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TARGETING SPEEDIER HEALING FOR CATEGORY 4 PRESSURE ULCERS: A CASE SERIES DEMONSTRATING PAIN REDUCTION AND ACCELERATED HEALING IN RECALCITRANT PRESSURE ULCERS USING MICROCURRENT ELECTRICAL STIMULATION THERAPY (ACCEL-HEAL SOLO).

AUTHORS

Clare Rogers, Tissue Viability Nurse Lead, Central London Community Healthcare NHS Trust (CLCH) West Hertfordshire. *c.rogers4@nhs.net;* **Clare Winter**, *claire.winter2@nhs.net*; **Lauren Johnson**, *lauren.johnson68@nhs.net*; **Deborah Dunderdale**, *deborah.dunderdale@nhs.net*; **Tissue Viability Nurses**, CLCH, West Hertfordshire; **Rajatri Pandey**, *rajatri.pandey@nhs.net.*; **Liz Ovens**, Independent Tissue Viability Nurse, UK *lizovens@gmail.com* **Cara Kennedy**, Tissue Viability Nursing Associate, (CLCH) West Hertfordshire *cara.kennedy@nhs.net*

INTRODUCTION

Patients with pressure ulcers can experience pain and discomfort, anxiety and depression, decline in wellbeing and social functioning, an increased risk of infection with increased risk of sepsis and death[1-5]. Management of pressure ulcers continue to pose huge challenges for health care professionals globally[6], with an associated economic burden[7].Costs also increase with ulcer severity, with category 3 and 4 pressure ulcers and those wounds that become infected, placing the heaviest burden[1,6].

Pressure ulcers invariably take a long time to heal with category 3/4 and unstageable ulcers taking a mean time of 7.7 and 10.0 months respectively[1]. Only 21% of category 4 pressure ulcers are resolved within 12 months[1]. The time to healing is an important factor in driving costs[1]. New ways of progressing these recalcitrant wounds are essential to reduce this burden for both patient and health systems.

Hard-to-heal wounds have been shown to lack electrical energy (known as the current of injury)[8,9], which inhibits the normal wound healing cascade[9,10]. Microcurrent electrical stimulation therapy (EST) can be applied externally to mimic the current of injury, which has become "exhausted" and dysfunctional in hard-to-heal wounds.

The impact of EST has been reported across many studies. Meta-analyses of EST studies have conclusively demonstrated pain reduction and accelerated wound contraction in hard-to-heal wounds.[11-13]. Recent microcurrent EST studies have demonstrated reduction in inflammation, accelerated re-epithelialisation, greater stratification and maturity of the new epithelium and a firmer attachment and deeper integration of the newly formed epidermis to the dermis[14,15]. The faster and improved quality of healing may reduce the risk of recurrence, which would inevitably provide huge benefits to health trusts in releasing more time to care for other patients[16].

METHOD

A case series was undertaken to determine the healing benefits of applying Accel-Heal Solo EST, as an adjunct to standard care for patients with recalcitrant category 4 pressure ulcers. Accel-Heal Solo is an easily operated, wearable therapy, delivering a pre-set programme of sub-sensory microcurrent stimulation over a continuous 12-day treatment period at the touch of a button, placed on intact skin either side of the wound.

Three patients with non-healing category 4 pressure ulcers were included. Following consent, Accel-Heal Solo was applied continuously to the wound edges for the 12-days, alongside standard care including off-loading. One patient received two therapies with an intermission of 22 days between them. Exclusion criteria included un-treated osteomyelitis and pregnancy. Wound size, descriptions, pain score using the visual analogue score 0-10 (VAS), and exudate levels were recorded periodically throughout the evaluations, together with photographic imagery.

DISCUSSION

The recent proposal regarding NHS reforms has suggested different approaches are required to improve patient care using a range of innovations to move care from hospital to community and change the current crisis in wound care[16]. Recent guidance[17] has supported the use of active therapies for non-healing wounds in the community, which need to be considered earlier for managing category 3 and 4 pressure ulcers, as demonstrated effectively in these cases, to prevent further complications[17,18], improve quality of life for patients, and reduce the ever increasing economic burden.

CONCLUSION

Accel-Heal Solo EST has been shown to reduce pain and kick-start the healing process for recalcitrant category 4 pressure ulcers, which were previously un-responsive to standard care alone, allowing patients to regain their lives.

