Using Active *Leptospermum* Honey in the Debridement Process: 6 Challenging Cases from the Inner City

Cecilia Gray, MSN, RN, CNS, CWON; and Fatima Ishii, BS, RN, CWON

**Abstract**

The use of honey-based dressings has been documented for thousands of years. Recent studies suggest their effectiveness may be, in part, related to their ability to facilitate autolytic debridement. Six patients who presented with multiple comorbidities and risk factors for delayed healing whose wounds required debridement were managed with active *Leptospermum* honey (ALH) to evaluate the safety and effectiveness of this treatment modality. The 6 patients ranged in age from 39 to 81 years. The ALH was covered with a foam dressing; both dressings were changed approximately every 3 days. After 9 to 20 days of use, wounds were completely, or almost completely, debrided, and a 75% concomitant average increase in the amount of granulation tissue in the wound bed was observed. No adverse events were noted. The use of ALH in this case series was effective, and no surgical debridement was needed. Research to compare the efficacy of ALH to other debridement methods is warranted.

**Keywords:** case report, wound, debridement, honey, pressure ulcer

**Index:** Ostomy Wound Management 2015;61(4):63–66

**Potential Conflicts of Interest:** Derma Sciences Inc (Princeton, NJ) provided editorial support for this manuscript.

Necrotic burden in chronic wounds is composed of necrotic tissue, exudate, and bacteria which alters the cellular environment, negatively impacting wound healing by prolonging inflammation and impeding epithelialization.1 Removing necrotic tissue (ie, debridement) reduces these barriers to healing.2 The 6 methods of debridement include autolytic, enzymatic, mechanical, conservative sharp, sharp, and biological, each with its own advantages and disadvantages. In general, the choice of method for a particular patient depends on the condition of the wound bed, resources, clinician knowledge, patient characteristics, and treatment goals.1,2

The use of honey in wound management dates back thousands of years and can be traced to ancient medical writings.3,4 In 2007, the United States Food and Drug Administration cleared the use of a line of honey-based wound dressings (active *Leptospermum* honey [ALH]) for a variety of wound types including leg ulcers, diabetic foot ulcers, donor sites, trauma and surgical wounds, pressure ulcers, and first-degree and second-degree burns. Randomized controlled trials, case series, and studies involving a variety of wound types have shown ALH has a range of benefits to facilitate healing, which includes aiding in the management of necrotic tissue and wound exudate and/or facilitating healing of stalled wounds.3-8

The observed benefits of ALH are believed to be achieved through 2 primary mechanisms of action: a low pH level and high osmolarity. Specifically, the pH averages 3.2–4.29,10, reviews of the clinical, *in vivo*, and *in vitro* literature9-12 concluded lowering the pH of the wound environment is associated with wound healing. Secondly, because of its high osmotic potential, ALH may help pull wound fluid from within the wound, which promotes autolytic debridement by allowing the body’s own actions to remove nonviable tissue from the wound. In this way, ALH is designed to support a moist healing environment that fosters granulation and epithelialization.3,4,13

The objective of this retrospective case series was to assess the safety and effectiveness of ALH on the removal of necrotic tissue in a variety of wounds in patients at a large 600-bed public hospital.

**Methods**

For this retrospective case series, all participating patients provided written informed consent for the use of their information. Patients were included if they presented with a wound that contained slough or eschar in need of debridement in a location feasible for foam dressing to adhere, such as the buttocks, heels, and feet. Wounds in locations with excessive moisture (eg, the sacrum and coccyx) were excluded if the patient was experiencing diarrhea, because in these cases, the foam cover dressing was unable to adhere. Participating patients were treated at the hospital’s inpatient acute care unit.
and chronic care units between April and September 2011. A substantial number of patients encountered are homeless individuals with little to no financial or other support, no insurance; this facility services a multicultural population with various ethnic and social diversities. Patients were treated by wound, ostomy, continence (WOC) nurses and were followed from admission to discharge. ALH was the only method used to assist with debridement. In all cases, ALH was applied in a thin layer (approximately 1/8–1/2 inch thick) to the wound bed after wound cleansing with normal saline or soapy water, followed by a secondary foam cover dressing. The choice of an appropriate absorptive cover dressing was important in order to manage the exudate production that occurs due to the autolytic debridement process.

The honey and cover dressings were changed as needed whenever the foam became approximately 75% saturated with exudate. At the first patient visit, demographic information and relevant medical history were recorded in the patient file. At each dressing change, wound measurements and appearance (percent of granulation tissue, slough, or eschar) were documented in the patient files. Wound measurements were performed using a centimeter ruler. The length was measured as longest length from 12 o’clock to 6 o’clock and widest width from 3 o’clock to 9 o’clock. Notes on progress, defined as a reduction in necrotic tissue, were taken at each dressing change.

