



**Clinical Commissioning Policy:
Sacral Nerve Stimulation for
Overactive Bladder**

Reference: NHS England XXX/X/X

Clinical Commissioning Policy: Sacral Nerve Stimulation for Overactive Bladder

Prepared by NHS England Clinical Reference Group for Complex Gynaecology

First published Month Year

Published by NHS England, in electronic format only.

DRAFT FOR PUBLIC CONSULTATION

Contents

Policy Statement	4
Equality Statement	4
Plain Language Summary	4
1. Introduction	5
2. Definitions	6
3. Aim and objectives	7
4. Epidemiology and needs assessment.....	7
5. Evidence base.....	7
6. Rationale behind the policy statement.....	10
7. Criteria for commissioning	11
8. Patient pathway	12
9. Governance arrangements.....	12
10. Mechanism for funding	12
11. Audit requirements	13
12. Documents which have informed this policy.....	13
13. Links to other policies.....	14
14. Date of review	14

DRAFT FOR PUBLIC CONSULTATION

Policy Statement

NHS England will routinely commission in accordance with the criteria outlined in this document.

In creating this policy NHS England has reviewed this clinical condition and the options for its treatment. It has considered the place of this treatment in current clinical practice, whether scientific research has shown the treatment to be of benefit to patients, (including how any benefit is balanced against possible risks) and whether its use represents the best use of NHS resources.

This policy document outlines the arrangements for funding of this treatment for the population in England.

Equality Statement

Throughout the production of this document, due regard has been given to eliminate discrimination, harassment and victimisation, to advance equality of opportunity, and to foster good relations between people who share a relevant protected characteristic (as cited in under the Equality Act 2010) and those who do not share it.

Plain Language Summary

An overactive bladder is one that tries to empty itself even when it is not full. The urge to go to the toilet is present but the bladder may contain only a small amount of urine or may leak small amounts of urine without the person being able to control it.

Physically and socially this can cause problems for people in their daily lives. Doctors use a variety of treatments to be able to control this condition. These include medication, injections into the muscle involved in emptying the bladder and bladder retraining. Generally these methods are successful for most people.

For those rare people where none of these treatments work there is another treatment called **Sacral Nerve Stimulation** therapy. This places small electrodes into the back, (just under the skin) where the bladder nerves are. Mild electrical impulses then stimulate the nerves to reduce the frequent signals to empty the bladder. The electrodes are attached to a small device that can be inserted under the skin if required permanently. The implant can be taken out at any time if the physician or person with the implant supports removal.

This policy document has been written so that people receiving this treatment will have an understanding of:

- What the treatment is
- Who would benefit
- When clinically it should take place
- The evidence and effectiveness information to support its use
- The cost to NHS England of the treatment

1. Introduction

Overactive bladder is defined by the International Continence Society as a syndrome referring to the urinary symptoms of urgency with or without urge urinary incontinence, and is a debilitating disorder affecting 12-14% of the population¹⁻⁴. Detrusor over activity is the urodynamic diagnosis most commonly responsible for the symptoms of OAB.

Although rarely life-threatening, these disorders can have a considerable negative impact on patients' quality of life, restricting their ability to work and function socially. The management of these disorders poses a significant health care burden as the disorders are rarely cured and severity increases progressively with age. The resulting consequences such as urinary tract infections, falls and fractures, and hospitalisations also impose additional costs¹⁻⁴. Incontinence can delay hospital discharge in the older patient or those with a disability. It is often responsible for an increasing level of dependency, i.e. independence to residential home, or residential home to nursing home. It is also a major factor prompting hospital admission in the care of elderly patients.

