

Guidelines on Urinary Incontinence

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TABLE OF CONTENTS

PAGE

1.	INTRODUCTION	4
1.1	References	5
2.	EPIDEMIOLOGY	5
2.1	Introduction	5
2.2	Risk factors in women	5
2.2.1.	Risk factors in pelvic organ prolapse (POP)	5
2.3	Risk factors in men	5
2.4	Overactive bladder (OAB)	6
2.5	Disease progression	6
2.5.1	Longitudinal studies	6
2.5.2	Genetic epidemiology	6
2.5.3	Twin studies	6
2.5.4	Worldwide estimates of current and future LUTS including urinary incontinence (UI) and OAB in individuals > 20 yrs	6
2.5.5	Conclusions	6
2.6	References	6
3.	PHARMACOTHERAPY	7
3.1	Introduction	7
3.2	Drugs used in the treatment of OAB/detrusor overactivity (DO)	7
3.3	Drugs used in the treatment of stress urinary incontinence (SIU)	8
3.4	Drugs used for the treatment of 'overflow incontinence'	9
3.5	Hormonal treatment of UI	9
3.5.1	Oestrogen	9
3.5.2	Other steroid hormones/receptor ligands	9
3.5.3	Desmopressin	9
3.6	References	10
4.	INCONTINENCE IN MEN	11
4.1	Initial assessment	11
4.2	Initial treatment	11
4.2.1	General management	11
4.2.2	Post-radical prostatectomy (RP) incontinence	12
4.2.3	Conclusions	12
4.3	Specialised management	13
4.3.1	Assessment	13
4.3.2	Interventions	13
4.3.3	Sphincter incompetence	13
4.3.3.1	Detrusor overactivity (DO)	13
4.3.3.2	Poor bladder emptying	13
4.3.3.3	Bladder outlet obstruction (BOO)	14
4.4	Surgical treatment	14
4.4.1	Incontinence after surgery for benign prostatic obstruction (BPO) or prostate cancer (CaP)	15
4.4.1.1	Incontinence after surgery for BPO or prostate cancer (CaP)	15
4.4.1.2	Incontinence after surgery for prostate cancer (CaP)	15
4.4.1.3	Definitions of post-RP continence	15
4.4.1.4	Incontinence risk factors	15
4.4.1.5	Interventional treatment for post-RP incontinence	15
4.4.1.6	Age	16
4.4.1.7	Post-RP incontinence with bladder neck stricture	16
4.4.2	Incontinence after external beam radiotherapy for CaP	16
4.4.2.1	Artificial urinary sphincter (AUS) after radiotherapy	16
4.4.2.2	Conclusion	16
4.4.2.3	Other treatments for SIU after radiotherapy	16
4.4.3	Incontinence after other treatment for CaP	16
4.4.3.1	Brachytherapy	16

4.4.3.2	Cryotherapy	16
4.4.3.3	High-intensity focused ultrasound (HIFU)	16
4.4.3.4	Recommendation	16
4.4.4	Treatment of incontinence after neobladder	16
4.4.5	Urethral and pelvic floor injuries	16
4.4.5.1	Recommendation	17
4.4.6	Incontinence in adult epispadias-exstrophy complex	17
4.4.7.	Refractory UUI and idiopathic DO	17
4.4.8	Incontinence and reduced capacity bladder	17
4.4.9	Urethro-cutaneous fistula and recto-urethral fistula	17
4.4.10	Management of AUS complications	17
4.5	References	17
5.	INCONTINENCE IN WOMEN	28
5.1	Initial Assessment	28
5.2	Initial treatment of UI in women	28
5.2.1	Pelvic floor muscle training (PFMT) under special circumstances	30
5.3	Specialised management of UI in women	31
5.3.1	Assessment	31
5.3.2	Treatment	31
5.4	Surgery for UI in women	32
5.4.1	Outcome measures	34
5.5	Outcome measures	34
5.6	References	34
6.	URINARY INCONTINENCE IN FRAIL / OLDER MEN AND WOMEN	44
6.1	History and symptom assessment	44
6.1.1	General principles	44
6.1.2	Nocturia	44
6.1.3	Post-void residual (PVR) volume	45
6.2	Clinical diagnosis	45
6.3	Initial management	45
6.3.1	Drug therapy	45
6.4	Ongoing management and reassessment	45
6.5	Specialised management	46
6.5.1	Surgical approaches to UI in the frail / older men and women	46
6.6	References	47
7.	Abbreviations used in the text	52

1. INTRODUCTION

In the first International Consultation on Incontinence in 1998, a structure of 'Clinical Guidelines for Management of Incontinence' was developed (1). This included a summary and overview, which were presented in flow sheets ('algorithms'), with recommendations for 'Initial Management' and 'Specialised Management' of urinary incontinence (UI) in children, men, women, patients with neuropathic bladder and elderly patients. These algorithms have already been presented in the previous EAU Guidelines on Incontinence and continue to be the skeleton of the guidelines. The algorithms are uniformly constructed to follow from top to bottom a chronological pathway from patient's history and symptoms assessment, clinical assessment using appropriate studies and tests so that the condition of the underlying pathophysiology can be defined as a basis for rational treatment decisions. To limit the number of diagnostic pathways in the algorithms, clinical presentations that require a similar complexity of diagnostic evaluation have been grouped together by history and symptoms.

Again, for simplification, treatment options have been grouped under a few diagnoses ('conditions') and their underlying pathophysiology, for which the terminology as standardised by the International Continence Society (ICS) is used. As a rule, the least invasive treatment option is recommended first, proceeding in a stepwise escalation to a more invasive treatment option, when the former fails.

Depth and intensity of diagnostic evaluation and therapeutic interventions are grouped into two levels, 'Initial Management' and 'Specialised Management'. The level of 'Initial Management' comprises measures generally needed at the first patient contact with a health professional. Depending on the healthcare system and local or general service restrictions, this first contact maybe with an incontinence nurse, a primary care physician or a specialist.

The primary information about the patient's condition is established by medical history, physical examination and applying basic diagnostic tests, which are readily available. If treatment is at all installed at this level of care, it will be mostly of an empirical nature.

The level of 'Specialised Management' appeals to patients in whom a diagnosis could not be established at the 'Initial Management', in whom primary treatment failed, or in whom history and symptoms suggest a more complex or serious condition requiring more elaborate diagnostic evaluation and/or specific treatment options. For instance, at this level urodynamic studies are usually required for establishing a diagnosis on the grounds of pathophysiology, and treatment options at this level include invasive interventions and surgery.

The principles of 'evidence-based medicine' (EBM) apply for analysis and rating of the relevant papers published in the literature, for which a modified Oxford system has been developed (2, 3). This approach applies 'levels of evidence' (LE) to the body of analysed literature and, from there, derives 'grades of recommendation' (GR) (Tables 1 and 2).

This document presents a synthesis of the findings of the 4th International Consultation on Incontinence held in July 2008 (4). References have been included in the text, with a focus on new publications covering the time span 2005 to the present. An exhaustive reference list is available for consultation on line at the society website (<http://www.uroweb.org/professional-resources/guidelines/>) and on the CD-rom version. Additionally, an ultra short document is available.

Table 1: Level of evidence*

Level	Type of evidence
1a	Evidence obtained from meta-analysis of randomised trials
1b	Evidence obtained from at least one randomised trial
2a	Evidence obtained from one well-designed controlled study without randomisation
2b	Evidence obtained from at least one other type of well-designed quasi-experimental study
3	Evidence obtained from well-designed non-experimental studies, such as comparative studies, correlation studies and case reports
4	Evidence obtained from expert committee reports or opinions or clinical experience of respected authorities

Modified from Sackett et al. (2, 3).

Table 2: Grade of recommendation*

Grade	Nature of recommendations
A	Based on clinical studies of good quality and consistency addressing the specific recommendations and including at least one randomised trial
B	Based on well-conducted clinical studies, but without randomised clinical trials
C	Made despite the absence of directly applicable clinical studies of good quality

Modified from Sackett et al. (2, 3).

1.1 REFERENCES

1. Thüroff JW, Abrams P, Artibani W, Haab F, Khoury S, Madersbacher H, Nijman R, Norton P. Clinical guidelines for the management of incontinence. In: Abrams P, Khoury S, Wein A, (eds). *Incontinence*. Plymouth: Health Publications Ltd, 1999, pp. 933-943.
2. Oxford Centre for Evidence-based Medicine Levels of Evidence (May 2001). Produced by Bob Phillips, Chris Ball, Dave Sackett, Doug Badenoch, Sharon Straus, Brian Haynes, Martin Dawes since November 1998.
<http://www.cebm.net/index.aspx?o=1025> [accessed February 2009].
3. Abrams P, Khoury S, Grant A. Evidence-based medicine overview of the main steps for developing and grading guideline recommendations. In: Abrams P, Cardozo L, Khoury S, Wein A, (eds). *Incontinence*. Paris: Health Publications Ltd, 2005, pp. 10-11.
4. Abrams P, Cardozo L, Wein A, Khoury S. 4th International Consultation on Incontinence. Paris, July 5-8, 2008. Publication due in the course of 2009.

2. EPIDEMIOLOGY*

2.1 Introduction

There is a large variation in the estimated prevalence of urinary incontinence (UI), even after taking into account differences in definitions, epidemiological methodology and demographic characteristics. However, recent prospective studies have provided much data on the incidence of UI and the natural history (progression, regression and resolution) of UI (1-4).

Urinary incontinence, or urine loss occurring at least once during the last 12 months, has been estimated as occurring in 5-69% of women and 1-39% of men. In general, UI is twice as common in women as in men. Limited data from twin studies suggest there is a substantial genetic component to UI, especially stress urinary incontinence (SUI) (5, 6).

2.2 Risk factors in women

Pregnancy and vaginal delivery are significant risk factors, but become less important with age. Contrary to previous popular belief, menopause per se does not appear to be a risk factor for UI and there is conflicting evidence regarding hysterectomy. Diabetes mellitus is a risk factor in most studies. Research also suggests that oral oestrogen substitution and body mass index are important modifiable risk factors for UI. Although mild loss of cognitive function is not a risk factor for UI, it increases the impact of UI.

Smoking, diet, depression, urinary tract infections (UTIs) and exercise are not risk factors.

2.2.1 Risk factors in pelvic organ prolapse (POP)

Pelvic organ prolapse (POP) has a prevalence of 5-10% based on the finding of a mass bulging in the vagina. Childbirth carries an increased risk for POP later in life, with the risk increasing with the number of children. It is unclear whether Caesarean section (CS) prevents the development of POP though most studies indicate CS carries less risk than vaginal delivery for subsequent pelvic floor morbidity. Several studies suggest hysterectomy and other pelvic surgery increase the risk of POP. Further research is needed.

2.3 Risk factors in men

Risk factors for UI in men include increasing age, lower urinary tract symptoms (LUTS), infections, functional and cognitive impairment, neurological disorders and prostatectomy.

*This section of the guidelines is based on the recommendations of the ICI committee chaired by Ian Milsom (Committee 1: Epidemiology).

2.4 Overactive bladder (OAB)

The prevalence of OAB in adult males varies from 10% to 26% and in adult females from 8% to 42%. It increases with age and often occurs with other LUTS.

Several common chronic conditions, such as depression, constipation, neurological conditions and erectile dysfunction, have been significantly associated with OAB, even after adjusting for important covariates, such as age, gender and country (7).

2.5 Disease progression

2.5.1 Longitudinal studies

The literature on incidence and remission of UI is still scarce, particularly among men. However, the annual incidence rates of UI in women ranges from 2% to 11%, with the highest incidence occurring during pregnancy. Rates of complete remission of UI range from 0% to 13%, with the highest remission rate after pregnancy. The annual incidence rates of OAB range from 4% to 6%, while annual remission rates of OAB range from 2% to 3%. The annual incidence of prolapse surgery ranges from 0.16% to 0.2%. The estimated life-time cumulative risk for prolapse surgery is estimated to be 7-11%.

2.5.2 Genetic epidemiology

The familial transmission of UI is well documented. However, it is often difficult to differentiate between heritability and non-inherited transmission (environmental factors) in the family environment. Ethnic and racial differences for UI and POP are also well documented.

2.5.3 Twin studies

It is possible to estimate the relative proportions of phenotypic variance caused by genetic and environmental factors by comparing monozygotic female twins (who have an identical genotype) with dizygotic female twins (who share an average of 50% of their segregating genes). A genetic influence is suggested when monozygotic twins are more concordant for the disease than dizygotic twins. Suggested candidate genes include, for example, a polymorphism of the gene for collagen type I. In contrast, an environmental effect is suggested when monozygotic twins are discordant for the disease

2.5.4 Worldwide estimates of current and future LUTS including UI and OAB in individuals > 20 years old

The EPIC study is a population-based study estimating the prevalence of UI, OAB and other LUTS among men and women from five countries using the 2002 ICS definitions. The age- and gender-specific prevalence rates from the EPIC study were used to estimate the current and future worldwide number of individuals with LUTS, OAB and UI (8). This was done by extrapolating prevalence rates to the worldwide population aged 20 years and older (4.2 billion). Males and females from the age of 20 to 80+ years were stratified into five-year age groups (e.g. 20-24 years) to estimate the current and future worldwide number of individuals with LUTS, OAB and UI, and the age- and gender-specific prevalence rates.

Projected population estimates for all worldwide regions are based on information from the United States (US) Census Bureau International Database (IDB) (9).

2.5.5 Conclusions

As the population ages, the prevalence of LUTS is also expected to increase.

LUTS are burdensome to individuals. The projected increase in the number of individuals experiencing LUTS has implications for healthcare resources and overall health burden.

The estimated number of individuals with LUTS has been based on a conservative prevalence rate. Thus, the future number of those with LUTS may be much higher.

2.6 REFERENCES*

1. Offermans MP, Du Moulin MF, Hamers JP, Dassen T, Halfens RJ. Prevalence of urinary incontinence and associated risk factors in nursing home residents: A systematic review. *Neurourol Urodyn* 2009 Feb 3. [Epub ahead of print]
<http://www.ncbi.nlm.nih.gov/pubmed/19191259>
2. Botlero R, Davis SR, Urquhart DM, Shortreed S, Bell RJ. Age-specific prevalence of, and factors associated with, different types of urinary incontinence in community-dwelling Australian women assessed with a validated questionnaire. *Maturitas* 2009 Jan 30. [Epub ahead of print]
<http://www.ncbi.nlm.nih.gov/pubmed/19181467>
3. Wennberg AL, Molander U, Fall M, Edlund C, Peeker R, Milsom I. A Longitudinal Population-based Survey of Urinary Incontinence, Overactive Bladder, and Other Lower Urinary Tract Symptoms in

- Women. Eur Urol 2009 Jan 13. [Epub ahead of print]
<http://www.ncbi.nlm.nih.gov/pubmed/19157689>
4. Long RM, Giri SK, Flood HD. Current concepts in female stress urinary incontinence. *Surgeon* 2008;6(6):366-72.
<http://www.ncbi.nlm.nih.gov/pubmed/19110826>
 5. Altman D, Forsman M, Falconer C, Lichtenstein P. Genetic influence on stress urinary incontinence and pelvic organ prolapse. *Eur Urol* 2008;54(4):918-22. Epub 2007 Dec 17.
<http://www.ncbi.nlm.nih.gov/pubmed/18155350>
 6. Rohr G, Kragstrup J, Gaist D, Christensen K. Genetic and environmental influences on urinary incontinence: a Danish population-based twin study of middle-aged and elderly women. *Acta Obstet Gynecol Scand* 2004;83(10):978-82.
<http://www.ncbi.nlm.nih.gov/pubmed/15453898>
 7. Irwin DE, Milsom I, Reilly K, Hunskaar S, Kopp Z, Herschorn S, Coyne KS, Kelleher CJ, Artibani W, Abrams P. Overactive bladder is associated with erectile dysfunction and reduced sexual quality of life in men. *J Sex Med* 2008;5(12):2904-10.
<http://www.ncbi.nlm.nih.gov/pubmed/19090944>
 8. Irwin DE, Milsom I, Hunskaar S, Reilly K, Kopp Z, Herschorn S, Coyne K, Kelleher C, Hampel C, Artibani W, Abrams P. 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;50(6):1306-14; discussion 1314-5. Epub 2006 Oct 2.
<http://www.ncbi.nlm.nih.gov/pubmed/17049716>
 9. US Census Bureau, International Data Base
<http://www.census.gov/ipc/www/idb/index.html> [accessed February 2009]

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3. PHARMACOTHERAPY*

3.1 Introduction

More than 50 million people in the developed world are affected by UI and many drugs have been used for treatment (Table 3). Although drugs may be efficacious in some patients, side-effects mean they are often discontinued after short periods of time and they are best used as an adjuvant to conservative and surgical therapy (1).

3.2 Drugs used in the treatment of overactive bladder (OAB)/detrusor overactivity (DO)

The clinical relevance of efficacy of antimuscarinic drugs relative to placebo has been widely discussed (2). However, recent large meta-analyses of the most widely used antimuscarinic drugs have clearly shown these drugs provide a significant clinical benefit (3, 4). More research is needed to decide the best drugs for first-, second-, or third-line treatment (4). None of the commonly used antimuscarinic drugs (darifenacin, fesoterodine, oxybutynin, propiverine, solifenacin, tolterodine and trospium) is an ideal first-line treatment for all OAB/DO patients. Optimal treatment should be individualised, considering the patient's co-morbidities, concomitant medications and the pharmacological profiles of the different drugs (5).

Table 3: Drugs used in the treatment of OAB/DO*

Drugs	LE	GR
<i>Antimuscarinic drugs</i>		
• Tolterodine	1	A
• Trospium	1	A
• Solifenacin	1	A
• Darifenacin	1	A
• Propantheline	2	B
• Atropine, hyoscyamine	3	C

*This section of the guidelines is based on the recommendations of the ICI committee chaired by Karl-Erik Andersson (Committee 8: Drug Treatment).

<i>Drugs acting on membrane channels</i>		
• Calcium antagonists	2	
• K ⁺ -channel openers	2	
<i>Drugs with mixed actions</i>		
• Oxybutynin	1	A
• Propiverine	1	A
• Dicyclomine	3	C
• Flavoxate	2	
<i>Antidepressants</i>		
• Imipramine	3	C
• Duloxetine	2	C
<i>Alpha-adrenoreceptor antagonists</i>		
• Alfuzosin	3	C
• Doxazosin	3	C
• Prazosin	3	C
• Terazosin	3	C
• Tamsulosin	3	C
<i>Beta-adrenoreceptor antagonists</i>		
• Terbutaline (beta-2)	3	C
• Salbutamol (beta-2)	3	C
• YM-178 (beta-3)	2	B
<i>PDE-5 inhibitors (for male LUTS/OAB)</i>		
• Sildenafil, tadalafil, vardenafil	2	B
<i>COX inhibitors</i>		
• Indomethacin	2	C
• Flurbiprofen	2	C
<i>Toxins</i>		
• Botulinum toxin (neurogenic), injected into bladder wall	2	A
• Botulinum toxin (idiopathic), injected into bladder wall	3	B
• Capsaicin (neurogenic), intravesical	2	C
• Resiniferatoxin (neurogenic), intravesical	2	C
<i>Other drugs</i>		
• Baclofen, intrathecal	3	C
<i>Hormones</i>		
• Oestrogen	2	C
• Desmopressin, for nocturia (nocturnal polyuria), but care should be taken because of the risk of hyponatraemia, especially in the elderly	1	A

Assessments have been done according to the Oxford modified system, see Tables 1 and 2

LE = level of evidence; GR = grade or recommendation; PDE-5 inhibitor = phosphodiesterase-type 5 inhibitor; COX inhibitor = cyclo-oxygenase inhibitor.

3.3 Drugs used in the treatment of stress urinary incontinence (SUI)

Factors that may contribute to urethral closure include:

- the tone of urethral smooth and striated muscle
- the passive properties of the urethral lamina propria, particularly its vasculature.

The relative contribution of these factors to intraurethral pressure is still debated. However, evidence shows that a substantial part of urethral tone is mediated through stimulation of alpha-adrenoreceptors in the urethral smooth muscle by released noradrenaline (6, 7). A contributory factor to SUI, mainly in elderly women with a lack of oestrogen, may be a deterioration in the mucosal co-adaptation function. Pharmacological treatment of SUI aims to increase the force of intraurethral closure by increasing tone in the urethral smooth and striated muscles. Several drugs may contribute to such an increase (8, 9). Their clinical use is limited by low efficacy and/or side-effects (Table 4).

Table 4: Drugs used in the treatment of stress urinary incontinence

Drug	LE	GR
• Duloxetine	1	B
• Imipramine	3	NR
• Clenbuterol	3	C
• Methoxamine	2	NR
• Midodrine	2	C
• Ephedrine	3	NR
• Norephedrine (phenylpropanolamine)	3	NR
• Oestrogen	2	NR

GR = grade of recommendation; NR = no recommendation possible.

3.4 Drugs used for the treatment of ‘overflow incontinence’

Incontinence may occur when there are large quantities of residual urine with a markedly distended bladder (chronic urinary retention). The ICS no longer approves of the term, ‘overflow incontinence’ (10).

