Spinal cord stimulation for cancer-related neuropathic pain in the NHS

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Foreword

With the positive progress in cancer survival in recent years, the number of survivors is increasing and consequently so will the number experiencing cancer-related neuropathic pain. Although such pain often resolves within a short time, some patients can develop chronic neuropathic pain, which can be debilitating and life-limiting, and they often suffer for many years without finding effective relief. They may struggle to find a clinician aware of the long-term effects and impact of this type of pain and the importance of effective management for affected patients.

Management of chronic neuropathic pain is complex. Conventional medical management options are the first choice, but these can be limited by poor efficacy and tolerability. Non-pharmacological options are the next step, but some may not be provided by local care systems, and their availability in the new NHS structure may depend on local system decisions. Alternative treatment options are therefore needed.

Spinal cord stimulation (SCS) is an effective non-pharmacological treatment, especially in patients with nociceptive and neuropathic pain syndromes. Its use in cancer survivors with neuropathic pain is therefore increasingly under the spotlight. It can be truly life-changing for patients, as evidenced by Julie's story (page 9), and could fill the gap when other therapies are no longer available or effective. However, the analyses in this report show that fewer than 1% of patients who could benefit from SCS have received it.

By increasing awareness of SCS, its effectiveness and cost-effectiveness and identifying barriers and potential solutions to its use, my hope is that this report will lead to wider availability and access for the many patients living with the burden of cancer-related neuropathic pain after surviving their initial cancer diagnosis.

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Executive summary

Survival rates from cancer are increasing, and improving survival remains a key priority for the NHS. However, many cancer survivors experience chronic pain related to their cancer or cancer treatment, which severely impacts aspects of their life. Chronic pain is also associated with considerable direct and indirect costs to healthcare systems. Therefore, to manage the increasing numbers of patients requiring chronic pain management, the NHS must take action to provide further clinical and cost-effective pain management for patients with cancer.

Forty percent of patients with cancer-related pain have a neuropathic component, and spinal cord stimulation (SCS) is a minimally invasive non-pharmacological therapy used[1] to treat chronic neuropathic pain. It improves pain, health-related quality of life and pain-related disability, reduces consumption of drugs, and is cost effective. The National Institute for Health and Care Excellence (NICE) recommends SCS as an option for adults with chronic neuropathic pain for at least six months following a successful trial of SCS.[1] Despite this recommendation via technology appraisal 159 (2008),[1] which should have mandated funding to meet population need, adoption of SCS has been slow.

Hospital Episode Statistics (HES)[2] data over five fiscal years have been analysed to better understand the access challenges for SCS within the NHS.

The number of patients receiving SCS as a treatment continues to remain low versus estimated population need.

Between **2016** and **2021**

4,580 patients

had **SCS insertions** for any indication

Only 105 (2.3%)

of these had a historical diagnosis of cancer

Evidence of considerable regional variance is apparent, being highest in northern England. SCS service delivery was heavily impacted by COVID-19 and recovery remains sluggish:

In **2018/19** there were

1,335 spells

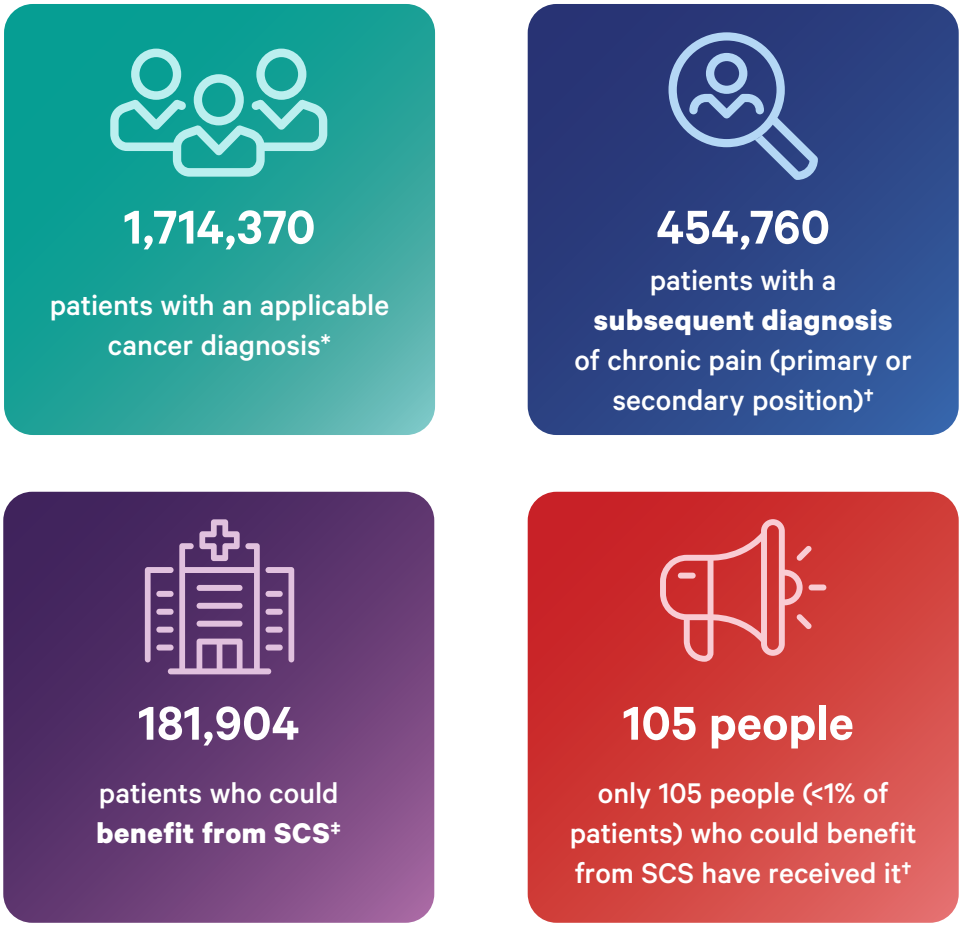
where **SCS activities** took place

This **fell** to **720**

by 2020/21 at the height of the pandemic, a **46% decrease**

However, most patients, including those at very high risk of COVID-19, had a strong willingness to attend for SCS, preferring surgery to happen as soon as possible, indicating a high clinical need for this intervention in patients with chronic pain.

The changing NHS environment presents opportunities to help develop new pathways and services that will support local populations and underserved communities. Management of chronic neuropathic pain is complex and the decision to initiate SCS treatment requires a multidisciplinary team, including specialist opinion. To embed this treatment option in cancer pathways requires clinical teams to have better awareness and understanding of this treatment choice and its position within the clinical pathway. Insertion of an SCS device is generally a simple procedure with relatively short length of stay, so SCS services will not only support the NHS long term plan[3] and Core20PLUS5[4] agenda, but may also, if set up correctly, help reduce the backlog and burden on the workforce by minimising unnecessary emergency admissions for pain management and clinic appointments.



* *Based on Hospital Episode Statistics (HES) analysis of most common cancer diagnosis codes for patients who had subsequent diagnosis of chronic pain and received SCS insertion during 2016/17–2020/21 (Table 4).*

† *Based on HES*

‡ *Based on 40% of patients with chronic cancer-related pain having a neuropathic component.*[5]

Action points

For each local population/ integrated care system (ICS), look at the potential impact of SCS on quality of life for the local population and potential savings across the system.

For areas that use SCS but need support in growing their service, develop local strategies and business cases to build on and expand existing services and use that learning and best practice to expand into cancer services.

Work with cancer alliances and patients to understand and share the impact of chronic pain.

For areas not using SCS for neuropathic pain, develop an awareness and education strategy, upskill the workforce and set up services.

For areas that are proactively administering SCS as best practice, support expansion through cancer networks to make this treatment available to more patients with neuropathic pain.

Introduction

This report aims to investigate neuropathic pain in patients with cancer in England and the non-pharmacological treatment option of spinal cord stimulation (SCS), which is a minimally invasive therapy used to treat chronic neuropathic pain.[5, 6]

Cancer pain is one of the most common, feared, debilitating and often undertreated symptoms experienced by patients with cancer.[7] It is the most common symptom of cancer at diagnosis and rises in prevalence throughout and beyond cancer treatment.[8]

Cancer pain is a **complex phenomenon** that comprises

components.[7]

Up to 40% of **patients** with chronic cancer pain have a **significant neuropathic component**,[5] known as cancer-related neuropathic pain or neuropathic cancer pain (**NCP**).[9]

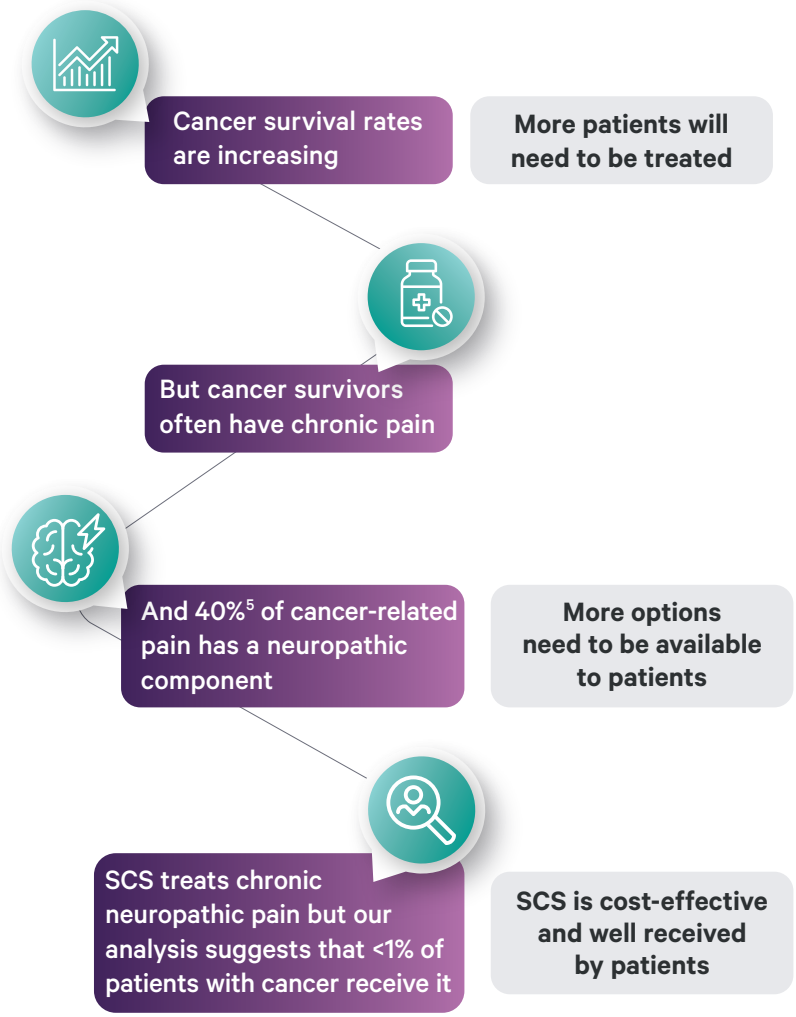
Spinal cord stimulation involves implanting electrodes next to the spinal cord and modifying the perception of neuropathic pain by stimulating the dorsal column.[1] It uses mild electric currents applied to the spine through the device to interrupt pain signals and replace the sensation with a mild tingling known as paraesthesia.[10] The benefits shown through research are improvements in pain in patients with numerous conditions, health-related quality of life and pain-related disability, as well as reduced consumption of drugs.[5, 6, 10-18] Evidence supports the use of SCS to reduce pain in patients with numerous conditions, including cancer- and cancer treatment-related pain, such as chemotherapy-induced peripheral neuropathy, post-surgical pain and radiation-induced pain.[5, 6, 10-18]

For patients suffering from refractory pain, defined as significant pain for longer than six months, SCS is a clinically effective and cost-effective established standard of care. In the UK, the National Institute for Health and Care Excellence (NICE) recommends SCS as a treatment option for adults with chronic pain of neuropathic origin who continue to experience chronic pain for at least six months despite appropriate conventional medical management and who have had a successful trial of stimulation as part of a multidisciplinary team assessment.[1]

As more people are surviving cancer, more patients are experiencing cancer-related neuropathic pain. There is therefore a greater need to manage such pain through both conventional medical pharmacological treatments and non-pharmacological approaches. This has stemmed further interest in

the indication of SCS for treating patients with cancer and neuropathic pain.[19] Although improving survival will remain a key priority, the chronic pain experienced by the increasing number of cancer survivors, also needs to come into focus.