The provision of integrated continence services is a standard described in the National Service Framework for Older People.⁵ The Good Practice in Continence Services⁶ and the National Service Framework for Older People have called for integrated continence services to be established for people with incontinence. Yet in 2005 and 2006 the National Audit of Continence Care for Older People, sponsored by the Healthcare Commission, reported there has been little progress in the pursuit of truly integrated continence services as envisaged. The National Audit of Continence Care 2009 commissioned by the Healthcare Quality Improvement Partnership provides the largest, most detailed evaluation of continence care in Europe. It demonstrates that, although the amount of authoritative guidance is increasing, the quality of continence care remains variable and in some respects remains poor.⁷ This is a cause for concern because continued inadequate assessment of incontinence does not indicate high-quality care. Moreover, it is expensive from a financial and a health perspective. Given the great daily cost of containing continence, the audit highlights the importance of assessing, treating and reducing the numbers of incontinent people and the wider associated financial costs.

The current management of OAB involves several levels of treatment. Symptoms are typically managed conservatively by means of behavioural techniques (e.g. bladder training) physical therapies (e.g. electrical stimulation using vaginal or anal electrodes) or pharmacotherapy (anti-muscarinics, Beta-3 agonists). When these approaches are unsuccessful, more invasive procedures such as Botulinum toxin 'A' intra-vesical injections are used. Percutaneous posterior tibial nerve stimulation should be offered only if the woman does not want botulinum toxin 'A' or sacral nerve stimulation (NICE 2013 Guideline 171). Irreversible surgical procedures include bladder reconstruction (for example, augmentation cystoplasty) and urinary diversion. However, these procedures have associated complications and management requirements such as revisions, ureteric stenosis and hydro-nephrosis.

Sacral nerve stimulation (SNS) is a minimally invasive treatment which uses mild electrical impulses to stimulate sacral nerves. It is proposed as a potential treatment for the symptoms of overactive bladder including urge urinary incontinence and urgency-frequency alone or in combination, in patients who have failed or cannot tolerate

conservative treatments.

The National Institute for Health and Clinical Excellence (NICE) has published a number of documents related to SNS (www.nice.org.uk)

1. NICE Interventional Procedure Guidance on sacral nerve stimulation for urge incontinence and urgency-frequency (IPG64) – normal arrangements.
2. NICE Clinical Guideline on Urinary Incontinence in Women (CG171): Recommends sacral nerve stimulation for the treatment of OAB due to detrusor over activity in women who have not responded to conservative management including drugs, who either:
 - a. Are unable to perform clean intermittent catheterisation, or
 - b. Who have not responded to botulinum toxin A treatment
3. NICE Clinical Guideline on Lower Urinary Tract Syndrome in Men (CG97): Recommends sacral nerve stimulation to manage detrusor over activity only to men whose symptoms have not responded to conservative management and drug treatments.

**A recent NICE HTA appraisal has also confirmed that Mirabegron, a beta 3 agonist, would be positioned within a complex treatment pathway and potentially offered an additional pharmacological treatment before invasive treatment options were considered.

2. Definitions

Urge urinary incontinence is one of the most commonly encountered forms of urinary incontinence. It may be defined as the involuntary leakage of urine accompanied by, or immediately preceded by, a sudden desire to void.

Urgency-frequency syndrome is a form of voiding dysfunction characterised by an uncontrolled urge to void, resulting in frequent, small amounts of urine voided many more times than is normally expected (as often as every 15 minutes).

Overactive bladder is defined by the International Continence Society as a syndrome referring to the urinary symptoms of urgency with or without urge urinary incontinence, and is a debilitating disorder affecting 12-14% of the population. It is usually associated with frequency and nocturia in the absence of infection or other obvious pathology.^{2-4,8}

Sacral Nerve Stimulation therapy involves the use of mild electrical pulses to stimulate the sacral nerves located in the lower back. Electrodes are placed next to a sacral nerve, usually S3, by inserting the electrode leads into the corresponding foramen of the sacrum. Adequate electrode placement is confirmed by obtaining appropriate motor and sensory responses. The electrodes are inserted subcutaneously and are subsequently attached to an implantable pulse generator. The procedure is reversible. Testing can also be performed using a tined lead which is particularly useful in patients with repeated temporary lead dislocation.

