

# Reduction in wound pain associated with electrical stimulation therapy results in a corresponding decrease in analgesic consumption: an evaluation of patients with painful leg ulcers

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**Introduction:** For many people with hard to heal leg ulcers, wound pain is a debilitating complication, which can limit mobility, affect sleep and reduce quality of life.[1] Despite widespread use of analgesics, wound pain often remains unresolved; this is a major unmet need in the management of hard to heal wounds. EST has been shown in many studies to improve the rate of healing of hard to heal wounds; although a reduction in pain has often been observed, no substantive studies have focused on this outcome. The principle aims of this study were, to assess the effect of EST on pain from hard to heal wounds and to assess the effect of EST on quantity and type of analgesic needed to manage wound pain.

**Method:** Twenty patients with painful leg ulcers that were not progressing towards healing were offered treatment with a microcurrent EST device, Accel-Heal Solo (**Figure 1**)\* a single-use, pre-programmed, sub-sensory electrical stimulation therapy device designed to stimulate healing and reduce wound pain. Daily pain scores (numerical ratings scale 0-10) that related specifically to wound pain and not pain from any other conditions or injuries, and analgesic consumption, were recorded via a patient diary for 7 days prior to application of microcurrent EST. The microcurrent EST device was then applied for 24 days (two consecutive 12-day applications) alongside standard wound care. Pain scores and analgesic consumption was captured daily for 4 weeks. Changes in wound dimensions were monitored at weekly intervals, as a secondary objective.



**Figure 1.** The Accel-Heal Solo microcurrent EST device\*

**Table 1.** Controlled analgesics used in wound management

Controlled analgesics used in wound management
Gabapentin
Pregabalin
Codeine
Oramorph
Tramadol

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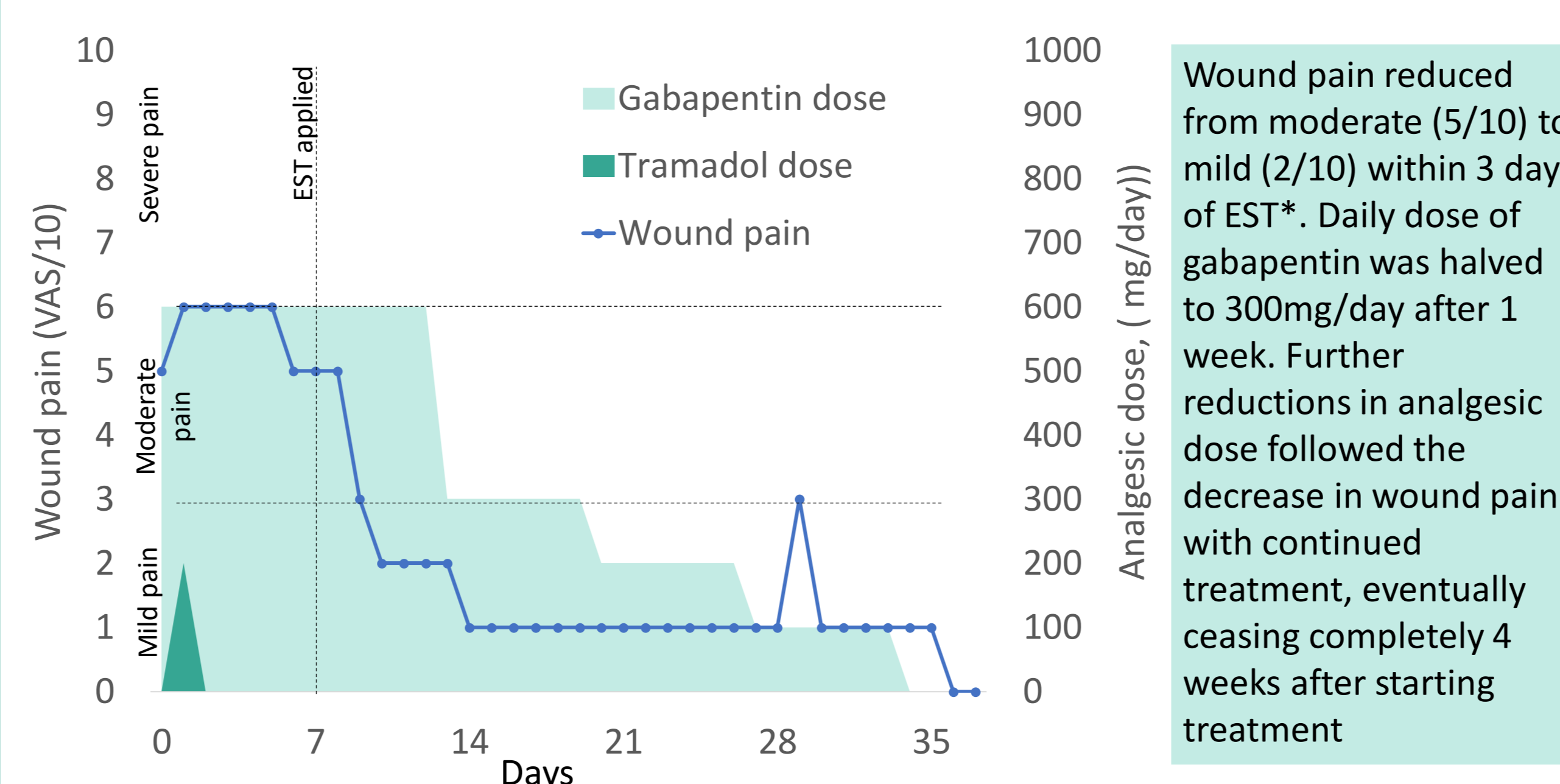
\*Accel-Heal Solo, Accel-Heal Technologies Limited, Hever, Kent, UK.