More patients are expected to suffer from chronic pain than ever before



Treatments don't always work for everyone – it is important to have a range of options for patients based on their specific needs

The report aims to:

- Highlight the patient experience of living with neuropathic pain resulting from cancer or cancer treatments
- Describe how SCS can support patients with cancer and neuropathic pain
- Review the current landscape of patients receiving this treatment
- Assess how to improve access to SCS within the new NHS organisational structure.

Julie's story

I had surgery for a stage 3 colon cancer in March 2014, which was followed by eight cycles of adjuvant chemotherapy (oxaliplatin and raltitrexed) from May to September that year, although the treatment was cut short after six cycles because of neutropenia (low white cell count).

During my treatment, I had periods of acute peripheral neuropathy, which are expected with oxaliplatin chemotherapy. These consisted of tingling in my feet and hands, which was worse in cold surroundings (e.g hands in the fridge/freezer and walking barefoot on cold floor tiles). The symptoms improved by warming my hands and feet. The pharmacist I saw at each hospital visit warned me that if these symptoms lasted longer than a week, I would need to reduce the dose of oxaliplatin to 80% or even 60% to prevent the peripheral neuropathy becoming permanent. Patients with stage 3 bowel cancer had a 50% chance of living for five years at that time, so I was reluctant to reduce the dose, as survival seemed the most important thing to me, and I was not aware that long-term chronic peripheral neuropathy would be much worse than the acute form. Apparently, it is common for other patients to think the same way as me and be less than truthful when reporting their symptoms during chemotherapy.

The symptoms stopped after the end of chemotherapy for around six weeks (a period known as 'coasting') but then started up again in a slightly different form. I had continual discomfort in my feet (my hands were OK). This continued to get worse and more painful over the following weeks, and I mentioned it at my final visit to the cancer centre, but I was told by the registrar that it could take a long time to get better. No suggestions were made as to what I could do to improve the situation, and no follow-up was offered. I started researching peripheral neuropathy myself at this stage, as no-one had actually told me that this was what was causing the pain. My degree in physiology was helpful, as was the fact that I knew several oncologists through my public involvement in research work, but it did take quite a lot of perseverance to keep following up all possibilities, and I'm not sure that all patients would be able, or want, to do this.

I waited for some improvement to happen for several months, and I mentioned it at my follow-up meetings with my surgeon, who wrote to the oncologist. However, I received no further advice about the situation, so after six months I approached my GP for help. She had no experience of peripheral neuropathy related to chemotherapy but was very willing to work with me to find a solution. We tried a range of drugs including gabapentin, pregabalin, amitriptyline and duloxetine, but nothing worked. I then saw a neurologist, who was unable to help, and I was finally referred to the chronic pain clinic three years after the pain had started. It had continued to get worse throughout this period and eventually I could only manage to walk 150 m – any more than this and I looked for an alternative way to get to places. The pain in my feet when walking or standing was like walking barefoot on a road that has just been resurfaced with small gravel chippings – not pleasant! I only walked when necessary and chose small supermarkets to shop in. For five years I didn't go shopping in Cardiff or walk in the park 50 m from my house. I was able to get a Blue Badge during this

time, which was an enormous help. My ‘go-to’ footwear became trainers with memory foam soles, which are still what I prefer seven years later.

The chronic pain service tried me on more drugs (including tramadol), acupuncture and 8% capsaicin cream – none of which worked. I was beginning to think that there would be no solution five years after chemotherapy when I saw a programme on television about spinal cord stimulation (SCS) as a treatment for another type of chemotherapy, and this made me think it might be a possible solution for me.

My chronic pain consultant wasn’t keen to refer me for SCS, but I found out about the Neuromodulation Centre in Cardiff and contacted the consultant there, who agreed to see me if my GP would make a referral. After some preliminary tests to make sure my condition was suitable for SCS, I was referred to the neurosurgeon in Cardiff who agreed to the surgery, which was an on-book NHS procedure. COVID-19 delayed the operation somewhat, but nine months later I was given a spinal cord stimulator, which changed my life.

The stimulator is easy to manage and recharge, and I have a range of programs I can choose from. For most programs, I feel nothing when they are switched on and just have the positive effects of removing the pain. The SCS was the only treatment I had tried over the years since chemotherapy that had any positive effect on my pain from chemotherapy-induced peripheral neuropathy (CIPN). The pain I had felt previously now became discomfort – more of a buzzing feeling than a sharp pain. I was able for the first time to enjoy a walk in the park and could happily spend an hour on my feet, which was a huge step forward. I’m not back to normal, and I won’t be going out hill walking with the Ramblers again, but I can do most of the things I want to do in everyday life with no problems. Footwear is still an issue, as my feet are still quite sensitive, and heels have now been banished forever, but I find that memory foam trainers can fit into most outfits!

Two years on from my surgery I am still getting good results from my SCS and occasionally revisit my clinical neuromodulation specialist to make some adjustments or try new programs, which can all be done sitting at a computer with a handset. I feel that the solution I have been given is at the cutting edge of science and has the potential to improve the quality of life for many people with chronic peripheral neuropathy – if they are aware of its existence.

Julie Hepburn

31 December 2022

Background

Chronic pain

Chronic pain is defined as pain that persists for more than several months or beyond the normal course of a disease or expected time of healing, at which point it becomes a significant medical condition in itself rather than a symptom.[1] Prevalence of chronic pain in the UK varies from less than 10% to greater than 30%, depending on the specific definition used.[1] Chronic pain affects people of all ages, although its prevalence generally increases with age.[1]

Chronic pain is accompanied by physiological and psychological changes that result in negative effects on general activity, physical function, sleep, mood, employment, relationships, quality of life and social interactions (Figure 1).[1, 11, 20] Emotional withdrawal and depression are common, with mood and anxiety disorders affecting up to 61% of patients with chronic pain conditions.[1, 11, 20]

Chronic pain impacts on quality of life more than many other diseases, including diabetes, rheumatoid arthritis, inflammatory bowel disease and chronic obstructive pulmonary disease (COPD).[21]

Figure 1. How chronic pain affects quality of life[1, 11, 20]

Chronic pain is complex and difficult to treat[22] and often responds poorly to conventional pharmacologic therapy, including opioid-based therapy[5]

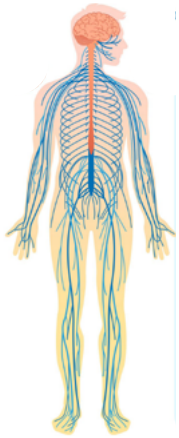
Chronic pain is associated with considerable direct and indirect costs to healthcare systems and is one of the main reasons for medical appointments. In a study from the UK, primary care management of patients with chronic pain accounted for 4.6 million appointments per year, equivalent to 793 whole-time general practitioners (GPs), at a total cost of around £69 million.[23]

Neuropathic pain

Neuropathic pain is a subtype of chronic pain that affects 7–10% of the population.[13, 16] Patients describe neuropathic pain as severe shooting or burning, sometimes with tingling.[24] It is a complex, debilitating and disabling condition, with substantial impact on health-related quality-of-life (HRQoL) comparable to that of other disabling diseases such as rheumatoid arthritis and COPD.[25, 26]

The condition is initiated or caused by nervous system damage or dysfunction and may be peripheral, central or general neuropathic (Figure 2).[13, 22, 27] Once a peripheral nerve is damaged, the pain fibres become abnormally sensitive, triggering spontaneous pain that is amplified in the spinal cord; even a minor stimulus such as a touch can trigger pain (allodynia). The pain may persist for months or years after damaged tissue has healed. In this setting, pain no longer reflects ongoing injury but a malfunctioning nervous system.

Figure 2. Common causes of neuropathic pain[27]



Peripheral	Central	General
• Painful diabetic neuralgia • Post-herpetic neuralgia • Trigeminal neuralgia • Lumbar radiculopathy • Nerve damage, including postoperative • **Pain because of cancer tumour infiltration**	• Post-stroke pain • Multiple sclerosis • **Chemotherapy-induced pain**	• Idiopathic • Neuropathic contributions to other painful conditions

Cancer pain

The aetiology of cancer pain may be unknown and can depend on the histological type and the anatomical site involved.[28] In more than 75% of patients with cancer, chronic pain is related to the direct effects of their malignancy.[5] However, treatment of cancer – including surgery, radiation, and chemotherapy (Table 1) – can also result in a number of pain syndromes.[5] Among patients who report cancer-associated pain,[5] 70% have pain due to cancer treatment; and more than 25% of patients experience moderate-to-severe pain during treatment.[7]

Table 1. Common chemotherapy agents with neuro-related side effects[22]

Chemotherapy agent	Examples	Common uses	Neuro-related side effects

Platinum-containing compounds	• Cisplatin
	• Carboplatin
	• Oxaliplatin
		• Solid tumour malignancies
		  • Non-small cell lung cancer
		  • Testicular cancer
		  • Ovarian cancer
		  • Bladder cancer
			• Peripheral neuropathy

Vinka alkaloids	• Vincristine
	• Vinblastine
		• Haematological malignancies
		  • Leukaemias
		  • Lymphomas
		• Solid malignancies
		  • Paediatric tumours
		  • Breast cancer
		  • Germ-cell cancer
			• Neurotoxicity, including peripheral sensory neuropathy
			• Autonomic dysfunction

Taxols	• Paclitaxel • Docitaxel • Cabazitaxel	• Breast cancer • Ovarian cancer • AIDS-related Kaposi's sarcoma	• Neurotoxicity, including peripheral sensory neuropathy

AIDS, acquired immunodeficiency syndrome.

