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Title **Spinal Cord Stimulation for Chronic Pain of Neuropathic or Ischemic Origin: Systematic Review and Economic Evaluation**

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Aim

To address the question: What is the clinical and cost effectiveness of spinal cord stimulation (SCS) in managing chronic neuropathic or ischemic pain?

Conclusions and results

The evidence suggested that SCS was effective in reducing the chronic neuropathic pain of failed back surgery syndrome (FBSS) and complex regional pain syndrome (CRPS) type I. For ischemic pain, selection criteria developed for critical limb ischemia (CLI) and SCS may have clinical benefits for refractory angina, short-term. Further trials of other types of neuropathic pain or subgroups of ischemic pain may be useful. From approximately 6000 citations identified, 11 randomized controlled trials (RCTs) were included in the clinical effectiveness review: 3 of neuropathic pain and 8 of ischemic pain. Trials were available for the neuropathic conditions of FBSS and CRPS type I, and they suggested that SCS was more effective than conventional medical management (CMM) or reoperation in reducing pain. The ischemic pain trials had small sample sizes. Trial evidence failed to demonstrate that pain relief in CLI was better for SCS than for CMM. However, it suggested that SCS was effective in delaying refractory angina pain onset during exercise at short-term follow-up, although not more so than coronary artery bypass grafting (CABG) in patients eligible for that surgery. The results for the neuropathic pain model suggested that the cost-effectiveness estimates for SCS in patients with FBSS who responded inadequately to medical or surgical treatment were below 20 000 pounds sterling (GBP) per quality-adjusted life-year (QALY) gained. In patients with CRPS who responded inadequately to medical treatment, the incremental cost-effectiveness ratio (ICER) was GBP 25 095 per QALY gained. When the SCS device costs varied from GBP 5000 to GBP 15 000, the ICERs ranged from GBP 2563 per QALY to GBP 22 356 per QALY for FBSS when compared with CMM, and from GBP 2283 per QALY to GBP 19 624 per QALY for FBSS compared with reoperation. For CRPS, the ICERs ranged from GBP 9374 per QALY to GBP 66 646 per QALY. If device longevity and device average price were varied simultaneously, ICERs were below or close to GBP 30 000 per QALY when device longevity was 3 years, and below or close to GBP 20 000 per QALY when device longevity was 4 years. Sensitivity analyses varied the costs of CMM, device longevity, and average device cost, showing that ICERs for CRPS were higher. In the ischemic model, it was difficult to determine if SCS represented value for money when evidence was insufficient to demonstrate comparative efficacy. Threshold analysis suggested that the most favorable economic profiles for treatment with SCS were when compared to CABG in patients eligible for percutaneous coronary intervention (PCI), and in patients eligible for CABG and PCI. In these two cases, SCS dominated (it cost less and accrued more survival benefits) over CABG.

Recommendations

See Executive Summary link at www.hta.ac.uk/project/1677.asp.

Methods

See Executive Summary link at www.hta.ac.uk/project/1677.asp.

Further research/reviews required

Clinical effectiveness was demonstrated for SCS over CMM in reducing pain for FBSS and CRPS type I. It is unclear whether this can be generalized to other forms of neuropathic pain. Evidence from small trials failed to demonstrate that pain relief in CLI was better for SCS than for CMM, and suggested that SCS was effective in delaying angina pain onset, short-term. Trials of other types of neuropathic pain, or subgroups of ischemic pain, may be useful.

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