# Joint Clinical Guideline for Patients with an implanted spinal cord stimulator (SCS) or dorsal root ganglion (DRG) stimulator undergoing surgical procedures

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| **For Use in:** | Division 2, Surgical and Anaesthetics Directorates |
| **By:** | All surgical and anaesthetics staff |
| **For:** | Patients with an implanted spinal cord stimulator (SCS) or dorsal root ganglion (DRG) stimulator undergoing surgical procedures |
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| **Name of document author:** | Mike Sidery |
| **Job title of document author:** | Consultant in Anaesthesia and Pain Management |
| **Name of document author's Line Manager:** | Mike Irvine |
| **Job title of author's Line Manager:** | Clinical Director, Anaesthetics |
| **Supported by:** | Mark Sanders, Pain Management Clinical Lead Consultant in Anaesthesia and Pain Management, Dr L De Gray, Pain Management QEH Kings Lynn |
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**This is a Controlled Document**

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## 1. Definitions of Terms Used

SCS systems comprise of one or more electrodes placed in the epidural space, anywhere between the cervical spine and the sacrum. The site of the pain determines the actual position of the epidural leads. Usually a single programmable battery (like a pacemaker) is implanted in a pocket under the skin – this is known as an Implantable Pulse Generator (IPG). The site of the IPG varies. Tunnelled extension leads will connect the epidural leads to the IPG.

DRG systems place the electrode in the foramen over a targeted nerve root via the epidural space. Otherwise, components are the same.

Once in place the systems can last the lifetime of the patient. Rechargeable batteries need replacing every 10 years. The lifespan of non-rechargeable batteries is determined by patient use of the battery.

## 2. Quick reference

### Unipolar Diathermy

- contraindicated
- in emergency only, when essential, placement of the reference electrode should ensure that the epidural lead(s) and the battery are outside the field of the diathermy.

### Bladder Surgery

- use bipolar diathermy; if not available, doctors must seek advice from the Pain Management Service (x4453 office hours. Out of hours contact - on call anaesthetist via switchboard.

### Neuroaxial Anaesthetic Procedures

- contraindicated
- seek advice from Pain Management Service

### Positioning during surgery

- log roll if the implant occurred within the last three months to prevent electrode migration

### Infection Risk

- no need for prophylactic antibiotics

## 3. Objective

The aim of these guidelines is to facilitate the safe peri-operative management of patients who have a spinal cord stimulator or DRG system in situ and highlight the important implications that this might have for both anaesthetists and surgeons.

## 4. Rationale

In 2008 NICE evaluated the role of spinal cord stimulation in the management of some chronic pain conditions. The evidence strongly supported their use in patients with certain neuropathic pain states and the number of patients with spinal cord stimulator systems or DRG stimulators in situ is growing. This has implications for the delivery of surgical and anaesthetic services.

The primary indication for insertion of a spinal cord stimulator is neuropathic pain. Intractable angina has a good evidence base and is a common indication. Non-pain indications include overactive bladder and faecal and urinary incontinence. Patients with systems implanted for the non-pain indications are still rare.

In practice, patients with persistent post-surgical or traumatic neuropathic pain (and that would include "failed back surgery syndrome") and complex regional pain syndrome will represent the majority of those who present for surgery.

## 5. Scope

This guideline provides the information needed to minimise the likelihood of harm to either the patient or the implanted system from the use of diathermy or neuroaxial anaesthetic techniques.

## 6. Implications for surgeons:

### Diathermy

The use of uni- or mono diathermy is contraindicated. The epidural leads can, in theory, act as the reference electrode and their small surface area increases the risk of heating. There is also the risk of heating and damage to the implanted battery.

However, both elective and emergency situations might arise where the use of unipolar diathermy would be in the patient's best interest. The risks and benefits should, if at all possible, be discussed with the patient. It is strongly advised that advice is sought from the Pain Management Service in these circumstances.