The global burden of cancer pain is enormous.[28] It is prevalent in almost 50% of all patients with cancer and more than 70% with advanced cancer.[7] At least two-thirds of patients with cancer experience pain before death, and among patients with advanced cancer, about half experience pain of moderate to severe intensity and almost a quarter more severe pain.[7, 8] Furthermore, patients are living longer with cancer, and many cancer survivors (people with cancer whose curative treatment was completed) endure cancer pain for extended periods;[28] indeed, 33–40% of cancer survivors experience chronic pain.[8] Most studies report persistence of post-surgical pain at one year after surgery; many patients experience improvements in pain over time, but a significant proportion of cancer survivors suffer for many years.[29] For example, 52% of women diagnosed with post-breast cancer surgery pain reported persistence of pain nine years after surgery on average.[29]

Cancer-related neuropathic pain

Neuropathic pain is a significant component in up to 40% of patients with chronic cancer pain,[5] known as cancer-related neuropathic pain or neuropathic cancer pain (NCP).[9] Direct nerve damage by tumour pressure, invasion of nerve structures and resulting entrapment, hypoxia or chemical changes in the tumour microenvironment, like inflammatory signalling, proinflammatory cytokine production and release of tumour algogens, can result in NCP.[30] Figure 3 shows common aetiologies of NCP.

Figure 3. Common aetiologies of cancer-related neuropathic pain[31]

Cancer-related neuropathic pain

- Radiculopathies
  - Lumbosacral
  - Cervical
  - Thoracic
- Plexopathies
  - Cervical
  - Brachial
  - Lumbosacral
  - Coccygeal plexopathy
- Peripheral neuropathies
- Cranial neuralgia
  - Glossopharyngeal
  - Trigeminal
- Leptomeningeal seeding
- Tumour-related bone pain*
- Spinal cord compressions

Cancer treatment-related neuropathic pain

- Chemotherapy-induced peripheral neuropathies (CIPN)
- Chronic post-surgical pain syndromes:
  - Post-mastectomy
  - Post-neck dissection
  - Post-thoracotomy
- Post-radiation pain syndrome
  - Radiation-induced brachial plexopathies
  - Radiation myelopathy
  - Lymphoedema pain

*Tumour-related bone pain is a mixed type of neuropathic pain (somatic plus neuropathic).

Left untreated, neuropathic pain, especially NCP, can impact patients' quality of life,[5, 32-34] not only causing distress for the patient but contributing to direct and indirect costs to the NHS and overall economic burden.

Management of neuropathic pain

Neuropathic pain is managed primarily through pharmacological therapy using a variety of drugs. Opioids are the mainstay of treatment, but their use can be limited over concerns about adverse effects, including constipation (the most common opioid side effect), drowsiness and emesis, and around dependence and addiction.[30, 35, 36]

Opioids have a serious risk of dependence and addiction, especially with long-term use, and there has been concern about prescribing rates of opioids in the UK.[36] Opioid addiction is a serious and life-threatening issue, and although they are important and effective medicines for short-term pain relief, the Commission on Human Medicines (CHM) advises against long-term use in the treatment of non-cancer pain due to the risk of dependence and addiction.[36]

Co-analgesics – drugs with another indication but that can be useful and synergistic in neuropathic pain management – may be used in addition to opioids and include some of the following:[30,35]

- Antidepressants such as amitriptyline, citalopram, duloxetine, fluoxetine, paroxetine and sertraline, which may help with quality of life, pain, sleep and psychological distress, even in the absence of a diagnosis of depression.[30, 37] They are usually prescribed off-licence in this setting and many patients experience inadequate response or side effects.[13, 30, 37]
- The gabapentinoids gabapentin and pregabalin, licensed as anti-epileptic drugs, which have established efficacy but are associated with dose-limiting side effects such as somnolence and dizziness.[30]
- Topical analgesics, which include lidocaine and capsaicin patches. Evidence for lidocaine is more robust than for capsaicin, while local side effects occur with both.[30]

Due to the many issues with pharmacological treatments, clinicians and patients may consider non-pharmacological options for pain, one of which is spinal cord stimulation (SCS).

What is SCS?

SCS is a minimally invasive therapy used to treat chronic neuropathic pain.[5, 6]

- **It involves implanting electrodes next to the spinal cord and modifying the perception of neuropathic pain by stimulating the dorsal column.**[1]
- **Mild electric currents applied to the spine through the device interrupt pain signals and replace the sensation with a mild tingling known as paraesthesia.**[10]
- **Clinical evidence from randomised controlled trials, case reports and retrospective reviews supports the use of SCS to reduce pain in patients with numerous conditions, including failed back surgery syndrome (FBSS); complex regional pain syndrome (CPRS); painful diabetic neuropathy and peripheral neuropathic pain; chronic spinal pain and pain after spinal cord injury, as well as cancer- and cancer treatment-related pain, such as chemotherapy-induced peripheral neuropathy (CIPN), post-surgical pain and radiation-induced pain.**[5, 6, 10-18]

Guidance on use of SCS

European Society for Medical Oncology (ESMO)

ESMO recognises SCS as a well-established neuromodulation technique for chronic neuropathic pain.[38]

For cancer-related pain, there is potential benefit from SCS if pain is difficult to control with pharmacological options.[38]

SCS should be included as part of the overall pain management strategy, to be managed by a multidisciplinary team (MDT) with skill in this type of intervention. It is expected to be applicable to only a very small number of cases.[38]

National Institute for Health and Care Excellence (NICE)

In the UK, NICE recommends SCS as a treatment option for adults with chronic pain of neuropathic origin who continue to experience chronic pain for at least six months despite appropriate conventional medical management (CMM) and have had a successful trial of SCS as part of a multidisciplinary team assessment.[1]

NICE's technology appraisal estimated incremental cost-effectiveness ratios (ICERs) when SCS was used in combination with CMM compared with CMM alone of £9,155 per quality-adjusted life-year (QALY) for treatment of FBSS and £18,881 for treatment of CPRS.[1]

For patients with cancer suffering from neuropathic pain, the treatment options tend to start with pharmacological treatments and then expand to non-pharmacological options. This is where patients will benefit from having access to SCS treatment options. Most common cancers exhibit moderate to severe pain within 6–12 months, so services need to be planned accordingly if that level of pain is expected.[39]

Registries

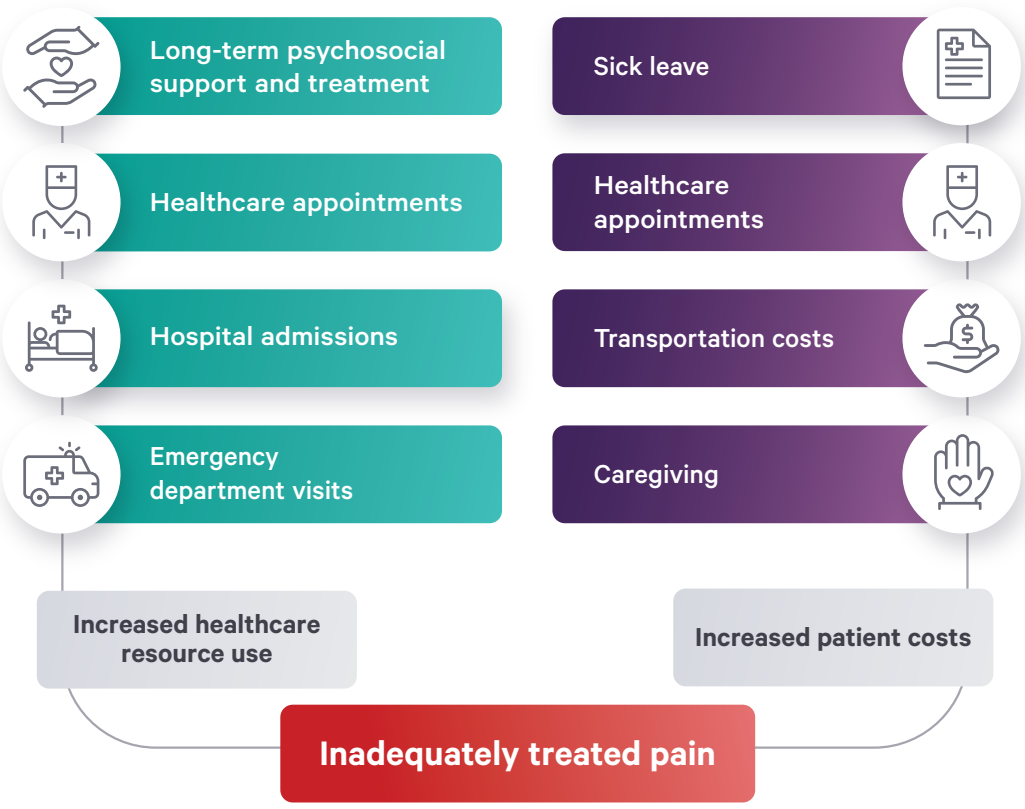
As part of the national Getting It Right First Time (GIRFT) publication,[14] there was a recommendation that all neuromodulation treatments such as SCS need to be recorded in a registry to understand clinical practice and the impact of SCS. The UK Neuromodulation Registry was therefore established in 2018.[19]

At a broader level, the International Neuromodulation Registry was also created to admit data for research and analysis from all types of neuromodulations in various clinical settings, collating data from small or large sites.[40]

Economic costs of neuropathic pain

Untreated or inadequately treated pain can have a severe negative impact on the physical and psychological health, functional status and HRQoL of patients.[7] It can also result in higher healthcare resource use and patient costs (Figure 4).[7] For example, persistent spinal pain syndrome, which accounts for 5,000 cases of neuropathic pain per year in the UK, costs the NHS in excess of £7 million annually.[5] Figure 5 shows costs related to neuropathic pain in the UK.[26]

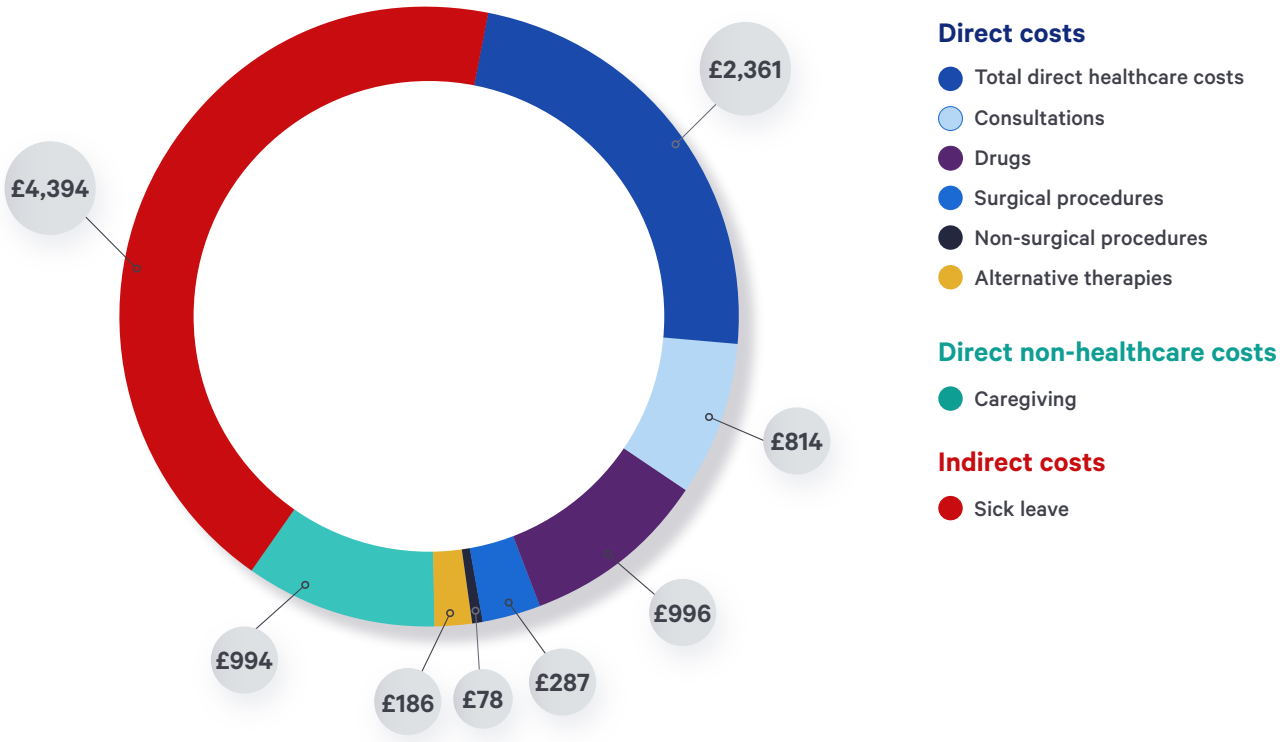
Figure 4. Impact of untreated pain or inadequate pain management[5, 7, 26, 41]



With a mean Work Productivity and Activity Impairment (WPAI) score of 44.3 in the UK, the proportion of patients' work time affected by neuropathic pain is relatively high compared with other diseases such as diabetes, respiratory conditions and arthritis.[26]

Figure 5. Costs* associated with neuropathic pain in the UK in 2012[26]

Total annual costs per patient in UK: £7,748



*Based on a conversion rate from € to £ of 0.8 for 2012.

