NATIONAL INSTITUTE FOR HEALTH AND CARE EXCELLENCE

GUIDANCE EXECUTIVE (GE)

Review of TA159; Spinal cord stimulation for chronic pain of neuropathic or ischaemic origin

This guidance was issued in October 2008.

The guidance was considered for review in November 2011. In January 2012 it was decided to defer the consideration of the review until the end of 2013.

1. Recommendation

The guidance should be transferred to the 'static guidance list'. That we consult on this proposal.

2. Original remit(s)

To appraise the clinical and cost effectiveness of spinal cord stimulation in the management of chronic pain of neuropathic or ischaemic origin.

3. Current guidance

1.1 Spinal cord stimulation is recommended as a treatment option for adults with chronic pain of neuropathic origin who:

- continue to experience chronic pain (measuring at least 50 mm on a 0–100 mm visual analogue scale) for at least 6 months despite appropriate conventional medical management, and
- who have had a successful trial of stimulation as part of the assessment specified in recommendation 1.3.

1.2 Spinal cord stimulation is not recommended as a treatment option for adults with chronic pain of ischaemic origin except in the context of research as part of a clinical trial. Such research should be designed to generate robust evidence about the benefits of spinal cord stimulation (including pain relief, functional outcomes and quality of life) compared with standard care.

1.3 Spinal cord stimulation should be provided only after an assessment by a multidisciplinary team experienced in chronic pain assessment and management of people with spinal cord stimulation devices, including experience in the provision of ongoing monitoring and support of the person assessed.

1.4 When assessing the severity of pain and the trial of stimulation, the multidisciplinary team should be aware of the need to ensure equality of access to treatment with spinal cord stimulation. Tests to assess pain and response to spinal cord stimulation should take into account a person's disabilities (such as physical or sensory disabilities), or linguistic or other communication difficulties, and may need

to be adapted.

1.5 If different spinal cord stimulation systems are considered to be equally suitable for a person, the least costly should be used. Assessment of cost should take into account acquisition costs, the anticipated longevity of the system, the stimulation requirements of the person with chronic pain and the support package offered.

1.6 People who are currently using spinal cord stimulation for the treatment of chronic pain of ischaemic origin should have the option to continue treatment until they and their clinicians consider it appropriate to stop.

4. Rationale[1]

The new evidence for use of spinal cord stimulation in neuropathic pain supports the recommendation in TA159. The new evidence for use of spinal cord stimulation in pain of ischaemic origin is not sufficiently robust to impact on the current recommendations. It is therefore proposed that TA159 be placed on the static list until such time that further evidence is made available.

5. Implications for other guidance producing programmes

The Centre for Clinical Practice is in the process of scoping the update of its guideline on the management of low back pain. Scope consultation commenced on the 21st October. It is proposed that the guideline update will cross-refer to TA159.

6. New evidence

The search strategy from the original assessment report was re-run on the Cochrane Library, Medline, Medline In-Process and Embase. References from October 2007 onwards were reviewed. Additional searches of clinical trials registries and other sources were also carried out. The results of the literature search are discussed in the 'Summary of evidence and implications for review' section below. See Appendix 2 for further details of ongoing and unpublished studies.

7. Summary of evidence and implications for review

Since the consideration for review of TA159 in 2011, the CE marked indications for spinal cord stimulation devices listed in the appraisal have remained largely unchanged. An additional spinal cord stimulation device manufacturer (Spinal Modulation) has received CE marking. This additional device does not impact current NICE guidance, because individual devices are not specified in the recommendations of TA159.

Since list prices for spinal cord stimulation devices are not routinely available in the UK, no update on prices for these devices is possible. A range of prices were provided by the Association of British Healthcare Industries (ABHI) for the

[1] A list of the options for consideration, and the consequences of each option is provided in Appendix 1 at the end of this paper

development of TA159 and it is specified in TA159, that the least costly spinal cord stimulation device should be used if more than one device is considered suitable.

