

Economic aspects of Spinal Cord Stimulation (SCS)

Burden of Chronic Pain

Chronic pain affects one in five adults in Europe¹. Up to 10 per cent of chronic pain cases are neuropathic in origin.² Chronic pain undermines the ability to lead a productive working and social life and has a significant impact on European economies. According to a recent report, the cost of chronic pain in Europe has been estimated to be as much as €300 billion per year,³ 90 per cent of which are indirect costs.³

In the UK, the direct cost estimate for chronic pain is £1.6 billion (€1.9 billion) annually³, whereas in Germany it is around €4 billion per year.^{i,3}

Chronic pain is thought to be one of the most common conditions for which people seek medical attention.⁴

- People with severe pain visit a healthcare professional an average of 13 times in six months, double the average number of visits made by the general adult population.³
- Twenty-five per cent of those with severe pain had visited an emergency room in the past six months and 22 per cent had been hospitalised due to their pain – more than double the percentage for the general population in both instances.³
- People living with chronic pain who are able to continue in employment, miss on average 14 days per year because of their pain.³

As already mentioned, besides direct costs, indirect costs make up for a substantial part and include the cost of lost productivity, social security, welfare payments, travel expenses of patients seeking treatment, and the cost of relatives sacrificing work and leisure to care for someone suffering from disabling chronic pain.³

ⁱ DM10 billion (at the time the research was conducted).

On average, 38 per cent

of Europeans with chronic pain report that their pain is not adequately managed.³

More than 50 per cent

of chronic pain sufferers wait at least two years before their pain is adequately managed.³

Nearly one third of patients

claim they have been poorly informed about new options to better manage their pain.⁵

Furthermore, most neuropathic pain patients are prone to depression and drug dependency⁴ resulting in a further burden to the healthcare system.

Economic benefits of SCS compared with other treatment options.

Spinal Cord Stimulation (SCS) technology has been around for more than 35 years for the treatment of chronic intractable pain with over 350,000⁶ patients being treated to date, **60,000 of which worldwide have been treated with the Precision™ Plus System.**

While initial implantation costs (device costs) are high, when compared to other treatment modalities, in the medium to long term, SCS has the potential to be cost-saving compared with conventional medical management.⁷ Improved management of chronic pain promises to generate tangible savings for the taxpayer both in the short as well as the longer term,³ thus dismissing any potential unfairness against the upfront costs of SCS technology.

Indeed, cost-effectiveness analyses (that is, the comparison between the costs and the outcomes of the therapy) and clinical studies have shown that SCS is more cost effective in comparison to other conventional pain therapies, one to three years, post implant for patients with failed back surgery syndrome (FBSS) and complex regional pain syndrome (CRPS).⁸

- **SCS vs. Conventional Medical Management (CMM):** Economic benefit from SCS is noticeable even within six months. A six month study comparing patients receiving conventional medical management only with SCS patients found that the initial upfront

cost of SCS is offset by 15 per cent within six months due to reduced use of pain medication and non-drug therapies.^{7,ii}

When comparing SCS with CMM, in the SCS group, it was found:

- Opioids were used an average 11 days less.⁷
- Non-steroidal anti-inflammatory drugs (NSAIDs) were used an average 38 days less.⁷
- Anti-depressants were used for almost two weeks less.⁷
- Physical therapy was used by seven per cent, compared with 44 per cent in the CMM group.⁷

SCS compared to conventional medical management is not only cost saving to the healthcare system but is also more effective.^{9,iii} In a randomised controlled trial, when combined with CMM and compared with CMM alone, SCS has proved to be able to provide pain relief and improve health-related quality of life and functional capacity in patients with neuropathic pain secondary to FBSS.^{10,iv}

- **SCS vs. Conventional therapies:** In the long run, SCS costs are lower because non-SCS patients consume more healthcare resources such as drug therapy, rehabilitation services, and other therapies for pain control. FBSS patients who respond to SCS can achieve significant cost savings as well as increased rate of return to work, increased pain control and better quality of life.^{11,v}
- **SCS vs. Reoperation:** SCS is less expensive and more effective than reoperation in selected FBSS patients and should be used as a first treatment of choice.^{12,vi}
In patients with FBSS, SCS pays for itself in 5.5 years, this time may reduce to 2.1 years for patients that respond well to treatment. This is due to the reduced demand for medical care by these patients and subsequent cost savings.^{13,vii}