Given the significant impact of untreated pain on HRQoL and costs to patients and healthcare systems, there is a need to optimise access to interventional pain management options.[7] Although SCS devices are relatively expensive (approximately £19,000 each), NHS policy around the treatment of cancer-related pain may benefit from consideration of the current economic benefit and impact of SCS, which is shown to increase HRQoL for patients experiencing chronic pain.[42]

Access to SCS across England

Hospital episode statistics (HES) data

Using HES data, we aimed to better understand the access challenges for SCS in established patient cohorts and the specific application of cancer-related pain. Our analysis considers five fiscal years of HES data (2016/17–2020/21) using a variety of approaches.

What is HES data?[43]

Hospital Episode Statistics (HES) is a database containing details of all admissions, accident and emergency (A&E) attendances and outpatient appointments at NHS hospitals in England. It allows hospitals to be paid for the care they deliver and can also be used for non-clinical purposes, such as research and planning health services.

HES data cover all patients treated in England funded by the NHS, including private patients treated in NHS hospitals, patients resident outside of England, and care delivered by treatment centres (including those in the independent sector) funded by the NHS.

Each HES record contains a wide range of information about an individual patient admitted to an NHS hospital, including clinical information about diagnoses and operations; patient information, such as age group, gender and ethnicity; administrative information, such as dates and methods of admission and discharge; and geographical information, such as where patients are treated and the area where they live.

Strict statistical disclosure control is applied in accordance with NHS Digital protocol to all published HES data, which suppresses small numbers to stop people identifying themselves and others to ensure that patient confidentiality is maintained. The data have to be used to benefit health and social care.

The HES disclaimer can be found in the Appendix.

Our HES data analysis aimed to look at the variation of care and access to SCS insertions across England. Table 2 shows the Operating Procedure Codes Supplement (OPCS) procedure codes used to extract the HES data; this report primarily focuses on A48.3: de-novo insertions of SCS devices. Quality and Outcomes Framework (QOF) data from NHS Digital were used to normalise metrics per 100,000 population.[44] Data suppression has been applied to patient counts between 1 and 7, and patient and spell counts have been rounded to the nearest 5 when greater than 7.

Table 2. Operating Procedure Codes Supplement (OPCS)-4 codes for spinal cord stimulation (SCS) activities used to retrieve Hospital Episode Statistics (HES) data[16, 45]

Procedure/diagnosis	Code	Subject
SCS insertion	A48.3	Implantation of neurostimulator adjacent to the spinal cord
Other SCS procedures	A48.4	Attention to neurostimulator adjacent to the spinal cord
	A48.5	Reprogramming of neurostimulator adjacent to spinal cord
	A48.6	Removal of neurostimulator adjacent to spinal cord
	A48.7	Insertion of neurostimulator electrodes into the spinal cord

*Permanent insertions are coded as OPCS-4 code A48.3; SCS trials are coded as OPCS-4 code A48.7.[16, 45]

Key highlights from the HES data

- **The number of patients receiving SCS as a treatment continues to remain low versus estimated population need (Table 5).[2] This is compounded by significant regional variance.**
- **SCS service delivery was heavily impacted by the COVID-19 pandemic and recovery remains sluggish. In 2018/19, there were 1,335 spells where SCS activities took place; this fell to 720 by 2020/21 at the height of the pandemic – a 46% decrease.**
- **SCS is effectively delivered as a day-case procedure; with mean length of stay between 0.4 and 0.6 days during the last two fiscal periods.**
- **HES data showed that interaction with pain services among patients with cancer-related pain is low.**

Current use of SCS in England

Adoption and use of SCS had been increasing steadily pre-pandemic, as highlighted in Figure 6. The pandemic subsequently had a significant impact on the number of SCS insertions, and data from 2021/22 highlight how service recovery has been sluggish. Length of stay has notably declined over the five fiscal years in this analysis, plateauing at around 0.4–0.6 days, which highlights that SCS insertions can be effectively performed as day-case procedures.

Figure 6. SCS insertions* by fiscal year and mean length of stay.[2]

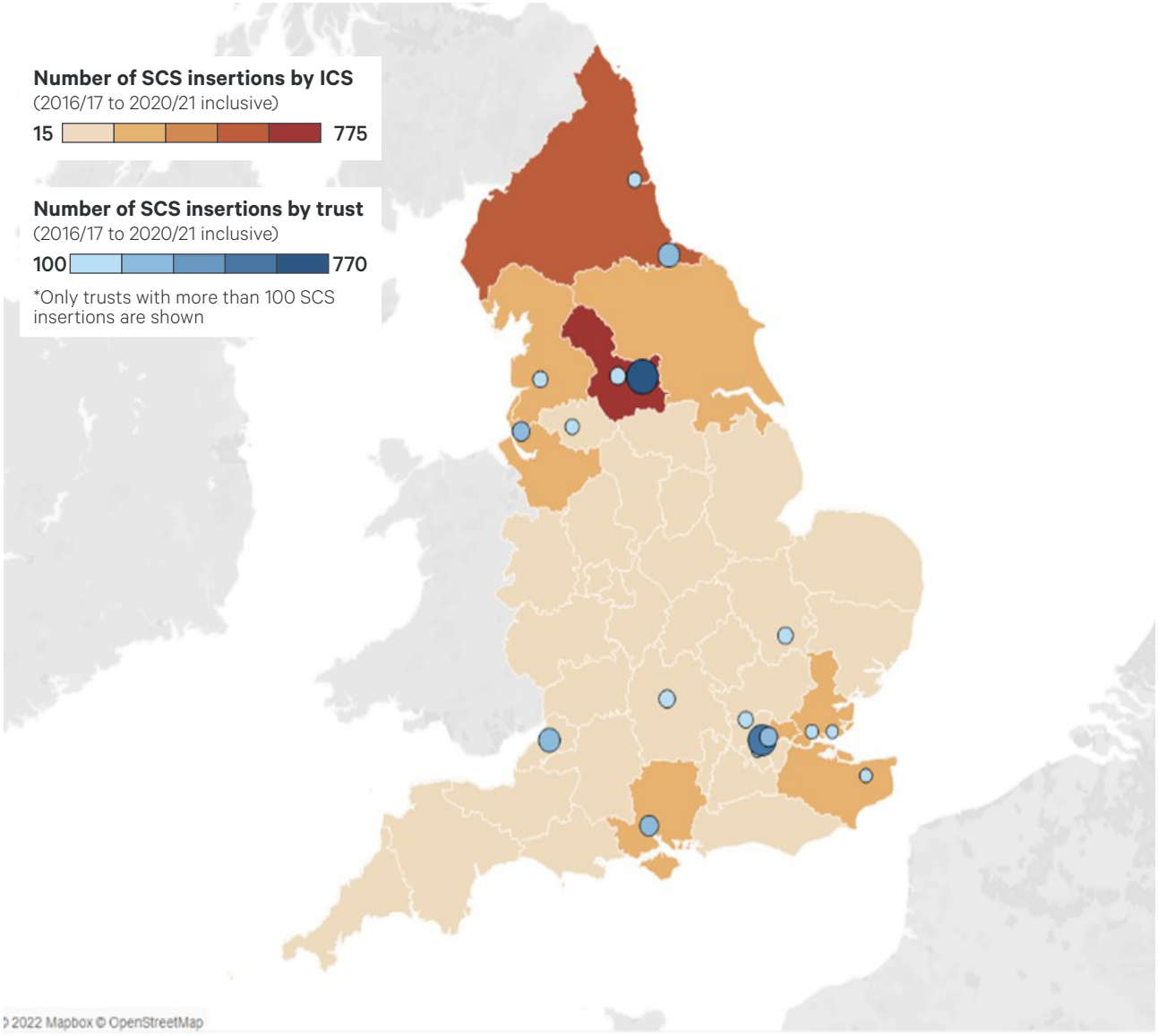
*Permanent insertions are assumed to be coded as Operating Procedure Codes Supplement (OPCS)-4 code A48.3.

Regional variance

Using HES data, we can identify the integrated care systems (ICSs) and trusts where SCS insertions (A48.3) are being conducted.[2] Figure 7, which shows the number of all SCS insertions by ICS and by trust, highlights regional variation, with larger numbers of SCS insertions in the North of England. Although trusts in southern parts of England are providing SCS procedures, patient numbers are lower.

The barriers causing the differences in adoption are not fully understood but are likely to relate to a number of factors such as local commissioning, local preferences and capacity, training, and operational set-up to provide services. A clear understanding of the local barriers to adoption and provision of SCS to local populations is clearly needed to unify and standardise care and access to care. The raw data, population size of each ICS and numbers of patients who had SCS insertions can be found in Tables 7 and 8 in the Appendix.

Figure 7. Number of all spinal cord stimulation (SCS) insertions (refers to A483 OPCS code only) by integrated care system (ICS) and trust (between 2016/17 and 2020/21)[2]*



Current use of SCS in patients with cancer pain

Our analysis shows that 4,580 patients had SCS insertions between 2016 and 2021 for any indication. Only 105 patients with a historical diagnosis of cancer received an SCS insertion during this period.[2]

Analysis of the use of SCS in patients with cancer (Table 3) shows that SCS insertions for cancer-related pain (based on the assumption that the presence of a cancer code means that the SCS was received for cancer-related pain) are currently limited. Although utilisation of SCS in this indication was slowly increasing until the COVID-19 pandemic, it represents only 2% of all SCS insertions.[2] Consistent with the data in Figure 6 is the low average length of stay, again highlighting that SCS can be effectively delivered as a day-case procedure.

Table 3. Spinal cord stimulation (SCS) insertions for patient who have had a cancer diagnosis by fiscal year, 2016/17–2020/21[2]

Measure	2016/17	2017/18	2018/19	2019/20	2020/21
Spell count (n)	10	10	30	40	25
Mean length of stay (days)	0.3	0.8	0.5	0.9	0.3

*Permanent insertions are coded as Operating Procedure Codes Supplement (OPCS)-4 code A48.3.[16, 45]

Despite the magnitude of chronic pain and cancer-related pain in the UK population and the well-proven benefits of SCS in treating pain, there is a clear treatment gap that needs greater consideration to ensure patients living with chronic pain are optimally managed.

