The geko™ a neuromuscular electrostimulation (NMES) device and its healing effect on diabetic foot and venous leg ulcers

Jillian Brooke RN BSc(hons) MClScWH CETN(C) Saint Elizabeth Health Care | Amanda Loney RN BScN, WOCN, FNCC, CETN(C) Bayshore Home Health

The Problem:
3 million Canadians live with diabetes, which cost the Canadian healthcare system and economy $11.7 billion in 2010, and costs will rise to $16 billion by 2020. 15% of those living with diabetes will develop a diabetic foot ulcer, complications of which led to more than 2,000 amputations across Canada in 2011-2012. Early detection and treatment can reduce the need for, and prevalence of, amputations, the cost of which is 10-40 times greater than the cost of effective initiatives to prevent amputation.

Leg ulcers occur in 1-2% of adults, with 70% being of venous etiology. The Medical Advisory Secretariat estimates the affected population have ulcer history spanning 5-10 years; a third exceeding 10 years. In one Ontario study, the care for affected population have ulcer history spanning 5-10 years; a third exceeding 10 years. In one Ontario study, the care for

Solution
Small, wireless and worn at the knee, the geko™ is a novel, self-contained, wearable device powered by OrPulse™ technology to increase blood circulation in the veins to promote the healing of wounds. It stimulates the common peroneal nerve activating calf and foot muscle pumps, increasing venous, arterial, and microcirculatory blood flow, up to 60% of that achieved by walking.

Community patients from HNHB & ESC in Ontario with longstanding diabetic foot and venous leg ulcers were treated by adding the geko™ device to current therapies. Measurements and photographs were taken to record the healing progress.

Conclusion:
Challenging, refractory venous leg ulcer and diabetic foot ulcer patients from both Erie St. Clair (Managed by St. Elizabeth Health Care) and Hamilton Niagara Halmdard Brant (Managed by Bayshore Home Health), Community Care Access Centres in Ontario Canada, were involved in this evaluation. With the patients as their own controls, meaning nothing else worked to date and all other therapies were kept constant with the addition of the geko™ device, we observed a marked improvement up to and including wound closure and discharge from service. In many cases wounds were chronic up to and exceeding ten years. The three-case examples in this poster are representative of the observations.

This neuromuscular electrostimulation device, the geko™, activates the calf and foot muscle pumps to increase blood circulation which can help in a range of conditions. The tiny device has the ability to generate about 60% of the blood-flow circulation which can help in a range of conditions.

References:
2. Canadian Institute for Health Information, Compromised Wounds in Canada August 2013 Update.

Case 1

**Background**
- 74 year old male, left leg venous insufficiency and venous ulcers with edema
- Wound recurrence for 7-7 years at the time of geko™ introduction
- Two venous ulcers on the left leg: Promal wound (4.6 x 1.9 x 0.5cm), distal (2.1 x 1.8 x 0.9cm)
- Prior to treatment 2-3 times weekly and was unable to tolerate compression
- Compression reintroduced at 4 weeks
- Throughout treatment the patient was MSSA positive and also experienced a pseudomonal infection which resolved with treatment.

**Treatment**
- The geko™ T-1 was started from 2 hours/day to 8 hours/day removing the geko™ after each session
- The geko™ T-2 and R-2 were then introduced to provide additional stimulation

**Case 2**

**Background**
- 50 year old female, diabetic leg right leg amputation, left leg diabetic foot ulcer
- Wound recurrence for 1 month
- Infected tunnel, proxix 8 cm length along tibia, undermined to bone 300 degrees
- PICC line inserted for antibiotic therapy and adhered to offloading

**Treatment**
- The geko™ R-2 worn for 24 hours per day (clinician decision), instead of guidelines 2-8 hours per day, due to imminent limb loss
- The geko™ R-2 and R-2 were then introduced to provide additional stimulation

**Case 3**

**Background**
- 80 year old male, 6.5 month non-healing venous leg ulcer on right leg.
- Wound dimensions 4.8 x 2.0 cm prior to treatment. ABPI's left leg 0.86, right leg 0.9
- Episodes of critical colonization evident, treated with antimicrobial dressings
- 2 layer compression bandages discontinued due to discomfort
- Tolerated Velcro short stretch garment

**Treatment**
- The geko™ T-1 device worn for 2 hours per day for the first 3 days, progressing to a maximum of 4 hours per day for a 4 week period
- The geko™ T-2 and R-2 were then introduced to provide additional stimulation

**Case 3**

**Background**
- 50 year old male, left leg venous leg ulcer on right leg.
- Wound dimensions 4.8 x 2.0 cm prior to treatment. ABPI's left leg 0.86, right leg 0.9
- Episodes of critical colonization evident, treated with antimicrobial dressings
- 2 layer compression bandages discontinued due to discomfort
- Tolerated Velcro short stretch garment

**Treatment**
- The geko™ T-1 device worn for 2 hours per day for the first 3 days, progressing to a maximum of 4 hours per day for a 4 week period

**Case 3**

**Background**
- 50 year old male, 6.5 month non-healing venous leg ulcer on right leg.
- Wound dimensions 4.8 x 2.0 cm prior to treatment. ABPI's left leg 0.86, right leg 0.9
- Episodes of critical colonization evident, treated with antimicrobial dressings
- 2 layer compression bandages discontinued due to discomfort
- Tolerated Velcro short stretch garment

**Treatment**
- The geko™ T-1 device worn for 2 hours per day for the first 3 days, progressing to a maximum of 4 hours per day for a 4 week period

**Case 3**

**Background**
- 50 year old male, 6.5 month non-healing venous leg ulcer on right leg.
- Wound dimensions 4.8 x 2.0 cm prior to treatment. ABPI's left leg 0.86, right leg 0.9
- Episodes of critical colonization evident, treated with antimicrobial dressings
- 2 layer compression bandages discontinued due to discomfort
- Tolerated Velcro short stretch garment

**Treatment**
- The geko™ T-1 device worn for 2 hours per day for the first 3 days, progressing to a maximum of 4 hours per day for a 4 week period