Various medical approaches to overflow incontinence have been suggested (11, 12) based upon theoretical reasoning, animal studies (13, 14) and reports of drugs associated with poor bladder emptying (15).

These include direct or indirect muscarinic receptor agonists and alpha-1-adrenoreceptor antagonists. However, a recent review of controlled clinical studies on direct and indirect parasympathetic agonists in patients with an underactive detrusor found these drugs were not consistently beneficial and may even be harmful (16). In contrast, alpha-1-adrenoreceptor antagonists have been consistently beneficial in patients with acute urinary retention (17).

A recent Medline search using the keyword ‘overflow incontinence’ did not find any randomised controlled trials (RCT) for treatment using parasympathomimetic drugs or alpha-1-adrenoreceptor antagonists nor even a case series with a meaningful number of patients. This indicates that medical treatments currently used to treat overflow incontinence are being used on the basis of empirical evidence. Any previous recommendations for the medical treatment of overflow incontinence can be considered as ‘expert opinion’ at best.

In addition, it is important to make sure any medical treatment for overflow incontinence is likely to reduce or eliminate residual urine better than the alternatives of catheterisation or surgery.

3.5 Hormonal treatment of UI

3.5.1 Oestrogen

Oestrogen deficiency is an aetiological factor in the pathogenesis of several conditions. However, oestrogen treatment, either alone or combined with progestogen, has achieved only poor results in UI. The current evidence (level of evidence: 1) against the treatment of UI with oestrogen is based on studies originally designed to assess oestrogen for preventing cardiovascular events. In fact, the evidence is derived from secondary analyses of these studies using subjective, self-reported symptoms of urinary leakage. Nevertheless, these large RCTs showed a worsening of pre-existing UI (stress and urgency) and an increased new incidence of UI, with either oestrogen monotherapy or oestrogen combined with progestogen. It should be noted, however, that most patients were taking combined equine oestrogen, which may not be representative of all oestrogens taken by all routes of administration.

A systematic review of the effects of oestrogen on symptoms suggestive of OAB concluded that oestrogen therapy may be effective in alleviating OAB symptoms and local administration may be the most beneficial route of administration (18). It is possible that urinary urgency, frequency and urgency incontinence are symptoms of urogenital atrophy in older post-menopausal women (19). There is good evidence that low-dose (local) vaginal oestrogen therapy may reverse the symptoms and cytological changes of urogenital atrophy. However, oestrogens (with or without progestogens) should not be used to treat UI, as there is no evidence to show they have a direct effect on the lower urinary tract.

3.5.2 Other steroid hormones/receptor ligands

There are no reported clinical trials evaluating the effect of androgens, particularly testosterone, on UI in women.

3.5.3 Desmopressin

Desmopressin (DDVAP) was found to be well tolerated and resulted in a significant improvement in UI

compared to placebo in reducing nocturnal voids and increasing the hours of undisturbed sleep. Quality of life (QOL) also improved. However, hyponatraemia is one of the main, clinically important, side-effects of DDVAP administration. Hyponatraemia can lead to a range of adverse events from mild headache, anorexia, nausea, and vomiting to loss of consciousness, seizures and death. The risk of hyponatraemia has been reported in a meta-analysis as about 7.6% (20) and seems to increase with age, cardiac disease and a high 24-hour urine volume (21).

3.6 REFERENCES*

1. Andersson K-E, Appell R, Cardozo L et al. Pharmacological treatment of urinary incontinence, in Abrams P, Khoury S, Wein A (Eds), Incontinence, 3rd International Consultation on Incontinence. Plymouth, Plymbridge Distributors Ltd, UK, Plymouth, 2005, p 811.
2. Herbison P, Hay-Smith J, Ellis G, Moore K. Effectiveness of anticholinergic drugs compared with placebo in the treatment of overactive bladder: systematic review. *Br Med J* 2003;326(7394):841-4. <http://www.ncbi.nlm.nih.gov/pubmed/12702614>
3. Chapple CR, Martinez-Garcia R, Selvaggi L, Toozs-Hobson P, Warnack W, Drogendijk T, Wright DM, Bolodeoku J; for the STAR study group. A comparison of the efficacy and tolerability of solifenacin succinate and extended release tolterodine at treating overactive bladder syndrome: results of the STAR trial. *Eur Urol* 2005;48(3):464-70. <http://www.ncbi.nlm.nih.gov/pubmed/15990220>
4. Novara G, Galfano A, Secco S, D'Elia C, Cavalleri S, Ficarra V, Artibani W.. Systematic Review and Meta-Analysis of Randomized Controlled Trials with Antimuscarinic Drugs for Overactive Bladder. *Eur Urol* 2008;54(4):740-63. <http://www.ncbi.nlm.nih.gov/pubmed/18632201>
5. Chapple CR, Van Kerrebroeck PE, Jünemann KP, Wang JT, Brodsky M. Comparison of fesoterodine and tolterodine in patients with overactive bladder. *BJU Int* 2008;102(9):1128-32. <http://www.ncbi.nlm.nih.gov/pubmed/18647298>
6. Andersson KE. Pharmacology of lower urinary tract smooth muscles and penile erectile tissues. *Pharmacol Rev* 1993;45(3):253-308. <http://www.ncbi.nlm.nih.gov/pubmed/8248281>
7. Andersson KE, Wein AJ. Pharmacology of the lower urinary tract—basis for current and future treatments of urinary incontinence. *Pharmacol Rev* 2004;56(4):581-631. <http://www.ncbi.nlm.nih.gov/pubmed/15602011>
8. Andersson KE. Current concepts in the treatment of disorders of micturition. *Drugs* 1988;35(4):477-94. <http://www.ncbi.nlm.nih.gov/pubmed/3292211>
9. Zinner N, Gittelman M, Harris R, Susset J, Kanelos A, Auerbach S; Trospium Study Group. Trospium chloride improves overactive bladder symptoms: a multicenter phase III trial. *J Urol* 2004;171(6 Pt 1):2311-5. <http://www.ncbi.nlm.nih.gov/pubmed/15126811>
10. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, van Kerrebroeck P, Victor A, Wein A; Standardisation Sub-committee of the International Continence Society. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. *Neurourol Urodyn* 2002;21(2):167-78. <http://www.ncbi.nlm.nih.gov/pubmed/11857671>
11. Chutkan DS, Takahashi PY. Urinary incontinence in the elderly. Drug treatment options. *Drugs* 1998;56(4):587-95. <http://www.ncbi.nlm.nih.gov/pubmed/9806105>
12. Hampel C, Gillitzer R, Pahernik S, Melchior SW, Thüroff JW. [Drug therapy of female urinary incontinence] *Urologe A* 2005;44(3):244-55. [article in German] <http://www.ncbi.nlm.nih.gov/pubmed/15711814>
13. Kamo I, Chancellor MB, De Groat WC, Yoshimura A. Differential effects of activation of peripheral and spinal tachykinin neurokinin3 receptors on the micturition reflex in rats. *J Urol* 2005;174(2):776-81. <http://www.ncbi.nlm.nih.gov/pubmed/16006975>
14. Gu B, Fraser MO, Thor KB, Dolber PC. Induction of bladder sphincter dyssynergia by kappa-2 opioid receptor agonists in the female rat. *J Urol* 2004 Jan;171(1):472-7. <http://www.ncbi.nlm.nih.gov/pubmed/14665958>
15. Anders RJ, Wang E, Radhakrishnan J, Sharifi R, Lee M. Overflow urinary incontinence due to carbamazepine. *J Urol* 1985 Oct;134(4):758-9. <http://www.ncbi.nlm.nih.gov/pubmed/4032590>

16. Barendrecht MM, Oelke M, Laguna MP, Michel C. Is the use of parasympathomimetics for treating an underactive urinary bladder evidence-based? *BJU Int* 2007;99(4):749-52.
<http://www.ncbi.nlm.nih.gov/pubmed/17233798>
17. McNeill SA, Hargreave TB; Members of the Alfaur Study Group. Alfuzosin once daily facilitates return to voiding in patients in acute urinary retention. *J Urol* 2004;171(6 Pt 1):2316-20.
<http://www.ncbi.nlm.nih.gov/pubmed/15126812>
18. Cardozo L, Lisec M, Millard R, van Vierssen Trip O, Kuzmin I, Drogendijk TE, Huang M, Ridder AM. Randomized, double-blind placebo controlled trial of the once daily antimuscarinic agent solifenacin succinate in patients with overactive bladder. *J Urol* 2004;172(5 Pt 1):1919-24.
<http://www.ncbi.nlm.nih.gov/pubmed/15540755>
19. Robinson D, Cardozo L, Terpstra G, Bolodeoku J; Tamsulosin Study Group. A randomized double-blind placebo-controlled multicentre study to explore the efficacy and safety of tamsulosin and tolterodine in women with overactive bladder syndrome. *BJU Int* 2007;100(4):840-5.
<http://www.ncbi.nlm.nih.gov/pubmed/17822465>
21. Weatherall M. The risk of hyponatremia in older adults using desmopressin for nocturia: a systematic review and meta-analysis. *Neurourol Urodyn* 2004;23(4):302-5.
<http://www.ncbi.nlm.nih.gov/pubmed/15227644>
21. Rembratt A, Norgaard JP, Andersson KE. Desmopressin in elderly patients with nocturia: short-term safety and effects on urine output, sleep and voiding patterns. *BJU Int* 2003;91(7):642-6.
<http://www.ncbi.nlm.nih.gov/pubmed/12699476>

**An exhaustive reference list is available for consultation on line at the society website (<http://www.uroweb.org/professional-resources/guidelines/>) and on the guidelines CD-rom version.*

4. INCONTINENCE IN MEN*

4.1 Initial assessment

Initial assessment in men should triage patients with a 'complicated' incontinence, who need to be referred for specialist management, from the remainder who are suitable for general assessment.

The 'complicated' incontinence group comprises patients with:

- pain
- haematuria
- recurrent infection
- previous failed incontinence surgery
- total incontinence
- voiding dysfunction (e.g. due to bladder outlet obstruction). Poor bladder emptying may be suspected from symptoms, physical examination or if imaging has been performed by ultrasound or X-ray after voiding
- previous pelvic radiotherapy.

The group of remaining patients, with a history of UI identified by initial assessment, can be stratified into four main symptomatic groups of men suitable for initial management:

- post-micturition dribble alone
- OAB symptoms: urgency (with or without urge incontinence), frequency, and nocturia
- stress incontinence, most often after prostatectomy
- mixed urgency and stress incontinence, most often after prostatectomy.

4.2 Initial treatment

4.2.1 General management

Conservative management is the main approach to UI in men at the primary care level (Figure 1), and is often considered to be simple and low cost. The term 'conservative management' describes any treatment that does not involve pharmacological or surgical intervention. However, for conditions, such as OAB, conservative strategies are often combined with drug treatment.

*This section of the guidelines is based on the recommendations of the ICI committees chaired by Jean Hay-Smith and Sender Herschorn. 4.1 (Initial assessment of UI) and 4.2 (Initial treatment of UI) provide the management algorithms and the explanatory notes; 4.4 (Surgical treatment of UI) provides additional evidence from the chapters.

Many conservative management interventions require a change of behaviour, which is neither easy to initiate nor to maintain. Most patients with minor-to-moderate symptoms wish to try less invasive treatments first. However, patients with complicated or severe symptoms may need to be referred directly for specialised management.

For men with post-micturition dribble, no further assessment is generally required. However, the patient should be told how to exert a strong pelvic floor muscle contraction after voiding or to manually compress the bulbous urethra directly after micturition (grade of recommendation: B).

For men with stress incontinence, urgency or mixed stress/urgency incontinence, initial treatment should include appropriate lifestyle advice, physical therapies, scheduled voiding regimes, behavioural therapies and medication. In summary, these initial treatments carry lower grades of recommendation.

Recommendations for initial treatments for UI in men

Recommendations	GR
• Lifestyle intervention	NR
• Supervised pelvic floor muscle training for post prostatectomy SUI	B
• Scheduled voiding regimes for OAB	C
• When there is no evidence of significant post-void residual urine, antimuscarinic drugs for OAB symptoms, with or without urgency incontinence	C
• Alpha-adrenergic antagonists (alpha-blockers) can be added if there is also bladder outlet obstruction	C

GR = grade of recommendation; NR = no recommendation possible.

4.2.2 Post-radical prostatectomy RP incontinence

Despite the prevalence of UI and LUTS in older men, the only group to have been researched properly is men who have had RP. Overall, the effect of conservative treatment (lifestyle interventions, physical therapies, scheduled voiding regimes, complementary therapies) has been much less researched in men compared to women. There is generally insufficient level 1 or 2 evidence and most recommendations are essentially hypotheses requiring further research.

Recommendations for conservative treatment of UI in men

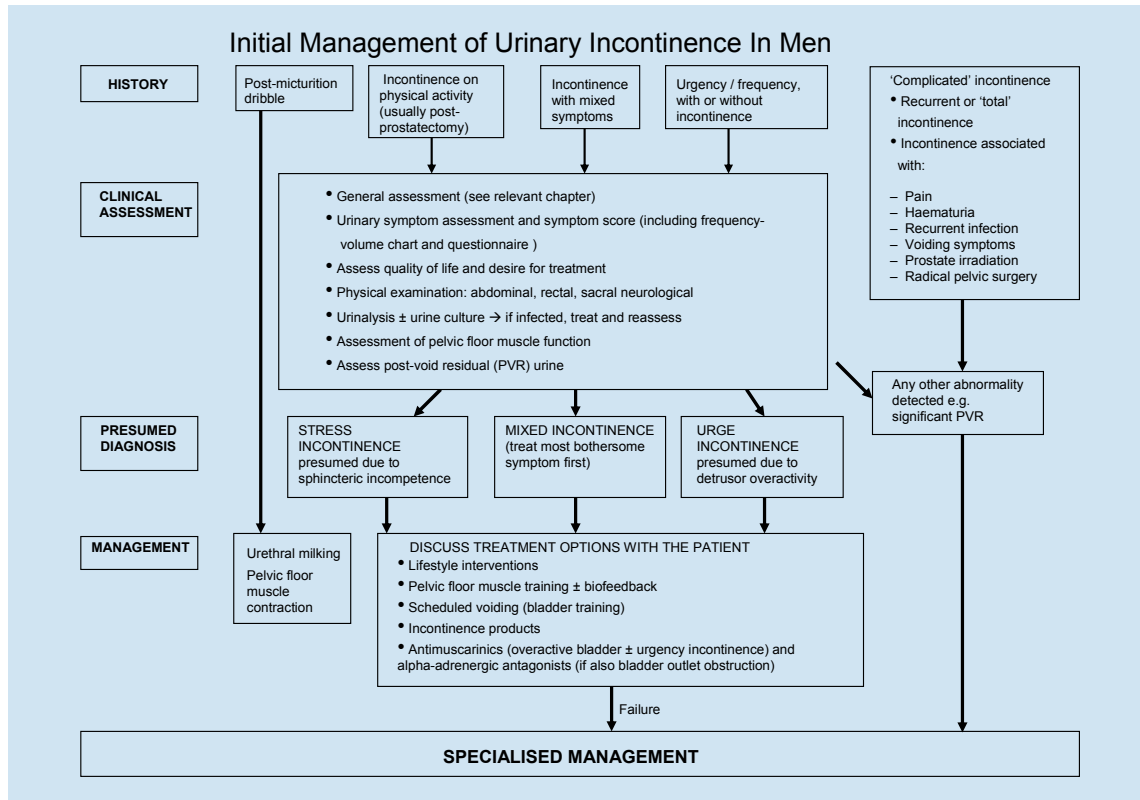
Recommendations	GR
<i>Lifestyle interventions</i>	
• It seems reasonable for health professionals to offer men advice on healthy lifestyle choices that may reduce or delay the onset of continence problems	NR
<i>Pelvic floor muscle training (PFMT)</i>	
• Some pre-operative or immediate post-operative instructions in PFMT for men undergoing radical prostatectomy may be helpful	B
• It is not clear whether PFMT taught by digital rectal examination (DRE) has more benefit than verbal or written instruction in PFMT	B
• The use of biofeedback to assist PFMT is currently a therapist/patient decision based on economics and preference	B
<i>Electrical stimulation</i>	
• For men with post-prostatectomy incontinence, adding electrical stimulation to a PFMT programme does not appear to be of benefit	B

GR = grade of recommendation; NR = no recommendation possible

4.2.3 Conclusions

- There is generally insufficient level 1 or 2 evidence for these initial treatments. Most 'recommendations' are hypotheses needing further testing in high-quality research studies.
- If initial treatment is unsuccessful after a reasonable period of time (e.g. 8-12 weeks), specialist's advice is highly recommended.

Figure 1: Algorithm for initial management of UI in men.



4.3 Specialised management of UI in men

The specialist may first decide to re-institute initial management if previous therapy might have been inadequate. Specialised management of UI in men is summarised in Figure 2.

4.3.1 Assessment

Patients with 'complicated' incontinence referred directly to specialised management will probably need additional testing to exclude any other underlying pathology, i.e. cytology, cystourethroscopy and urinary tract imaging. If these tests are normal, patients can be treated for incontinence by initial or specialised management options as appropriate. If symptoms suggestive of detrusor overactivity or of sphincter incompetence persist, urodynamic studies are recommended to establish a diagnosis based on pathophysiological findings (urodynamic diagnosis).

4.3.2 Interventions

If initial management has failed and the patient's incontinence is affecting quality of life, invasive therapies may be considered.

4.3.3 Sphincter incompetence

For sphincter incompetence, the recommended option is surgical implantation of an artificial urinary sphincter (AUS) (grade of recommendation: B). An alternative option is a male sling.

4.3.3.1 Detrusor overactivity (DO)

For idiopathic DO (with intractable OAB symptoms), the recommended therapies are:

- surgical bladder augmentation with intestinal segments (grade of recommendation: C)
- implantation of a neuromodulator (grade of recommendation: B).

Detrusor injections with botulinum toxin continue to show promise in the treatment of symptomatic detrusor overactivity unresponsive to other therapies.

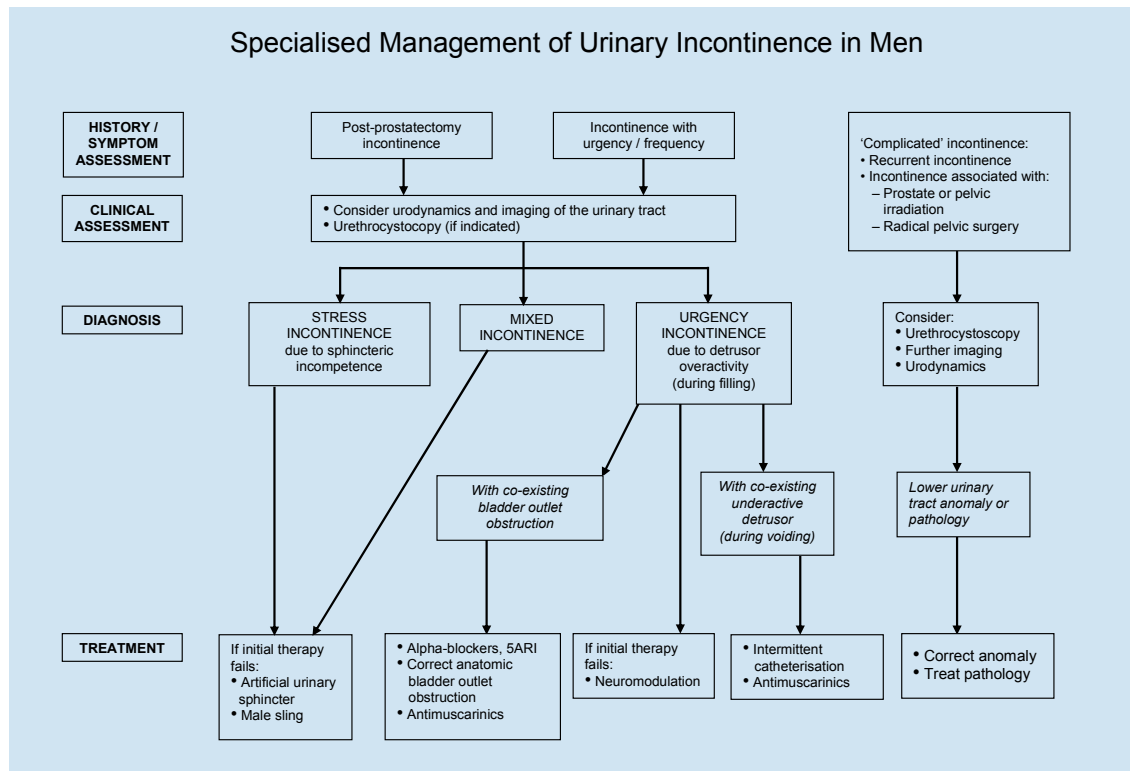
4.3.3.2 Poor bladder emptying

If incontinence is associated with poor bladder emptying due to detrusor underactivity, effective means should be used to ensure bladder emptying, e.g. CIC (grade of recommendation: B-C).