Due to the lack of clinical consensus concerning which cancer types may benefit most from SCS and to better quantify the treatment gap in cancer-related pain, we focused our analysis on the cancer types associated with historical SCS insertion detailed in Table 3. Table 4 shows the most common cancer diagnoses for patients implanted with an SCS device between 2016/17 and 2020/21.[2]

Table 4. Most common cancer diagnosis codes for patients with a spinal cord stimulation (SCS) insertion (wider definition),* 2016/17–2020/21.[2]

ICD-10 code†	Diagnosis	SCS insertion patient count (n)
C61	Malignant neoplasm of prostate	30
C44	Other malignant neoplasms of skin	30
C79	Secondary malignant neoplasm of other and unspecified sites	20
C43	Malignant melanoma of skin	15
C77	Secondary and unspecified malignant neoplasm of lymph nodes	15
C78	Secondary malignant neoplasm of respiratory and digestive organs	15
C50	Malignant neoplasm of breast	15
C34	Malignant neoplasm of bronchus and lung	10
C90	Multiple myeloma and malignant plasma cell neoplasms	10

ICD-10, International Statistical Classification of Diseases and Related Health Problems, 10th revision.

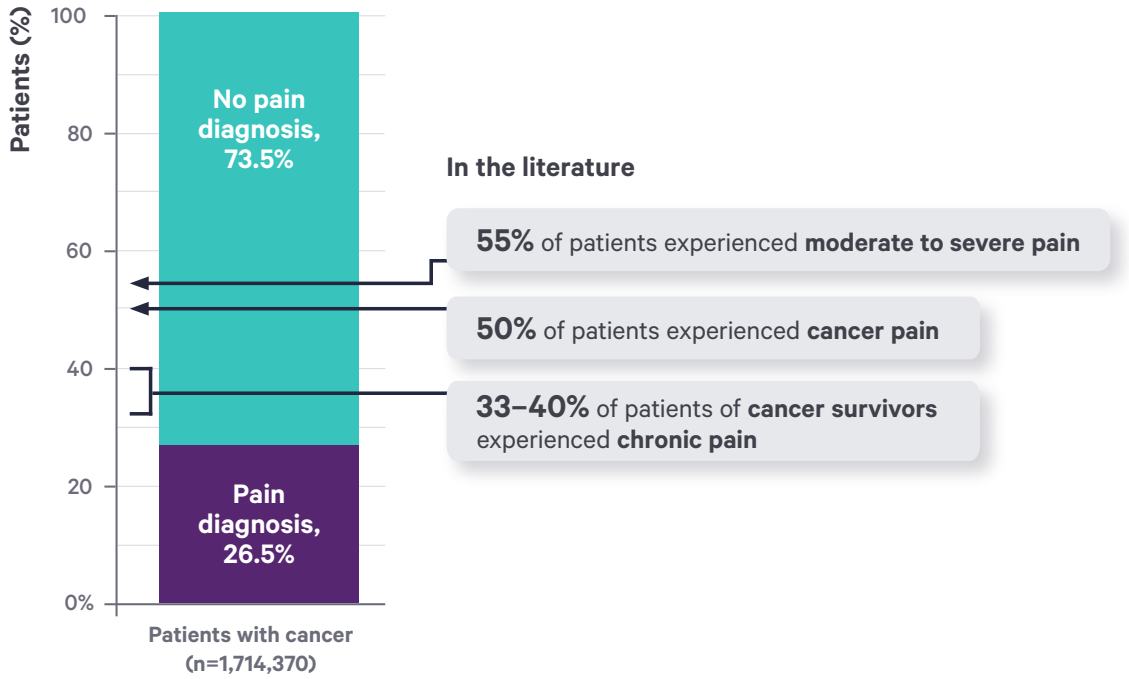
*Includes both A48.3 and A48.7 ICD-10 codes.

†Only codes with unsuppressed values are shown.

Our analysis identified 1,714,370 patients with these specific cancer diagnoses between 2016/17 and 2020/21.[2] Of these, 454,760 (26.5%) received a subsequent diagnosis of pain in secondary care.[2]

Figure 8 shows that the pain diagnosis rates observed in our HES analysis are lower than those reported in the literature.[2,7,8] The reasons for the lower rates observed in HES data are not fully understood but could include patients not always presenting to hospitals and pain not always being recorded as the primary or secondary diagnosis code. Another possibility relates to the point in their journey when patients report or are treated for NCP, as anecdotal evidence suggests that many cancer survivors are not treated with SCS for this indication until many years after their initial cancer diagnosis; it is therefore possible that some patients in remission receiving SCS for chronic NCP may not still have had a cancer code in their records in the five years covered by our analysis.

Figure 8. Observed pain diagnosis rates compared to rates reported in the literature.[2,7,8]

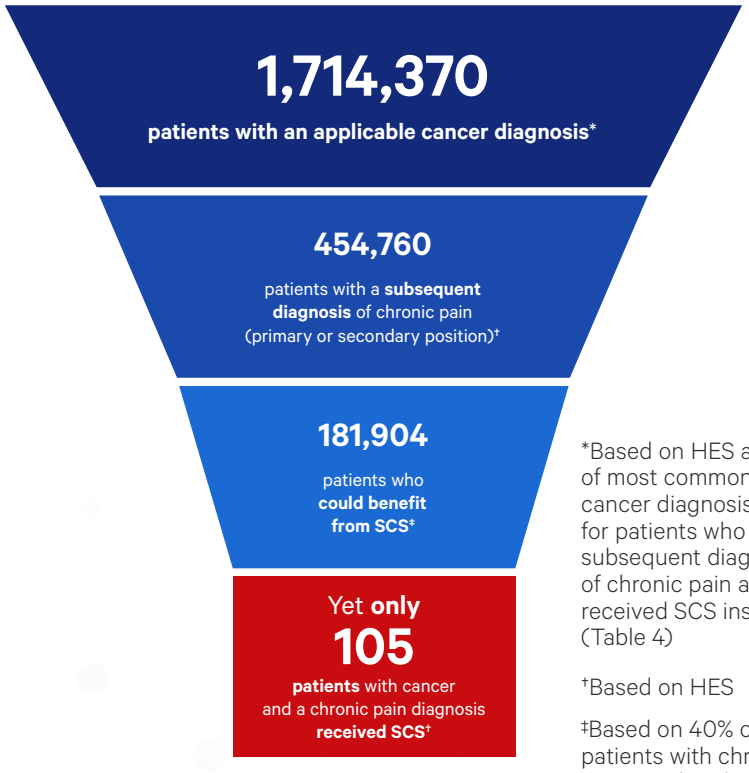


Many patients with pain are not treated within a pain management specialty. Greater awareness of SCS technology is therefore needed, especially among the specialties managing these patients, to ensure more timely referrals to relevant pain specialists.

Estimated unmet need

Only a small proportion of patients in England with neuropathic pain who may benefit from SCS receive this intervention, and NICE guidance published in 2008 has not affected uptake of SCS over the past decade.[16]

While there is a degree of uncertainty in our assumptions, there is undoubtedly a treatment gap for these patients, particularly considering our analysis includes only a small group of cancer types (Table 4). There are no set criteria for these patients to be moved onto non-pharmacological therapies such as SCS, and they need to be identified and supported earlier in their patient journey.



*Based on HES analysis of most common cancer diagnosis codes for patients who had subsequent diagnosis of chronic pain and received SCS insertion (Table 4)

†Based on HES

‡Based on 40% of patients with chronic cancer-related pain having a neuropathic component.[5]

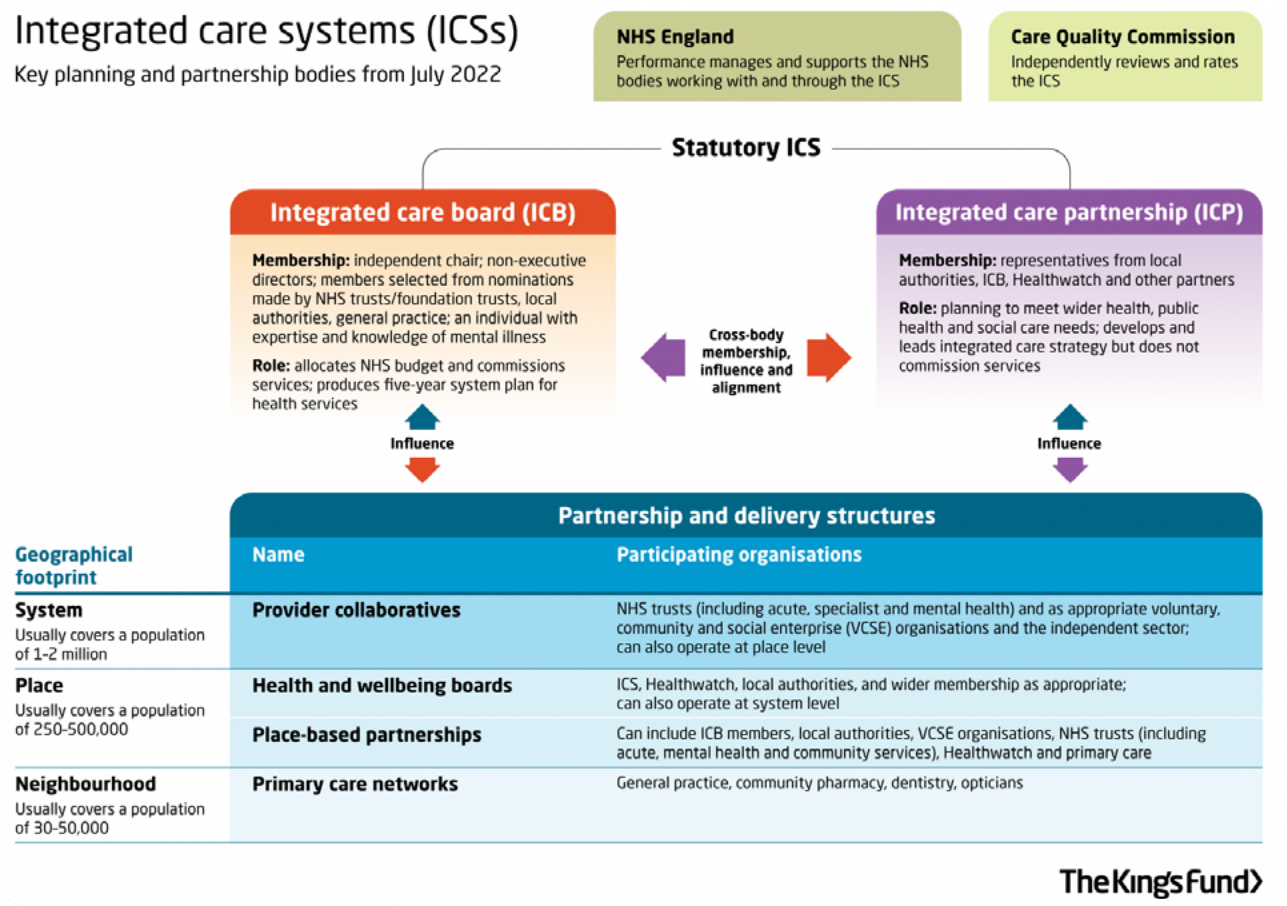
Looking forward, with cancer being an NHS priority, given the anticipated increase in need for cancer-related pain management and the significant impact of under-treated pain in this cohort of patients, NHS organisations need to urgently plan and implement service provision at levels appropriate to meet the future need. Research to investigate reasons for and mitigate inequities in access to SCS is needed given the regional variation in access to SCS that we identified.