Prior to 'permanent' implantation responsiveness is tested using a temporary stimulator.

Permanent implantation of the device is determined on the basis of results of test stimulation. A patient qualifies for permanent implant if they report at least 50%

improvement during the test phase in symptoms recorded in the bladder diaries. This offers SNS a unique advantage over other surgical options, as the patient outcomes can be assessed before a commitment is made to the permanent procedure.

The permanent implant of the SNS system is minimally invasive, and it provides sustainable symptom relief in carefully-selected patients thereby avoiding repeated treatment with botulinum toxin A, or irreversible surgery. In patients who have failed treatment with SNS or where removal of the device is necessary, the treatment is fully reversible, simply involving an explant of the implanted components. Unlike some alternative treatments, SNS does not preclude further treatment options nor does it pose a delay or waiting period before which further treatment can be prescribed. The battery usually needs to be replaced every 5 to 7 years but may need to have it done sooner if there any complications.

3. Aim and objectives

This policy aims to:

- Outline the clinical criteria which will identify the patients most likely to benefit from SNS for overactive bladder.

The objectives are to:

- Clarify how the evidence and its quality determines the clinical commissioning position for SNS in the treatment of bladder dysfunction and
- Set out the minimum requirements for the service

4. Epidemiology and needs assessment

The estimated prevalence of OAB is around 10-12% of the adult female population.¹² Further, the prevalence of urinary incontinence in men aged 18 - 64 years is 3%; and over 65 year is 8.5%, with 28.5% of this total comprising men with clinical significant urinary incontinence and most likely to seek treatment (NICE costing template for 'management of lower urinary tract syndrome in men').

The prevalence of urinary incontinence (UI) and OAB increases with age, and some populations, such as those with a higher number of nursing homes, may have a greater prevalence of urinary incontinence than the population as a whole¹⁰. However, most people with UI and OAB do not report symptoms to their GP¹¹.

Available data from NICE suggest that the standard benchmark rate for a referral into a urinary continence service for women is 0.80%, or 800 per 100,000, of the adult female population (aged 15 years or older) per year. Approximately 25-40% of OAB related cases are refractory to conservative treatment and drug therapy¹² Patients will require second-line therapy. This does require the patient to have had access to appropriate and continued support for proper behavioural therapy support whilst undergoing a trial of pharmacotherapy.

5. Evidence base

Clinical Efficacy

A systematic review of the efficacy and safety of sacral nerve stimulation for urinary urge incontinence and urgency frequency urge urinary incontinence commissioned by

NICE was identified.¹³ The review concludes that the results from randomised control trials (RCT) included in the review provide evidence of some benefit from SNS in reducing incontinence episodes, pad usage, and frequency of voids, and in improving bladder capacity and voided volume. Benefits of SNS were reported to persist at follow-up three to five years after implantation of the pulse generator. Although the few data sources available suggest improvement, the impact of SNS on quality of life of patients with urge incontinence or urgency-frequency is still to be established.

The efficacy results of the RCTs included in the review are presented for each outcome measure according to the clinical indications for SNS, a) urge urinary incontinence; b) urgency-frequency; or c) a combination of these two conditions.

Urge urinary incontinence

Two RCTs reported findings on cure and improvement rates at the six months follow-up in patients with urge incontinence randomised to a stimulation (n= 16 and 34) or a delayed group (n=22 and n=42).^{14,15} The trials showed that complete continence (completely dry with no incontinent episodes) or improvement of more than 50% in incontinence symptoms was observed in 50% and 80% of patients, respectively, following the procedure.

In the stimulation group of the two trials, the number of leakage episodes per day, severity of leakage, and number of pads used per day were significantly lower six months after implantation compared with baseline- See Appendix 1.