4.3.3.3 Bladder outlet obstruction (BOO)

If incontinence is due to bladder outlet obstruction, then the obstruction should be relieved (grade of recommendation: B-C). Pharmacological treatment options for UI and proven outlet obstruction are alpha-blockers or 5-alpha-reductase inhibitors (grade of recommendation: C-D). There is increasing evidence for the safety of antimuscarinic agents for OAB symptoms in men with outlet obstruction, when combined with an alpha-blocker (grade of recommendation: B). Currently, botulinum toxin injections into the detrusor muscle are being used 'off-label' for this indication.

Figure 2: Algorithm for specialised management of UI in men



4.4 Surgical treatment

Urinary incontinence in men suitable for surgical correction can be classified by cause into sphincter-related incontinence (post-operative, post-traumatic, and congenital), bladder-related incontinence and fistulae (Table 5). Initial routine assessment and further evaluations are described in Table 6.

Table 5: Aetiological classification of surgically correctable UI in men

Sphincter-related

- Postoperative
 - Post-prostatectomy for benign disease
 - Post-prostatectomy for prostate cancer
 - Post radiotherapy, brachytherapy, cryosurgery, HIFU for prostate cancer
 - Post cystectomy and neobladder for bladder cancer
- Post-traumatic
 - After prostatico-membranous disruption and urethral reconstruction
 - Pelvic floor trauma
- Unresolved paediatric UI
 - Exstrophy and incontinent epispadias

Bladder-related

- Refractory UUI (overactive bladder)
- Reduced capacity bladder

Fistulae

- Urethro-cutaneous
- Recto-urethral

HIFU = high-intensity focused ultrasound; UI = urinary incontinence; UUI = urge urinary incontinence.

Table 6: Initial assessment prior to surgical therapy

<i>Routine assessment</i>
<ul style="list-style-type: none">• Medical history and physical examination, urinalysis, post void residual urine, frequency/volume chart, pad test, and serum creatinine if renal disease is suspected
<i>Further evaluation as required (level of evidence: 2-4, grade of recommendation: A-C)</i>
<ul style="list-style-type: none">• Cysto-urethroscopy to assess urethral integrity, sphincter appearance, stricture, bladder pathology and imaging of the upper and lower urinary tract (ultrasound, cysto-urethrography, intravenous pyelogram)• Urodynamic studies to assess sphincter and/or detrusor function• Valsalva leak point pressure to measure sphincter weakness• Urethral pressure profile (UPP) or retrograde perfusion sphincterometry may be performed if AUS or slings are to be implanted• Sphincter electromyography to investigate suspected neuropathy• Multichannel pressure/flow video-urodynamic evaluation to assess detrusor function and characterise the underlying pathophysiology

4.4.1 Incontinence after surgery for BPO or prostate cancer (CaP)

4.4.1.1 Incontinence after surgery for benign prostatic obstruction (BPO)

Incidence of UI is similar after open surgery, transurethral resection of the prostate (TURP), transurethral incision of the prostate (TUIP) and Holium laser enucleation.

4.4.1.2 Incontinence after surgery for prostate cancer (CaP)

Generally, the incidence of UI after RP has decreased, but it is still a significant problem. Overall, the reported incidences range between 5% and 48%. Generally, patients report higher degrees of UI than do their physicians. The degree of UI varies and is often estimated by the numbers of pads and their wetness, social impairment and bothersomeness, which are usually assessed by non-standardised instruments.

4.4.1.3 Definitions of post-RP continence

The definitions of post-RP continence are:

- total control without any pad or leakage
- no pad but loss of few drops of urine ('underwear staining')
- none or 1 pad ('safety pad') per day.

4.4.1.4 Incontinence risk factors

Reported risk factors for incontinence after RP include age at surgery, prostate size, co-morbidities, nerve-sparing surgery, bladder neck stenosis, tumour stage (possibly related to surgical technique), and pre-operative bladder and sphincter dysfunction. The risk is unrelated to the technique of prostatectomy (radical vs non-radical vs robotic: these reports are entirely from centres of excellence).

4.4.1.5 Interventional treatment for post-RP incontinence

After a period of conservative management of at least 6-12 months, the artificial urinary sphincter (AUS) is the treatment of choice for patients with moderate-to-severe UI. In studies that report treatment results of UI after surgery of BPO and CaP together, the success rates for AUS range between 59% and 90% (0-1 pad/day). Long-term success rates and high patient satisfaction seem to outweigh the need for periodic revisions in some patients. Until similar experience is seen with newer, less invasive treatments, the AUS remains the reference standard to which all other treatments must be compared (level of evidence: 2) (grade of recommendation: B).

Male slings are an alternative for men with mild-to-moderate UI (radiotherapy is an adverse risk factor). The overall minimum success is 58%, with best results achieved in patients with low-to-moderate leakage of urine, who had not undergone radiotherapy (level of evidence: 3) (grade of recommendation: C).

Bulking agents are a less effective option for some men with mild-to-moderate UI. The early failure rate is about 50% and any beneficial effects decrease with time (level of evidence: 3) (grade of recommendation: C).

The implantation of compressive adjustable balloons is a new treatment option. Early high complication rates appear to have been resolved. However, more evidence is required before specific recommendations can be made (level of evidence: 3) (grade of recommendation: D).

4.4.1.6 Age

Age is not a restriction for surgical treatment of post-prostatectomy incontinence. However, cognitive impairment and a lack of normal dexterity may restrict use of an AUS and must be assessed pre-operatively (level of evidence: 3-4) (grade of recommendation: C).

4.4.1.7 Post-RP incontinence with bladder neck stricture

Treatment options for incontinence following RP with concomitant bladder neck stricture and other types of surgical stricture are visual internal urethrotomy, followed by implantation of an AUS once the urethra has been stabilised.

4.4.2 Incontinence after external beam radiotherapy for CaP

The risk of incontinence after external beam radiotherapy ranges between 0 and 18.9%, but it may increase over time. There is a higher earlier risk in patients, who have had either a pre- or post-treatment TURP of 5-11%. Adjuvant radiotherapy may increase the risk of incontinence after RP. Also salvage RP after radiotherapy has an increased risk of incontinence.

4.4.2.1 AUS after radiotherapy

There is a variably higher revision rate after radiotherapy than without radiotherapy, due to a higher incidence of erosion and infection, possibly caused by urethral atrophy from radiation-induced vasculitis. Detrusor overactivity and bladder neck contractures may also occur. Prolonged and/or intermittent de-activation of the sphincter is recommended; the cuff of the sphincter must be placed outside the radiotherapy field.

4.4.2.2 Conclusion

An artificial sphincter is the most widely used treatment. Radiotherapy is a risk factor for an increase in complications (level of evidence: 3, grade of recommendation: C)

4.4.2.3 Other treatments for SUI after radiotherapy

Limited evidence suggests that perineal compression slings can be an alternative therapy. However, injectable agents have not been successful (level of evidence 3; grade of recommendation: C).

4.4.3 Incontinence after other treatment for CaP

4.4.3.1 Brachytherapy

After brachytherapy, incontinence occurs in 0-45% of the cases. TURP after brachytherapy carries a high risk of incontinence.

4.4.3.2 Cryotherapy

Radiotherapy prior to cryotherapy is a risk factor for incontinence, fistulae occur in 0-5%.

4.4.3.3 High-intensity focused ultrasound (HIFU)

The rate of incontinence decreases with surgical experience.

4.4.3.4 Recommendation

The artificial sphincter is most widely used (grade of recommendation: C). Injectable agents have not been successful (grade of recommendation: C).

4.4.4 Treatment of incontinence after neobladder

Continence rates achieved 2 years after orthotopic urinary diversion are 85-100% during the day and 55-100% at night. Treatment includes conservative management, intermittent catheterisation and artificial sphincter implantation (grade of recommendation: C).

4.4.5 Urethral and pelvic floor injuries

Incontinence following injuries of the posterior urethra occurs in 0-20% of patients. The most commonly published surgical therapy is the AUS (level of evidence: 2) (grade of recommendation: B).

Depending on the individual case, additional procedures are needed, i.e. urethral or bladder neck reconstruction. If reconstruction is impossible, one treatment option is bladder neck closure and construction of a Mitrofanoff catheterisable abdominal stoma (level of evidence: 3) (grade of recommendation: C).

For patients with severe bladder neck stricture and incontinence, an intra-urethral stent may be used together with an AUS (level of evidence: 3) (grade of recommendation: C).

4.4.5.1 Recommendation

Recommendation

- Although other treatments are possible, the AUS provides a reasonable outcome in appropriate cases.

4.4.6 Incontinence in adult epispadias-exstrophy complex

Patients should be treated in centres of excellence using a patient-directed approach. Treatment choices include:

- bladder neck reconstructive surgery
- bladder neck closure
- bladder reconstruction
- urinary diversion.

There is not enough data to provide a specific recommendation. The patient's transition is important between the paediatric and adult urologist. Life-long follow-up is mandatory, particularly for continence, voiding efficiency, upper tract status and other urological complications (level of evidence: 3) (grade of recommendation: C).

4.4.7 Refractory UUI and idiopathic DO

Botulinum toxin A detrusor injection is a minimally invasive treatment with some efficacy that is currently used as an 'off-label detrusor injection for this indication. Other treatment options include neuromodulation or detrusor myectomy, which have both been successful in a few male patients. Augmentation cystoplasty with intestinal segments is potentially successful in controlling symptoms but may have side-effects. Urinary diversion is a final option (level of evidence: 3) (grade of recommendation: C).

4.4.8 Incontinence and reduced capacity bladder

Augmentation cystoplasty has been successful in helping with reduced capacity bladder due to most aetiologies except radiotherapy cystitis (level of evidence: 3) (grade of recommendation: C).

4.4.9 Urethro-cutaneous fistula and recto-urethral fistula

The aetiology of acquired fistulae can be iatrogenic, trauma, inflammation, and tumour. Fistulae in men are most often iatrogenic (surgery, radiotherapy, cryotherapy, HIFU) or inflammatory (diverticulitis). The localisation and size of acquired urethro-cutaneous fistulae are demonstrated by clinical, endoscopic and imaging studies.

Surgical reconstruction is performed as required. Similar diagnostic manoeuvres are applied to recto-urethral fistulas. Surgical reconstruction may be carried out in fistulae that do not close, with or without temporary urinary and faecal diversion. Most repairs are carried out after prior faecal diversion. Various techniques are available for closure and can be done in collaboration with colorectal surgeons (level of evidence: 3) (grade of recommendation: C).

4.4.10 Management of AUS complications

Recurrent incontinence after AUS implantation may result from alteration in bladder function, urethral atrophy, or mechanical malfunction. All or part of the prosthesis must be surgically removed if there is infection and/or erosion of components. Risk factors are surgery, radiotherapy, catheterisation and endoscopy (level of evidence: 3) (grade of recommendation: C).

4.5 REFERENCES*

- Herschorn S, Thuroff J, Bruschini H, et al. Surgical treatment of urinary incontinence in men. In: Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence: Third International Consultation*. Paris: Health Publications Ltd, 2005, pp.1241-1296.
- Blatt AH, Titus J, Chan L. Ultrasound measurement of bladder wall thickness in the assessment of voiding dysfunction. *J Urol* 2008;179(6):2275-8; discussion 2278-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17382743>
- Fischer MC, Huckabay C, Nitti VW. The male perineal sling: assessment and prediction of outcome. *J Urol* 2007;177(4):1414-18.
<http://www.ncbi.nlm.nih.gov/pubmed/17382743>
- Migliari R, Pistolesi D, Leone P, Viola D, Trovarelli S. Male bulbourethral sling after radical prostatectomy: intermediate outcomes at 2 to 4-year followup. *J Urol* 2006;176(5):2114-18; discussion 2118.
<http://www.ncbi.nlm.nih.gov/pubmed/17070273>

- Hübner WA, Schlarp OM. Adjustable continence therapy (ProACT): evolution of the surgical technique and comparison of the original 50 patients with the most recent 50 patients at a single centre. *Eur Urol* 2007;52(3):680-6.
<http://www.ncbi.nlm.nih.gov/pubmed/17097218>
- Rehder P, Gozzi C. Transobturator sling suspension for male urinary incontinence including post-radical prostatectomy. *Eur Urol* 2007;52(3):860-6.
<http://www.ncbi.nlm.nih.gov/pubmed/17316969>
- Fassi-Fehri H, Badet L, Cherass A, Murat FJ, Colombel M, Martin X, Gelet A. Efficacy of the InVance male sling in men with stress urinary incontinence. *Eur Urol* 2007;51(2):498-503.
<http://www.ncbi.nlm.nih.gov/pubmed/16996679>
- Leuret T, Cour F, Benchetrit J, Grise P, Bernstein J, Delaporte V, Chartier-Kastler E, Botto H, Costa P. Treatment of postprostatectomy stress urinary incontinence using a minimally invasive adjustable continence balloon device, ProACT: results of a preliminary, multicenter, pilot study. *Urology* 2008;71(2):256-60.
<http://www.ncbi.nlm.nih.gov/pubmed/18308096>
- Imamoglu MA, Tuygun C, Bakirtas H, Yi itbasi O, Kiper A. The comparison of artificial urinary sphincter implantation and endourethral macroplastique injection for the treatment of postprostatectomy incontinence. *Eur Urol* 2005;47(2):209-13.
<http://www.ncbi.nlm.nih.gov/pubmed/15661416>
- Trigo Rocha F, Gomes CM, Mitre AI, Arap S, Srougi M. A prospective study evaluating the efficacy of the artificial sphincter AMS 800 for the treatment of postradical prostatectomy urinary incontinence and the correlation between preoperative urodynamic and surgical outcomes. *Urology* 2008;71(1): 85-9.
<http://www.ncbi.nlm.nih.gov/pubmed/18242371>
- Rodriguez E Jr, Skarecky DW, Ahlering TE. Post-robotic prostatectomy urinary continence: characterization of perfect continence versus occasional dribbling in pad-free men. *Urology* 2006;67(4):785-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16566988>
- Rodriguez E Jr, Skarecky DW, Ahlering TE. Post-robotic prostatectomy urinary continence: characterization of perfect continence versus occasional dribbling in pad-free men. *Urology* 2006;67(4):785-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16566988>
- Penson DF, McLerran D, Feng Z, Li L, Albertsen PC, Gilliland FD, Hamilton A, Hoffman RM, Stephenson RA, Potosky AL, Stanford JL. 5-year urinary and sexual outcomes after radical prostatectomy: results from the prostate cancer outcomes study. *J Urol* 2005;173(5):1701-5.
<http://www.ncbi.nlm.nih.gov/pubmed/15821561>
- Jacobsen NE, Moore KN, Estey E, Voaklander D. Open versus laparoscopic radical prostatectomy: a prospective comparison of postoperative urinary incontinence rates. *J Urol* 2007;177(2):615-19.
<http://www.ncbi.nlm.nih.gov/pubmed/17222646>
- Sacco E, Prayer-Galetti T, Pinto F, Fracalanza S, Betto G, Pagano F, Artibani W. Urinary incontinence after radical prostatectomy: incidence by definition, risk factors and temporal trend in a large series with a long-term follow-up. *BJU Int* 2006;97(6):1234-41.
<http://www.ncbi.nlm.nih.gov/pubmed/16686718>
- Moore KN, Truong V, Estey E, Voaklander DC. Urinary incontinence after radical prostatectomy: can men at risk be identified preoperatively? *J Wound Ostomy Continence Nurs* 2007;34(3):270-9; quiz 280-1.
<http://www.ncbi.nlm.nih.gov/pubmed/17505246>
- Majoros A, Bach D, Keszthelyi A, Hamvas A, Romics I. Urinary incontinence and voiding dysfunction after radical retropubic prostatectomy (prospective urodynamic study). *Neurourol Urodyn* 2006;25(1):2-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16224797>
- Mohamad BA, Marszalek M, Brossner C, Ponholzer A, Wehrberger C, Willinger M, Madersbacher S. Radical prostatectomy in Austria: a nationwide analysis of 16,524 cases. *Eur Urol* 2007;51(3):684-8; discussion 689.
<http://www.ncbi.nlm.nih.gov/pubmed/16835007>
- Rogers CG, Su LM, Link RE, Sullivan W, Wagner A, Pavlovich CP. Age stratified functional outcomes after laparoscopic radical prostatectomy. *J Urol* 2006;176(6Pt1):2448-52.
<http://www.ncbi.nlm.nih.gov/pubmed/17085126>

- Pierorazio PM, Spencer BA, McCann TR, McKiernan JM, Benson MC. Preoperative risk stratification predicts likelihood of concurrent PSA-free survival, continence, and potency (the trifecta analysis) after radical retropubic prostatectomy. *Urology* 2007;70(4):717-22.
<http://www.ncbi.nlm.nih.gov/pubmed/17991543>
- Loeb S, Smith ND, Roehl KA, Catalona WJ. Intermediate-term potency, continence, and survival outcomes of radical prostatectomy for clinically high-risk or locally advanced prostate cancer. *Urology* 2007;69(6):1170-5.
<http://www.ncbi.nlm.nih.gov/pubmed/17572209>
- Nandipati KC, Raina R, Agarwal A, Zippe CD. Nerve-sparing surgery significantly affects long-term continence after radical prostatectomy. *Urology* 2007;70(6):1127-30.
<http://www.ncbi.nlm.nih.gov/pubmed/18158032>
- Burkhard FC, Kessler TM, Fleischmann A, Thalmann GN, Schumacher M, Studer UE. Nerve sparing open radical retropubic prostatectomy – does it have an impact on urinary continence? *J Urol* 2006;176(1):189-95.
<http://www.ncbi.nlm.nih.gov/pubmed/16753399>
- Onur R, Singla A. Comparison of bone-anchored male sling and collagen implant for the treatment of male incontinence. *Int J Urol* 2006;13(9):1207-11.
<http://www.ncbi.nlm.nih.gov/pubmed/16984554>
- Hurtado EA, McCrery RJ, Appell RA. Complications of ethylene vinyl alcohol copolymer as an intraurethral bulking agent in men with stress urinary incontinence. *Urology* 2008;71(4):662-5.
<http://www.ncbi.nlm.nih.gov/pubmed/18279931>
- Mitterberger M, Marksteiner R, Margreiter E, Pinggera GM, Frauscher F, Ulmer H, Fussenegger M, Bartsch G, Strasser H. Myoblast and fibroblast therapy for post-prostatectomy urinary incontinence: 1-year followup of 63 patients. *J Urol* 2008;179(1):226-31.
<http://www.ncbi.nlm.nih.gov/pubmed/18001790>
- Strasser H, Marksteiner R, Margreiter E, Mitterberger M, Pinggera GM, Frauscher F, Fussenegger M, Kofler K, Bartsch G. Transurethral ultrasonography-guided injection of adult autologous stem cells versus transurethral endoscopic injection of collagen in treatment of urinary incontinence. *World J Urol* 2007;25(4):385-92.
<http://www.ncbi.nlm.nih.gov/pubmed/17701044>
- Kleinert S, Horton R. Retraction – autologous myoblasts and fibroblasts versus collagen [corrected] for treatment of stress urinary incontinence in women: a [corrected] randomised controlled trial. *Lancet* 2008;372(9641):789-90.
<http://www.ncbi.nlm.nih.gov/pubmed/18774408>
- Strasser H, Marksteiner R, Margreiter E, Pinggera GM, Mitterberger M, Frauscher F, Ulmer H, Fussenegger M, Kofler K, Bartsch G. Autologous myoblasts and fibroblasts versus collagen for treatment of stress urinary incontinence in women: a randomised controlled trial. *Lancet* 2007;369(9580):2179-86.
<http://www.ncbi.nlm.nih.gov/pubmed/17604800>
- Kielb SJ, Clemens JQ. Comprehensive urodynamics evaluation of 146 men with incontinence after radical prostatectomy. *Urology* 2005;66(2):392-6.
<http://www.ncbi.nlm.nih.gov/pubmed/16040102>
- Klingler HC, Marberger M. Incontinence after radical prostatectomy: surgical treatment options. *Curr Opin Urol* 2006;16(2):60-4.
<http://www.ncbi.nlm.nih.gov/pubmed/16479205>
- Stern JA, Clemens JQ, Tiplitsky SI, Matschke HM, Jain PM, Schaeffer AJ. Long-term results of the bulbourethral sling procedure. *J Urol* 2005;173(5):1654-6.
<http://www.ncbi.nlm.nih.gov/pubmed/15821529>
- Xu YM, Zhang XR, Sa YL, Chen R, Fei XF. Bulbourethral composite suspension for treatment of male-acquired urinary incontinence. *Eur Urol* 2007;51(6):1709-14; discussion 17156.
<http://www.ncbi.nlm.nih.gov/pubmed/17011113>
- Rajpurkar AD, Onur R, Singla A. Patient satisfaction and clinical efficacy of the new perineal bone-anchored male sling. *Eur Urol* 2005;47(2):237-42; discussion 242.
<http://www.ncbi.nlm.nih.gov/pubmed/15661420>
- Comiter CV, Rhee EY. The 'ventral urethral elevation plus' sling: a novel approach to treating stress urinary incontinence in men. *BJU Int* 2008;101(2):187-91.
<http://www.ncbi.nlm.nih.gov/pubmed/17970788>