**Results:** In the overall study, twenty patients were enrolled, of whom the majority had venous leg ulcers. Analgesics were being taken by most enrolled patients to manage wound pain; controlled analgesics (e.g., gabapentin, pregabalin, codeine, oramorph, tramadol, **Table 1**) were needed by several patients. Despite this, during the 7-day pre-treatment phase, wound pain was unresolved in all patients, with pain scores >4 in all cases. During treatment with microcurrent EST, mean wound pain reduced from severe ( $\geq 7$ ) or moderate (scores 7-3) pain to lower pain and in some cases resolved completely. Consumption of analgesics was observed in some cases to reduce in line with reduction in wound pain for example, reductions in codeine, gabapentin and ibuprofen usage were observed. During treatment with EST, wounds made good progress towards healing, with reductions in wound area and volume both recorded (not shown). A six month follow up of all enrolled patients is underway. The outcomes of three cases are shown here whilst awaiting the full study results.

In the three cases shown, including different wound aetiologies (pyoderma gangrenosum, venous leg ulcer [VLU] and arterial ulcer) all had moderate or severe unresolved wound pain despite taking analgesia. In all three cases wound pain was having a detrimental impact on the patient's well-being and quality of life. The 7-day run-in demonstrated that wound pain levels were persistently high despite regular analgesia during this phase. Cases 1 and 2 were taking controlled analgesics to manage their wound pain (gabapentin with sporadic tramadol and codeine, respectively). After the application of EST and after a delay of a few days, pain scores started to reduce and use of analgesics declined shortly afterwards. As expected, dosage of analgesics declined as pain reduced.

## CASE 1

**Patient:** 67-year old female  
**Aetiology:** Pyoderma gangrenosum  
**Wound duration:** 10 months  
**Wound pain:** 5-6/10 during run-in  
**Analgesia:** 600mg gabapentin per day; sporadic tramadol  
**History:** DVT right leg; hypertension; cellulitis; no previous leg ulcers  
**Wound management:** Dermovate ointment; compression therapy; twice weekly dressing changes.  
 This patient cares for 80-year old husband and is also a carer in the community. She is very active and tolerated her pain with the use of analgesics. She was unable to take morphine or codeine due to sensitivity, therefore was prescribed gabapentin at 600mg/day. Microcurrent EST\* was initiated after a 7-day run-in period, on 31<sup>st</sup> July 2023. Two back-to-back 12-day treatments were applied.