The two randomised controlled trials used the SF-36 short-form Health Survey to assess the impact of SNS on patients' quality of life. Weil et al¹⁵ found a significant difference in only the emotional role score (See Appendix 2). They also reported that, for the stimulation group at six months, the physical functioning score (67; 95% CI, 55-78) and the overall score for the physical component of the scale (42; 95% CI, 37-57) were significantly higher (p=0.034 and p=0.019 respectively) than the corresponding baseline values (52; 95% CI, 41-64 and 36; 95% CI, 30-41) (See Appendix 2). Schmidt et al¹⁴ observed a significant between-group difference six months after implantation in the physical health component of the questionnaire (p=0.0008) but no significant difference between the treatment groups in the mental health component (See Appendix 2).

Urgency-frequency symptoms

One RCT (n=50) was identified reporting findings at the six months follow-up in patients with urgency frequency randomised to a stimulation (n=25) or a delayed group (n=25).¹⁶ In the trial a 50% improvement in number of voids was observed in 56% of the patients in the stimulation group and 4% of the patients in the delay group at six months.

The trial also reported a significant decrease in the frequency of voids (from 16.9 to 9.3, p<0.0001) and degree of urgency (from 2.2 to 1.6, p=0.01) at six months compared to baseline in the stimulation group. Mean volume voided (from 118ml to 226 ml, p<0.001) and mean bladder capacity (from 234ml to 325ml, p=0.008) were also significantly higher compared with baseline values. In contrast, none of these parameters changed significantly in the delay group- (See Appendix 2).

Hassouna et al¹⁶ used the SF-36 Health Survey to assess the physical and mental health in 23 stimulation and 20 delay group patients at six months (See Appendix 2). Significantly higher scores were observed in the stimulation group for all the subscales of SF-36 with the exception of the emotional role score.

Combination of both urge urinary incontinence and urgency-frequency symptoms

One RCT was identified which compared the efficacy of a 2-stage implant with a 1-stage

implant procedure in 22 patients with overactive bladder symptoms (urge incontinence and urgency-frequency). No significant differences were observed in main clinical symptoms and quality of life between the two procedures.¹⁵

Safety

A systematic review of the efficacy and safety of sacral nerve stimulation for urinary urge incontinence and urgency frequency urge urinary incontinence commissioned by NICE was identified.¹⁷ Adverse events were documented amongst a total of 1015 patients in 27 studies included in the review.

- Among 860 patients 283 (33%) underwent surgical revision of the SNS implant. The most common reasons for reoperation were relocation of the neurostimulator because of pain at the implant site; revision of the lead system for suspected or detected lead migration; and infection.
- Pain was reported in 162 out of 663 tested patients (24%) and included pain at the generator site, pain at lead site, stimulation related pain, and new pain.
- Lead related complications were observed in 130 out of 807 (16%) patients and were mainly lead migration, lead breakage, loosened connection between extension lead and electrode, and electrode insulation defects.
- Forty-two out of 279 patients (15%) required replacement or relocation of the pulse generator mainly because of pain at the implant site, upgrade or reprogramming of an early pulse generator (Itrel I), battery failure, infection, or technical failure.
- Overall, wound problems (e.g. seroma, haematoma, partial wound dehiscence) occurred in 20 out of 283 tested patients (7%).
- Modifications of bowel function or adverse bowel function were documented in 20 out of 353 implanted patients (6%).
- Infection was reported in 35 out of 739 of patients (5%)
- Problems related to the implanted pulse generator (e.g. battery exhaustion) occurred in 5% of the patients who received SNS.
- No major neurological complications were documented apart from a suspected case of nerve injury and a case of generalised fasciculation whose aetiology could not be established.

Cost Effectiveness

In an economic model comparing SNS with botulinum toxin 'A' over a five-year period

with a societal perspective, Leong et al.¹⁸ reported a greater gain in quality adjusted life years (QALY) and a greater associated cost when SNS was performed prior to botulinum toxin 'A' treatment. As the QALY gain from botulinum toxin 'A' injection was less due to the repeated loss of effect with reinjections over time, SNS was demonstrated to become cost-effective after five years compared with botulinum toxin A, with an incremental cost-effectiveness ratio of 27,991 Euros, which is within the accepted NICE threshold of £20,000 to £30,000.