- Rapp DE, Reynolds WS, Lucioni A, Bales GT. Surgical technique using AdVance sling placement in the treatment of post-prostatectomy urinary incontinence. *Int Braz J Urol* 2007;33(2):231-5; discussion 236-7.
<http://www.ncbi.nlm.nih.gov/pubmed/17488544>
- Moreno Sierra J, Victor Romano S, Galante Romo I, Barrera Ortega J, Salinas Casado J, Silmi Moyano A. [New male sling 'Argus' for the treatment of stress urinary incontinence]. *Arch Esp Urol* 2006;59(6):607-13. [article in Spanish].
<http://www.ncbi.nlm.nih.gov/pubmed/16933489>
- Romano SV, Metrebian SE, Vaz F, Muller V, D'Ancona CA, Costa De Souza EA, Nakamura F. An adjustable male sling for treating urinary incontinence after prostatectomy: a phase III multicentre trial. *BJU Int* 2006;97(3):533-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16469021>
- Castle EP, Andrews PE, Itano N, Novicki DE, Swanson SK, Ferrigni RG. The male sling for post-prostatectomy incontinence: mean followup of 18 months. *J Urol* 2005;173(5):1657-60.
<http://www.ncbi.nlm.nih.gov/pubmed/15821530>
- Gallagher BL, Dwyer NT, Gaynor-Krupnick DM, Latini JM, Kreder KJ. Objective and quality-of-life outcomes with bone-anchored male bulbourethral sling. *Urology* 2007;69(6):1090-4.
<http://www.ncbi.nlm.nih.gov/pubmed/17572193>
- Giberti C, Gallo F, Schenone M, Cortese P. The bone-anchor sub-urethral sling for the treatment of iatrogenic male incontinence: subjective and objective assessment after 41 months of mean follow-up. *World J Urol* 2008;26(2):173-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17982750>
- Comiter CV. Surgery Insight: surgical management of postprostatectomy incontinence – the artificial urinary sphincter and male sling. *Nat Clin Pract Urol* 2007;4(11):615-24.
<http://www.ncbi.nlm.nih.gov/pubmed/17982438>
- Suburethral synthetic sling insertion for stress urinary incontinence in men. National Institute for Health and Clinical Excellence. Issued March 2008. [accessed on 21 September 2008].
<http://www.nice.org.uk/nicemedia/pdf/IPG256Guidance.pdf>
- Gregori A, Simonato A, Lissiani A, Scieri F, Rossi R, Gaboardi F. Transrectal ultrasound guided implantation of the ProACT adjustable continence therapy system in patients with post-radical prostatectomy stress urinary incontinence: a pilot study. *J Urol* 2006;176(5):2109-13; discussion 2113.
<http://www.ncbi.nlm.nih.gov/pubmed/17070270>
- Hübner WA, Schlarp OM. Treatment of incontinence after prostatectomy using a new minimally invasive device: adjustable continence therapy. *BJU Int* 2005;96(4):587-94.
<http://www.ncbi.nlm.nih.gov/pubmed/16104915>
- Trigo-Rocha F, Gomes CM, Pompeo AC, Lucon AM, Arap S. Prospective study evaluating efficacy and safety of Adjustable Continence Therapy (ProACT) for post radical prostatectomy urinary incontinence. *Urology* 2006;67(5):965-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16698356>
- Cansino Alcaide JR, Alvarez Maestro M, Martín Hernández M, Cabrera Castillo PM, Pérez-Utrilla Pérez M, Rodríguez de Bethencourt F, Hidalgo Togores L, De la Peña Barthel JJ. [Paraurethral balloon implantation in the treatment of male urinary incontinence. La Paz University Hospital experience]. *Arch Esp Urol* 2007;60(6):647-55. [article in Spanish]
<http://www.ncbi.nlm.nih.gov/pubmed/17847738>
- Kocjancic E, Crivellaro S, Ranzoni S, Bonvini D, Gontero P, Frea B. Adjustable Continence Therapy for the treatment of male stress urinary incontinence: a single-centre study. *Scand J Urol Nephrol* 2007;41(4):324-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17763225>
- Kim SP, Sarmast Z, Daignault S, Faerber GJ, McGuire EJ, Latini JM. Long-term durability and functional outcomes among patients with artificial urinary sphincters: a 10-year retrospective review from the University of Michigan. *J Urol* 2008;179(5):1912-16.
<http://www.ncbi.nlm.nih.gov/pubmed/18353376>
- Lai HH, Hsu EI, Teh BS, Butler EB, Boone TB. 13 years of experience with artificial urinary sphincter implantation at Baylor College of Medicine. *J Urol* 2007;177(3):1021-5.
<http://www.ncbi.nlm.nih.gov/pubmed/17296403>
- O'Connor RC, Lyon MB, Guralnick ML, Bales GT. Long-term follow-up of single versus double cuff artificial urinary sphincter insertion for the treatment of severe postprostatectomy stress urinary incontinence. *Urology* 2008;71(1):90-3.
<http://www.ncbi.nlm.nih.gov/pubmed/18242372>

- Galli S, Simonato A, Bozzola A, Gregori A, Lissiani A, Scaburri A, Gaboardi F. Oncologic outcome and continence recovery after laparoscopic radical prostatectomy: 3 years' follow-up in a 'second generation center'. *Eur Urol* 2006;49(5):859-65.
<http://www.ncbi.nlm.nih.gov/pubmed/16519991>
- Colombo R, Naspro R, Salonia A, Montorsi F, Raber M, Suardi N, Saccà A, Rigatti P. Radical prostatectomy after previous prostate surgery: clinical and functional outcomes. *J Urol* 2006;176(6Pt1):2459-63; discussion 2463.
<http://www.ncbi.nlm.nih.gov/pubmed/17085129>
- Schneider T, Sperling H, Rossi R, Schmidt S, Rübber H. Do early injections of bulking agents following radical prostatectomy improve early continence? *World J Urol* 2005;23(5):338-42.
<http://www.ncbi.nlm.nih.gov/pubmed/16261366>
- Jones JS, Vasavada SP, Abdelmalak JB, Liou L, Ahmed ES, Zippe CD, Rackley RR. Sling may hasten return of continence after radical prostatectomy. *Urology* 2005;65(6):1163-7.
<http://www.ncbi.nlm.nih.gov/pubmed/15922423>
- Wendt-Nordahl G, Bucher B, Häcker A, Knoll T, Alken P, Michel MS. Improvement in mortality and morbidity in transurethral resection of the prostate over 17 years in a single center. *J Endourol* 2007;21(9):1081-7.
<http://www.ncbi.nlm.nih.gov/pubmed/17941791>
- Roehrborn CG, McConnell JD, Barry MJ, Benaim E, Bruskewitz R, Blute M, HL Holtgrewe, Kaplan S, Lange J, Lowe F, Roberts R, Stein B. Guideline on the Management of Benign Prostatic Hyperplasia (BPH), 2006. American Urological Association.
<http://www.auanet.org/content/guidelines-and-quality-care/clinical-guidelines.cfm?sub=bph>
- Tan A, Liao C, Mo Z, Cao Y. Meta-analysis of holmium laser enucleation versus transurethral resection of the prostate for symptomatic prostatic obstruction. *Br J Surg* 2007;94(10):1201-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17729384>
- Gupta N, Sivaramakrishna, Kumar R, Dogra PN, Seth A. Comparison of standard transurethral resection, transurethral vapour resection and holmium laser enucleation of the prostate for managing benign prostatic hyperplasia of >40 g. *BJU Int* 2006;97(1):85-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16336334>
- Westney OL, Bevan-Thomas R, Palmer JL, Cespedes RD, McGuire EJ. Transurethral collagen injections for male intrinsic sphincter deficiency: the University of Texas-Houston experience. *J Urol* 2005;174(3):994-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16094021>
- Dylewski DA, Jamison MG, Borawski KM, Sherman ND, Amundsen CL, Webster GD. A statistical comparison of pad numbers versus pad weights in the quantification of urinary incontinence. *Neurourol Urodyn* 2007;26(1):3-7.
<http://www.ncbi.nlm.nih.gov/pubmed/17080415>
- O'Connor RC, Nanigian DK, Patel BN, Guralnick ML, Ellison LM, Stone AR. Artificial urinary sphincter placement in elderly men. *Urology* 2007;69(1):126-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17270633>
- Ponholzer A, Brössner C, Struhal G, Marszalek M, Madersbacher S. Lower urinary tract symptoms, urinary incontinence, sexual function and quality of life after radical prostatectomy and external beam radiation therapy: real life experience in Austria. *World J Urol* 2006;24(3):325-30.
<http://www.ncbi.nlm.nih.gov/pubmed/16688458>
- Miller DC, Sanda MG, Dunn RL, Montie JE, Pimentel H, Sandler HM, McLaughlin WP, Wei JT. Long-term outcomes among localized prostate cancer survivors: health-related quality-of-life changes after radical prostatectomy, external radiation, and brachytherapy. *J Clin Oncol* 2005;23(12):2772-80.
<http://www.ncbi.nlm.nih.gov/pubmed/15837992>
- Nguyen PL, D'Amico AV, Lee AK, Suh WW. Patient selection, cancer control, and complications after salvage local therapy for postradiation prostate-specific antigen failure: a systematic review of the literature. *Cancer* 2007;110(7):1417-28.
<http://www.ncbi.nlm.nih.gov/pubmed/17694553>
- Raj GV, Peterson AC, Webster GD. Outcomes following erosions of the artificial urinary sphincter. *J Urol* 2006;175(6):2186-90; discussion 2190.
<http://www.ncbi.nlm.nih.gov/pubmed/16697836>
- Bottomley D, Ash D, Al-Qaisieh B, Carey B, Joseph J, St Clair S, Gould K. Side effects of permanent I125 prostate seed implants in 667 patients treated in Leeds. *Radiother Oncol* 2007;82(1):46-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17161481>

- Petit JH, Gluck C, Kiger WS 3rd, Laury Henry D, Karasiewicz C, Talcott JA, Berg S, Holupka EJ, Kaplan ID. Androgen deprivation-mediated cytoreduction before interstitial brachytherapy for prostate cancer does not abrogate the elevated risk of urinary morbidity associated with larger initial prostate volume. *Brachytherapy* 2007;6(4):267-71.
<http://www.ncbi.nlm.nih.gov/pubmed/17959423>
- Robinson JW, Donnelly BJ, Coupland K, Siever JE, Saliken JC, Scott C, Brasher PM, Ernst DS. Quality of life 2 years after salvage cryosurgery for the treatment of local recurrence of prostate cancer after radiotherapy. *Urol Oncol* 2006;24(6):472-86.
<http://www.ncbi.nlm.nih.gov/pubmed/17138127>
- Rebillard X, Soulié M, Chartier-Kastler E, Davin JL, Mignard JP, Moreau JL, Coulange C; Association Francaise d'Urologie. High-intensity focused ultrasound in prostate cancer; a systematic literature review of the French Association of Urology. *BJU Int* 2008;101(10):1205-13.
<http://www.ncbi.nlm.nih.gov/pubmed/18325057>
- Nieuwenhuijzen JA, de Vries RR, Bex A, van der Poel HG, Meinhardt W, Antonini N, Horenblas S. Urinary diversions after cystectomy: the association of clinical factors, complications and functional results of four different diversions. *Eur Urol* 2008;53(4):834-42; discussion 842-34.
<http://www.ncbi.nlm.nih.gov/pubmed/17904276>
- Cerqueira M, Xambre L, Silva V, Santos R, Lages R, Prisco R, Carreira F. [Bulbourethral sling. The experience of our service]. *Actas Urol Esp* 2005;29(4):401-7.
<http://www.ncbi.nlm.nih.gov/pubmed/15981429>
- Raj GV, Peterson AC, Toh KL, Webster GD. Outcomes following revisions and secondary implantation of the artificial urinary sphincter. *J Urol* 2005;173(4):1242-5.
<http://www.ncbi.nlm.nih.gov/pubmed/16697836>
- Simonato A, Gregori A, Lissiani A, Carmignani G. Two-stage transperineal management of posterior urethral strictures or bladder neck contractures associated with urinary incontinence after prostate surgery and endoscopic treatment failures. *Eur Urol* 2007;52(5):1499-504.
<http://www.ncbi.nlm.nih.gov/pubmed/17418481>
- Woodhouse CR, North AC, Gearhart JP. Standing the test of time: long-term outcome of reconstruction of the exstrophy bladder. *World J Urol* 2006;24(3):244-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16518662>
- Lee C, Reutter HM, Grasser MF, Fisch M, Noeker M. Gender-associated differences in the psychosocial and developmental outcome in patients affected with the bladder exstrophy-epispadias complex. *BJU Int* 2006;97(2):349-53.
<http://www.ncbi.nlm.nih.gov/pubmed/16430645>
- Burki T, Hamid R, Duffy P, Ransley P, Wilcox D, Mushtaq I. Long-term followup of patients after redo bladder neck reconstruction for bladder exstrophy complex. *J Urol* 2006;176(3):1138-41; discussion 1141-2.
<http://www.ncbi.nlm.nih.gov/pubmed/16890709>
- Baird AD, Frimberger D, Gearhart JP. Reconstructive lower urinary tract surgery in incontinent adolescents with exstrophy/epispadias complex. *Urology* 2005;66(3):636-40.
<http://www.ncbi.nlm.nih.gov/pubmed/16140093>
- Burki T, Hamid R, Ransley PG, Mushtaq I, Duffy PG. Injectable polydimethylsiloxane for treating incontinence in children with the exstrophy-epispadias complex: long-term results. *BJU Int* 2006;98(4):849-53.
<http://www.ncbi.nlm.nih.gov/pubmed/16978283>
- Lottmann HB, Margaryan M, Lortat-Jacob S, Bernuy M, Lackgren G. Long-term effects of dextranomer endoscopic injections for the treatment of urinary incontinence: an update of a prospective study of 61 patients. *J Urol* 2006;176(4Pt2):1762-6.
<http://www.ncbi.nlm.nih.gov/pubmed/16945642>
- Quek P. A critical review on magnetic stimulation: what is its role in the management of pelvic floor disorders? *Curr Opin Urol* 2005;15(4):231-5.
<http://www.ncbi.nlm.nih.gov/pubmed/15928511>
- Kuo HC. Multiple intravesical instillation of low-dose resineratoxin is effective in the treatment of detrusor overactivity refractory to anticholinergics. *BJU Int* 2005;95(7):1023-7.
<http://www.ncbi.nlm.nih.gov/pubmed/15839924>
- Kuo HC, Liu HT, Yang WC. Therapeutic effect of multiple resineratoxin intravesical instillations in patients with refractory detrusor overactivity: a randomized, double-blind, placebo controlled study. *J Urol* 2006;176(2):641-5.
<http://www.ncbi.nlm.nih.gov/pubmed/16813911>

- Rios LA, Panhoca R, Mattos D Jr, Srugi M, Bruschini H. Intravesical resiniferatoxin for the treatment of women with idiopathic detrusor overactivity and urgency incontinence: a single dose, 4 weeks, double-blind, randomized, placebo controlled trial. *Neurourol Urodyn* 2007;26(6):773-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17638305>
- Cruz F, Dinis P. Resiniferatoxin and botulinum toxin type A for treatment of lower urinary tract symptoms. *Neurourol Urodyn* 2007;26(6Suppl.):920-7.
<http://www.ncbi.nlm.nih.gov/pubmed/17705161>
- Liu HT, Kuo HC. Increased expression of transient receptor potential vanilloid subfamily 1 in the bladder predicts the response to intravesical instillations of resiniferatoxin in patients with refractory idiopathic detrusor overactivity. *BJU Int* 2007;100(5):1086-90.
<http://www.ncbi.nlm.nih.gov/pubmed/17711510>
- Silva C, Silva J, Castro H, Reis F, Dinis P, Avelino A, Cruz F. Bladder sensory desensitization decreases urinary urgency. *BMC Urol* 2007;7:9.
<http://www.ncbi.nlm.nih.gov/pubmed/17561998>
- Apostolidis A, Gonzales GE, Fowler CJ. Effect of intravesical Resiniferatoxin (RTX) on lower urinary tract symptoms, urodynamic parameters, and quality of life of patients with urodynamic increased bladder sensation. *Eur Urol* 2006;50(6):1299-1305.
<http://www.ncbi.nlm.nih.gov/pubmed/16697519>
- Jeffery S, Fynes M, Lee F, Wang K, Williams L, Morley R. Efficacy and complications of intradetrusor injection with botulinum toxin A in patients with refractory idiopathic detrusor overactivity. *BJU Int* 2007;100(6):1302-6.
<http://www.ncbi.nlm.nih.gov/pubmed/17979928>
- Kuschel S, Werner M, Schmid DM, Faust E, Schuessler B. Botulinum toxin-A for idiopathic overactivity of the vesical detrusor: a 2-year follow-up. *Int Urogynecol J Pelvic Floor Dysfunct* 2008;19(7):905-9.
<http://www.ncbi.nlm.nih.gov/pubmed/18204796>
- Schmid DM, Sauermann P, Werner M, Schuessler B, Blick N, Muentener M, Strebel RT, Perucchini D, Scheiner D, Schaer G, John H, Reitz A, Hauri D, Schurch B. Experience with 100 cases treated with botulinum-A toxin injections in the detrusor muscle for idiopathic overactive bladder syndrome refractory to anticholinergics. *J Urol* 2006;176(1):177-85.
<http://www.ncbi.nlm.nih.gov/pubmed/16753396>
- Lee JC, Yokoyama T, Hwang HJ, Arimitsu H, Yamamoto Y, Kawasaki M, Takigawa T, Takeshi K, Nishikawa A, Kumon H, Oguma K. Clinical application of Clostridium botulinum type A neurotoxin purified by a simple procedure for patients with urinary incontinence caused by refractory destrusor overactivity. *FEMS Immunol Med Microbiol* 2007;51(1):201-11.
<http://www.ncbi.nlm.nih.gov/pubmed/17692094>
- Popat R, Apostolidis A, Kalsi V, Gonzales G, Fowler CJ, Dasgupta P. A comparison between the response of patients with idiopathic detrusor overactivity and neurogenic detrusor overactivity to the first intradetrusor injection of botulinum-A toxin. *J Urol* 2005;174(3):984-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16094019>
- Rajkumar GN, Small DR, Mustafa AW, Conn G. A prospective study to evaluate the safety, tolerability, efficacy and durability of response of intravesical injection of botulinum toxin type A into detrusor muscle in patients with refractory idiopathic detrusor overactivity. *BJU Int* 2005;96(6):848-52.
<http://www.ncbi.nlm.nih.gov/pubmed/16153215>
- Kuo HC. Comparison of effectiveness of detrusor, suburothelial and bladder base injections of botulinum toxin A for idiopathic detrusor overactivity. *J Urol* 2007;178(4Pt1):1359-63.
<http://www.ncbi.nlm.nih.gov/pubmed/17706718>
- Ghalayini IF, Al-Ghazo MA. Intradetrusor injection of botulinum-A toxin in patients with idiopathic and neurogenic detrusor overactivity: urodynamic outcome and patient satisfaction. *Neurourol Urodyn* 2007;26(4):531-6.
<http://www.ncbi.nlm.nih.gov/pubmed/17330289>
- Sahai A, Khan MS, Dasgupta P. Efficacy of botulinum toxin-A for treating idiopathic detrusor overactivity: results from a single center, randomized, double-blind, placebo controlled trial. *J Urol* 2007;177(6):2231-6.
<http://www.ncbi.nlm.nih.gov/pubmed/17509328>
- Kessler TM, Danuser H, Schumacher M, Studer UE, Burkhard FC. Botulinum A toxin injections into the detrusor: an effective treatment in idiopathic and neurogenic detrusor overactivity? *Neurourol Urodyn* 2005;24(3):231-6.
<http://www.ncbi.nlm.nih.gov/pubmed/15747344>