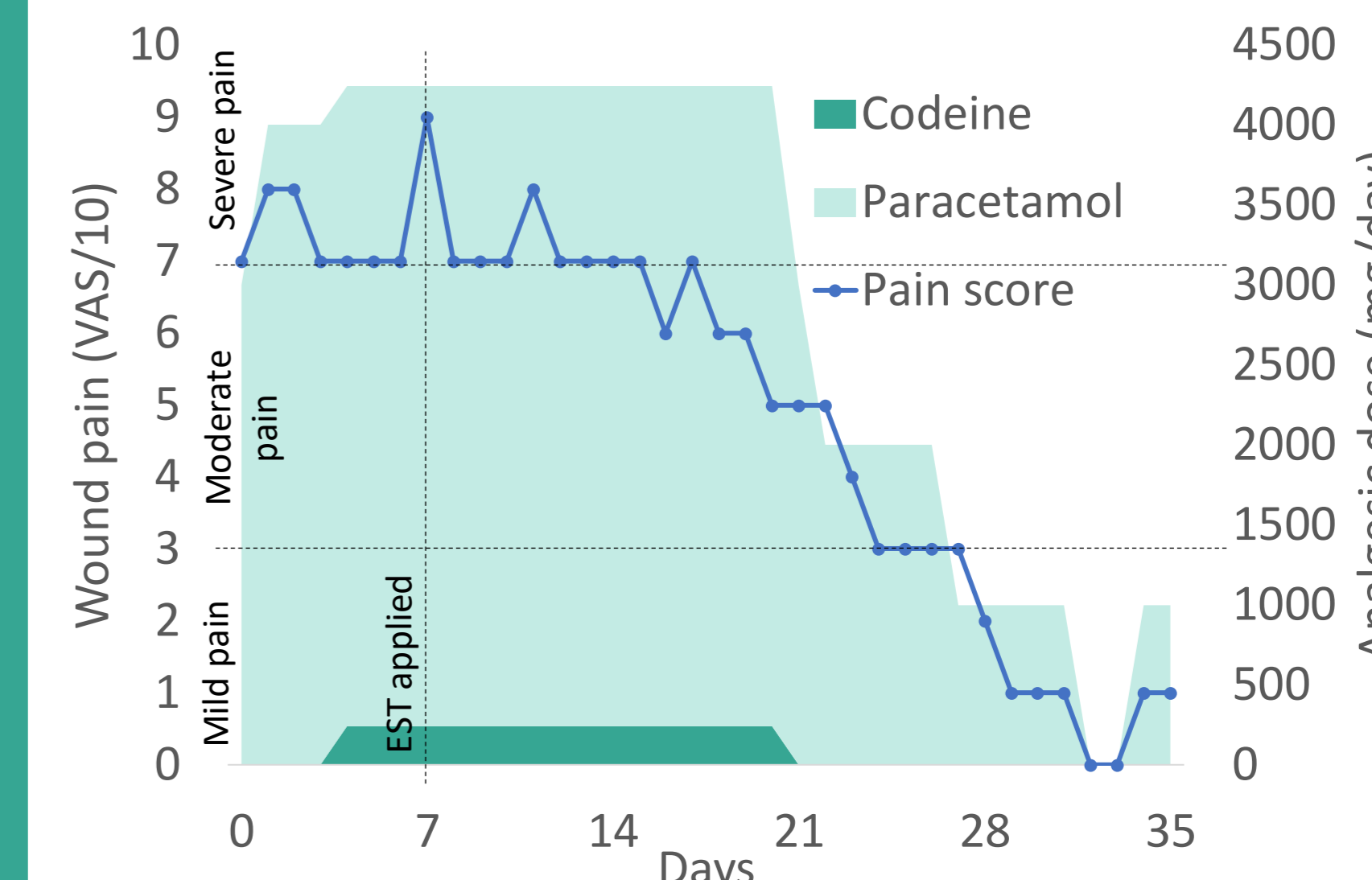
The patient had not realised the extent to which the gabapentin had been affecting her until she was able to stop taking it thanks to the effect of the EST device.\* She reported becoming more alert and less sleepy. Her final wound care visit took place whilst on holiday - she was able to enjoy her holiday thanks to the reduction in pain.