Since the publication of TA159, a meta-analysis of 4 clinical studies (Slavin et al., 2013) provides further evidence of the safety and effectiveness of spinal cord stimulation in treating chronic intractable pain of the trunk and/or limbs, and other studies demonstrated that spinal cord stimulation induces pain relief in people with diabetic neuropathy (Joosten et al. 2012). There were also several studies investigating the cost effectiveness of spinal cord stimulation in people with neuropathic pain, whether spinal cord stimulation should be considered earlier than last resort treatment, the impact of psychological factors on spinal cord stimulation outcomes and whether high frequency or standard frequency spinal cord stimulation should be used. None of the results would change the current recommendation in TA159 for neuropathic pain.

The original appraisal did not recommend spinal cord stimulation treatment for chronic pain of ischaemic origin, and recommended that future research address the use of spinal cord stimulation as a treatment for chronic pain of ischaemic origin. The 2011 review proposal identified two published studies since October 2008 (Andréll et al., 2010; Lanza et al., 2011) evaluating spinal cord stimulation in people with angina pectoris refractory to conventional treatment. Neither study are likely to provide the level of evidence required to change the current recommendation. The two identified systematic reviews covering the use of spinal cord stimulation in chronic pain of ischaemic origin (Simpson et al., 2009; Taylor et al., 2009) did not differ from those included in TA159 and support the recommendation in TA159 with respect to the use of spinal cord stimulation in ischaemic pain.

The reason for the deferral of the review consideration to the end of 2013 was to include the findings of the RASCAL study (Refractory Angina Spinal Cord stimulation and usuAL care). Later it emerged that the RASCAL trial was a pilot study (n=45), and therefore it is unlikely that it will be sufficiently powered provide the level of evidence required to lead to a change to the current recommendation for ischaemic pain in TA159.

Since December 2011, Lanza et al (2012a) published a study on the long term effect of spinal cord stimulation on angina pectoris (n=25). Different types of spinal cord stimulation were compared with sham spinal cord stimulation, but people in the sham group were randomised to either active treatment arm after 1 month. Zipes et al (2012) also published a study comparing high stimulation spinal cord stimulation with low system spinal cord stimulation (standard) in patients with refractory angina who are not candidates for revascularization. This study did not compare active treatment with a sham comparator. In 2012, Lanza et al. also published a review of observational studies from 1987 to 2010. In these observational studies, the results showed a consistent reduction of the number of angina attacks (by 45-84%) and of consumption of short-acting nitrate tablets (by -75% to -94%). Although the review of observational studies suggests that spinal cord stimulation maybe effective compared with sham treatment, the level of evidence is likely not to reach the threshold necessary to influence a change in the current recommendation in TA159 regarding ischaemic pain.

No ongoing clinical trials of spinal cord stimulation for the treatment of ischaemic pain were identified during this search.

Based on the available evidence and above information presented, it is proposed that TA159 be placed on the static list until such time that further evidence is made available.

8. Implementation

A submission from Implementation is included in Appendix 3.

According to a national audit evaluating the uptake of spinal cord stimulation treatments, the utilization rates for spinal cord stimulation have increased two-fold between 2000-1 and 2009-10, which is in-line with current NICE guidance. Since 2010, utilisation rates increased but plateaued at approximately 2150 finished consultant episodes per year.

9. Equality issues

Apart from the consideration of a person's disability when assessing pain and response to spinal cord stimulation, as reflected in 1.4 and 4.3.4 of TA159, no equality issues were raised during the scoping process, or during the course of the appraisal.