All assessments were qualitative except for percentage of granulation tissue and wound measurements. These are described separately per case and were not combined or compared in any way that required data analysis.

Case Studies

Case 1. Sixty-three-year-old Mr. A was out of town visiting family when he experienced shortness of breath and fever. He returned home after a long car ride to the emergency room where he was admitted with septic shock secondary to Acinetobacter pneumonia, complicated by Salmonella bacteremia and Clostridium difficile colitis. Mr. A had a history of hypertension and required vasopressors, medication for sedation, and intubation. He presented with a Stage III pressure ulcer in the occipital area measuring 2.0 cm x 3.5 cm tissue loss with 100% adherent yellow slough (see Figure 1a). After wound cleansing, ALH and a secondary foam cover dressing were applied per the protocol described. The ALH dressing was changed on day 3. Mr. A was discharged after 9 days of ALH use (2 dressing changes), wound size had decreased to 1.5 cm x 2.0 cm, and wound bed appearance improved to 30% yellow slough and 70% scattered granulation buds (see Figure 1b).

Case 2. Ms. B, 54 years old, came to the emergency room with dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, and daily chest pains for the previous week. She had a history of coronary arterial disease, peripheral arterial disease, diabetes, hypertension, congestive heart failure, and left atrium deviation. She had a necrotic diabetic heel ulcer that measured 3.0 cm x 3.0 cm with an undetermined depth due to the presence of black eschar and yellow slough covering the wound bed (see Figure 2a). Physicians were concerned about the use of sharp debridement due to Ms. B’s history of diabetes and poor perfusion; therefore, ALH was chosen to support autolytic debridement. After wound cleansing, ALH and a secondary foam dressing were applied as described. Following 1 week of ALH with dressing changes approximately every 3 days, the breakdown of the eschar led to 70% granulation tissue and 30% yellow slough remaining. After 2 weeks, the wound measured 2.5 cm x 2.0 cm with 80% granulation tissue and 20% yellow stringy slough. The patient was discharged home 3 days later after receiving 6 dressing changes total (see Figure 2b).

Case 3. Mr. C, a 50-year-old with a history of congestive heart failure, methamphetamine abuse, gastrointestinal bleeding, and deep vein thrombosis, developed severe untreated ulcerations on his feet and legs over 3 months while living in a friend’s garage. One wound on his foot measured...
10.0 cm x 15.0 cm with 100% thick, adherent yellow slough (see Figure 3a). Due to his nonadherence with treatments, Mr. C was frequently discharged and readmitted for lack of healing progress. At his last readmission, his physicians felt he was too noncompliant with treatment and were considering amputating the foot. After wound cleansing, ALH and a secondary foam cover dressing were applied per the protocol described and changed every 3 days. After consistent ALH usage for 20 days, the wound measured 11.0 cm x 13.0 cm with 100% granulation tissue (see Figure 3b). There were no signs of osteomyelitis, and periwound skin, ankle, and toes appeared healthy. Following the wound improvement seen with ALH, the physicians determined amputation was no longer necessary. After a total of 8 dressing changes, Mr. C was stable enough to be discharged home.

Case 4. Mr. D, a 51-year-old man with paraplegia and chronic sacral and ischial pressure ulcers previously treated with surgical muscle flaps, was readmitted to the hospital with a sacral pressure ulcer that had reopened to reveal a large cavity. His history included frequent admissions for sacral wound care, osteomyelitis, and long-term antibiotic use (details unavailable). Six weeks earlier, his sacral pressure ulcer had decreased to a 1.0 cm x 1.0 cm red granulating wound managed with a foam dressing. He told his clinicians he had slept and stayed in his wheelchair for 3 weeks straight without offloading or repositioning. The wound now measured 10.0 cm x 12.0 cm x 5.0 cm with 6.0 cm undermining from 9 o’clock to 2 o’clock, 40% thick slough, and 60% smooth pink tissue (see Figure 4a). ALH and a secondary foam cover dressing were applied per the protocol described. Following 10 days of ALH applied every 3 days, the wound displayed 100% granulation tissue. By discharge 10 weeks later, the wound measured 5.0 cm x 8.0 cm x 1.0 cm with 2.5 cm undermining from 9 o’clock to 12 o’clock and 100% granulation tissue. Despite Mr. D’s comorbidities, poor nutritional status, and noncompliance with medication, the necrotic tissue was successfully removed from this wound with the use of ALH (see Figure 4b). He was discharged to hospice care after a total of 21 dressing changes.