A 10-year Markov model from the Spanish healthcare system perspective also compared SNS with botulinum toxin 'A', in addition to optimal medical therapy.¹⁹ Similarly, these authors found that although the initial costs of SNS were higher than those of alternative treatments, reduced follow-up costs over the long-term in combination with sustained clinical effectiveness made SNS the dominant option over 10 years compared with the alternatives.

In the recently updated NICE Clinical Guideline for Urinary Incontinence in Women (CG 171), the health economic model used in the recommendations showed that SNS had a lower probability of being cost effective than botulinum toxin 'A' at a £20,000 per QALY threshold. Therefore the NICE recommendations state that "botulinum toxin 'A' should be offered first to women who are able to catheterize. For women who are unable to catheterize, SNS was a cost-effective option compared with no treatment."

Guidelines

SNS is recommended in European and International guidelines:

- International Consultation on Incontinence (ICI) Guidelines: Recommends neuromodulation as part of the specialised management of patients with mixed incontinence and urge incontinence due to detrusor over activity if initial therapy fails.
- European Association of Urologists (EAU) Guidelines: Recommend neuro-stimulation as a specialised treatment to be used after failure of initial therapy in women with bladder hypersensitivity and overactive bladder. Recommend neuro-stimulation in men for the same conditions, with the exception of bladder hypersensitivity.
- American Urology Association (AUA) Guidelines: FDA-Approved: Clinicians may offer SNS as third line treatment in a carefully selected patient population characterised by severe refractory OAB symptoms or patients who are not candidates for second-line therapy and are willing to undergo a surgical procedure. (Recommendation; Evidence strength – Grade C; Benefits outweigh risks/burdens).

6. Rationale behind the policy statement

In creating this policy the NHS England has reviewed this clinical condition and the options for its treatment. It has considered the place of this treatment in current clinical practice, whether scientific research has shown the treatment to be of benefit to patients, (including how any benefit is balanced against possible risks) and whether its use represents the best use of NHS resources.

7. Criteria for commissioning

SNS treatment **will routinely be commissioned** by NHS England for adult patients with urinary urge incontinence, urinary urgency-frequency syndrome or double incontinence (urinary and faecal) who meet the following criteria:

1. A confirmed diagnosis defined by a quality controlled² conventional urodynamic assessment or ambulatory urodynamics when indicated. If the urodynamic diagnosis is inconclusive, a decision for further management including SNS must be made at the regional MDT.
2. Symptoms which are refractory to behavioural and lifestyle modification, pelvic floor exercises and pharmacological therapy; at least two anticholinergics followed by a B3 agonist (NICE TA; <http://guidance.nice.org.uk/TA290>)
3. Offered intra-vaginal oestrogens for the treatment of symptoms of OAB in postmenopausal women with symptoms of vaginal atrophy
4. Whose OAB symptoms have not responded to conservative management including drugs, in accordance with NICE CG 171:
 - a. The patient is unable to perform clean intermittent catheterization, OR,
 - b. Their symptoms have not responded to botulinum toxin A treatment.
5. Referred to a specialist surgeon at a centre experienced in providing SNS and after MDT review has discussed:
 - a. The surgical and non-surgical options appropriate for their individual circumstances
 - b. The benefits and limitations of each option, with particular attention to long- term results.
 - c. Realistic expectations of the effectiveness of SNS including the risk of failure, the long term commitment, the risk of complications requiring reoperation and device removal and possible adverse effects.
6. Does not have a physical or mental disability which prevents a safe level of cooperation with the technical demands of the procedure. (Formal evaluation should be performed if necessary).
7. Does not have a known condition likely to necessitate future MRI scanning (as MRI contraindicated after SNS treatment, except MRI of head)
8. Is able to operate the neuro-stimulator