The use of unipolar diathermy has been documented in emergencies (Reference 3). Ensuring that the return electrode is anatomically positioned so that the current vector pathway between the diathermy electrode and return electrode is away from the battery and epidural leads (References 1 + 2). The device should be turned off in the event of use of any diathermy.

### Bladder Surgery

Diathermy in the bladder represents a particular challenge: unipolar diathermy is the default technique; the lumbar epidural space is the commonest position for SCS/DRG electrodes and the iliac fossa or upper buttock are the most common positions for the IPG.

Bipolar diathermy equipment for bladder surgery is currently not available at the Norfolk and Norwich University Hospital and, should a case arise that necessitates the use of diathermy in the

bladder in a patient with a spinal cord stimulator or DRG system in situ, the doctors involved must contact the Pain Management Service for advice.

### Infection

There is no evidence to support the use of prophylactic antibiotics to prevent a bacteraemia that might interfere with the implanted system.

## 7. Implications for Anaesthetists:

### Neuroaxial techniques

A spinal cord stimulator system in situ is a relative contraindication for any neuroaxial procedure (caudal, single shot spinal or epidural). Concerns include damage to the electrodes and introduction of infection. An infected spinal cord stimulator system must be removed in its entirety. The presence of a spinal cord stimulator system is unlikely to impact the efficacy of the neuroaxial technique itself.

In extreme circumstances a single shot spinal anaesthetic could be considered. In which case:

- Seek advice from the Pain Management Service.
- Strict aseptic technique must be adhered to.
- Up-to-date imaging of the position of the battery, extension leads, and the electrodes must be obtained.
- Specific consent must be obtained for the procedure, including the risk of inadvertent damage to the system and infection.
- Patients with a spinal cord stimulator system for management of post spinal surgery leg pain will probably have had surgery below the level of the epidural electrodes, further limiting the site for safe spinal injection.

### Positioning

If a spinal cord stimulator system has been in situ for more than three months, then no particular attention to patient position is necessary. If the system has been in place within the last three months, logrolling of a patient on and off the theatre table is advised to prevent epidural electrode migration.

Advice need not necessarily be sought from the Pain Management Service if a patient presents for elective or emergency surgery with a spinal cord stimulator system in situ. These guidelines should address the important issues that arise.

However, if there are any doubts or concerns, it is the responsibility of the doctor caring for that patient to contact the Pain Management Service and seek advice.

Patients presenting for radiological investigations with a spinal cord stimulator system in situ should be treated according to the local radiology guidelines.

All companies now produce MRI compatible systems, but not all implanted systems will be. They might be old or for technical reasons (the need for extension leads, for example) the system might not be MRI compatible. In the context of a non - compatible system being exposed to MRI there is

the risk of the epidural electrode heating and /or implanted battery damage if a patient enters an MRI scanner.

In emergency situations spinal cord stimulator systems have been removed in situations where life-saving MR images have been required. This should be discussed with the spinal cord stimulator team through the contacts referred to in this document.

## 8. Monitoring compliance:

Incidents of delay of surgery, harm or potential harm will be recorded and used to modify these guidelines in an attempt to prevent future incidents. A Datix form must be completed for each incident in a timely manner.

Incidents will be discussed at relevant governance meetings to review the circumstances surrounding the incident and recommendations made for further action.

## 9. Summary of development and consultation process undertaken before registration and dissemination

The author has reviewed this document.

This version has been endorsed by Clinical Guidelines Assessment Panel Committee.

## 10. References

1. British Pain Society 2009. Spinal cord stimulation for the management of pain: recommendations for best clinical practice.

2. Raphael JH, Mutagi HS and Kapur S. 2009. Spinal cord stimulation and its anaesthetic implications. *Continuing Education in Anaesthesia, Critical Care & Pain.* 9 (3): 78-81

*3. Ghaly et al. 2016. Do we need to establish guidelines for patients with neuromodulation implantable devices, including spinal cord stimulators undergoing nonspinal surgeries? Surg Neurol Int. 7: 18.*