- Apostolidis A, Popat R, Yiangou Y, Cockayne D, Ford AP, Davis JB, Dasgupta P, Fowler CJ, Anand P. Decreased sensory receptors P2X3 and TRPV1 in suburothelial nerve fibers following intradetrusor injections of botulinum toxin for human detrusor overactivity. *J Urol* 2005;174(3):977-82; discussion 982-3.
<http://www.ncbi.nlm.nih.gov/pubmed/16094018>
- Sinha D, Karri K, Arunkalaivanan AS. Applications of Botulinum toxin in urogynaecology. *Eur J Obstet Gynecol Reprod Biol* 2007;133(1):4-11.
<http://www.ncbi.nlm.nih.gov/pubmed/17275980>
- De Laet K, Wyndaele JJ. Adverse events after botulinum A toxin injection for neurogenic voiding disorders. *Spinal Cord* 2005;43(7):397-9.
<http://www.ncbi.nlm.nih.gov/pubmed/15741978>
- Early communication about an ongoing safety review Botox and Botox Cosmetic (botulinum toxin type A) and Myobloc (botulinum toxin type B). [accessed 8 February 2008].
http://www.fda.gov/cder/drug/early_comm/botulinum_toxins.htm
- Schurch B, Corcos J. Botulinum toxin injections for paediatric incontinence. *Curr Opin Urol* 2005;15(4):264-7.
<http://www.ncbi.nlm.nih.gov/pubmed/15928517>
- Kalsi V, Apostolidis A, Popat R, Gonzales G, Fowler CJ, Dasgupta P. Quality of life changes in patients with neurogenic versus idiopathic detrusor overactivity after intradetrusor injections of botulinum neurotoxin type A and correlations with lower urinary tract symptoms and urodynamic changes. *Eur Urol* 2006;49(3):528-35.
<http://www.ncbi.nlm.nih.gov/pubmed/16426735>
- Kalsi V, Popat RB, Apostolidis A, Kavia R, Odeyemi IA, Dakin HA, Warner J, Elneil S, Fowler CJ, Dasgupta P. Cost-consequence analysis evaluating the use of botulinum neurotoxin-A in patients with detrusor overactivity based on clinical outcomes observed at a single UK centre. *Eur Urol* 2006;49(3):519-27.
<http://www.ncbi.nlm.nih.gov/pubmed/16413656>
- Hirst GR, Watkins AJ, Guerrero K, Wareham K, Emery SJ, Jones DR, Lucas MG. Botulinum toxin B is not an effective treatment of refractory overactive bladder. *Urology* 2007;69(1):69-73.
<http://www.ncbi.nlm.nih.gov/pubmed/17270619>
- Karsenty G, Elzayat E, Delapparent T, St-Denis B, Lemieux MC, Corcos J. Botulinum toxin type A injections into the trigone to treat idiopathic overactive bladder do not induce vesicoureteral reflux. *J Urol* 2007;177(3):1011-14.
<http://www.ncbi.nlm.nih.gov/pubmed/17296399>
- Apostolidis A, Dasgupta P, Fowler CJ. Proposed mechanism for the efficacy of injected botulinum toxin in the treatment of human detrusor overactivity. *Eur Urol* 2006;49(4):644-50.
<http://www.ncbi.nlm.nih.gov/pubmed/16426734>
- Sahai A, Dowson C, Khan MS, Dasgupta P. Re: Efficacy and complications of intradetrusor injection with botulinum toxin A in patients with refractory idiopathic detrusor overactivity. *BJU Int* 2008;101(4):515-16; author reply 516-17.
<http://www.ncbi.nlm.nih.gov/pubmed/18234066>
- Smaldone MC, Chancellor MB. Neuromodulation versus neurotoxin for the treatment of refractory detrusor overactivity: for neurotoxin. *Nat Clin Pract Urol* 2008;5(3):120-1.
<http://www.ncbi.nlm.nih.gov/pubmed/18195722>
- Sahai A. A prospective study to evaluate the safety, tolerability, efficacy and durability of response of intravesical injection of botulinum toxin type A into detrusor muscle in patients with refractory idiopathic detrusor overactivity. *BJU Int* 2006;97(2):413.
<http://www.ncbi.nlm.nih.gov/pubmed/16430657>
- Nitti VW. Botulinum toxin for the treatment of idiopathic and neurogenic overactive bladder: state of the art. *Rev Urol* 2006;8(4):198-208.
<http://www.ncbi.nlm.nih.gov/pubmed/17192799>
- Patel AK, Patterson JM, Chapple CR. The emerging role of intravesical botulinum toxin therapy in idiopathic detrusor overactivity. *Int J Clin Pract Suppl* 2006;(151):27-32.
<http://www.ncbi.nlm.nih.gov/pubmed/17169008>
- Casanova N, McGuire E, Fenner DE. Botulinum toxin: a potential alternative to current treatment of neurogenic and idiopathic urinary incontinence due to detrusor overactivity. *Int J Gynaecol Obstet* 2006;95(3):305-11.
<http://www.ncbi.nlm.nih.gov/pubmed/17070528>

- Patel AK, Patterson JM, Chapple CR. Botulinum toxin injections for neurogenic and idiopathic detrusor overactivity: A critical analysis of results. *Eur Urol* 2006;50(4):684-709; discussion 709-10. <http://www.ncbi.nlm.nih.gov/pubmed/16934391>
- Patterson JM, Chapple CR. Botulinum toxin in urinary incontinence. *Curr Opin Urol* 2006;16(4):255-60. <http://www.ncbi.nlm.nih.gov/pubmed/16770124>
- Dmochowski R, Sand PK. Botulinum toxin A in the overactive bladder: current status and future directions. *BJU Int* 2007;99(2):247-62. <http://www.ncbi.nlm.nih.gov/pubmed/17313422>
- Apostolidis A, Fowler CJ. The use of botulinum neurotoxin type A (BoNTA) in urology. *J Neural Transm* 2008;115(4):593-605. <http://www.ncbi.nlm.nih.gov/pubmed/18322639>
- Ho MH, Lin LL, Haessler AL, Bhatia NN. Intravesical injection of botulinum toxin for the treatment of overactive bladder. *Curr Opin Obstet Gynecol* 2005;17(5):512-18. <http://www.ncbi.nlm.nih.gov/pubmed/18322639>
- Kim DK, Thomas CA, Smith C, Chancellor MB. The case for bladder botulinum toxin application. *Urol Clin North Am* 2006;33(4):503-10, ix. <http://www.ncbi.nlm.nih.gov/pubmed/17011386>
- MacDonald R, Fink HA, Huckabay C, Monga M, Wilt TJ. Botulinum toxin for treatment of urinary incontinence due to detrusor overactivity: a systematic review of effectiveness and adverse effects. *Spinal Cord* 2007;45(8):535-41. <http://www.ncbi.nlm.nih.gov/pubmed/17453012>
- Schmidt RA. Treatment of unstable bladder. *Urology* 1991;37(1):28-32. <http://www.ncbi.nlm.nih.gov/pubmed/1986470>
- van der Pal F, Heesakkers JP, Bemelmans BL. Current opinion on the working mechanisms of neuromodulation in the treatment of lower urinary tract dysfunction. *Curr Opin Urol* 2006;16(4):261-7. <http://www.ncbi.nlm.nih.gov/pubmed/16770125>
- Daneshgari F, Moy ML. Current indications for neuromodulation. *Urol Clin North Am* 2005;32(1):37-40, vi. <http://www.ncbi.nlm.nih.gov/pubmed/15698874>
- Leng WW, Chancellor MB. How sacral nerve stimulation neuromodulation works. *Urol Clin North Am* 2005;32(1):11-18. <http://www.ncbi.nlm.nih.gov/pubmed/15698871>
- Keppene V, Mozer P, Chartier-Kastler E, Ruffion A. [Neuromodulation in the management of neurogenic lower urinary tract dysfunction]. *Prog Urol* 2007;17(3):609-15. <http://www.ncbi.nlm.nih.gov/pubmed/17622098>
- Nakib N, Siegel S. Neuromodulation versus neurotoxin for the treatment of refractory detrusor overactivity: for neuromodulation. *Nat Clin Pract Urol* 2008;5(3):118-19. <http://www.ncbi.nlm.nih.gov/pubmed/18195723>
- van Kerrebroeck PE, van Voskuilen AC, Heesakkers JP, et al. Results of sacral neuromodulation therapy for urinary voiding dysfunction: outcomes of a prospective, worldwide clinical study. *J Urol* 2007;178(5):2029-34. <http://www.ncbi.nlm.nih.gov/pubmed/17869298>
- Groen J, Ruud Bosch JL, van Mastrigt R. Sacral neuromodulation in women with idiopathic detrusor overactivity incontinence: decreased overactivity but unchanged bladder contraction strength and urethral resistance during voiding. *J Urol* 2006;175(3 Pt 1):1005-9; discussion 1009. <http://www.ncbi.nlm.nih.gov/pubmed/16469603>
- Groenendijk PM, Lycklama a Nyeholt AA, Heesakkers JP, et al. Urodynamic evaluation of sacral neuromodulation for urge urinary incontinence. *BJU Int* 2008;101(3):325-9. <http://www.ncbi.nlm.nih.gov/pubmed/18070199>
- South MM, Romero AA, Jamison MG, Webster GD, Amundsen CL. Detrusor overactivity does not predict outcome of sacral neuromodulation test stimulation. *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(12):1395-8. <http://www.ncbi.nlm.nih.gov/pubmed/17364132>
- Groenendijk PM, Heesakkers JP, Lycklama ANAA. Urethral instability and sacral nerve stimulation-a better parameter to predict efficacy? *J Urol* 2007;178(2):568-2; discussion 572. <http://www.ncbi.nlm.nih.gov/pubmed/17570438>
- Humphreys MR, Vandersteen DR, Slezak JM, et al. Preliminary results of sacral neuromodulation in 23 children. *J Urol* 2006;176(5):2227-31. <http://www.ncbi.nlm.nih.gov/pubmed/17070300?>

- McAchran SE, Daneshgari F. Sacral neuromodulation in the older woman. *Clin Obstet Gynecol* 2007;50(3):735-44.
<http://www.ncbi.nlm.nih.gov/pubmed/17762421>
- Hussain Z, Harrison SC. Neuromodulation for lower urinary tract dysfunction--an update. *ScientificWorldJournal* 2007;7:1036-45.
<http://www.ncbi.nlm.nih.gov/pubmed/17619785>
- Oerlemans DJ, van Kerrebroeck PE. Sacral nerve stimulation for neuromodulation of the lower urinary tract. *Neurourol Urodyn* 2008;27(1):28-33.
<http://www.ncbi.nlm.nih.gov/pubmed/17563110>
- Spinelli M, Malaguti S, Giardiello G, Lazzeri M, Tarantola J, Van Den Hombergh U. A new minimally invasive procedure for pudendal nerve stimulation to treat neurogenic bladder: description of the method and preliminary data. *Neurourol Urodyn* 2005;24(4):305-309.
<http://www.ncbi.nlm.nih.gov/pubmed/15977260>
- Brazzelli M, Murray A, Fraser C. Efficacy and safety of sacral nerve stimulation for urinary urge incontinence: a systematic review. *J Urol* 2006;175(3 Pt 1):835-41.
<http://www.ncbi.nlm.nih.gov/pubmed/16469561>
- Kumar SP, Abrams PH. Detrusor myectomy: long-term results with a minimum follow-up of 2 years. *BJU Int* 2005;96(3):341-4.
<http://www.ncbi.nlm.nih.gov/pubmed/16042727>
- Blaivas JG, Weiss JP, Desai P, Flisser AJ, Stember DS, Stahl PJ. Long-term followup of augmentation enterocystoplasty and continent diversion in patients with benign disease. *J Urol* 2005;173(5):1631-4.
<http://www.ncbi.nlm.nih.gov/pubmed/15821519>
- de Figueiredo AA, Lucon AM, Srougi M. Bladder augmentation for the treatment of chronic tuberculous cystitis. Clinical and urodynamic evaluation of 25 patients after long term follow-up. *Neurourol Urodyn* 2006;25(5):433-40.
<http://www.ncbi.nlm.nih.gov/pubmed/16791845>
- Lima SV, Araujo LA, Vilar Fde O, Lima RS, Lima RF. Nonsecretory intestincystoplasty: a 15-year prospective study of 183 patients. *J Urol* 2008;179(3):1113-6; discussion 1116-7.
<http://www.ncbi.nlm.nih.gov/pubmed/18206934>
- Shakespeare D, Mitchell DM, Carey BM, et al. Recto-urethral fistula following brachytherapy for localized prostate cancer. *Colorectal Dis* 2007;9(4):328-31.
<http://www.ncbi.nlm.nih.gov/pubmed/17432984>
- Ismail M, Ahmed S, Kastner C, Davies J. Salvage cryotherapy for recurrent prostate cancer after radiation failure: a prospective case series of the first 100 patients. *BJU Int* 2007;100(4):760-4.
<http://www.ncbi.nlm.nih.gov/pubmed/17662081>
- Larson DW, Chrouser K, Young-Fadok T, Nelson H. Rectal complications after modern radiation for prostate cancer: a colorectal surgical challenge. *J Gastrointest Surg* 2005;9(4):461-6.
<http://www.ncbi.nlm.nih.gov/pubmed/15797224>
- Lane BR, Stein DE, Remzi FH, Strong SA, Fazio VW, Angermeier KW. Management of radiotherapy induced rectourethral fistula. *J Urol* 2006;175(4):1382-1387; discussion 1387-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16516003>
- Chrouser KL, Leibovich BC, Sweat SD, et al. Urinary fistulas following external radiation or permanent brachytherapy for the treatment of prostate cancer. *J Urol* 2005;173(6):1953-7.
<http://www.ncbi.nlm.nih.gov/pubmed/15879789>
- Marguet C, Raj GV, Brashears JH, Ludwig K, Mouraviev V, Robertson CN, Polascik TJ. Rectourethral fistula after combination radiotherapy for prostate cancer. *Urology* 2007;69(5):898-901.
<http://www.ncbi.nlm.nih.gov/pubmed/17482930>
- Rivera R, Barboglio PG, Hellinger M, Gousse AE. Staging rectourinary fistulas to guide surgical treatment. *J Urol* 2007;177(2):586-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17222638>
- Elliott SP, McAninch JW, Chi T, Doyle SM, Master VA. Management of severe urethral complications of prostate cancer therapy. *J Urol* 2006;176(6 Pt 1):2508-13.
<http://www.ncbi.nlm.nih.gov/pubmed/17085144>
- Singh I, Mittal G, Kumar P, Gangas R. Delayed post-traumatic prostatic-urethrorectal fistula: transperineal rectal sparing repair - point of technique. *Int J Urol* 2006;13(1):92-4.
<http://www.ncbi.nlm.nih.gov/pubmed/16448443>
- Pratap A, Agrawal CS, Pandit RK, Sapkota G, Anchal N. Factors contributing to a successful outcome of combined abdominal transpubic perineal urethroplasty for complex posterior urethral disruptions. *J Urol* 2006;176(6 Pt 1):2514-7; discussion 2517.
<http://www.ncbi.nlm.nih.gov/pubmed/17085145>

- Dal Moro F, Mancini M, Pinto F, Zanovello N, Bassi PF, Pagano F. Successful repair of iatrogenic rectourinary fistulas using the posterior sagittal transrectal approach (York-Mason): 15-year experience. *World J Surg* 2006;30(1):107-13.
<http://www.ncbi.nlm.nih.gov/pubmed/16369708>
- Erickson BA, Dumanian GA, Sisco M, Jang TL, Halverson AL, Gonzalez CM. Rectourethral fistula associated with two short segment urethral strictures in the anterior and posterior urethra: single-stage reconstruction using buccal mucosa and a radial forearm fasciocutaneous free flap. *Urology* 2006;67(1):195-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16413364>
- Castillo OA, Bodden E, Vitagliano G. Management of rectal injury during laparoscopic radical prostatectomy. *Int Braz J Urol* 2006;32(4):428-33.
<http://www.ncbi.nlm.nih.gov/pubmed/16953909>
- Quinlan M, Cahill R, Keane F, Grainger R, Butler M. Transanal endoscopic microsurgical repair of iatrogenic recto-urethral fistula. *Surgeon* 2005;3(6):416-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16353863>
- Bochove-Overgaauw DM, Beerlage HP, Bosscha K, Gelderman WA. Transanal endoscopic microsurgery for correction of rectourethral fistulae. *J Endourol* 2006;20(12):1087-90.
<http://www.ncbi.nlm.nih.gov/pubmed/17206908>
- Varma MG, Wang JY, Garcia-Aguilar J, Shelton AA, McAninch JW, Goldberg SM. Dartos muscle interposition flap for the treatment of rectourethral fistulas. *Dis Colon Rectum* 2007;50(11):1849-55.
<http://www.ncbi.nlm.nih.gov/pubmed/17828402>
- Chirica M, Parc Y, Turet E, Dehni N, McNamara D, Parc R. Coloanal sleeve anastomosis (Soave procedure): the ultimate treatment option for complex rectourinary fistulas. *Dis Colon Rectum* 2006;49(9):1379-83.
<http://www.ncbi.nlm.nih.gov/pubmed/16819570>
- Reynolds WS, Patel R, Msezane L, Lucioni A, Rapp DE, Bales GT. Current use of artificial urinary sphincters in the United States. *J Urol* 2007;178(2):578-83.
<http://www.ncbi.nlm.nih.gov/pubmed/17570407>
- Catto JW, Natarajan V, Tophill PR. Simultaneous augmentation cystoplasty is associated with earlier rather than increased artificial urinary sphincter infection. *J Urol* 2005;173(4):1237-41.
<http://www.ncbi.nlm.nih.gov/pubmed/15758760>
- Henry GD, Graham SM, Cleves MA, Simmons CJ, Flynn B. Perineal approach for artificial urinary sphincter implantation appears to control male stress incontinence better than the transscrotal approach. *J Urol* 2008;179(4):1475-9; discussion 1479.
<http://www.ncbi.nlm.nih.gov/pubmed/18295275>
- Kendirci M, Gupta S, Shaw K, et al. Synchronous prosthetic implantation through a transscrotal incision: an outcome analysis. *J Urol* 2006;175(6):2218-22.
<http://www.ncbi.nlm.nih.gov/pubmed/16697843>
- Sellers CL, Morey AF, Jones LA. Cost and time benefits of dual implantation of inflatable penile and artificial urinary sphincter prosthetics by single incision. *Urology* 2005;65(5):852-3.
<http://www.ncbi.nlm.nih.gov/pubmed/15882709>
- van der Horst C, Naumann CM, Wilson SK, Wefer B, Braun PM, Junemann KP. [Dysfunctions of artificial urinary sphincters (AMS 800) and their management via a transscrotal access. Optimum procedure illustrated by reference to clinical examples]. *Urologe A* 2007;46(12):1704-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17932644>
- Hussain M, Greenwell TJ, Venn SN, Mundy AR. The current role of the artificial urinary sphincter for the treatment of urinary incontinence. *J Urol* 2005;174(2):418-24.
<http://www.ncbi.nlm.nih.gov/pubmed/16006857>
- Petrou SP, Thiel DD, Elliot DS, Broderick GA, Wehle MJ, Young PR. Does indigo carmine prevent early artificial urinary sphincter cuff erosion? *Can J Urol* 2006;13(4):3195-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16952328>
- Webster GD, Sherman ND. Management of male incontinence following artificial urinary sphincter failure. *Curr Opin Urol* 2005;15(6):386-90.
<http://www.ncbi.nlm.nih.gov/pubmed/16205488>
- Lopez Pereira P, Somoza Ariba I, Martinez Urrutia MJ, Lobato Romero R, Jaureguizar Monroe E. Artificial urinary sphincter: 11-year experience in adolescents with congenital neuropathic bladder. *Eur Urol* 2006;50(5):1096-101; discussion 101.
<http://www.ncbi.nlm.nih.gov/pubmed/16530321>

- Ruiz E, Puigdevall J, Moldes J, et al. 14 years of experience with the artificial urinary sphincter in children and adolescents without spina bifida. *J Urol* 2006;176(4 Pt 2):1821-5.
<http://www.ncbi.nlm.nih.gov/pubmed/16945659>
- Patki P, Hamid R, Shah PJ, Craggs M. Long-term efficacy of AMS 800 artificial urinary sphincter in male patients with urodynamic stress incontinence due to spinal cord lesion. *Spinal Cord* 2006;44(5):297-300.
<http://www.ncbi.nlm.nih.gov/pubmed/16249789>
- Magera JS, Jr., Elliott DS. Tandem transcorporal artificial urinary sphincter cuff salvage technique: surgical description and results. *J Urol* 2007;177(3):1015-19; discussion 1019-20.
<http://www.ncbi.nlm.nih.gov/pubmed/17296400>
- Rahman NU, Minor TX, Deng D, Lue TF. Combined external urethral bulking and artificial urinary sphincter for urethral atrophy and stress urinary incontinence. *BJU Int* 2005;95(6):824-6.
<http://www.ncbi.nlm.nih.gov/pubmed/15794791>
- Werner M, Schmid DM, Schussler B. Efficacy of botulinum-A toxin in the treatment of detrusor overactivity incontinence: a prospective nonrandomized study. *Am J Obstet Gynecol* 2005;192(5):1735-40.
<http://www.ncbi.nlm.nih.gov/pubmed/15902187>

An exhaustive reference list is available for consultation on line at the society website (<http://www.uroweb.org/professional-resources/guidelines/>) and on the guidelines CD-rom version.

5. INCONTINENCE IN WOMEN*

5.1 Initial assessment

Initial assessment should triage patients into those with a 'complicated' incontinence, who require referral for specialised management and those suitable for general assessment. The 'complicated' incontinence group comprises patients with:

- Pain
- Haematuria
- Recurrent infections
- Voiding dysfunction
- Significant pelvic organ prolapse
- Failed previous incontinence surgery
- Previous pelvic radiotherapy
- Previous pelvic surgery
- Suspected fistula.

The remaining patients, with a history of UI identified by initial assessment, can be stratified into three main symptomatic groups of women suitable for initial primary care management:

- Stress incontinence
- Overactive bladder (OAB) symptoms: urgency with or without urgency incontinence, frequency and nocturia
- Mixed urgency and stress incontinence.

Routine physical examination includes abdominal, pelvic and perineal examinations. Women should perform a 'stress test' (cough and strain) to detect leakage secondary to sphincter incompetence. Any POP or urogenital atrophy must be assessed. It is also important to assess voluntary pelvic floor muscle function by vaginal or rectal examination before teaching pelvic floor muscle training (PFMT).

