Cost-effectiveness of electrical stimulation therapy in the treatment of chronic wounds: a systematic review, meta-analysis and economic analysis in the context of the NHS

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Introduction: Hard-to-heal wounds are a major burden to healthcare systems [1]. Electrical stimulation therapy (EST) is an advanced wound technology with a large body of evidence supporting improved clinical outcomes. However, robust cost-effectiveness analysis of this treatment type, based on a meta-analysis approach, is lacking. The aim of this study was to robustly explore the cost-effectiveness of EST in addition to standard of care (SoC) versus SoC alone to ascertain if this therapy could lead to cost savings.

Method: A systematic review and meta-analysis of randomised controlled studies (RCTs) was conducted according to the PRISMA guidelines. A cost-effectiveness model was developed based on the findings of the meta-analysis, and on the clinical usage and cost of the EST device* used in the of the largest included RCT [2] which involved treatment in the patient's own home, with no additional HCP or clinic visits needed. Weekly costs of community wound care were taken from published estimates [3] and inflated to 2024 levels [4], reflecting costs of community treatment of hard-to-heal wounds to the NHS. The cost-effectiveness analysis modelled costs and resource use associated with the wound treatment of a hypothetical cohort of 100 patients followed over a 12-week time horizon, treated with either EST + SoC or SoC alone. A sensitivity analysis varied assumptions about the clinical benefits of EST, specifically the time to healing and the proportion of ulcers healed.

Results: Fourteen RCTs with relevant data (proportion of wounds healed and/or time to healing) were identified, representing 783 patients with various chronic wound aetiologies (diabetic foot ulcers, pressure ulcers and venous leg ulcers) [2, 5-17].

Versus SoC alone, EST + SoC, increased the proportion of wounds healed from 26.9% to 48.9% (a 22% improvement), and significantly increased the likelihood of wound healing more than two-fold (odds ratio [OR] 2.46 [95% CI, 1.75-3.46], p<0.0001; **Figure 1**).

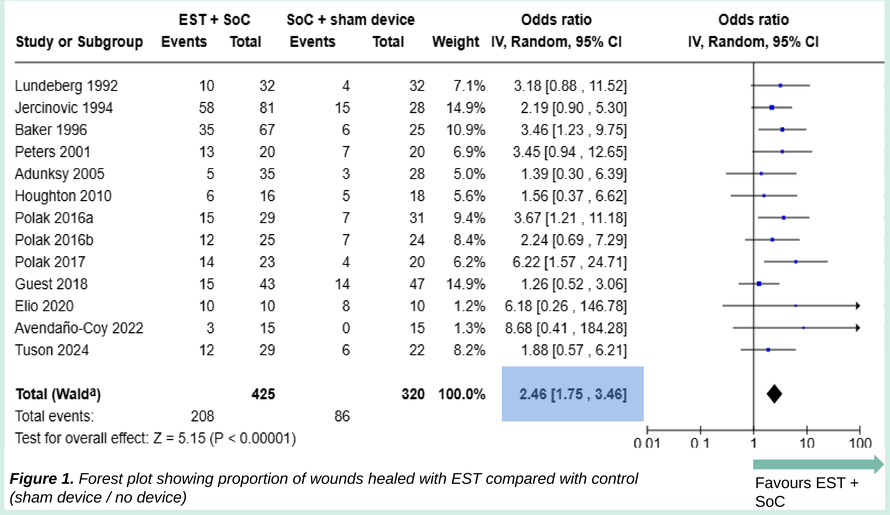

Figure 1. Forest plot showing proportion of wounds healed with EST compared with control (sham device / no device)

Versus SoC alone, EST + SoC, significantly decreased the mean time to healing by 2.67 weeks (95% CI, 1.49-3.84, p<0.00001).

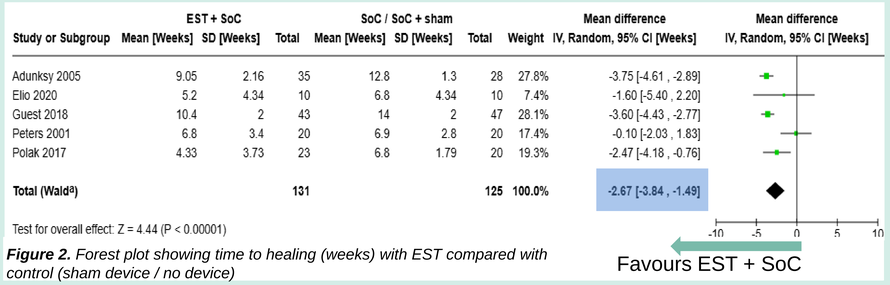

Figure 2. Forest plot showing time to healing (weeks) with EST compared with control (sham device / no device)

Cost-effectiveness analysis, concluded that in patients with hard to heal wounds, treatment with EST + SoC could save more than £38,000 in overall treatment-related costs, reduce nursing visits by 385 visits and lead to 154 more ulcer-free weeks per 100 patients treated over a 12-week period, compared with treatment with SoC alone.

Cost savings of £38,226

154 more wound-free weeks

385 fewer nurse visits

A sensitivity analysis varied the additional % of patients treated with EST who could be expected to heal versus SoC (from 22%, derived from the meta-analysis to 0%, to represent a conservative approach) and also varied the expected reduction in the speed to healing (from -3.94 weeks to -1.49, based on the confidence intervals from the meta-analysis; **Table 1)**. The lower costs observed with EST were largely driven by reducing the duration of treatment (achieving faster healing). With the addition of EST to SoC, overall costs remained lower in all of the modelled scenarios.

Reduced time to healing as a result of adding EST to SoC	Additional % healed with addition of EST to SoC			
	22% (base case from meta-analysis)	11% (half of base case)	5.5% (quarter of base case)	0% (no effect on proportion healed)
2.67 weeks faster (mean estimate from base case)	£38,226 savings	£33,464 savings	£31,088 savings	£28,712 savings
1.49 weeks faster (lowest estimate from base case)	£25,424 savings	£15,409 savings	£10,414 savings	£5,418 savings
3.94 weeks faster (highest estimate from base case)	£50,919 savings	£51,365 savings	£51,587 savings	£51,809 savings

***Table 1.** Sensitivity analysis of the cost-effectiveness data*.

Discussion and conclusion: EST + SoC increases the proportion of wounds which achieve healing compared with SoC alone. A novel finding from the meta-analysis was that EST + SoC heals wounds significantly faster than SoC alone. This combination of clinical benefits translated into significant cost and resource savings compared with SoC alone. In particular, cost savings were closely linked with patient benefits in the form of more ulcer-free weeks. A cost-effectiveness analysis based on the findings of the meta-analysis showed that the addition of EST to standard care is not only expected to improve outcomes for patients but also to reduce costs for the NHS and is a cost-effective adjunct to standard care in non-healing wounds

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