GE paper sign off: Elisabeth George, Associate Director, 25 Oct 2013

Contributors to this paper:

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Appendix 1 – explanation of options

When considering whether to review one of its Technology Appraisals NICE must select one of the options in the table below:

Options	**Consequence**	**Selected – 'Yes/No'**
A review of the guidance should be planned into the appraisal work programme.	A review of the appraisal will be planned into the NICE's work programme.	No
The decision to review the guidance should be deferred to [specify date or trial].	NICE will reconsider whether a review is necessary at the specified date.	No
A review of the guidance should be combined with a review of a related technology appraisal.	A review of the appraisal(s) will be planned into NICE's work programme as a Multiple Technology Appraisal, alongside the specified related technology.	No
A review of the guidance should be combined with a new technology appraisal that has recently been referred to NICE.	A review of the appraisal(s) will be planned into NICE's work programme as a Multiple Technology Appraisal, alongside the newly referred technology.	No
The guidance should be incorporated into an on-going clinical guideline.	The on-going guideline will include the recommendations of the technology appraisal. The technology appraisal will remain extant alongside the guideline. Normally it will also be recommended that the technology appraisal guidance is moved to the static list until such time as the clinical guideline is considered for review. This option has the effect of preserving the funding direction associated with a positive recommendation in a NICE technology appraisal.	No
The guidance should be updated in an on-going clinical guideline.	Responsibility for the updating the technology appraisal passes to the NICE Clinical Guidelines programme. Once the guideline is published the technology appraisal will be withdrawn. Note that this option does not preserve the funding direction associated with a positive recommendation in a NICE Technology Appraisal. However, if the recommendations are unchanged from the technology appraisal, the technology appraisal can be left in place (effectively the same as incorporation).	No

Options	Consequence	Selected – 'Yes/No'
The guidance should be transferred to the 'static guidance list'.	The guidance will remain in place, in its current form, unless NICE becomes aware of substantive information which would make it reconsider. Literature searches are carried out every 5 years to check whether any of the Appraisals on the static list should be flagged for review.	Yes

NICE would typically consider updating a technology appraisal in an ongoing guideline if the following criteria were met:

i. The technology falls within the scope of a clinical guideline (or public health guidance)

ii. There is no proposed change to an existing Patient Access Scheme or Flexible Pricing arrangement for the technology, or no new proposal(s) for such a scheme or arrangement

iii. There is no new evidence that is likely to lead to a significant change in the clinical and cost effectiveness of a treatment

iv. The treatment is well established and embedded in the NHS. Evidence that a treatment is not well established or embedded may include;

- Spending on a treatment for the indication which was the subject of the appraisal continues to rise
- There is evidence of unjustified variation across the country in access to a treatment
- There is plausible and verifiable information to suggest that the availability of the treatment is likely to suffer if the funding direction were removed
- The treatment is excluded from the Payment by Results tariff

v. Stakeholder opinion, expressed in response to review consultation, is broadly supportive of the proposal.

Appendix 2 – supporting information

Relevant Institute work

Published

Opioids in palliative care: safe and effective prescribing of strong opioids for pain in palliative care of adults. CG140. Published: May 2012. Review: May 2015.

Neuropathic pain: the pharmacological management of neuropathic pain in adults in non-specialist settings. CG96. Published: March 2010. Review: March 2011.

Chest pain of recent onset: assessment and diagnosis of recent onset chest pain or discomfort of suspected cardiac origin. CG95. Published: March 2010. Review: March 2013. Review decision: the guideline should be considered for an update.

Low back pain: early management of persistent non-specific low back pain. CG88. Published: May 2009. Review: May 2012. Review decision: the guideline should be updated.

Low back pain (early management) pathway. Published: January 2013.

Occipital nerve stimulation for intractable chronic migraine. IPG452. Published: April 2013.

Peripheral nerve-field stimulation for chronic low back pain. IPG451. Published: March 2013.

Percutaneous electrical nerve stimulation for refractory neuropathic pain. IPG450. Published: March 2013.

Deep brain stimulation for refractory chronic pain syndromes (excluding headache). IPG382. Published: March 2011.

Percutaneous intradiscal electrothermal therapy for low back pain. IPG319. Published: November 2009.