RESULTS

Patient A

- 72 year old female with a category 4 pressure ulcer to the coccyx, which developed during hospital admission for chemotherapy 5 months previously. Chemotherapy delayed wound healing, so this was temporarily interrupted.
- PMH:- Multiple Myeloma 2023 ; Anaemia ; Trochanteric bursitis 2020; Left total hip replacement; Bilateral cataracts.
- No pain
- Accel-Heal Solo was commenced to kick-start wound healing.
- Wound dimensions prior to Accel-Heal Solo:- 1.5 cm x 4 cm x 6 cm deep (36cm³) (see figure 1), with undermining at 5 points of between 2-6 cm deep. Bone was palpable at 12 0'clock, with low to moderate serous exudate
- Maceration to peri-wound. 100% granulation tissue to wound.
- Following the 12-day Accel-Heal Solo therapy, there were no changes to the length or width of the wound, but significant reduction to the undermining.
- The patient had 1 x 7 day treatment with PICO dressing but it was difficult to maintain a seal due to the anatomical position of the wound and it was therefore discontinued.
- 28 days following commencement of Accel-Heal Solo, the wound measured 1.5cm x 1 cm x 5 cm deep 7.5cm³ (79% reduction). Only one area of undermining remained at 12 0'clock of 5cm.
- On review, 35 days following commencement of Accel-Heal Solo (see figure 2), the wound measured 1cm x 2 cm (2cm²) with no depth and no undermining (94% reduction). The wound had hyper-granulation and evidence of biofilm, which was treated.
- A second Accel-Heal Solo was commenced, with the aim to heal the wound as soon as possible to allow the patient to re-commence chemotherapy.
- The wound healed 85 days (see figure 3) following commencement of the first Accel-Heal Solo therapy. The patient found the device extremely comfortable and easy to wear and was delighted with the progress and enablement to re-commence chemotherapy.

Figure 1. Day 0. Wound to cocyx

Figure 2. Day 35. Wound to cocyx

Figure 3. Day 85. Wound healed to cocyx

wound healed within 85 days

Patient B

- 81 year old male, residing in a care home, with a recalcitrant category 4 sacral pressure ulcer present for 4 months. Was treated for osteomyelitis.
- PMH:- Hypertension. L3 and L4 de-compression spine
- Pain score 8.5 visual analogue score (VAS). Taking Co-codamol regularly
- Accel-Heal Solo was commenced to reduce pain and kick-start wound healing.
- Wound dimensions prior to Accel-Heal Solo:- 2.3 cm x 2 cm x 2 cm deep (9.2cm³). Undermining up to 2 cm (see figure 4).
- Pain score reduced to 0 VAS (100% reduction) within 12 days of using Accel-Heal Solo.
- 21 days following commencement of Accel-Heal Solo, the sacral wound measured 2cm x 2cm x 1.2 cm deep (4.8cm³) (48% reduction), with undermining remaining up to 2 cm. However, the wound was much more superficial (see figure 5).
- 56 days following commencement of Accel-Heal Solo, the sacral wound measured 1.2cm x 1 cm x 0.5 cm deep (0.6cm³) (94% reduction) with no undermining (see figure 6).
- Patient was discharged from the tissue viability team and the district nurses reported the wound then healed.
- The patient quality of life, and mobility improved due to healing and pain reduction.

Figure 4. Day 0. Wound to sacrum

Figure 5. Day 21. Wound to sacrum

Figure 6. Day 56. Wound to sacrum

Pain score reduced by 100% within 12 days

↓94%

Wound reduced by 94% within 56 days

Patient C

- 54 year old male with recurrent category 4 sacral pressure ulcer present for 5 years. He had developed and was treated for local abscess in May 2024. No presence of osteomyletitis.
- PMH:- Congenital Hydrocephalus; Spina Bifida under neuro - team. Wheelchair bound. Self-caring. Lives alone.
- No pain
- Accel-Heal Solo was commenced to kick-start wound healing.
- Wound dimensions prior to Accel-Heal Solo:- 1.5 x 2 x 1.5cm (4.5 cm^3) with multiple areas of undermining up to 4 cm deep and palpable bone (see figure 7).
- Following the 12-day therapy, the wound measured 1.5 x 1.5 x 2.5 cm (5.6 cm^3) (increased by 20%). However, the undermining had reduced to a maximum of 3.5cm with one area completely healed (see figure 8).
- Within 19 days of commencing Accel-Heal Solo, the wound measured 1.5 x 1.5 x 2.2cm (4.95 cm^3) (decreased by 12% in 7 days). The undermining had reduced to a maximum of 3 cm with several areas significantly reduced. (see figure 9).
- A second Accel-Heal Solo will be commenced.

Figure 7. Day 0. Sacral pressure ulcer

Figure 8. Day 12. Sacral pressure ulcer

Figure 9. Day 19. Sacral pressure ulcer

Significant reduction in undermining within 19 days of Accel-Heal Solo. Patient will receive a second therapy due to the chronicity of the wound.

