the dressing, most clients only require a one-time demonstration.



various species, is non-cytotoxic [and] a non-irritant with very low risk of client sensitization.”¹⁰

Complex and/or expensive dressings are not readily available in northern nursing stations.

A 10 g tube of medical honey costs about \$4. The absorptive adherent dressing we use costs less than \$3, and our most basic dressings are only 12 cents each. These items are of practical use in a low-resource environment.

The ability to effect wound closure in clients with a diabetic foot ulcer living in remote communities, relying on inexpensive supplies that are easy for the clients to use when away from professional care, is an important outcome in wound care provision. 🖐️

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