Laparoscopic uterine nerve ablation (LUNA) for chronic pelvic pain. IPG234. Published: October 2007.

In progress

Neuropathic pain: the pharmacological management of neuropathic pain in adults in non-specialist settings. Clinical Guideline update. Status: due for publication October 2013.

Referred - QSs and CGs

Low back pain

Pain management (young people and adults)

Suspended/terminated

None.

Details of changes to the indications of the technology

Indication considered in original appraisal	Proposed indication (for this appraisal)
3.1 Spinal cord stimulation (SCS) is a treatment for chronic pain that is usually considered after standard treatments (such as those listed in section 2.4) have failed. SCS modifies the perception of neuropathic and ischaemic pain by stimulating the dorsal column of the spinal cord. SCS is minimally invasive and reversible. A typical SCS system has four components. 3.3 Fourteen SCS devices manufactured by three companies have received European approval to market (CE marking) and are available in the UK.	**Boston Scientific** All Boston Scientific spinal cord stimulators are indicated as an aid in the management of chronic intractable pain. Boston Scientific Precision Plus Spinal Cord Stimulator received a CE Mark in 2005 and an additional CE Mark in August 2012 for peripheral nerve stimulation for patients with chronic intractable pain of the trunk December 2012 - CE mark for Precision Spectra Spinal Cord Stimulator System (a SCS system with 32 contacts and 32 dedicated power sources). Source: manufacturer's email to NICE (17 Sept 2013) **Medtronic** Since the publication of TA159, Medtronic has received CE marking for an additional spinal cord stimulation (SCS) device in addition to the six CE marked Medtronic devices listed in the original TA. The newest addition is a rechargeable IPG called RestoreSensor, which is identical to the existing RestoreUltra device with the exception of an accelerometer incorporated within the IPG that provides adaptive stimulation technology. RestoreSensor is CE marked for use in the management of chronic intractable pain of the trunk and/or limbs, peripheral vascular disease, or refractory angina pectoris. Medtronic has also now obtained CE marking for SureScan MRI SCS Systems, which has enabled MRI compatibility with the Medtronic SCS portfolio. The SureScan CE mark covers the following SCS devices: RestoreSensor, SureScan MRI, PrimeAdvanced SureScan

	MRI, RestoreAdvanced SureScan MRI, and RestoreUltra SureScan MRI, when used in conjunction with the Medtronic Vectris SureScan MRI leads. Source: manufacturer's email to NICE (13 Sept 2013) **St Jude Medical** CE Marked spinal cord stimulation systems for the licensed indications of neuropathic & vascular pain (angina & ischaemic): Genesis, Genesis G4, Genesis Dual 4 Channel IPG, Eon 16 Channel Rechargeable IPG, Eon C IPG, Eon Mini IPG Source: manufacturer's email to NICE (13 Sept 2013)

Details of new products

Device (manufacturer)	**Details (phase of development, expected launch date,)**
Senza Spinal Cord Stimulation System (Nevro)	Clinical trial ISRCTN33292457 due for completion December 2012