**Discussion:** Treatment of painful, hard to heal wounds with microcurrent EST\* resulted in a meaningful reduction in wound pain that enabled a corresponding reduction in pain medication, including the complete cessation of controlled analgesics in some cases. Cessation of controlled analgesics in people with hard to heal wounds, typically elderly and medically compromised individuals, is important because side-effects from these medications can lead to an increased risk of falling and other treatment-related adverse events. As well as the positive pain-related outcomes, the measured changes in wound dimensions during treatment (awaiting further analysis) demonstrated clear progress towards healing.

## CASE 2

**Patient:** 62-year old female  
**Aetiology:** Medial aspect VLU (3 small wounds); recurring since 1999  
**Duration:** 24 months  
**Wound pain:** 7-8/10 during run-in  
**Analgesia:** 3000/4000mg paracetamol and 250mg codeine daily  
**History:** depression; hypothyroidism; arthritis; right knee replacement; TB; benign tumour removed from ear; DVT  
**Wound management:** compression; patient was unable to tolerate full compression and would ask nurses to apply lightly.

Patient works up to 11.5-hour shifts as a health care support worker. Employer allows her to take regular breaks to raise her legs, however she had to "work through the pain". She loves cruises, especially around the Caribbean, and was hoping to be able to go away without having to worry about bandages.