ⁱⁱ A total of 100 patients were randomised to either the SCS or Conventional Medical Management (CMM) in the PROCESS trial, a prospective, randomised, controlled, multicenter study of patients with failed back surgery syndrome trial. The 6-month mean total healthcare cost in the SCS group was significantly higher than in the CMM group ($p < 0.001$), due to the inclusion of costs associated with surgery and implantables. However, of the total mean additional cost of SCS, 15% is offset in 6-months due to the reduction in the usage of drugs for pain relief and 'other' non-drug pain treatment.

ⁱⁱⁱ A decision tree and Markov model were developed to synthesise evidence on both health-care costs and outcomes for patients with FBSS. Outcome data of SCS and CMM were sourced from 2-year follow-up data of two randomised controlled trials (RCTs).

^{iv} A total of 100 FBSS patients with predominant leg pain of neuropathic radicular origin were randomised to receive spinal cord stimulation plus conventional medical management (SCS group) or conventional medical management alone (CMM group) for at least 6 months. All patients were followed up to one year. Compared with the CMM group, the SCS group experienced improved leg and back pain relief, quality of life, and functional capacity, as well as greater treatment satisfaction ($p \leq 0.05$ for all comparisons).

^v Within a group of 104 patients with failed back syndrome, 60 patients underwent SCS electrode implantation, whereas 44 patients were designated as control subjects. For this cost-effectiveness analysis, patients were monitored for a 5-year period and authors tabulated the actual costs of treatments. From these data, the cumulative costs for each group were calculated for a 5-year period.

^{vi} A disinterested third party collected charge data for the first 42 patients in a randomised controlled crossover trial.

^{vii} An analysis of the medical costs of SCS therapy in the treatment of patients with failed back surgery syndrome (FBSS). The medical costs of SCS therapy were compared with an alternative regimen of surgeries and other interventions.

- **SCS vs. Physical therapy:** SCS combined with physical therapy (PT) and compared to PT alone in patients with complex regional sympathetic dystrophy (now termed chronic regional pain syndrome or CRPS) has proven to be more effective and less costly. SCS can be classified as a Grade A technology – a technology for which there is compelling evidence for adoption and appropriate utilisation.^{14,viii}

Economic Benefits of Rechargeable SCS systems

One of the criticisms about SCS is the battery limitations of non-rechargeable SCS systems and the need for repeat surgeries to replace the battery.

The cost-effectiveness of a rechargeable SCS device continues to increase over time post-implant, becoming less costly and more effective than medical management.⁸

One study has demonstrated that the costs of a rechargeable SCS system compared to a non-rechargeable system can be offset 4.1 years after implantation,¹⁵ providing the most cost-effective long-term option for people living with chronic pain.^{ix}

Rechargeable devices mean fewer surgeries for patients, compared with patients who receive non-rechargeable devices that require replacement surgeries every two to five years.¹⁵ This helps patients to maintain a more independent a life with a lower risk of potential complications associated with surgery.¹⁶ One charge of the rechargeable battery can last from one to two days and up to one month depending on the power output utilised.¹⁶

According to the UK's National Institute for Health and Clinical Excellence (NICE) guidelines, rechargeable devices, although more costly than some non-rechargeable neurostimulators, may have greater longevity and that this may be particularly important for those people requiring a greater complexity or intensity of stimulation.¹⁷

In an age of increased scrutiny on patient outcomes and sensitivities to budgetary pressures, rechargeable SCS like the Precision™ Plus systems offer a cost-effective and viable treatment alternative for patients suffering from chronic neuropathic pain. Technological advances paralleled with demonstrated cost savings make a compelling argument for choosing rechargeable over non-rechargeable SCS systems.

^{viii} Fifty-four patients with chronic Reflex Sympathetic Dystrophy (RSD) were randomised to receive either SCS together with physical therapy (36 patients) or physical therapy alone (18 patients). For this analysis, during 12 months of follow-up, costs and effects were assessed in both groups.

^{ix} A generalised state-transition probability framework was used to model costs.

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