"Under-treated pain associated with cancer diminishes quality of life and intensifies the suffering of patients and their families. In patients whose pain is not adequately controlled with traditional measures or who suffer from side effects of medications, these implantable [SCS] devices allow patients to return to an improved quality of life and greater independence." [46]

Accessing SCS in the new NHS structure

On 1 July 2022, the NHS officially changed, as the new Health & Social Care Act came into force, the role of clinical commissioning groups (CCGs) ceased to exist, and commissioning moved to ICSs. Across England, 42 ICSs with 200 provider collaboratives are the new decision-makers to look at requirements based on local population needs. Figure 9 shows the structure of the NHS as of July 2022.

Figure 9. The structure of the NHS in England from July 2022[47]



Source: https://www.kingsfund.org.uk/audio-video/integrated-care-systems-health-and-care-act

What does this mean?

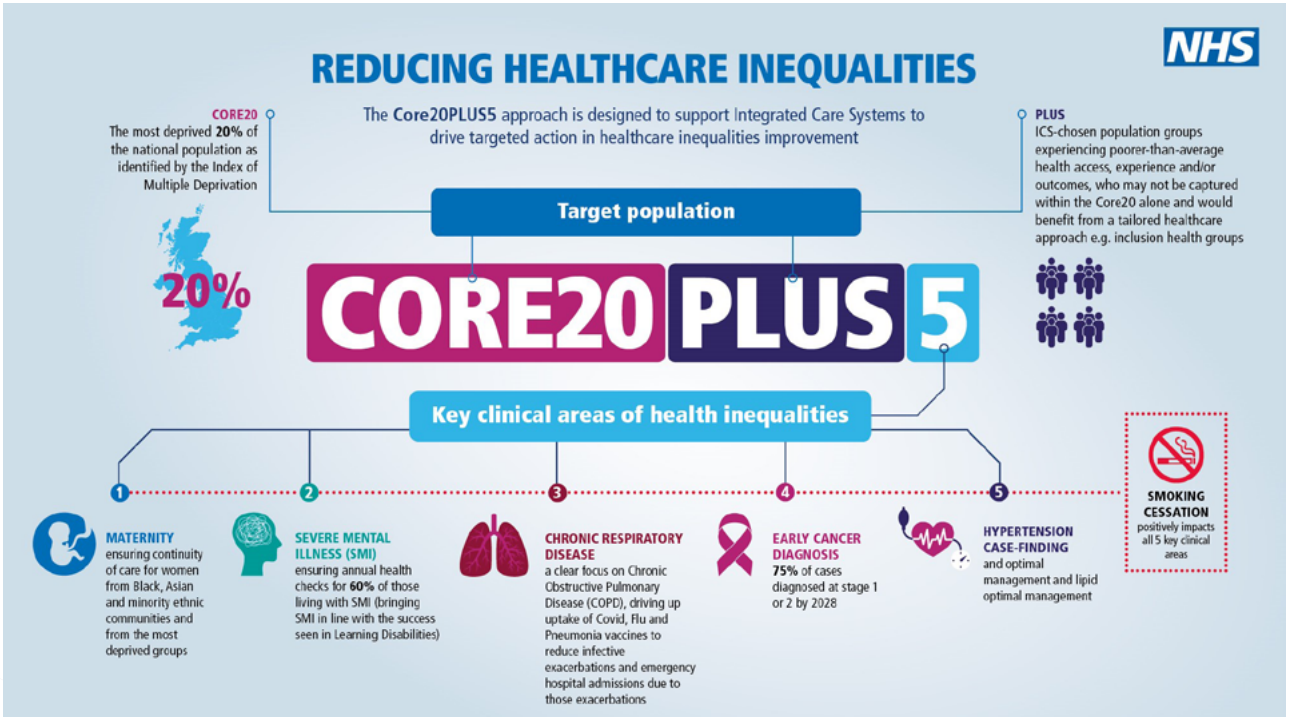
Decision-makers may be different from those in the previous structure, and outcomes and benefits may be considered at a system level as opposed to organisational.

While delivery remains the focus of the NHS long term plan,[3] operational priorities of the NHS for 2022/23 are reducing waiting times, reducing the backlog, and reducing health inequalities through the Core20PLUS5 initiative (Figure 10).[4]

- It is important to recognise that some non-pharmacological treatments, such as psychological therapies, may not be provided by local care systems, and their availability in the new NHS structure may depend on local system decisions. Treatments such as SCS are seen as an effective form of non-pharmacological treatment, especially in patients with nociceptive and neuropathic pain syndromes,[2] and could fill the gap when other therapies are no longer available or effective.
- The pandemic brought to light health inequalities, with great variations identified across the country, including for people living with chronic pain.[48]

In the new NHS structure, integrated care boards (ICBs) are responsible for governance to reduce unwarranted variation and health inequalities and increase system resilience, ensuring they deliver the best care for the patients within their communities. The ICBs therefore have an important role in monitoring health inequalities in terms of deprivation, ethnicity, disabilities and patients access to services. Core20PLUS5 provides the monitoring agenda framework for reducing inequalities and is an opportunity for external organisations to support the agenda and reduce inequalities.[4]

Figure 10. Core20PLUS5[4]



Source: https://www.england.nhs.uk/publication/core20plus5-infographic/

Why is this relevant?

Cancer remains part of the NHS long term plan[3] and early diagnosis is a priority, so any treatments that help manage patients in the community and reduce the number of clinician visits will be valuable.

Severe mental illness occurs in patients with severe chronic pain – this will be an important issue to resolve as part of Core20PLUS5.[4]

Health inequalities and access to treatments is key on most ICB agendas, and the ICS data in the Appendix can be used to investigate further whether there are issues in access to services.

For specialised commissioning during 2023/24, funding streams will move from national to ICS level, and the cancer alliances will influence the ICBs and support them to lead the cancer agenda.

Cancer alliances

Clinical networks such as the cancer alliances will operate at system, regional and national levels. They will have important roles in decision-making about clinical pathways and clinically led service change, advising on the most appropriate models and standards of care.

In 2016, 21 cancer alliances were established across the country (Figure 11); the footprint does not match that of an ICS, as one cancer alliance may cover a number of ICSs. These are the primary vehicle for the delivery of the NHS long term plan[3] for cancer improvement and, historically, have provided funding and capacity to secure cancer transformation.

Figure 11. Map of the integrated care systems (ICSs) in England compared with the cancer alliance boundaries

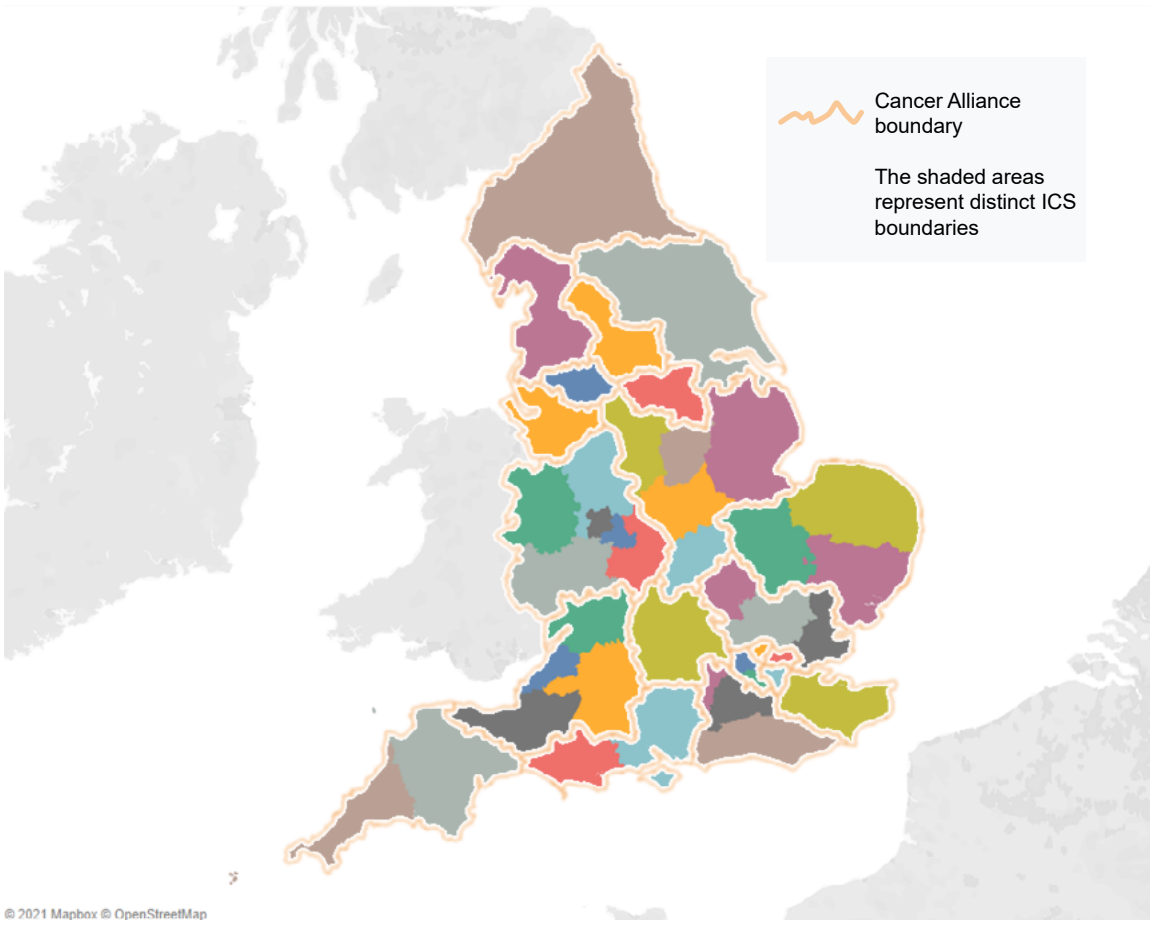
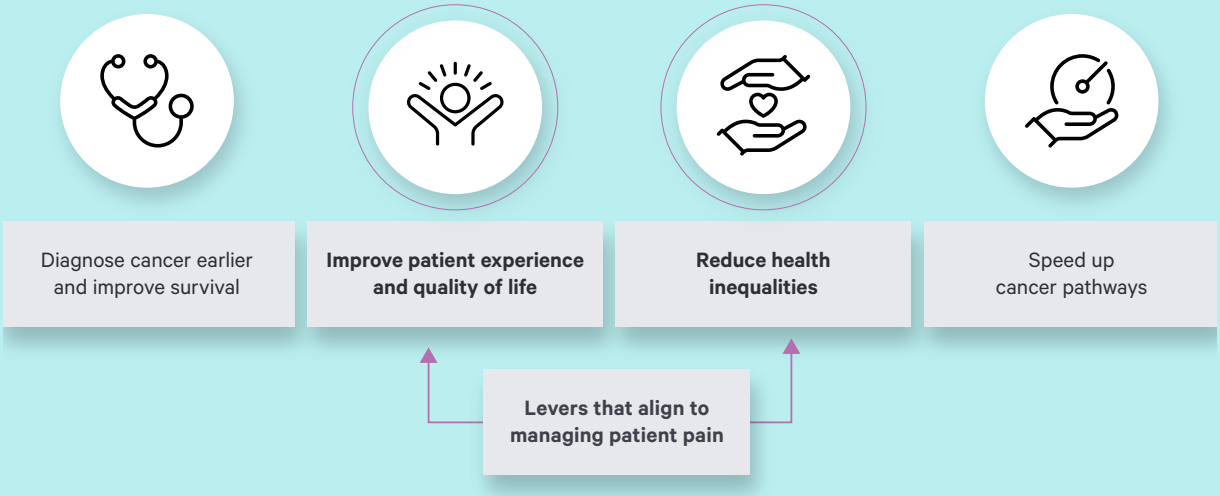


Table 9 in the Appendix provides the ICS cancer population numbers with those with a diagnosis of pain in secondary care.