5.2 Initial treatment of UI in women

For women with stress, urgency or mixed urinary incontinence, initial treatment includes appropriate lifestyle advice, physical therapy, a scheduled voiding regime, behavioural therapy and medication (Table 7, Figure 3). Some recommendations are based on good and consistent evidence of effect. However, many other recommendations are based on insufficient level 1 or 2 evidence and are essentially hypotheses requiring better evidence of their benefit.

* This section of the guidelines is based on the recommendations of the ICI committees chaired by Jean Hay-Smith (Committee 12: Adult Conservative Management), Tony Smith (Committee 14: Surgery for Urinary Incontinence in Women) and Linda Brubaker (Committee 15: Surgery for Pelvic Organ Prolapse).

Table 7: Initial treatment for UI in women

Treatment	GR
<i>Lifestyle interventions</i>	
• For morbidly and moderately obese women, weight loss helps to reduce UI prevalence	A
• Caffeine intake reduction may benefit UI symptoms	B
• A decrease in fluid intake should only be tried in patients with abnormally high fluid intakes, as a decrease in fluids may lead to UTIs, constipation, or dehydration	C
• Crossing the legs and bending forward can help to reduce leakage during coughing or other provocations	C
<i>Pelvic floor muscle training: general considerations</i>	
• PFMT should be offered as first-line conservative therapy to women with stress, urgency, or mixed UI	A
• Provide the most intensive PFMT programme possible (i.e. amount of exercise and of health professional supervision) within service constraints, as health-professional or supervised programmes are more effective than self-directed programmes. In addition, greater health professional contact is better than less	A
• The addition of biofeedback to the PFMT programme does not appear to be of benefit:	
- clinic biofeedback	A
- home-based biofeedback	B
<i>Vaginal cones</i>	
• VC may be offered to women with SUI or MUI	
• VC can be offered as first-line conservative therapy to those who can, and are prepared to use them	B
• VC may not be helpful because of side-effects and discomfort	
• VC and EStim seem equally effective in SUI and MUI, but the usefulness of VC and EStim is limited because of side-effects and discomfort	B
<i>Electrical stimulation</i>	
• EStim may be offered to women with SUI, UUI or MUI	
• For treating SUI, 6 months of EStim, 50 Hz twice daily at home, may be better than no treatment	C
• Low-intensity home-based EStim daily for 6 months may be better than 16 sessions of maximal clinic-based EStim	C
• For treating UUI secondary to DO, 9 weeks of EStim, 4-10 Hz twice daily at home, might be better than no treatment	C
• Addition of EStim to a biofeedback-assisted PFMT programme does not appear to add benefit	C
• EStim may have limited usefulness, because some women cannot use it (due to contraindications), have difficulty using it, or dislike it	
<i>Magnetic stimulation (MStim)</i>	
• MStim should only be used as part of a clinical trial as its benefit has not been established	NR
<i>Bladder training</i>	
• BT is an appropriate first-line treatment for UUI in women	A
• Either BT or antimuscarinic drugs may be effective for treating UUI	B
• Some patients may prefer BT because it does not produce the adverse events associated with drug therapy	
• Addition of a brief written instruction for BT, in addition to drug therapy, has no benefit	B
• For women with symptoms of SUI or MUI, a combination of PFMT/BT may be better than PFMT alone in the short-term	B
• Clinicians and researchers should refer to the operant conditioning and educational literature to explain their choice of training parameters or approach	NR
• Clinicians should provide the most intensive BT supervision possible within service constraints	B
<i>Timed voiding</i>	
• Timed voiding with a 2-hour voiding interval may be beneficial as a sole intervention for women with mild UI and infrequent voiding patterns	C

GR = grade of recommendation; UI = urinary incontinence; UTI = urinary tract infection; PFMT = pelvic floor muscle training; VC = vaginal cone; SUI = stress urinary incontinence; MUI = mixed urinary incontinence; EStim = electrical stimulation; MStim = magnetic stimulation; UUI = urge urinary incontinence; DO = detrusor overactivity; NR = no recommendation possible; BT = bladder training.

5.2.1 Pelvic floor muscle training (PFMT) under special circumstances

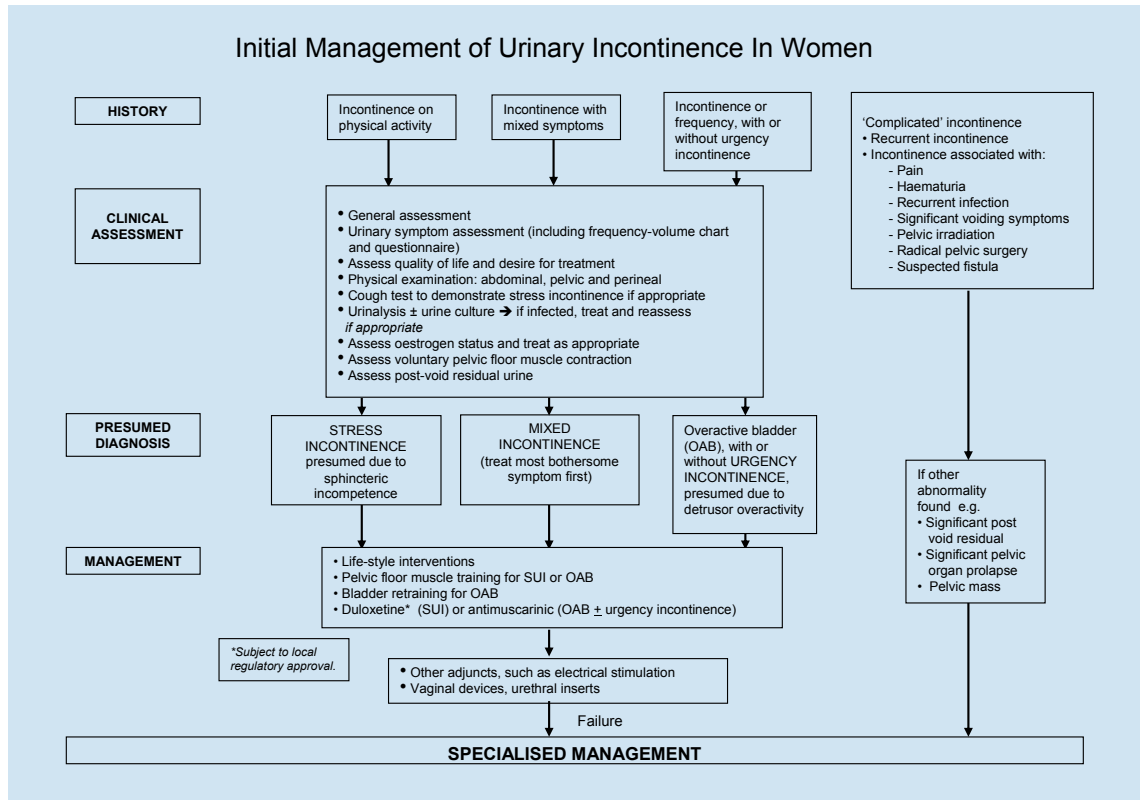
The following recommendations may help with decision-making for specific groups. However, most of these are essentially hypotheses that need further testing. Since empirical evidence is lacking the recommendations presented below are supported by expert opinion.

Recommendations for PFMT in special circumstances

Recommendations	GR
<i>Pregnant women expecting their first baby</i>	
• Offer an intensive strengthening ante-partum PFMT	
• Provide regular health professional contact to supervise PFMT training to prevent post-partum UI:	
- women continent at 18 weeks	A
- population approaches, i.e. intervention offered whether or not women are continent at 20 weeks' gestation	B
<i>Post-partum women, immediately after delivery</i>	
• After vaginal delivery of a large baby (≥ 4000 g) or a forceps delivery an individually-taught PFMT programme, which includes advice on how to keep to the programme, will be beneficial	C
<i>Post-partum women with persistent symptoms of UI at 3 months after delivery</i>	
• PFMT is offered as first-line conservative therapy	A
• 'Intensive' programmes, i.e. highly supervised and high amount of exercise	B
<i>Women with SUI</i>	
• PFMT is more effective than EStim as first-line conservative therapy, particularly if PFMT is intensively supervised	B
• PFMT is more effective than BT as first-line conservative therapy	B
• PFMT and duloxetine are both effective. Clinicians and women may choose to try PFMT first because of the side-effects associated with drug therapy	C
• PFMT and surgery are both effective, but many clinicians and women may prefer PFMT as a first-line therapy because it is less invasive	C
• PFMT and VC are both effective. PFMT is the preferred first choice because there is less leakage and some women cannot or do not like to use VCs	B
• PFMT is better than clenbuterol or phenylpropanolamine hydrochloride as first-line therapy because of the side-effects experienced with the medications	B
• A combination of PFMT + BT may be better than PFMT alone in short-term	C
<i>Women with UUI or MUI</i>	
• PFMT and BT are both effective as first-line conservative therapies	B
• PFMT is better than oxybutynin as first-line therapy	B

GR = grade of recommendation; PFMT = pelvic floor muscle training; UI = urinary incontinence; SUI = stress urinary incontinence; EStim = electrical stimulation; BT = bladder training; VC = vaginal cone; UUI = urgency urinary incontinence; MUI = mixed urinary incontinence.

Figure 3: Algorithm for initial management of UI in women



5.3 Specialised management of UI in women

5.3.1 Assessment

Women with ‘complicated’ incontinence requiring specialist management will probably need additional testing to rule out any underlying pathology, i.e. cytology, cysto-urethroscopy or urinary tract imaging. If these tests reveal no further pathology, the patient should be treated for UI by initial or specialised management options, as appropriate (Figure 4).

Women who have failed initial management and with an impaired QoL are likely to request further treatment. If initial management has been given an adequate trial, then interventional therapy may be helpful. Urodynamic testing to diagnose the type of UI is highly recommended prior to intervention if the results are likely to influence the choice of management. It may also be helpful to test urethral function by urethral pressure profile or leak point pressure during urodynamic testing.

A systematic assessment for POP is highly recommended. The Pelvic Organ Prolapses Quantification (POPQ) method should be used in research studies. Co-existing POP should be treated.

5.3.2 Treatment

If urodynamic SUI is confirmed, the following treatment options may be recommended for patients with some bladder-neck and urethral mobility:

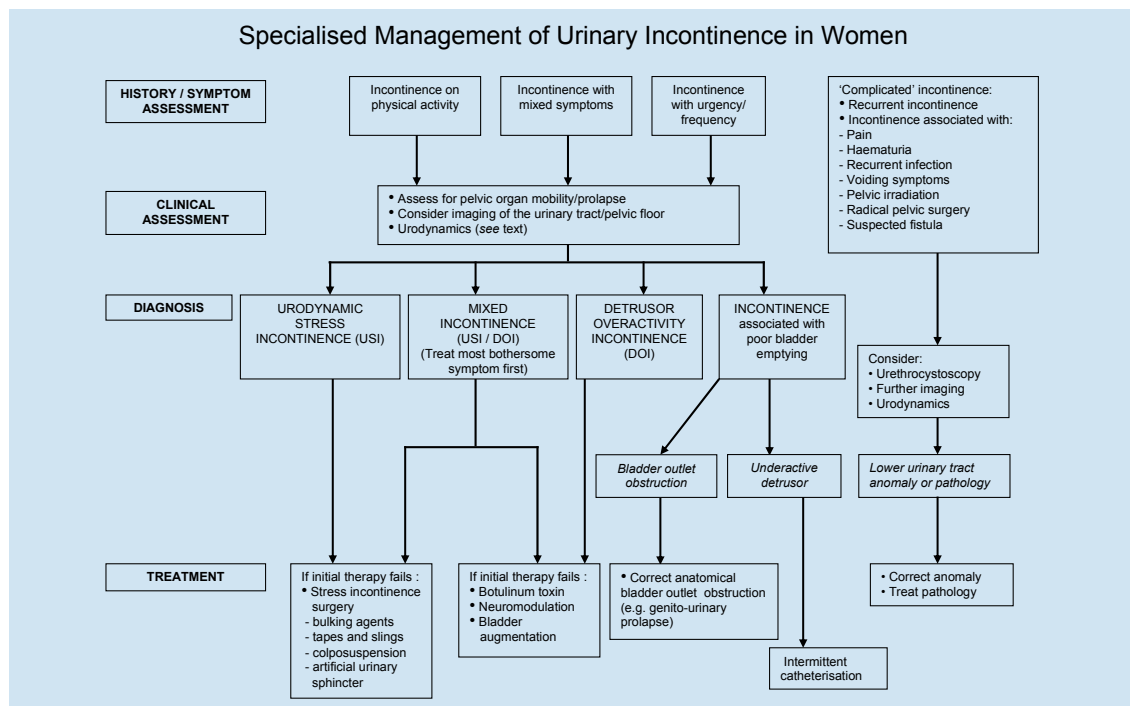
- full range of non-surgical treatments
- retropubic suspension procedures
- bladder neck/sub-urethral sling operations.

It may be helpful to correct symptomatic POP at the same time. For patients with limited bladder-neck mobility, consider using bladder neck sling procedures, injectable bulking agents and the artificial urinary sphincter.

Urgency incontinence (overactive bladder) secondary to idiopathic DO may be treated by neuromodulation or bladder augmentation. Botulinum toxin injection can be used to treat symptomatic DO unresponsive to other therapies (grade of recommendation: C). Botulinum toxin is currently being used for detrusor injection ‘off-label’ for this indication.

Patients with voiding dysfunction leading to significant post-void residual urine may have bladder outlet obstruction or detrusor underactivity. Pelvic organ prolapse is a common cause of voiding dysfunction.

Figure 4: Algorithm for specialised management of UI in women



5.4 Surgery for UI in women

Surgical approaches to UI in women are listed in Table 8. There are various confounding variables for successful surgery (Table 9). The true incidence of complications associated with surgery for UI is not known, due to a lack of standard methods of reporting and definitions. In addition, there is a discrepancy between academic and community practice. However, there appears to be a low incidence of most complications, which makes it difficult to perform power calculations for RCTs. National registries provide some information about the level of complications. Complications are less likely with proper surgical training (level of evidence: 2-3) and skills can be maintained by performing at least 20 cases annually for each primary procedure (National Institute of Clinical Excellence, NICE).

Table 8: Surgery for UI in women

Surgical approach	LE	GR
Anterior colporrhaphy		
• Outcome of anterior colporrhaphy is comparable to needle suspension, but less effective than open colposuspension. The effectiveness deteriorates substantially with time	2	
• Anterior colporrhaphy is not recommended as treatment of SUI alone		A
Open colposuspension		
• Similar success compared to mid-urethral retropubic slings	1	
• Similar success compared to bladder neck slings	1-2	
• Similar success compared to transobturator slings	2	
• Risk of voiding dysfunction is higher than with TVT	1	
• Risk of voiding dysfunction is less than with slings	1	
• Prolapse after colposuspension is more likely than after TVT	1	
• The risk of de-novo DO is the same as after TVT	1	
• Mitrofanoff urethroplasty, BNS suspension, and paravaginal repair are not recommended for treatment of SUI alone		B
• Open colposuspension is an effective, long-lasting treatment for primary SUI		A
Laparoscopic colposuspension		
• Laparoscopic colposuspension is comparable to open colposuspension when performed by experienced laparoscopic surgeons	1-2	
• Equal or higher cure rates compared to TVT	1-2	
• Shorter operating time and faster recovery compared to TVT	1-2	

• Laparoscopic colposuspension is an option for treating SUI		B
• Laparoscopic colposuspension should only be performed by experienced laparoscopic surgeons		NR
<i>Traditional sling procedures</i>		
• Autologous fascial sling is effective	1	
• Autologous fascial sling may be more effective than biological and synthetic slings	2	
• Adverse events may be more common than with non-autologous materials	3	
• Autologous fascial sling is recommended as an effective, long-lasting treatment for SUI		A
<i>Urethral bulking agents</i>		
• Urethral bulking agents show similar symptomatic improvement with both placebo and autologous fat	1	
• Less effective than conventional surgery	2	
• No evidence to show that any bulking agent is more effective than another	2	
• No data to compare urethral bulking agents with non-surgical treatments or with other minimal-access surgical techniques	2	
• Women should be aware that efficacy of ureteral bulking agents decreases with time, repeat injections may be necessary, and efficacy is less than that of other surgical techniques		B
<i>Mid-urethral tapes</i>		
• TVT® is more effective than SPARC® tape	2	
• IVS® has similar efficacy as TVT®, but a higher complication rate	2	
<i>Mid-urethral tapes vs other procedures</i>		
• TVT® is equally effective as colposuspension and traditional sling operations	1-2	
• Operation time, hospital stay and return to normal activity is shorter with TVT® than with colposuspension	1-2	
• Post-operative voiding problems and need for prolapse surgery are more common with colposuspension	1-2	
<i>Retropubic tapes vs transobturator tapes</i>		
• Similar efficacy up to 12 months		
• Similar complication rates in Finnish study	1	
• Relative risk of bladder injury increased by 6-fold for retropubic sling		
• Relative risk of urethral injury increased by 4-fold for transobturator sling		
<i>Contraindications for mid-urethral slings</i>		
• Absolute contraindications are urethrovaginal fistula, urethral diverticulum, intra-operative urethral injury and untreated urinary malignancy	4	
• Increased risk of complications including failure with radiotherapy, UTI, steroids, COPD, anticoagulant therapy, vaginal atrophy, congenital anomalies (exstrophy, ureteral ectopy, etc) and planned pregnancy		
<i>'Mini-slings'</i>		
• Data immature, no recommendation possible		NR
<i>Surgery for detrusor overactivity</i>		
• Sacral neuromodulation appears to have benefit for patients with urgency incontinence, as well as urgency and frequency	1-3	A
• Posterior tibial nerve stimulation is effective, but durability is a concern	3-4	
<i>Urethral diverticulae</i>		
• No grade A recommendations regarding optimal diagnostic algorithm or adjuvant therapy of concomitant SUI		
• One long-term study showing recurrence of diverticulum in 17%, de-novo SUI in 38%, and dyspareunia in 22%	3	
<i>Non-obstetric urinary fistulae</i>		
• No grade A recommendation for fistula evaluation, timing of corrective intervention, methods and adjuncts of correction, and associated management strategies. All evidence is based on clinical series and/or case studies and lacks randomised and/or controlled studies	2-4	

LE = level of evidence; GR = grade of recommendation; SUI = stress urinary incontinence; TVT = tension-free vaginal tape; NR = no recommendation possible; MMK = Marshall-Marchetti-Krantz; BNS = bladder-neck suspension; DO = detrusor overactivity; IVS = intravaginal slingplasty; UTI = urinary tract infection; COPD = chronic obstructive pulmonary disease.

Table 9: Confounding variables for use of surgery for UI in women

Confounding variables for use of surgery	
•	Age
•	Physical activity
•	Medical illness
•	Psychiatric illness
•	Obesity
•	Parity
•	Previous incontinence surgery
•	Hysterectomy during anti-incontinence procedure
•	Race
•	Severity and duration of symptoms
•	Overactive bladder
•	Urethral occlusive forces
•	Surgical factors

5.4.1 Outcome measures

Until a universal outcome tool has been established, multiple outcome measures must be used. They include:

- symptoms and separate bother questionnaire
- clinically important outcomes (pad use, re-operation rates, anticholinergics, clean intermittent self-catheterisation (CIC) and recurrent UTIs)
- complications
- QoL tool with ‘minimal clinically important difference’ (MCID) Global Impression Index
- health-economic outcome.

Recommendations for surgical treatment of SUI

Surgical procedure	GR
• Anterior colporrhaphy	NR
• Transvaginal BNS (needle)	NR
• Burch procedure: open	A
• Burch procedure: laparoscopic (by experienced laparoscopic surgeon only)	B
• Paravaginal	NR
• MMK urethroplasty	NR
• BN sling: autologous fascia	A
• Sub-urethral slings (TVT)	A
• Urethral bulking agents	B

NR = no recommendation possible; BNS = bladder-neck suspension; GR = grade of recommendation; MMK = Marshall-Marchetti-Krantz; BN = bladder neck; TVT = tension-free vaginal tape.