SNS **will not** be routinely commissioned for patients:

1. With stress incontinence, the most common type of urinary dysfunction, urinary retention due to obstruction (e.g. from cancer, or urethral stricture)
2. With non-obstructive urinary retention (SNS for women who failed or could not tolerate the first-line treatments needs approval from local Clinical Commissioning Groups.
3. Who have failed to demonstrate a positive response to the peripheral nerve evaluation test (If patient shows 50% or less reduction in the main symptom

they are deemed ineligible for the permanent device)

4. Who are unable to operate the neuro-stimulator

Contraindications to SNS:

1. Pregnancy
2. Progressive neurological conditions, spina bifida and congenital sacral abnormalities

Cautions:

- Women undertaking horse riding and keen cyclists as the leads may break or migrate
- Cardiac pacemaker
- Only bipolar diathermy in patients undergoing pelvic and abdominal surgery
- Lithotripsy
- Radiotherapy over the device

8. Patient pathway

Patients will have undergone assessment and management of their symptoms in primary care without success before referral to secondary and tertiary services.

Initial treatment should be as per current NICE guidance.

Patient with refractory symptoms should be referred to a specialised unit for assessment. This assessment should include multichannel urodynamic testing followed by discussion of clinical and urodynamic findings at an incontinence MDT.

Patients should be counselled fully about the benefits and limitations of all available treatments, including conservative management, Botulinum toxin, SNS and surgical treatment.

9. Governance arrangements

The procedure should only be performed in specialist units by clinicians with a particular interest in the assessment and treatment of OAB, and expertise in this intervention with appropriate facilities and support (e.g. Medical Physics). The physician performing the implant must be trained in the use of the SNS device

The team needs at least two clinicians who can do the procedures and deal with complications, and at least one specialist nurse to provide patient support and undertake patient instruction, programming and long term follow up. There should be access to expertise of a neurologist and neurosurgeon.

Centres that provide SNS for faecal incontinence may have shared expertise and facilities.

10. Mechanism for funding

SNS for bladder indications will be commissioned directly by NHS England as per NHS England Commissioning Policy. The trial period of sacral nerve stimulation may be with either peripheral nerve stimulation or a temporarily implanted lead with

stage one of the tined lead procedure

Cost estimates for NHS England

Temporary Stimulation:

Test stimulation lead kit: £210

OPCS procedure code A48.7 - Insertion of neuro-stimulator electrodes into the spinal cord

HRG AA21B (National price 2014-15): £708 plus 10% for MFF = £779

Total: **£989**

Permanent implantation:

Permanent SNS implant – device and procedure costs

Interstim II implantable neuro-stimulator: £5,700

Tined lead kit: £1,350

Introducer kit: £200

Patient programmer: £500

OPCS procedure code A70.1 - Implantation of neuro-stimulator into peripheral nerve

HRG AB07Z (National price 2014-15): £2,435 plus 10% for MFF = £2,679

Total: **£10,429**

Battery replacement (every 5-7years)

£5,700 for neurostimulator + £2,679 national price

Total: **£8,379**

Assuming an annual demand of 25 patients, the costs of nerve stimulation could potentially comprise both temporary and subsequently permanent implantation, at a total cost per patient of **£11,418**. Therefore the total annual cost is expected to be **£286,000** per annum.

After 5-7 years, battery replacement costs will begin at **£8,379** per patient as above. This will create a further annual cost of **£210,000** per annum, as existing patients' batteries begin to need replacement.

The occurrence and costs of potential complications are outlined in the NHS England specification A08/s/b

11. Audit requirements

Performance management of this commissioning policy should be based on the NICE CG 171 audit criteria. This policy is subject to prior approval. Use of a national database (such as that of the British Society of Urogynaecology)

12. Documents which have informed this policy

NICE Clinical Guideline on Urinary Incontinence in Women (CG171)

NICE Clinical Guideline on Lower Urinary Tract Syndrome in Men (CG97)

13. Links to other policies

- This policy follows the principles set out in the ethical framework that govern the commissioning of NHS healthcare and those policies dealing with the approach to experimental treatments and processes for the management of individual funding requests (IFR).
- Clinical commissioning policy for Sacral nerve stimulation for faecal incontinence (www.nhs.uk)

14. Date of review

This policy will be reviewed in April 2016 unless information is received which indicates that the proposed review date should be brought forward or delayed.