Case 5. Thirty-nine-year-old Mr. E, who had a history of hypertension, diabetes, chronic kidney disease, and myocardial infarction, had a fall and was found face down and unresponsive. MRI/MRA results confirmed he had suffered an acute stroke. On admission, he was extremely confused, combative, and agitated, requiring vest restraints for safety. He had recently immigrated to the US and had very little familial support. He sustained linear full-thickness skin loss to the bilateral axillary area secondary to shear/friction damage from the vest restraint. The wound measured 1.0 cm x 12.0 cm with adherent yellow-tan slough (see Figure 5a). After wound cleansing, ALH and a secondary foam cover dressing were applied per the protocol described and changed every 3 days. At discharge after 2 weeks of using ALH, the wound showed marked improvement, measuring 0.5 cm x 4.0 cm, with 25% slough and 75% epithelialized tissue (see Figure 5b). Mr. E had a total of 7 dressing changes before his discharge home.

Case 6. Ms. F is an 81-year-old woman with a history of schizophrenia, an implantable atrial defibrillator, and PEG feedings. She was admitted with C. difficile following 20 days of diarrhea. She was extremely cachectic. She had an unstageable sacral pressure ulcer measuring 8.0 cm x 4.0 cm with 50% yellow slough and 50% red granulation tissue (see Figure 6a). After wound cleansing, ALH and a secondary foam cover dressing were applied per the protocol described and changed every 3 days. Ms. F was discharged after 2 weeks of ALH/cover dressing treatment (a total of 5 dressing changes); the pressure ulcer was classified Stage III and had decreased in size to 1.5 cm x 2.0 cm with only trace amounts of slough remaining (see Figure 6b).
be associated with significantly decreased mean healing time involving 63 patients with lower limb diabetic neuropathic ulcers wound healing. For example, a randomized controlled trial in- previously demonstrated positive outcomes related to ALH and however, optimal and rapid wound management, including inpatient facility, wounds often are not managed to closure; led to good wound outcomes in these patients. In an acute challenges, the use of ALH as part of a wound care protocol of these often present barriers to healing. Yet despite these nutritional deficiency, and nonadherence to prescribed care. All factors such as multiple comorbidities, drug addiction, nu-
inner city, indigent, often elderly and immunocompromised patients, including ALH was easy to apply and required no specific training, which allowed it to be quickly integrated into the facility’s protocols of care. As illustrated in several of the current cases, treatment of inner city, indigent, often elderly and immunocompromised adults with clinically complex wounds is very difficult due to factors such as multiple comorbidities, drug addiction, nutritional deficiency, and nonadherence to prescribed care. All of these often present barriers to healing. Yet despite these challenges, the use of ALH as part of a wound care protocol led to good wound outcomes in these patients. In an acute inpatient facility, wounds often are not managed to closure; however, optimal and rapid wound management, including removal of necrotic tissue, remains paramount.

Current findings are supported by literature that has previously demonstrated positive outcomes related to ALH and wound healing. For example, a randomized controlled trial involving 63 patients with lower limb diabetic neuropathic ulcers compared ALH to saline-soaked dressings and found ALH to be associated with significantly decreased mean healing time (31.4 ± 4 versus 43 ± 3, P = 0.029). Furthermore, these findings underscore existing case studies that support the effectiveness of honey, including ALH, for wound debridement.

Limitations
Because this is a case series with a limited sample size, these results should be interpreted with caution. In all of the cases, a foam cover dressing was used to contain high amounts of drainage and to prevent maceration of surrounding peri-
Discussion
These 6 cases provide support for the effectiveness of ALH in promoting autolytic debridement (ie, removing necrotic tissue and supporting an environment for optimal wound healing). Furthermore, no adverse events were reported with the use of ALH or problems with leakage leading to peri-
Figure 5. a) Full-thickness skin loss on upper arm with adherent yellow-tan slough on day 1 of active Leptospermum honey use; b) After 13 days, wound size decreased and 75% of wound bed consists of granulation tissue.
Figure 6. a) Unstageable sacral pressure ulcer with 50% yellow slough on day 1 of active Leptospermum honey use; b) After 14 days, wound size has decreased and only trace amounts of slough remain.

References
6. Kamaratos AV, Tziooglanius KN, Irakilou SA, Panoutsopoulos GI, Kanellos IE, Melidonis AI. Manuka honey-impregnated dressings in the treatment of neuro-