The main responsibilities of cancer alliances are to:



Strategically, cancer alliances will support ICSs to bring together partners from across their area (including representatives from place and system level and from provider collaboratives) to undertake, as a minimum, four main roles on behalf of their ICB(s):

- Planning
- Whole-system and whole-pathway delivery
- Clinical leadership
- Strategic commissioning.

The ICBs may also ask cancer alliances to take on additional roles, based on local circumstances, and should lead local discussions with their cancer alliance to agree where this is appropriate.

Community diagnostic centres have been introduced to support faster access to diagnostic services, and many have been equipped to perform minor procedures. With the correct set-up, staffing and governance, could they allow SCS insertions at one of these centres as a day-case procedure?

Which other stakeholders are involved in the adoption of medical devices and new technology?

The AHSN Network is tasked with supporting adoption into the NHS of health technologies that benefit patients and drive health system efficiencies.[49] The 15 regional academic health science networks (AHSNs) that make up the AHSN Network are involved in supporting growth within the NHS and social economic growth, improving population health, transforming patient safety and quality improvement, and driving digital transformation.[49, 50] They often navigate the introduction of new technology within the NHS and support partnerships with industry, helping to spread innovation across their networks, as well as helping their trusts locally.[49, 50]

The ASHN Network has a real-world evaluation programme that aims to help innovators work with adopting organisations to secure rapid rollout of new products that deliver benefits to patients, while complementing NICE's work generating technology appraisals and adhering to regulatory requirements.[49] The AHSN Network has supported and undertaken real-world evaluations with innovators for many years. It brings together and coordinates existing regional infrastructures to support practical and useful real-world evaluations.[49] It uses its relationships to help innovators build NHS-focused business cases that support spread and adoption of high-impact innovations.[49]

Improving access to SCS for cancer-related neuropathic pain

Although SCS is a clinically effective and cost-effective intervention for chronic neuropathic pain, it is being underused in patients who may benefit from relief of pain caused by many underlying conditions. Not only are small numbers of patients with neuropathic cancer pain being treated with SCS, but with elective waiting times increased during the COVID-19 pandemic and a significant backlog, of patients there is clearly an unmet need for patients with neuropathic cancer pain. Our analysis highlights a great difference between the potential number of patients experiencing neuropathic cancer pain and the number of patients with cancer receiving interventional procedures such as SCS. Only 1% of those who could benefit from SCS in cancer receive it.

Management of chronic neuropathic pain is complex, and the decision to initiate SCS treatment requires a multidisciplinary team, including specialist opinion. To embed this treatment option in cancer pathways requires clinical teams to have better awareness and understanding of this treatment choice and its positioning within the clinical pathway.

Insertion of an SCS device is generally a simple procedure with relatively short length of stay, and use of this intervention could support some of the current NHS challenges and priorities. SCS services will not only support the NHS long term plan and Core20PLUS5 agenda[3, 4] but, if set up correctly, may also help reduce the current backlog and burden on the workforce by minimising unnecessary clinic appointments.

Patients with chronic pain clearly want access to SCS given their willingness to attend hospital and undergo implantation during the COVID-19 pandemic.[11] The changing NHS environment presents a great opportunity to develop new pathways and services that will support local populations and underserved communities, including the many patients whose neuropathic cancer pain is currently undermanaged.

Call to action

General system understanding of barriers to patients accessing treatment – from awareness and understanding to funding and process issues – to support the 'levelling up' agenda.[51]

Clinical review to allow for medical consensus on SCS within cancer-related pain in the patient pathway.

Develop clear processes that allow all eligible patients from all regions to access the procedure in a timely manner.

For areas that are proactively administering SCS, support expansion through cancer networks to make this treatment available to more patients with neuropathic pain.

For areas not using SCS for neuropathic pain, develop an awareness and educational strategy to upskill the workforce, and set up services and educate patients on treatment options to facilitate patient choice.

Proactively increase awareness and understanding by working with cancer alliances and patients to share patient stories and impact on quality of life.

For each local population/ICS, look at the potential impact of SCS on quality of life for the local population and potential savings across the system.

For areas that use SCS but need support in growing the service, develop local strategies and business cases to build on and expand local services and use that learning and best practice to expand into cancer services.

Glossary

A&E	accident and emergency
AHSN	academic health science network
AIDS	acquired immune deficiency syndrome
CCG	clinical commissioning group
CHM	Commission on Human Medicines
CIPN	chemotherapy-induced peripheral neuropathy
CMM	conventional medical management
COPD	chronic obstructive pulmonary disease
COVID-19	coronavirus disease 2019
CRPS	complex regional pain syndrome
ESMO	European Society for Medical Oncology
FBSS	failed back surgery syndrome
GIRFT	Getting It Right First Time
GP	general practitioner
HES	Hospital Episode Statistics
HRQoL	health-related quality of life
ICB	integrated care board
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th revision
ICER	incremental cost-effectiveness ratio
ICP	integrated care partnership
ICS	integrated care system
MDT	multidisciplinary team
NCP	neuropathic cancer pain
NEC	not elsewhere classified
NHSE	National Health Service England
NHSI	National Health Service Improvement
NICE	National Institute for Health and Care Excellence
NOC	not otherwise classified
OPCS	Operating Procedure Codes Supplement
PSPS	persistent spinal pain syndrome
QALY	quality-adjusted life-year
QOF	Quality and Outcomes Framework
SCS	spinal cord stimulation
VCSE	voluntary, community and social enterprise
WPAI	Work Productivity and Activity Impairment

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Appendix

HES data tables

Table 5. Spinal cord stimulation insertions* – headline data, 2016/17–2020/21[2]

Integrated health & social care	Values
Patients with SCS insertion	
Number of patients who had an SCS insertion	4,580
Average elective waiting time for SCS insertion (days)	87
Patients with SCS insertion and cancer diagnosis†	
With cancer diagnosis (n, %)†	105 (2.3)
Average time from initial cancer diagnosis† until SCS insertion (days)	591
Patients with SCS insertion and pain diagnosis	
With pain diagnosis (n, %)	4,165 (90.9)
Average time from initial pain diagnosis until SCS insertion (days)	515

*Refers to A48.3 International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) code only.

†A cancer diagnosis here refers to any ICD-10 code beginning with 'C'.

Table 6. Patient register and spinal cord stimulation (SCS) by integrated care system (ICS), 2020/21[2]

ICS code	ICS name	Patient register (n)	Patients receiving SCS (n, %)
ICS01	Bath & North East Somerset, Swindon & Wiltshire ICS	967,856	50 (0.01)
ICS02	Bedfordshire, Luton and Milton Keynes ICS	1,050,027	55 (0.01)
ICS03	Birmingham and Solihull ICS	1,338,829	20 (0.00)
ICS04	Bristol, North Somerset & South Gloucestershire ICS	1,042,507	80 (0.01)
ICS05	Buckinghamshire, Oxfordshire & Berkshire West ICS	1,910,451	140 (0.01)
ICS06	Cambridge and Peterborough ICS	1,005,341	90 (0.01)
ICS07	Cheshire and Merseyside Health & Care Partnership	2,684,358	190 (0.01)
ICS08	Cornwall and the Isles of Scilly ICS	592,376	50 (0.01)
ICS09	Coventry and Warwickshire ICS	1,028,515	25 (0.00)
ICS10	Devon ICS	1,256,751	85 (0.01)
ICS11	Frimley Health and Care	804,030	55 (0.01)
ICS12	Greater Manchester Health & Social Care Partnership	3,141,134	145 (0)
ICS13	Hampshire and the Isle of Wight ICS	1,902,228	195 (0.01)
ICS14	Healthier Lancashire & South Cumbria	1,795,383	205 (0.01)
ICS15	Hereford and Worcestershire ICS	807,412	35 (0.00)
ICS16	Hertfordshire and West Essex ICS	1,590,213	125 (0.01)
ICS17	Humber Coast & Vale Health & Care Partnership	1,762,440	265 (0.02)
ICS18	Joined Up Care Derbyshire ICS	1,067,161	35 (0.00)
ICS19	Kent and Medway ICS	1,937,127	220 (0.01)
ICS20	Leicester & Rutland ICS	1,166,091	15 (0.00)
ICS21	Lincolnshire ICS	802,353	50 (0.01)
ICS22	Mid and South Essex ICS	1,242,029	200 (0.02)
ICS23	Norfolk and Waveney ICS	1,073,983	95 (0.01)

ICS code	ICS name	Patient register (n)	Patients receiving SCS (n, %)
ICS24	North Central London Partners in Health & Care ICS	1,696,716	50 (0.00)
ICS25	North East and North Cumbria ICS	3,126,274	445 (0.01)
ICS26	North East London ICS	2,284,386	195 (0.01)
ICS27	North West London ICS	2,650,244	75 (0.00)
ICS28	Northamptonshire ICS	790,574	40 (0.01)
ICS29	Nottingham and Nottinghamshire Health & Care ICS	1,104,075	40 (0.00)
ICS30	One Gloucestershire	666,338	55 (0.01)
ICS31	Our Dorset	811,484	55 (0.01)
ICS32	Our Healthier South East London ICS	2,017,836	75 (0.00)
ICS33	Shropshire, Telford & Wrekin ICS	512,966	25 (0.00)
ICS34	Somerset ICS	588,379	30 (0.01)
ICS35	South West London Health & Care Partnership	1,710,135	75 (0.00)
ICS36	South Yorkshire and Bassetlaw ICS	1,589,857	55 (0.00)
ICS37	Staffordshire and Stoke on Trent ICS	1,162,073	40 (0.00)
ICS38	Suffolk and North East Essex ICS	1,036,317	65 (0.01)
ICS39	Surrey Heartlands Health & Care Partnership ICS	1,113,139	65 (0.01)
ICS40	Sussex Health & Care Partnership ICS	1,798,146	130 (0.01)
ICS41	The Black Country and West Birmingham ICS	1,490,126	15 (0.00)
ICS42	West Yorkshire & Harrogate Health & Care Partnership	2,598,584	630 (0.02)

Table 7. Spinal cord stimulation insertions* by integrated care system (ICS), 2016/17–2020/21[2]