References:

1. Ouslander J. Management of overactive bladder. N Engl J Med. 2004 Feb 19;350(8):786-99
2. Abrams P, et al. The standardisation of terminology in lower urinary tract function: report from the standardisation sub-committee of the International Continence Society. Neurol Urodyn, 2002. 21(2) p167-78.
3. Wein A, Raymond R. Overactive Bladder: A better understanding of pathophysiology, diagnosis, and management. Journal. J Urol. 2006 Mar;175(3pt2):S5-S10
4. Koebl H, Igawa Ty, Salvatore S, Laterza RM, Lowry A, Sievert K-D, Sultan AH. Pathophysiology of urinary incontinence, fecal incontinence and pelvic organ prolapse. In Abrams P, Cardozo L, Khoury, Wein A (eds). Incontinence 5th ed. Plymouth: Health Publication Ltd 2013:261-360
5. National Framework for Older People. Department of Health 2001. www.gov.uk/dh
6. Good practice in incontinence services. Department of Health 2000. www.gov.uk
7. National Audit of Continence Care, 2010. www.RCPLondon.ac.uk
8. Garnet S, Abrams P. The natural history of the overactive bladder and detrusor overactivity. A review of the evidence regarding the long-term outcome of the overactive bladder. J Urol. 2003 Mar;169(3):843-8.
9. Irwin DE, Milsom I et al. Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. Eur Urol. 2006 Dec;50(6):1306-14; discussion 1314-5. Epub 2006 Oct 2
10. Durrant J, Snape J. Urinary incontinence in nursing homes for older people. Age and Ageing 2008; 32:12-8
11. Shaw C, Das Gupta RD, Bushnell DM. The extent and severity of urinary incontinence amongst women in UK GP waiting rooms. Family Practice, 2006; 25:497-506.
12. Wein AJ. Diagnosis and treatment of the overactive bladder. Urology. 2003 Nov;62(5 Suppl 2):20-7

13. Brazzelli M, Murray A et al. Efficacy and safety of sacral nerve stimulation for urinary urge incontinence: a systematic review. *J Urol*. 2006 Mar;175(3):835-841
14. Schmidt RA, Jonas U et al. Sacral nerve stimulation for treatment of refractory urinary urge incontinence. Sacral Nerve Stimulation Study Group. *J Urol*. 1999 Aug;162(2):352-7
15. Weil EH, Ruiz-Cerda JL et al. Sacral root neuromodulation in the treatment of refractory urinary urge incontinence: a prospective randomized clinical trial. *Eur Urol*. 2000 Feb;37(2):161-71
16. Hassouna M, Siegel S et al. Sacral neuromodulation in the treatment of urgency-frequency symptoms: a multicenter study on efficacy and safety. *J Urol*. 2000 Jun;163(6):1849-54
17. Brazzelli M, Murray A, Fraser C, Grant A. Systematic review of the efficacy and safety of sacral nerve stimulation for urinary urge incontinence and urgency-frequency. Aberdeen: Review Body for Interventional Procedures; 2003. Commissioned by the National Institute for Clinical Excellence. Available at <http://www.nice.org.uk/nicemedia/live/11063/30825/30825.pdf>. Accessed 16th May 2014
18. Leong et al. Cost-effectiveness analysis of sacral neuromodulation and botulinum toxin A for patients with idiopathic overactive bladder. *BJU Int*. 2010; 108:558-564.
19. Arlandis et al. Cost-effectiveness of sacral neuromodulation compared to botulinum neurotoxin A or continued medical management in refractory overactive bladder. *Value in Health*, 2011; 14:219-228