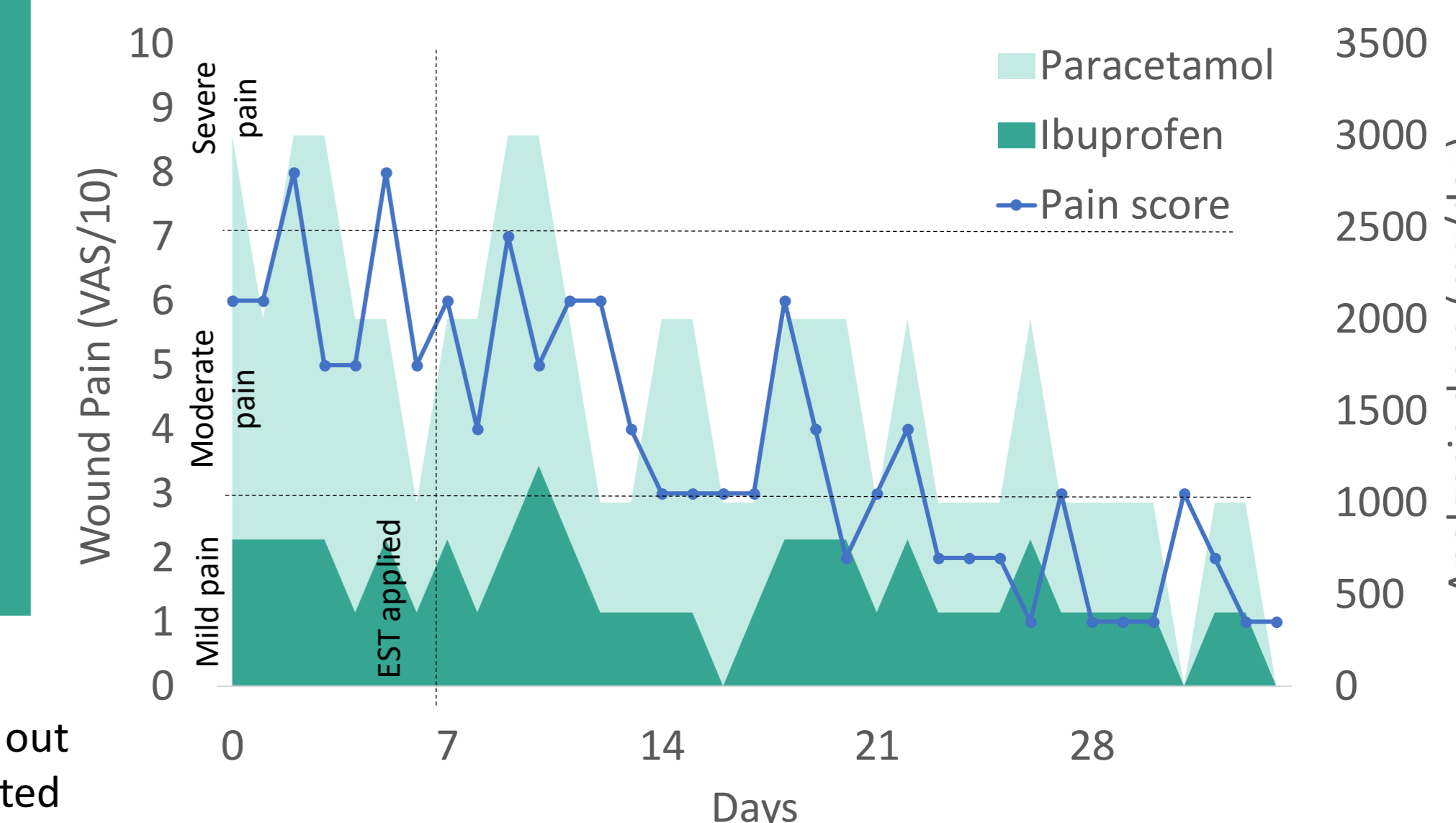
Wound pain began to reduce after a week of microcurrent EST\* from severe pain ( $\geq 7/10$ ) to mild pain ( $\leq 3/10$ ) within 17 days; this pain reduction was enough to allow target compression pressure to be achieved. With this regimen the patient achieved full healing within 10 weeks. Codeine (250mg/day) was stopped within 2 weeks of treatment and use of paracetamol reduced gradually from 4000mg/day to low levels (between 0 and 1000mg/day) within 4 weeks.



## CASE 3

**Patient:** 91-year old female  
**Aetiology:** Arterial ulcer on medial aspect of left foot sustained whilst using her mobility scooter  
**Duration:** 4 months  
**Wound pain:** 5-8/10 during run-in  
**Analgesia:** 2000-3000 mg paracetamol and 800mg ibuprofen daily  
**History:** bilateral PAD; arthritis

During the run-in phase this patient's pain score fluctuated between 5 (moderate) and 8 (severe) out of a maximum of 10. Her use of painkillers reflected this fluctuation with varying doses of paracetamol and ibuprofen needed daily. After microcurrent EST\* was initiated, wound pain gradually reduced, although some fluctuation was still observed. Use of paracetamol and ibuprofen decreased as pain decreased - on some days no ibuprofen was needed.



As the wound pain reduced, this patient was able to gradually increase her daily activity and was able to attend to her garden again.



**Conclusion:** As well as kick-starting the healing process,[1] microcurrent EST\* may provide a valid adjunct to oral analgesia in the attempt to address persistent wound pain in people with long-standing hard to heal wounds.

**References:** 1. Milne J, Swift A, Smith J, Martin R. Electrical stimulation for pain reduction in hard-to-heal wound healing. J Wound Care. 2021 2;30(7):568-580.  
**Abbreviations:** VAS, visual analogue score; VLU, venous leg ulcer.  
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