ICS code	ICS name	Spell count (n)	Patient count (n)	Total bed-days	Mean length of stay (days)	Elective waiting time (days)
ICS01	Bath & North East Somerset, Swindon & Wiltshire ICS	65	50	40	0.7	55
ICS02	Bedfordshire, Luton and Milton Keynes ICS	70	55	120	1.7	111
ICS03	Birmingham and Solihull ICS	25	20	30	1.3	55
ICS04	Bristol, North Somerset & South Gloucestershire ICS	135	80	70	0.5	49
ICS05	Buckinghamshire, Oxfordshire & Berkshire West ICS	155	140	505	3.2	70
ICS06	Cambridge and Peterborough ICS	125	90	35	0.3	120
ICS07	Cheshire and Merseyside Health & Care Partnership	205	190	265	1.3	86
ICS08	Cornwall and the Isles of Scilly ICS	80	50	*	0.1	48
ICS09	Coventry and Warwickshire ICS	30	25	45	1.5	99
ICS10	Devon ICS	110	85	15	0.2	114
ICS11	Frimley Health and Care	60	55	125	2	98
ICS12	Greater Manchester Health & Social Care Partnership	160	145	75	0.5	47
ICS13	Hampshire and the Isle of Wight ICS	235	195	390	1.7	113
ICS14	Healthier Lancashire & South Cumbria	220	205	270	1.2	151
ICS15	Hereford and Worcestershire ICS	50	35	65	1.3	53
ICS16	Hertfordshire and West Essex ICS	165	125	60	0.4	69

ICS code	ICS name	Spell count (n)	Patient count (n)	Total bed-days	Mean length of stay (days)	Elective waiting time (days)
ICS17	Humber Coast & Vale Health & Care Partnership	305	265	90	0.3	93
ICS18	Joined Up Care Derbyshire ICS	40	35	30	0.7	84
ICS19	Kent and Medway ICS	260	220	40	0.2	82
ICS20	Leicester & Rutland ICS	20	15	45	2.6	96
ICS21	Lincolnshire ICS	60	50	85	1.4	107
ICS22	Mid and South Essex ICS	235	200	15	0.1	93
ICS23	Norfolk and Waveney ICS	110	95	50	0.4	120
ICS24	North Central London Partners in Health & Care ICS	65	50	25	0.4	51
ICS25	North East and North Cumbria ICS	490	445	340	0.7	67
ICS26	North East London ICS	230	195	25	0.1	42
ICS27	North West London ICS	95	75	55	0.6	44
ICS28	Northamptonshire ICS	45	40	200	4.3	111
ICS29	Nottingham and Nottinghamshire Health & Care ICS	45	40	90	2.1	98
ICS30	One Gloucestershire	85	55	45	0.5	55
ICS31	Our Dorset	65	55	110	1.7	108
ICS32	Our Healthier South East London ICS	80	75	60	0.8	38
ICS33	Shropshire, Telford & Wrekin ICS	30	25	80	2.5	94
ICS34	Somerset ICS	50	30	15	0.3	45
ICS35	South West London Health & Care Partnership	85	75	60	0.7	47

ICS code	ICS name	Spell count (n)	Patient count (n)	Total bed-days	Mean length of stay (days)	Elective waiting time (days)
ICS36	South Yorkshire and Bassetlaw ICS	60	55	50	0.8	67
ICS37	Staffordshire and Stoke on Trent ICS	45	40	30	0.6	115
ICS38	Suffolk and North East Essex ICS	80	65	30	0.3	68
ICS39	Surrey Heartlands Health & Care Partnership ICS	70	65	45	0.6	36
ICS40	Sussex Health & Care Partnership ICS	140	130	65	0.5	46
ICS41	The Black Country and West Birmingham ICS	15	15	30	1.9	87
ICS42	West Yorkshire & Harrogate Health & Care Partnership	775	630	130	0.2	130

*Refers to A48.3 Operating Procedure Codes Supplement (OPCS) code only.

Table 8. Spinal cord stimulation insertions* by trust,† 2016/17–2020/21[2]

Trust code	Trust name	Spell count (n)	Patient count (n)	Total bed-days (n)	Mean length of stay (days)	Elective waiting time (days)
RR8	Leeds Teaching Hospitals NHS Trust	770	680	140	0.2	134
RJ1	Guy's and St Thomas' NHS foundation Trust	605	580	210	0.3	31
RTR	South Tees Hospitals NHS Foundation Trust	365	340	255	0.7	31
RVJ	North Bristol NHS Trust	355	220	200	0.6	45
RHM	University Hospital Southampton NHS Foundation Trust	270	230	325	1.2	115
R1H	Barts Health NHS Trust	250	205	15	0.1	32
RET	The Walton Centre NHS Foundation Trust	240	230	440	1.8	90
RTH	Oxford University Hospitals NHS Foundation Trust	205	190	1,170	5.7	124
RAE	Bradford Teaching Hospitals NHS Foundation Trust	200	150	*	0	137
RGT	Cambridge University Hospitals NHS Foundation Trust	185	125	30	0.2	132
RAN	Royal National Orthopaedic Hospital NHS Trust	175	110	120	0.7	89
RXN	Lancashire Teaching Hospitals NHS Foundation Trust	175	165	220	1.2	183
RM3	Northern Care Alliance NHS Foundation Trust	155	135	*	0	26

Trust code	Trust name	Spell count (n)	Patient count (n)	Total bed-days (n)	Mean length of stay (days)	Elective waiting time (days)
RTD	The Newcastle upon Tyne Hospitals NHS Foundation Trust	150	130	115	0.8	129
RDD	Basildon and Thurrock University Hospitals NHS Foundation Trust	135	130	*	0	39
RVV	East Kent Hospitals University NHS Foundation Trust	125	100	*	0	130
RRV	University College London Hospitals NHS Foundation Trust	120	95	55	0.5	57
RAJ	Mid and South Essex NHS Foundation Trust	115	85	*	0	163
RJ7	St George's University Hospitals NHS Foundation Trust	100	80	105	1.1	51
RX1	Nottingham University Hospitals NHS Trust	95	90	260	2.7	107
RCB	York and Scarborough Teaching Hospitals NHS Foundation Trust	90	85	10	0.1	89
RM1	Norfolk and Norwich University Hospitals NHS Foundation Trust	90	80	20	0.2	123
RH8	Royal Devon and Exeter NHS Foundation Trust	80	65	*	0	133
RQM	Chelsea and Westminster Hospital NHS Foundation Trust	65	45	20	0.3	27

Trust code	Trust name	Spell count (n)	Patient count (n)	Total bed-days (n)	Mean length of stay (days)	Elective waiting time (days)
REF	Royal Cornwall Hospitals NHS trust	55	35	*	0	45
RHQ	Sheffield Teaching Hospitals NHS Foundation Trust	55	50	60	1.1	36
NT3	Spire Healthcare	50	50	*	0	9
NVC	Ramsay Healthcare UK Operations Limited	25	25	*	0	6
RK9	University Hospitals Plymouth NHS Trust	20	15	*	0	104
RDE	East Suffolk and North Essex NHS Foundation Trust	15	15	*	0.3	49
RGQ	Ipswich Hospital NHS Trust	15	15	*	0	29
RJE	University Hospitals of North Midlands NHS Trust	15	15	*	0	164
RKB	University Hospitals Coventry and Warwickshire NHS Trust	15	10	40	2.4	119
RQ6	Royal Liverpool and Broadgreen University Hospitals NHS Trust	10	10	*	0.6	128

*Refers to A48.3 Operating Procedure Codes Supplement (OPCS) code only.

†Only trusts with unsuppressed spell counts are shown.

Table 9. Patient population per ICS 2020/21 with patients with cancer and pain by ICS, 2016/17–2020/212*

ICS code	ICS name	Patient register (n)	Patients with cancer (n)	Patients with cancer diagnosed with pain (%)
ICS01	Bath & North East Somerset, Swindon & Wiltshire ICS	967,856	25,390	25.0
ICS02	Bedfordshire, Luton and Milton Keynes ICS	1,050,027	25,175	25.6
ICS03	Birmingham and Solihull ICS	1,338,829	30,525	27.6
ICS04	Bristol, North Somerset & South Gloucestershire ICS	1,042,507	31,330	25.1
ICS05	Buckinghamshire, Oxfordshire & Berkshire West ICS	1,910,451	47,610	23.9
ICS06	Cambridge and Peterborough ICS	1,005,341	22,405	22.4
ICS07	Cheshire and Merseyside Health & Care Partnership	2,684,358	87,550	28.2
ICS08	Cornwall and the Isles of Scilly ICS	592,376	27,450	25.7
ICS09	Coventry and Warwickshire ICS	1,028,515	28,270	25.6
ICS10	Devon ICS	1,256,751	48,910	23.9
ICS11	Frimley Health and Care	804,030	20,570	22.5
ICS12	Greater Manchester Health & Social Care Partnership	3,141,134	78,135	27.8
ICS13	Hampshire and the Isle of Wight ICS	1,902,228	51,290	27.4
ICS14	Healthier Lancashire & South Cumbria	1,795,383	58,620	32.8
ICS15	Hereford and Worcestershire ICS	807,412	27,545	25.1
ICS16	Hertfordshire and West Essex ICS	1,590,213	38,670	25.6
ICS17	Humber Coast & Vale Health & Care Partnership	1,762,440	53,775	26.2
ICS18	Joined Up Care Derbyshire ICS	1,067,161	33,495	26.2
ICS19	Kent and Medway ICS	1,937,127	54,490	25.0
ICS20	Leicester & Rutland ICS	1,166,091	23,915	24.8
ICS21	Lincolnshire ICS	802,353	27,750	23.7
ICS22	Mid and South Essex ICS	1,242,029	34,290	26.5

ICS code	ICS name	Patient register (n)	Patients with cancer (n)	Patients with cancer diagnosed with pain (%)
ICS23	Norfolk and Waveney ICS	1,073,983	42,295	25.3
ICS24	North Central London Partners in Health & Care ICS	1,696,716	31,835	29.8
ICS25	North East and North Cumbria ICS	3,126,274	100,065	29.9
ICS26	North East London ICS	2,284,386	39,010	31.3
ICS27	North West London ICS	2,650,244	39,415	29.1
ICS28	Northamptonshire ICS	790,574	20,650	27.6
ICS29	Nottingham and Nottinghamshire Health & Care ICS	1,104,075	38,180	29.7
ICS30	One Gloucestershire	666,338	16,620	22.5
ICS31	Our Dorset	811,484	33,160	23.5
ICS32	Our Healthier South East London ICS	2,017,836	38,020	27.0
ICS33	Shropshire, Telford & Wrekin ICS	512,966	15,260	30.7
ICS34	Somerset ICS	588,379	21,595	26.7
ICS35	South West London Health & Care Partnership	1,710,135	31,590	27.4
ICS36	South Yorkshire and Bassetlaw ICS	1,589,857	45,425	27.8
ICS37	Staffordshire and Stoke on Trent ICS	1,162,073	34,805	30.5
ICS38	Suffolk and North East Essex ICS	1,036,317	36,320	25.3
ICS39	Surrey Heartlands Health & Care Partnership ICS	1,113,139	31,650	23.6
ICS40	Sussex Health & Care Partnership ICS	1,798,146	57,980	24.5
ICS41	The Black Country and West Birmingham ICS	1,490,126	35,005	28.8
ICS42	West Yorkshire & Harrogate Health & Care Partnership	2,598,584	62,260	26.4

*Refers to the cancer diagnosis codes identified in Table 4.

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