Registered and unpublished trials

Trial name and registration number	Details
A multicentre randomised controlled trial of Spinal Cord Stimulation plus usual care vs. usual care alone in the management of Refractory Angina: a feasibility & pilot study Refractory Angina Spinal Cord stimulation and usuAL care (RASCAL) ISRCTN65254102	Purpose: the overarching hypothesis is that spinal cord stimulation (SCS) plus usual care will have superior clinical and cost-effectiveness compared to usual care alone in Refractory Angina patients. A pilot study is first proposed to assess the feasibility of a definitive trial to address this hypothesis. The pilot study will randomise RA patients to SCS plus usual care or usual care Design: pragmatic multi-centre pilot randomised controlled trial Status: ongoing Expected completion: September 2014 (source: trial lead communication with NICE, June 2013)
Epidural spinal cord electrical stimulation frequency study: the effect of high frequency spinal cord stimulation in patients with complex regional pain syndrome using outcome parameters such as pain, global perceived effect, functional status and health-related quality of life ISRCTN36655259	Design: Multicentre double-blinded randomised controlled crossover study Start date: August 2011 Expected completion: March 2015
Randomized Controlled Double-blind Cross-over Trial Evaluating the Role of Frequencies on Spinal Cord Stimulation in the Management of Failed Back Surgery Syndrome (SCS Frequency Study) NCT01750229	Purpose: to evaluate the role of frequency settings on spinal cord stimulation Design: randomised, crossover assignment, double blind, efficacy study Start date: December 2012 Expected completion: September 2014
Senza spinal cord stimulation system for the treatment of chronic back and leg pain in failed back surgery syndrome (FBSS) patients ISRCTN33292457	Design: Single-centre double-blind three-period prospective randomised placebo controlled crossover study Completed: December 2012

Trial name and registration number	Details
Prospective, Randomized Study of Multicolumn Implantable Lead Stimulation for Predominant Low Back Pain PROMISE NCT01697358 Phase IV	Purpose: to compare the effectiveness of spinal cord stimulation (SCS) using the Medtronic Specify 5-6-5 multicolumn surgical lead plus optimal medical management (OMM) versus OMM alone in patients suffering from predominant low back pain due to failed back surgery syndrome Design: Randomized, parallel assignment, open label, efficacy study Status: recruiting Start date: January 2013 Expected completion: April 2016
Comparison of spinal cord stimulation and the clinical and quantitative sensory testing response in patients with Multiple Sclerosis pain versus patients with peripheral nerve injury pain ISRCTN36818685	Design: non-randomised interventional treatment trial Completed: June 2010
Randomized Study on SCS for the Treatment of Refractory Angina Pectoris NCT00121654 Phase IV	Purpose: randomized to one of three treatment groups: paresthesic SCS; subliminal SCS; low (non effective) stimulation (control). Design: single blind, prospective, multicenter study Start date: July 2005 Expected completion: December 2009
Effectiveness of the Precision Spinal Cord Stimulation System in Patients With Failed Back Surgery Syndrome and Axial Low Back Pain NCT00205868 Phase IV	Design: non-randomized, parallel assignment, open label, efficacy study Status: completed December 2007
Restore Claims Characterization Study NCT00200122 Phase IV	Purpose: to characterize the pain coverage capability of the RESTORE spinal cord stimulation (SCS) and assess health outcomes Design: randomized, parallel assignment, single blind, efficacy study Status: completed August 2007

Trial name and registration number	Details
Analgesic Efficacy of High Frequency Spinal Cord Stimulation: a Placebo-controlled Study NCT01400282 Phase IV	Purpose: to compare the efficacy of high frequency (HF SCS) stimulation and sham stimulation (Sham SCS - i.e. no stimulation) and conventional spinal cord stimulation (Conv SCS) on the patient reported global impression of change, pain intensity and health related quality of life Design: randomized, parallel assignment, double blind, efficacy study Expected completion: September 2012
Optimized Programming in a Multiple-Independent Current Sources Spinal Cord Stimulation (SCS) System NCT00871819 Phase IV	Purpose: to evaluate extent, location, and perception of paresthesia as a function of anode/cathode configuration. Design: double blind, single group assignment Status: Completed, September 2009, results available

Additional information

British Pain Society (2009) Spinal cord stimulation for the management of pain: recommendations for best clinical practice. A consensus document prepared on behalf of the British Pain Society in consultation with the Society of British Neurological Surgeons. Status: to be reviewed in 2013.

Healthcare Quality Improvement Partnership (2012) National pain audit final report 2010-2012.

References

Andréll P, Yu W, Gersbach P et al. (2010) **Long-term effects of spinal cord stimulation on angina symptoms and quality of life in patients with refractory angina pectoris – results from the European Angina Registry Link Study**. *Heart*, 96: 1132-1136.