Appendix 1- Leakage episodes, pad usage, severity of leakage, and bladder capacity in urge incontinent patients in randomised controlled trials

Study	Stimulation group				Delay group			
	n	Baseline	6 months	p value	n	Baseline	6 months	p value
Mean leakage episodes per day (SD)								
Weil 2000	21	13.5 (7.5)	1.4 (3.3)	<0.0005	22	13.5 (7.8)	11.2 (5.6)	n.s.
Schmidt 1999	34	9.7 (6.3)	2.6 (5.1)	<0.0001	42	9.3 (4.8)	11.3 (5.9)	0.002
Mean pad use per day (SD)								
Weil 2000	21	8.7 (6.8)	0.7 (1.3)	<0.0005	22	8.7 (7.1)	6.8 (4.0)	n.s.
Schmidt 1999	34	6.2 (5.0)	1.1 (2.0)	<0.0001	42	5.0 (3.7)	6.3 (3.6)	0.003
Mean severity of leakage (SD)								
Weil 2000	21	2.1 (0.6)	1.6 (1.7)	0.047	22	2.1 (0.6)	2.1 (0.6)	n.s.
Schmidt 1999	34	2.0 (0.7)	0.8 (0.9)	<0.0001	42	1.8 (0.6)	2.0 (0.6)	0.006
Mean bladder capacity (ml) (SD)								
Weil 2000	21	266 (112)	370 (91)	0.013	23	NR	NR	-

Severity of leakage was assessed on a 0-3 scale (0 dry, 1 loss of a few drops of urine, 2 loss of 1-2 tablespoons of urine, 3 complete wetting/soaked pad or outer clothing).
n.s. not significant
NR not reported

Appendix 2- Quality of life results at six months follow-up in randomised controlled trials

Study		n	SF-36 mean score (SD)							
			Physical Health			Mental Health				
			Physical functioning	Physical role	Bodily pain	General health	Vitality	Social functioning	Emotional role	Mental health
<i>Urge incontinent patients</i>										
Weil 2000	Implant	16	67 (25)	60 (28)	59 (25)	62 (23)	59 (23)	54 (9)	90 (15)	69 (24)
	Control	23	51 (28)	59 (23)	55 (23)	56 (22)	56 (25)	55 (13)	77 (23)	67 (23)
	p value		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.037	n.s.
Schmidt 1999	Implant	28		46					47	
	Control	32		36					45	
	p value			0.0008					n.s.	
<i>Urgency-frequency patients</i>										
Hassouna 2000	Implant	23	77	51	60	61	55	77	62	71
	Control	20	48	30	64	46	36	43	48	62
	p value		<0.0001	0.01	0.01	0.003	0.01	0.002	0.17	0.01

n.s. not significant

Appendix 3- Frequency of voiding, degree of urgency, volume per void, and bladder capacity in urgency-frequency patients in randomised controlled trials

Study id	Stimulation group			p value	Delay group			
	n	Baseline	6 months		n	Baseline	6 months	p value
Mean frequency of voiding per day (SD)								
Hassouna 2000	25	16.9 (9.7)	9.3 (5.1)	<0.0001	26	15.2 (6.6)	15.7 (7.6)	n.s.
Mean degree of urgency (0 none, 1 mild, 2 moderate, 3 severe) (SD)								
Hassouna 2000	25	2.2 (0.6)	1.6 (0.9)	0.01	25	2.4 (0.5)	2.3 (0.5)	n.s.
Mean voided volume per void (ml) (SD)								
Hassouna 2000	25	118 (74)	226 (124)	<0.001	26	124 (66)	123 (75)	n.s.
Mean bladder capacity (ml) (SD)								
Hassouna 2000	23	234 (128)	325 (185)	0.008	25	253 (93)	227 (104)	n.s.

n.s. not significant

DRAFT FOR PUBLIC CONSULTATION