References

1. Guest J., Fuller G W., Vowden P et al (2018). Cohort study evaluating pressure ulcer management in clinical practice in the UK following initial presentation in the community: costs and outcomes. BMJ open 8 (7) https://bmjopen.bmj.com/content/8/7/e021769
2. Galhardo VAC, Magalhaes MG, Blanes L, Juliano Y, Ferreira LM. Health-related quality of life and depression in older patients with pressure ulcers. Wounds: A Compendium of Clinical Research & Practice, 2010; 22(1): 20-26.
3. Gorecki C, Closs SJ, Nixon J, Briggs M. Patient-reported pressure ulcer pain: a mixed-methods systematic review. J Pain Symptom Manage, 2011; 42(3): 443-459.
4. Gorecki C, Nixon J, Madill A, Firth J, Brown JM. What influences the impact of pressure ulcers on health-related quality of life? A qualitative patient-focused exploration of contributory factors. Journal of Tissue Viability, 2012; 21(1): 3-12.
5. Borojeny LA., Albatineh AN., Dehkordi AH., Gheshlagh RG (2020). Incidence of pressure ulcers and its associations in different wards of the hospital: A systematic review and meta-analysis. Int J Prev Med 11 (1); 171
6. Siotos C, Bonett AM, Damoulakis G, Becerra AZ, Kokosis G, Hood K, Dorafshar AH, Shenaq DS. Burden of Pressure Injuries: Findings from the Global Burden of Disease Study. Eplasty. 2022 Jun 13;22:e19. PMID: 35873067; PMCID: PMC9275412.
7. Dealey C , Posnett J , Walker A. The cost of pressure ulcers in the United Kingdom. J Wound Care 2012;21:261–6.doi:10.12968/jowc.2012.21.6.261
8. Kloth L (2014). Electrical stimulation technologies for wound healing. Adv Wound Care 3(2): 81–90
9. Martin R (2024). Bioelectric Stimulation, Electric Fields and the Current of Injury: Have We been Overlooking One of the Most Important Coordinators of the Wound Healing Process? Wound Masterclass Vol 3 March 2024
10. Kambouris ME, Zagoriti Z, Lagoumintzis G Poulas K (2014) From therapeutic Electrotherapy to Electroceuticals: Formats, Applications and Prospects of Electrostimulation. Ann Res Rev Biol 4(20): 3054–70
11. Gardner SE, Frantz RA, Schmidt FL. (1999) Effect of electrical stimulation on chronic wound healing: a meta-analysis. Wound Repair Regen 7(6):495–503. https://doi.org/10.1046/j.1524-475X.1999.00495
12. Avendano-Coy J, Lopez-Munoz P, Serrano-Munoz D et al (2021). Electrical microcurrent stimulation therapy for wound healing: A meta-analysis of randomized clinical trials. J Tissue Viability S0965-206X(21)00132-7
13. Arora M, Harvey L, Glinsky J et al (2020). Electrical stimulation for treating pressure ulcers. Database Syst Rev; 1 (1): CD012196. Cochrane review
14. Lim LKP, Balakrishnan Y, Goh G, Tham KC, Ng YZ, Lunny DP, Leavesley D, Bonnard C. Automated electrical stimulation therapy accelerates re-epithelialization in a 3D in vitro human skin wound model. Adv Wound Care (New Rochelle). 2023 Dec 7. Doi 10.1089/wound.2023.0018
15. Lallyett C, Yeung C-YC, Nielson RH, et al (2018). Changes in S100 Proteins Identified in Healthy Skin following Electrical Stimulation: Relevance for Wound Healing. Adv Skin Wound Care;31(7):322-327.
16. Health Service Journal (HSJ)Guides (2024). How wound care can be a priority for the NHS. Available on line at https://guides.hsj.co.uk/6234.guide?_gl=1*bg7evu*_gcl_au*NzQ5Nzg4MDQzLjE3MjYxMzI4NzQ.*_ga*MTg1MDM2MDc3LjE3MjYxMzI4Nzl.*_ga_75WC93KDBJ*MTcyNjEzMjg3My4xLjAuMTcyNjEzMjg3My42MC4wLjA
17. Wounds UK (2022). Best Practice Statement: Active treatment of non-healing wounds in the community. Wounds UK, London. Available to download from: www.wounds-uk.com
18. Garten A., Smola H., Blome C et al (2023). Wound Balance: achieving wound healing with confidence. Wounds International, London. Available to download from www.woundsinternational.com

Disclosures

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