5.6 REFERENCES*

- Hilton P. Long-term follow-up studies in pelvic floor dysfunction: the Holy Grail or a realistic aim? *BJOG* 2008;115(2):135-43. Epub 2007. <http://www.ncbi.nlm.nih.gov/pubmed/17999691>
- Atkins D, et al. Systems for grading the quality of evidence and the strength of recommendations II: pilot study of a new system. *BMC Health Serv Res* 2005;5(1):25. <http://www.ncbi.nlm.nih.gov/pubmed/15788089>
- Guyatt GH, et al. What is “quality of evidence” and why is it important to clinicians? *BMJ* 2007;336(7651):995-8. <http://www.ncbi.nlm.nih.gov/pubmed/18456631>
- Guyatt GH, et al. Going from evidence to recommendations. *BMJ* 2008;336(7652):1049-51. <http://www.ncbi.nlm.nih.gov/pubmed/18467413>

- Guyatt GH, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336(7650):924-6.
<http://www.ncbi.nlm.nih.gov/pubmed/18436948>
- Bezerra CA, Bruschini H, Cody DJ. Traditional suburethral sling operations for urinary incontinence in women. *Cochrane Database of Syst Rev* 2005;(3):CD001754
<http://www.ncbi.nlm.nih.gov/pubmed/16034866>
- Lapitan MC, Cody DJ, Grant AM. Open retropubic colposuspension for urinary incontinence in women. *Cochrane Database of Syst Rev* 2005;(3):CD002912.
<http://www.ncbi.nlm.nih.gov/pubmed/16034879>
- Dean NM, Ellis G, Wilson PD, Herbison GP. Laparoscopic colposuspension for urinary incontinence in women. *Cochrane Database of Syst Rev* 2006;(3):CD002239.
<http://www.ncbi.nlm.nih.gov/pubmed/16855989>
- Keegan PE, Atiemo K, Cody J, McClinton S, Pickard R. Periurethral injection therapy for urinary incontinence in women. *Cochrane Database of Syst Rev* 2007;(3):CD003881.
<http://www.ncbi.nlm.nih.gov/pubmed/17636740>
- Smith A, Daneshgari F, Dmochowski R, Milani R, Miller K, Paraiso MF, Rovner E. Surgery for urinary incontinence in women. In: *Incontinence*, 3rd ed. Abrams P, Cardozo L, Khoury S, Wein A, eds. *Incontinence*: Plymouth, UK: Health Publications Ltd, 2005;1:pp 1297-1230.
- Klarskov P, Belving D, Bischoff N, Dorph S, Gerstenberg T, Okholm B, Pedersen PH, Tikjob G, Wormslev M, Hald T. Pelvic floor exercise versus surgery for female urinary stress incontinence. *Urol Int* 1986;41(2):129-32.
<http://www.ncbi.nlm.nih.gov/pubmed/3727190>
- Colombo M, Vitobello D, Proietti F, Milani R. Randomised comparison of Burch colposuspension versus anterior colporrhaphy in women with stress urinary incontinence and anterior vaginal wall prolapse. *BJOG* 2007;107(4):544-51.
<http://www.ncbi.nlm.nih.gov/pubmed/10759276>
- Carey MP, Goh JT, Rosamilia A, Cornish A, Gordon I, Hawthorne G, Maher CF, Dwyer PL, Moran P, Gilmour DT. Laparoscopic versus open Burch colposuspension: a randomised controlled trial. *BJOG* 2006;113(9):999-1006.
<http://www.ncbi.nlm.nih.gov/pubmed/16956331>
- Dumville JC, Manca A, Kitchener HC, Smith AR, Nelson L, Torgerson DJ; COLPO Study Group. Cost-effectiveness analysis of open colposuspension versus laparoscopic colposuspension in the treatment of urodynamic stress incontinence. *BJOG* 2006;113(9):1014-22.
- Ward KL, Hilton P; UK and Ireland TVT Trial Group. Tension-free vaginal tape versus colposuspension for primary urodynamic stress incontinence: 5-year follow up. *BJOG* 2008;115(2):226-33.
<http://www.ncbi.nlm.nih.gov/pubmed/17970791>
- Albo ME, et al; Urinary Incontinence Treatment Network. Burch colposuspension versus fascial sling to reduce urinary stress incontinence. *N Engl J Med* 2007;356(21):2143-55.
<http://www.ncbi.nlm.nih.gov/pubmed/17517855>
- Sivaslioglu AA, Caliskan E, Dolen I, Haberal A. A randomized comparison of transobturator tape and Burch colposuspension in the treatment of female stress urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(9):1015-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17180553>
- McCrery RJ, Rebecca J, Thompson PK. Outcomes of urethropexy added to paravaginal defect repair: a randomized trial of Burch versus Marshall-Marchetti-Krantz. *Journal of Pelvic Medicine and Surgery* 2005;11(3):137-43.
<http://www.jpelvic surgery.com/pt/re/spv/abstract.00146866-200505000-00003.htm>
- Bai SW, Sohn WH, Chung DJ, Park JH, Kim SK. Comparison of the efficacy of Burch colposuspension, pubovaginal sling, and tension-free vaginal tape for stress urinary incontinence. *Int J Gynaecol Obstet* 2005;91(3):246-51.
<http://www.ncbi.nlm.nih.gov/pubmed/16242695>
- Tennstedt S; Urinary Incontinence Treatment Network. Design of the Stress Incontinence Surgical Treatment Efficacy Trial (SISTEr). *Urology* 2005;66(6):1213-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16360445>
- Mallett VT, Brubaker L, Stoddard AM, Borello-France D, Tennstedt S, Hall L, Hammontree L; Urinary Incontinence Treatment Network. The expectations of patients who undergo surgery for stress incontinence. *Am J Obstet Gynecol* 2008;198(3):308.e1-e6.
<http://www.ncbi.nlm.nih.gov/pubmed/18313452>

- Richter HE, Diokno A, Kenton K, Norton P, Albo M, Kraus S, Moalli P, Chai TC, Zimmern P, Litman H, Tennstedt S; Urinary Incontinence Treatment Network. Predictors of treatment failure 24 months after surgery for stress urinary incontinence. *J Urol* 2008;179(3):1024-30.
<http://www.ncbi.nlm.nih.gov/pubmed/18206917>
- El-Barky E, El-Shazly A, El-Wahab OA, Kehinde EO, Al-Hunayan A, Al-Awadi, KA. Tension free vaginal tape versus Burch colposuspension for treatment of female stress urinary incontinence. *Int Urol Nephrol* 2005;37(2):277-81.
<http://www.ncbi.nlm.nih.gov/pubmed/16142556>
- Ankardal M, Milsom I, Stjerndahl JH, Engh ME. A three-armed randomized trial comparing open Burch colposuspension using sutures with laparoscopic colposuspension using sutures and laparoscopic colposuspension using mesh and staples in women with stress urinary incontinence. *Acta Obstet Gynecol Scand* 2005;84(8):773-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16026404>
- Ustün Y, Engin-Ustün Y, Güngör M, Tezcan S. Randomized comparison of Burch urethropexy procedures concomitant with gynecologic operations. *Gynecol Obstet Invest* 2005;59(1):19-23.
<http://www.ncbi.nlm.nih.gov/pubmed/15627777>
- Kitchener HC, Dunn G, Lawton V, Reid F, Nelson L, Smith AR. & Group, O. B. O. T. C. S. Laparoscopic versus open colposuspension—results of a prospective randomised controlled trial. *BJOG* 2006;113(9):1007-13.
<http://www.ncbi.nlm.nih.gov/pubmed/16956332>
- Dietz HP, Wilson PD. Laparoscopic colposuspension versus urethropexy: a case-control series. *Int Urogynecol J Pelvic Floor Dysfunct* 2005;16(1):15-8.
<http://www.ncbi.nlm.nih.gov/pubmed/15647961>
- McCracken GR, Henderson NA, Ashe RG. Five year follow-up comparing tension-free vaginal tape and colposuspension. *Ulster Med J* 2007;76(3):146-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17853641>
- Sun MJ, Ng SC, Tsui KP, Chang NE, Lin KC, Chen GD. Are there any predictors for failed Burch colposuspension? *Taiwan J Obstet Gynecol* 2006;45(1):33-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17272205>
- Ng S, Tee YT, Tsui KP, Chen GD. Is the role of Burch colposuspension fading away in this epoch for treating female urinary incontinence? *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(8):937-42.
<http://www.ncbi.nlm.nih.gov/pubmed/17139462>
- Rardin CR, Sung VW, Hampton BS, Clemons JL, Aguilar V, Sokol ER. Long-term follow-up of a transvaginal Burch urethropexy for stress urinary incontinence. *Am J Obstet Gynecol* 2007;197(6):656.e1-e5.
<http://www.ncbi.nlm.nih.gov/pubmed/18060969>
- Reid SV, Parys BT. Long-term 5-year followup of the results of the vesica procedure. *J Urol* 2005;173(4):1234-6.
<http://www.ncbi.nlm.nih.gov/pubmed/15758759>
- Gregorakis A, Bouropoulos C, Dimitriou D, Rallis G, Vernadakis S, Papadopoulos IN, Kastriotis I. Delayed reaction to the Dacron buttress used in Stamey bladder neck suspension. *Int Urol Nephrol* 2006;38(2):269-72.
<http://www.ncbi.nlm.nih.gov/pubmed/16868695>
- Smith A, Rovner E. Long-term chronic complications from Stamey endoscopic bladder neck suspension: a case series. *Int Urogynecol J Pelvic Floor Dysfunct* 2006;17(3):290-4.
<http://www.ncbi.nlm.nih.gov/pubmed/15965575>
- Mirosh M, Epp A. TVT vs laparoscopic Burch colposuspension for the treatment of stress urinary incontinence. International Continence Society. 35th annual meeting. Montreal, Canada, 2005.
- Dean NM, Herbison P, Ellis G, Wilson D. Laparoscopic colposuspension and tension-free vaginal tape: a systematic review. *BJOG* 2006;113(12):1345-53.
<http://www.ingentaconnect.com/content/bsc/bjo/2006/00000113/00000012/art00002;jsessionid=1946gsz6wq8wg.alexandra>
- Tan E, Tekkis PP, Cornish J, Teoh TG, Darzi AW, Khullar V. Laparoscopic versus open colposuspension for urodynamic stress incontinence. *Neurourol Urodyn* 2007;26(2):158-69.
<http://www.ncbi.nlm.nih.gov/pubmed/17252603>
- Jelovsek JE, Barber MD, Karram MM, Walters MD, Paraiso MF. Randomised trial of laparoscopic Burch colposuspension versus tension-free vaginal tape: long-term follow up. *BJOG* 2008;115(2):219-25; discussion 225.
<http://www.ncbi.nlm.nih.gov/pubmed/18081602>

- Valpas A, Rissanen P, Kujansuu E, Nilsson CG. A cost-effectiveness analysis of tension-free vaginal tape versus laparoscopic mesh colposuspension for primary female stress incontinence. *Acta Obstet Gynecol Scand* 2006;85(12):1485-90.
<http://www.ncbi.nlm.nih.gov/pubmed/17260226>
- Corcos J, Collet JP, Shapiro S, Herschorn S, Radomski SB, Schick E, Gajewski JB, Benedetti A, MacRamallah E, Hyams B. Multicenter randomized clinical trial comparing surgery and collagen injections for treatment of female stress urinary incontinence. *Urology* 2005;65(5):898-904.
<http://www.ncbi.nlm.nih.gov/pubmed/15882720>
- Maher CF, O'Reilly BA, Dwyer PL, Carey MP, Cornish A, Schuller P. Pubovaginal sling versus transurethral Macroplastique for stress urinary incontinence and intrinsic sphincter deficiency: a prospective randomised controlled trial. *BJOG* 2005;112(6):797-801.
<http://www.ncbi.nlm.nih.gov/pubmed/15924540>
- Appell R, Roger D, Robert M, Ira K, Hubbard W. Clinical experience with coaptite® urological bulking agent. International Continence Society, 33rd annual meeting, 2005. Florence, Italy.
- Bano F, Barrington JW, Dyer R. Comparison between porcine dermal implant (Permacol) and silicone injection (Macroplastique) for urodynamic stress incontinence. *International Urogynecology Journal & Pelvic Floor Dysfunction* 2005;16(2):147-50.
<http://www.ncbi.nlm.nih.gov/pubmed/15378234>
- Mayer RD, Dmochowski RR, Appell RA, Sand PK, Klimberg IW, Jacoby K, Graham CW, Snyder JA, Nitti VW, Winters JC. Multicenter prospective randomized 52-week trial of calcium hydroxylapatite versus bovine dermal collagen for treatment of stress urinary incontinence. *Urology* 2007;69(5):876-80.
<http://www.ncbi.nlm.nih.gov/pubmed/17482925>
- Ghoniem G, Bernhard P, Corcos J, Comiter C, Tomera K, Westney O, Herschorn S, Lucente V, Smith J, Wahle G, Mulcahy J. Multicenter randomised controlled trial to evaluate Macroplastique® urethral bulking agent for the Treatment of female stress urinary incontinence. International Continence Society, 35th annual meeting, 2005. Montreal, Canada.
- Abdelwahab HA, Ghoniem GM. Obstructive suburethral mass after transurethral injection of dextranomer/hyaluronic acid copolymer. *Int Urogynecol J* 2007;18(11):1379-80.
<http://www.ncbi.nlm.nih.gov/pubmed/17437054>
- Petrou SP, Pak RW, Lightner DJ. Simple aspiration technique to address voiding dysfunction associated with transurethral injection of dextranomer/hyaluronic acid copolymer. *Urology* 2006;68(1):186-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16777199>
- Hagemeyer T, Blau U, Gauruder-Burmester A, Tunn R. [Paraurethral abscess developing after mid-urethral Zuidex-injection in women with stress urinary incontinence -- management of complications and retrospective comparison with bladder neck located injection technique]. *Zentralbl Gynakol* 2006;128(2):68-70. [article in German]
<http://www.ncbi.nlm.nih.gov/pubmed/16673247>
- Madjar S, Sharma AK, Waltzer WC, Frischer Z, Secret CL. Periurethral mass formations following bulking agent injection for the treatment of urinary incontinence. *J Urol* 2006;175(4):1408-10.
<http://www.ncbi.nlm.nih.gov/pubmed/16516009>
- Wadie BS, Edwan A, Nabeeh AM. Autologous fascial sling vs polypropylene tape at short-term followup: a prospective randomized study. *J Urol* 2005;174(3):990-3.
<http://www.ncbi.nlm.nih.gov/pubmed/16094020>
- Guerrero K, Watkins A, Emery S, Wareham K, Stephenson T, Logan V, Lucas M. A randomised controlled trial comparing two autologous fascial sling techniques for the treatment of stress urinary incontinence in women: short, medium and long-term follow-up. *International Urogynecology Journal & Pelvic Floor Dysfunction* 2007;18(11):1263-70.
<http://www.biomedexperts.com/Abstract.bme/17347792>
- McBride AW, Ellerkmann RM, Bent AE, Melick CF. Comparison of long-term outcomes of autologous fascia lata slings with Suspend Tutoplast fascia lata allograft slings for stress incontinence. *Am J Obstet Gynecol* 2005;192(5):1677-81.
<http://www.ncbi.nlm.nih.gov/pubmed/15902176>
- Simsiman AJ, Powell CR, Stratford RR, Menefee SA. Suburethral sling materials: best outcome with autologous tissue. *Am J Obstet Gynecol* 2005;193(6):2112-6.
<http://www.ncbi.nlm.nih.gov/pubmed/16325625>

- Campeau L, Tu LM, Lemieux MC, Naud A, Karsenty G, Schick E, Corcos J. A multicenter, prospective, randomized clinical trial comparing tension-free vaginal tape surgery and no treatment for the management of stress urinary incontinence in elderly women. *Neurourol Urodyn* 2007;26(7):990-4. <http://www.ncbi.nlm.nih.gov/pubmed/17638307>
- Foote AJ, Maughan V, Carne C. Laparoscopic colposuspension versus vaginal suburethral slingplasty: a randomised prospective trial. *Aust N Z J Obstet Gynaecol* 2006;46(6):517-20. <http://www.ncbi.nlm.nih.gov/pubmed/17116057>
- Andonian S, Chen T, St-Denis B, Corcos J. Randomized clinical trial comparing suprapubic arch sling (SPARC) and tension-free vaginal tape (TVT): one-year results. *Eur Urol* 2005;47(4):537-41. <http://www.ncbi.nlm.nih.gov/pubmed/15774255>
- Lord HE, Taylor JD, Finn JC, Tsokos N, Jeffery JT, Atherton MJ, Evans SF, Bremner AP, Elder GO, Holman CD. A randomized controlled equivalence trial of short-term complications and efficacy of tension-free vaginal tape and suprapubic urethral support sling for treating stress incontinence. *BJU Int* 2006;98(2):367-76. <http://www.ncbi.nlm.nih.gov/pubmed/16879679>
- Lim YN, Muller R, Corstiaans A, Dietz HP, Barry C, Rane A. Suburethral slingplasty evaluation study in North Queensland, Australia: the SUSPEND trial. *Aust N Z J Obstet Gynaecol* 2005;45(1):52-9. <http://www.ncbi.nlm.nih.gov/pubmed/15730366>
- Meschia M, Pifarotti P, Bernasconi F, Magatti F, Viganò R, Bertozzi R, Barbacini P. Tension-free vaginal tape (TVT) and intravaginal slingplasty (IVS) for stress urinary incontinence: a multicenter randomized trial. *Am J Obstet Gynecol* 2006;195(5):1338-42. <http://www.ncbi.nlm.nih.gov/pubmed/16769016>
- Zullo MA, Plotti F, Calcagno M, Marullo E, Palaia I, Bellati F, Basile S, Muzii L, Angioli R, Panici PB. One-year follow-up of tension-free vaginal tape (TVT) and trans-obturator suburethral tape from inside to outside (TVT-O) for surgical treatment of female stress urinary incontinence: a prospective randomised trial. *Eur Urol* 2007;51(5):1376-82; discussion 1383-4. <http://www.ncbi.nlm.nih.gov/pubmed/17110021>
- Liapis A, Bakas P, Giner M, Creatsas G. Tension-free vaginal tape versus tension-free vaginal tape obturator in women with stress urinary incontinence. *Int J Gynaecol Obstet* 2006;92(1):48-51. <http://www.ncbi.nlm.nih.gov/pubmed/16253254>
- Laurikainen E, Valpas A, Kivelä A, Kalliola T, Rinne K, Takala T, Nilsson CG. Retropubic compared with transobturator tape placement in treatment of urinary incontinence: a randomized controlled trial. *Obstet Gynecol* 2007;109(1):4-11. <http://www.ncbi.nlm.nih.gov/pubmed/17197581>
- Araco F, Gravante G, Sorge R, Overton J, De Vita D, Sesti F, Piccione E. TVT-O vs TVT: a randomized trial in patients with different degrees of urinary stress incontinence. *Int Urogynecol J Pelvic Floor Dysfunct* 2008;19(7):917-26. <http://www.ncbi.nlm.nih.gov/pubmed/18217177>
- Rinne K, Laurikainen E, Kivelä A, Aukee P, Takala T, Valpas A, Nilsson CG. A randomized trial comparing TVT with TVT-O: 12 months results. *Int Urogynecol J Pelvic Floor Dysfunct* 2008;19(8):1049-54. <http://www.ncbi.nlm.nih.gov/pubmed/18373046>
- Andonian S, St-Denis B, Lemieux MC, Corcos J. Prospective clinical trial comparing Obtape and DUPS to TVT: one-year safety and efficacy results.[see comment]. *Eur Urol* 2007;52(1):245-51. <http://www.ncbi.nlm.nih.gov/pubmed/17234331>
- Porena M, Costantini E, Frea B, Giannantoni A, Ranzoni S, Mearini L, Bini V, Kocjancic E. Tension-free vaginal tape versus transobturator tape as surgery for stress urinary incontinence: results of a multicentre randomised trial. *Eur Urol* 2007;52(5):1481-90. <http://www.ncbi.nlm.nih.gov/pubmed/17482343>
- Gillon G, Stanton SL. Long-term follow-up of surgery for urinary incontinence in elderly women. *Br J Urol* 1984;56(5):478-81. <http://www.ncbi.nlm.nih.gov/pubmed/6534447>
- Gordon D, Gold R, Puzner D, Lessing JB, Groutz A. Tension-free vaginal tape in the elderly: is it a safe procedure? *Urology* 2005;65(3):479-82. <http://www.ncbi.nlm.nih.gov/pubmed/15780359>
- Lowenstein L, Kenton K, Dooley Y, R Mueller E, Brubaker L. Women who experience detrusor overactive at lower bladder volumes report greater bother. *Neurourol Urodyn* 2008;27(1):45-7. <http://www.ncbi.nlm.nih.gov/pubmed/17600369>