Joosten EA, Pluijms WA, Slangen R et al. (2011) **Spinal cord stimulation induces pain relief in painful diabetic polyneuropathy**. *European Journal of Pain Supplements.* 5(1): 190. Conference: 7 Congress of the European Federation of Pain Chapters: Pain in Europe VII, EFIC Hamburg Germany, September 2011.

Lanza GA, Grimaldi R, Greco S et al. (2011) **Spinal cord stimulation for the treatment of refractory angina pectoris: a multicenter randomized single-blind study (the SCS-ITA trial)**. *Pain* 152(1): 45-52.

Lanza GA, Grimaldi R, Greco S et al. (2012a) **Long-term effect of spinal cord stimulation for the treatment of refractory angina pectoris results from a multicenter randomized Italian study (the SCS-ITA trial)**. *Neuromodulation.Conference: 10th World Congress of the International Neuromodulation Society, London.*

Lanza GA, Barone L, Di MA (2012b) **Effect of spinal cord stimulation in patients with refractory angina: evidence from observational studies**. Neuromodulation,15(6): 542-549.

Simpson EL, Duenas A, Holmes MW et al. (2009) **Spinal cord stimulation for chronic pain of neuropathic or ischaemic origin: systematic review and economic evaluation**. *Health Technology Assessment*, 13(17): 1-173.

Slavin KV, Vaisman J, Pollack KL et al. (2013) **Treatment of chronic, intractable pain with a conventional implantable pulse generator: a meta-analysis of 4 clinical studies**. *Clinical Journal of Pain.* 29(1): 78-85.

Taylor RS, de VJ, Buchser E et al. (2009) **Spinal cord stimulation in the treatment of refractory angina: Systematic review and meta-analysis of randomised controlled trials**. *BMC Cardiovascular Disorders. 9.*

Zipes DP, Svorkdal N, Berman D et al. (2012) **Spinal cord stimulation therapy for patients with refractory angina who are not candidates for revascularization**. *Neuromodulation* 15(6): 550-558.

Appendix 3 – Implementation submission

1. Routine healthcare activity data

1.1. Hospital Episodes Statistics data

This section presents Hospital Episode Statistics (HES) Online data between 2006/07 and 2011/12 in England on the number of finished consultant episodes for the following OPCS-4 procedure codes relating to spinal cord stimulation:

A48.3 Insertion of neurostimulation adjacent to spinal cord

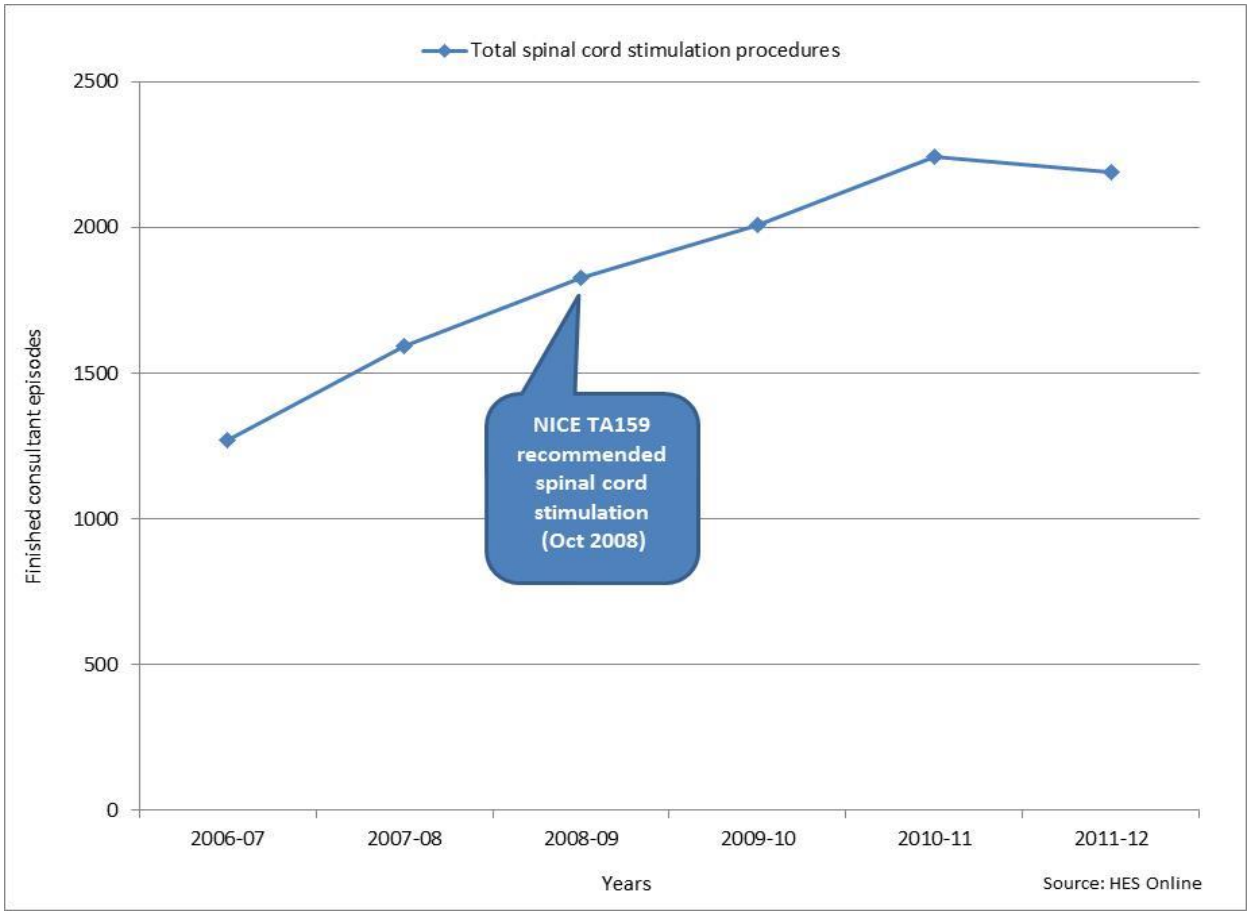
A48.4 Attention to neurostimulator adjacent to spinal cord NEC

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

Figure 1 Number of finished consultant episodes for spinal cord stimulation procedures in England



2. Implementation studies from published literature

Information is taken from the uptake database website.

2.1 Health and Social Care Information Centre (2013) NICE Technology Appraisals in the NHS in England 2012; Experimental Statistics - Innovation Scorecard

This experimental report presents data in the format of an interactive reporting spreadsheet, attempting to assess compliance with NICE TAs by NHS organisations. A total of 121 TAs are included, covering 88 medicines and 6 medical device technologies. For medicines, this Scorecard reports on the calendar year 2012 and considers medicines recommended before July 2012. The report describes data currently available and the limitations in using this data to assess compliance.

Table 2.2 of the innovation scorecard presents HES data on spinal cord stimulation by CCG area for the 2012 calendar year. The data shows that the average number of procedures across England over this time period is 4.4 per 100,000 resident population.

3. Qualitative input from the field team

The implementation field team have recorded the following feedback in relation to this guidance:

Nothing specific to add.

Healthcare activity data definitions

Hospital Episode Statistics (HES)

HES is a data warehouse containing details of all admissions, outpatient appointments and A&E attendances at NHS hospitals in England.

This data is collected during a patient's time at hospital and is submitted to allow hospitals to be paid for the care they deliver. HES data is designed to enable secondary use, that is use for non-clinical purposes, of this administrative data.

It is a records-based system that covers all NHS trusts in England, including acute hospitals, primary care trusts and mental health trusts. HES information is stored as a large collection of separate records - one for each period of care - in a secure data warehouse.