- Anger JT, Saigal CS, Madison R, Joyce G, Litwin MS; Urologic Diseases of America Project. Increasing Costs of Urinary Incontinence Among Female Medicare Beneficiaries. *J Urol* 2006;176(1):247-51; discussion 251.
<http://www.ncbi.nlm.nih.gov/pubmed/16753411>
- Anger JT, Rodríguez LV, Wang Q, Chen E, Pashos CL, Litwin MS. Racial disparities in the surgical management of stress incontinence among female Medicare beneficiaries. *J Urol* 2007;177(5):1846-50.
<http://www.ncbi.nlm.nih.gov/pubmed/17437833>
- Kraus SR, Markland A, Chai TC, Stoddard A, FitzGerald MP, Leng W, Mallett V, Tennstedt SL; Urinary Incontinence Treatment Network. Race and ethnicity do not contribute to differences in preoperative urinary incontinence severity or symptom bother in women who undergo stress incontinence surgery. *Am J Obstet Gynecol* 2007;197(1):92.e1-e6.
<http://www.ncbi.nlm.nih.gov/pubmed/17618773>
- Daneshgari F, Moore C. Advancing the understanding of pathophysiological rationale for the treatment of stress urinary incontinence in women: the 'trampoline theory'. *BJU Int* 2006;98 Suppl 1:8-14; discussion 15-6.
<http://www.ncbi.nlm.nih.gov/pubmed/16911594>
- Kjølhede P, Wahlström J, Wingren G. Pelvic floor dysfunction after Burch colposuspension--a comprehensive study. Part I. *Acta Obstet Gynecol Scand* 2005;84(9):894-901.
<http://www.ncbi.nlm.nih.gov/pubmed/16097983>
- Anger JT, Rodríguez LV, Wang Q, Chen E, Pashos CL, Litwin MS. Racial disparities in the surgical management of stress incontinence among female Medicare beneficiaries. *J Urol* 2007;177(5):1846-50.
<http://www.ncbi.nlm.nih.gov/pubmed/17437833>
- Skriapas K, Poulakis V, Dillenburg W, de Vries R, Witzsch U, Melekos M, Becht E. Tension-free vaginal tape (TVT) in morbidly obese patients with severe urodynamic stress incontinence as last option treatment. *Eur Urol* 2006;49(3):544-50.
<http://www.ncbi.nlm.nih.gov/pubmed/16387416>
- Rogers RG, Lebküchner U, Kammerer-Doak DN, Thompson PK, Walters MD, Nygaard IE. Obesity and retropubic surgery for stress incontinence: is there really an increased risk of intraoperative complications? *Am J Obstet Gynecol* 2006;195(6):1794-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17014816>
- Nam SB, Bae JH, Lee JG. Surgical considerations for recurrent stress urinary incontinence after the midurethral sling procedure: Redo midurethral sling and shortening of the tape. [Korean]. *Korean J Urol* 2007;48:527-35.
<http://www.urology.or.kr/journal/viewJournal.html?year=2007&vol=48&page=527>
- Moore RD, Gamble K, Miklos JR. Tension-free vaginal tape sling for recurrent stress incontinence after transobturator tape sling failure. *International Urogynecology Journal & Pelvic Floor Dysfunction* 2007;18:309-13.
<http://www.ncbi.nlm.nih.gov/pubmed/16868658>
- Argirovic R, Likic I, Kadija S, Milenkovic V, Ilic-Mostic T, Arsenijevic Lj. [Outcome of Burch retropubic urethropexy and the effect of concomitant abdominal hysterectomy]. *Acta Chir Iugosl* 2006;53(1):77-81.
<http://www.ncbi.nlm.nih.gov/pubmed/16989152>
- Botros SM, Abramov Y, Goldberg RP, Beaumont JL, Gandhi S, Miller JJ, Sand PK. Detrusor overactivity and urge urinary incontinence [corrected] following midurethral versus bladder sling procedures. *Am J Obstet Gynecol* 2005;193(6):2144-8. Erratum in: *Am J Obstet Gynecol* 2006;194(2):595.
<http://www.ncbi.nlm.nih.gov/pubmed/16325631>
- Duckett JR & Tamilselvi A. Effect of tension-free vaginal tape in women with a urodynamic diagnosis of idiopathic detrusor overactivity and stress incontinence. *BJOG: Int J Obstet Gynaecol* 2006;113(1):30-3.
<http://www.ncbi.nlm.nih.gov/pubmed/16398768>
- Choe JH, Choo MS, Lee KS. The impact of tension-free vaginal tape on overactive bladder symptoms in women with stress urinary incontinence: significance of detrusor overactivity. *J Urol* 2008;179(1):214-9.
<http://www.ncbi.nlm.nih.gov/pubmed/18001792>
- McLennan MT, Melick CF. Bladder perforation during tension-free vaginal tape procedures: analysis of learning curve and risk factors. *Obstet Gynecol* 2005;106(5 Pt 1):1000-4.
<http://www.ncbi.nlm.nih.gov/pubmed/16260518>

- Digesu GA, Salvatore S, Chaliha C, Athanasiou S, Milani R, Khullar V. Do overactive bladder symptoms improve after repair of anterior vaginal wall prolapse? *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(12):1439-43.
<http://www.ncbi.nlm.nih.gov/pubmed/17429557>
- Foster RT Sr, Barber MD, Parasio MF, Walters MD, Weidner AC, Amundsen CL. A prospective assessment of overactive bladder symptoms in a cohort of elderly women who underwent transvaginal surgery for advanced pelvic organ prolapse. *Am J Obstet Gynecol* 2007;197(1):82.e1-e4.
<http://www.ncbi.nlm.nih.gov/pubmed/17618768>
- Boyles SH, Edwards R, Gregory W, Clark A. Complications associated with transobturator sling procedures. *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(1):19-22.
<http://www.ncbi.nlm.nih.gov/pubmed/16568214>
- Deng DY, Rutman M, Raz S, Rodriguez LV. Presentation and management of major complications of midurethral slings: Are complications under-reported? *Neurourol Urodyn* 2007;26(1):46-52.
<http://www.ncbi.nlm.nih.gov/pubmed/17149713>
- TAUB Taub DA, Hollenbeck BK, Wei JT, Dunn RL, McGuire EJ, Latini JM. Complications following surgical intervention for stress urinary incontinence: a national perspective. *Neurourol Urodyn* 2005;24(7):659-65.
<http://www.ncbi.nlm.nih.gov/pubmed/16173038>
- Adams E, Bardsley A, Crumlin L, Currie I, Evans L, Haslam J, Hilton P, Jones M, Lucas M, Spinks J, Townsend J, Wagg A, Dougherty M, Wyn Evans B, Jacklin P, Kwan I, Pledge D, Vahidi S. Urinary Incontinence: The management of urinary incontinence in women. In: National Collaborating Centre for Women's and Children's Health, Hace NIF (Ed.). London, UK. RCOG Press. ISBN 1-904752-32-2, 2006.
<http://www.nice.org.uk/nicemedia/pdf/CG40fullguideline.pdf>
- Schraffordt Koops SE, Bisseling TM, Heintz AP, Vervest HA. Prospective analysis of complications of tension-free vaginal tape from The Netherlands Tension-free Vaginal Tape study. *Am J Obstet Gynecol* 2005;193(1):45-52.
<http://www.ncbi.nlm.nih.gov/pubmed/16021057>
- Zhu L, Lang J, Hai N, Wong F. Comparing vaginal tape and transobturator tape for the treatment of mild and moderate stress incontinence. *Int J Gynaecol Obstet.* 2007;99(1):14-7.
<http://www.ncbi.nlm.nih.gov/pubmed/17707822>
- Lee KS, Han DH, Choi YS, Yum SH, Song SH, Doo CK, Choo MS. A prospective trial comparing tension-free vaginal tape and transobturator vaginal tape inside-out for the surgical treatment of female stress urinary incontinence: 1-year followup. *J Urol* 2007;177(1):214-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17162048>
- David-Montefiore E, Frobert JL, Grisard-Anaf M, Lienhart J, Bonnet K, Poncelet C, Darai E. Peri-operative complications and pain after the suburethral sling procedure for urinary stress incontinence: a French prospective randomised multicentre study comparing the retropubic and transobturator routes. *Eur Urol* 2006;49(1):133-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16310932>
- Debodinance P. [Trans-obturator urethral sling for surgical correction of female stress urinary incontinence: Outside-in (Monarc) versus inside-out (TVT-O). Are both ways safe?]. *J Gynecol Obstet Biol Reprod (Paris)*. 2006;35(6):571-7. [article in French]
<http://www.ncbi.nlm.nih.gov/pubmed/17003744>
- Lee KS, Choo MS, Lee YS, Han JY, Kim JY, Jung BJ, Han DH. Prospective comparison of the 'inside-out' and 'outside-in' transobturator-tape procedures for the treatment of female stress urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunct.* 2008;19(4):577-82.
<http://www.ncbi.nlm.nih.gov/pubmed/17940717>
- Anger JT, Litwin MS, Wang Q, Pashos CL. The effect of age on outcomes of sling surgery for urinary incontinence. *J Am Geriatr Soc* 2007;55(12):1927-31.
<http://www.ncbi.nlm.nih.gov/pubmed/18081671>
- Rogers RG, Lebküchner U, Kammerer-Doak DN, Thompson PK, Walters MD, Nygaard I.E. Obesity and retropubic surgery for stress incontinence: is there really an increased risk of intraoperative complications? *Am J Obstet Gynecol* 2006;195(6):1794-8.
<http://www.ncbi.nlm.nih.gov/pubmed/17014816>
- LaSala CA, Schimpf MO, Udoh E, O'Sullivan DM, Tulikangas P. Outcome of tension-free vaginal tape procedure when complicated by intraoperative cystotomy. *Am J Obstet Gynecol* 2006;195(6):1857-61.
<http://www.ncbi.nlm.nih.gov/pubmed/17132487>

- Hodroff MA, Sutherland SE, Kesha JB, Siegel SW. Treatment of stress incontinence with the SPARC sling: intraoperative and early complications of 445 patients. *Urology* 2005;66(4):760-2.
<http://www.ncbi.nlm.nih.gov/pubmed/16230134>
- Davila GW, Johnson JD, Serels S. Multicenter experience with the Monarc transobturator sling system to treat stress urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunct* 2006;17(5):460-5.
<http://www.ncbi.nlm.nih.gov/pubmed/16314996>
- Barber MD, Gustilo-Ashby AM, Chen CC, Kaplan P, Paraiso MF, Walters MD. Perioperative complications and adverse events of the MONARC transobturator tape, compared with the tension-free vaginal tape. *Am J Obstet Gynecol* 2006;195(6):1820-5.
<http://www.ncbi.nlm.nih.gov/pubmed/17027591>
- MAUDE database. 2007.
<http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfMAUDE/TextSearch.cfm>
- Gandhi S, Abramov Y, Kwon C, Beaumont JL, Botros S, Sand PK, Goldberg RP. TVT versus SPARC: comparison of outcomes for two midurethral tape procedures. *Int Urogynecol J Pelvic Floor Dysfunct* 2006;17(2):125-30.
<http://www.ncbi.nlm.nih.gov/pubmed/16079957>
- Rajan S, Kohli N. Retropubic hematoma after transobturator sling procedure. *Obstet Gynecol* 2005;106(5 Pt 2):1199-202.
<http://www.ncbi.nlm.nih.gov/pubmed/16260571>
- Kölle D, Tamussino K, Hanzal E, Tammaa A, Preyer O, Bader A, Enzelsberger H, Ralph G, Riss P; Austrian Urogynecology Working Group. Bleeding complications with the tension-free vaginal tape operation. *Am J Obstet Gynecol* 2005;193(6):2045-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16325613>
- Roumeguère T, Quackels T, Bollens R, de Groote A, Zlotta A, Bossche MV, Schulman C. Trans-obturator vaginal tape (TOT) for female stress incontinence: one year follow-up in 120 patients. *Eur Urol* 2005;48(5):805-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16182440>
- Dietz HP, Barry C, Lim Y, Rane A. TVT vs Monarc: a comparative study. *Int Urogynecol J Pelvic Floor Dysfunct* 2006;17(6):566-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16525760>
- Morey AF, Medendorp AR, Noller MW, Mora RV, Shandera KC, Foley JP, Rivera LR, Reyna JA, Terry PJ. Transobturator versus transabdominal mid urethral slings: a multi-institutional comparison of obstructive voiding complications. *J Urol* 2006;175(3 Pt 1):1014-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16469607>
- Mishra VC, Mishra N, Karim OM, Motiwala HG. Voiding dysfunction after tension-free vaginal tape: a conservative approach is often successful. *Int Urogynecol J Pelvic Floor Dysfunct* 2005;16(3):210-4; discussion 214.
<http://www.ncbi.nlm.nih.gov/pubmed/15372143>
- Starkman JS, Duffy JW 3rd, Wolter CE, Kaufman MR, Scarpero HM, Dmochowski RR. The evolution of obstruction-induced overactive bladder (OAB) symptoms following urethrolysis for female bladder outlet obstruction. *J Urol* 2008;179(3):1018-23.
<http://www.ncbi.nlm.nih.gov/pubmed/18206925>
- Starkman JS, Wolter C, Gomelsky A, Scarpero HM, Dmochowski RR. Voiding dysfunction following removal of eroded synthetic midurethral slings. *J Urol* 2006;176(3):1040-4.
<http://www.ncbi.nlm.nih.gov/pubmed/16890687>
- Abdel-Fattah M, Sivanesan K, Ramsay I, Pringle S, Bjornsson S. How common are tape erosions? A comparison of two versions of the transobturator tension-free vaginal tape procedure. *BJU Int* 2006;98(3):594-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16925759>
- Feifer A, Corcos J. The use of synthetic sub-urethral slings in the treatment of female stress urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(9):1087-95
<http://www.ncbi.nlm.nih.gov/pubmed/17464439>
- de Boer F. Multifilament polypropylene mesh for urinary incontinence: 10 cases of infections requiring removal of the sling. *BJOG* 2005;112(10):1456.
<http://www.ncbi.nlm.nih.gov/pubmed/16167961>
- Siegel AL, Kim M, Goldstein M, Levey S, Ilbeigi P. High incidence of vaginal mesh extrusion using the intravaginal slingplasty sling. *Urol* 2005;174(4 Pt 1):1308-11.
<http://www.ncbi.nlm.nih.gov/pubmed/16145409>

- Siegel AL. Vaginal mesh extrusion associated with use of Mentor transobturator sling. *Urology* 2005;66(5):995-9.
<http://www.ncbi.nlm.nih.gov/pubmed/16286110>
- Yamada BS, Govier FE, Stefanovic KB, Kobashi KC. High rate of vaginal erosions associated with the mentor ObTape. *J Urol* 2006;176(2):651-4; discussion 654.
<http://www.ncbi.nlm.nih.gov/pubmed/16813914>
- Robert M, Murphy M, Birch C, Swaby C, Ross S. Five cases of tape erosion after transobturator surgery for urinary incontinence. *Obstet Gynecol* 2006;107(2 Pt 2):472-4.
<http://www.ncbi.nlm.nih.gov/pubmed/16449154>
- Hammad FT, Kennedy-Smith A, Robinson RG. Erosions and urinary retention following polypropylene synthetic sling: Australasian survey. *Eur Urol* 2005;47(5):641-6; discussion 646-7.
<http://www.ncbi.nlm.nih.gov/pubmed/15826756>
- Giri SK, Drumm J, Flood HD. Endoscopic holmium laser excision of intravesical tension-free vaginal tape and polypropylene suture after anti-incontinence procedures. *J Urol* 2005;174(4 Pt 1):1306-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16145408>
- Vervest HA, Bongers MY, van der Wurff AA. Nerve injury: an exceptional cause of pain after TVT. *Int Urogynecol J Pelvic Floor Dysfunct* 2006;17(6):665-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16633884>
- Shah SM, Bukkapatnam R, Rodríguez LV. Impact of vaginal surgery for stress urinary incontinence on female sexual function: is the use of polypropylene mesh detrimental? *Urology* 2005;65(2):270-4.
<http://www.ncbi.nlm.nih.gov/pubmed/15708036>
- Babalola EO, Famuyide AO, McGuire LJ, Gebhart JB, Klingele CJ. Vaginal erosion, sinus formation, and ischiorectal abscess following transobturator tape: ObTape implantation. *Int Urogynecol J Pelvic Floor Dysfunct* 2006;17(4):418-21.
<http://www.ncbi.nlm.nih.gov/pubmed/16186998>
- Benassi G, Marconi L, Accorsi F, Angeloni M, Benassi L. Abscess formation at the ischiorectal fossa 7 months after the application of a synthetic transobturator sling for stress urinary incontinence in a type II diabetic woman. *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(6):697-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17333445>
- Busby G, Broome J. Necrotising fasciitis following unrecognised bladder injury during transobturator sling procedure. *BJOG* 2007;114(1):111-2.
<http://www.ncbi.nlm.nih.gov/pubmed/17233867>
- Deffieux X, Donnadiu AC, Mordefroid M, Levante S, Frydman R, Fernandez H. Prepubic and thigh abscess after successive placement of two suburethral slings. *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(5):571-4.
<http://www.ncbi.nlm.nih.gov/pubmed/16832590>
- Goldman HB. Large thigh abscess after placement of synthetic transobturator sling. *Int Urogynecol J Pelvic Floor Dysfunct* 2006;17(3):295-6.
<http://www.ncbi.nlm.nih.gov/pubmed/15986099>
- Hurtado EA, McCrery RJ, Appell RA. Complications of ethylene vinyl alcohol copolymer as an off-label intra-urethral bulking agent in men with stress urinary incontinence. *SUFU* 2007.
http://www.urotoday.com/48/browse_categories/stress_urinary_incontinence_sui/sufu_2007_complications_of_ethylene_vinyl_alcohol_copolymer_as_an_offlabel_intraurethral_bulking_agent_in_men_with_stress_urinary_incontinence.html
- Hurtado EA, McCrery RJ, Appell RA. Complications of ethylene vinyl alcohol copolymer as an intra-urethral bulking agent in men with stress urinary incontinence. *Urology* 2008;71(4):662-5.
<http://www.ncbi.nlm.nih.gov/pubmed/18279931>
- Juang CM, Yu KJ, Chou P, Yen MS, Twu NF, Horng HC, Hsu WL. Efficacy analysis of trans-obturator tension-free vaginal tape (TVT-O) plus modified Ingelman-Sundberg procedure versus TVT-O alone in the treatment of mixed urinary incontinence: a randomized study. *Eur Urol* 2007;51(6):1671-8; discussion 1679.
<http://www.ncbi.nlm.nih.gov/pubmed/17254697>
- Atala A, Bauer SB, Soker S, Yoo JJ, Retik AB. Tissue-engineered autologous bladders for patients needing cystoplasty. *Lancet* 2006;367(9518):1241-6.
<http://www.ncbi.nlm.nih.gov/pubmed/16631879>
- Hijaz A, Vasavada SP, Daneshgari F, Frinjari H, Goldman H, Rackley R. Complications and troubleshooting of two-stage sacral neuromodulation therapy: a single-institution experience. *Urology* 2006;68(3):533-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16979724>

- Van Kerrebroeck PE, van Voskuilen AC, Heesakkers JP, Lycklama á Nijholt AA, Siegel S, Jonas U, Fowler CJ, Fall M, Gajewski JB, Hassouna MM, Cappellano F, Elhilali MM, Milam DF, Das AK, Dijkema HE, van den Hombergh U. Results of sacral neuromodulation therapy for urinary voiding dysfunction: outcomes of a prospective, worldwide clinical study. *J Urol* 2007;178(5):2029-34.
<http://www.ncbi.nlm.nih.gov/pubmed/17869298>
- Van Voskuilen AC, Oerlemans DJ, Weil EH, de Bie RA, van Kerrebroeck PE. Long term results of neuromodulation by sacral nerve stimulation for lower urinary tract symptoms: a retrospective single center study. *Eur Urol* 2006;49(2):366-72.
<http://www.ncbi.nlm.nih.gov/pubmed/16413105>
- Brazzelli M, Murray A, Fraser C. Efficacy and safety of sacral nerve stimulation for urinary urge incontinence: a systematic review. *J Urol* 2006;175(3 Pt 1):835-41.
<http://www.ncbi.nlm.nih.gov/pubmed/16469561>
- Han DH, Jeong YS, Choo MS, Lee KS. Outcomes of surgery of female urethral diverticula classified using magnetic resonance imaging. *Eur Urol* 2007;51(6):1664-70.
<http://www.ncbi.nlm.nih.gov/pubmed/17335961>
- Ljungqvist L, Peeker R, Fall M. Female urethral diverticulum: 26-year followup of a large series. *J Urol* 2007;177(1):219-24; discussion 224.
<http://www.ncbi.nlm.nih.gov/pubmed/17162049>
- Karantanis E, Allen W, Stevermuer TL, Simons AM, O'Sullivan R, Moore KH. The repeatability of the 24-hour pad test. *Int Urogynecol J Pelvic Floor Dysfunct* 2005;16(1):63-8; discussion 68.
<http://www.ncbi.nlm.nih.gov/pubmed/15647965>
- Dylewski DA, Jamison MG, Borawski KM, Sherman ND, Amundsen CL, Webster GD. A statistical comparison of pad numbers versus pad weights in the quantification of urinary incontinence. *Neurourol Urodyn* 2007;26(1):3-7.
<http://www.ncbi.nlm.nih.gov/pubmed/17080415>
- Wyrwich KW, Bullinger M, Aaronson N, Hays RD, Patrick DL, Symonds T; The Clinical Significance Consensus Meeting Group. Estimating clinically significant differences in quality of life outcomes. *Qual Life Res* 2005;14(2):285-95.
<http://www.ncbi.nlm.nih.gov/pubmed/15892420>
- Yalcin I, Patrick DL, Summers K, Kinchen K, Bump RC. Minimal clinically important differences in Incontinence Quality-of-Life scores in stress urinary incontinence. *Urology* 2006;67(6):1304-8.
<http://www.ncbi.nlm.nih.gov/pubmed/16750246>
- Hendriks MR, Evers SM, Bleijlevens MH, van Haastregt JC, Crebolder HF, van Eijk JT. Cost-effectiveness of a multidisciplinary fall prevention program in community-dwelling elderly people: a randomized controlled trial (ISRCTN 64716113). *Int J Technol Assess Health Care* 2008;24(2):193-202.
<http://www.ncbi.nlm.nih.gov/pubmed/18400123>
- Brazier, J. Measuring and valuing mental health for use in economic evaluation. *J Health Serv Res Policy* 2008;13 Suppl 3:70-5.
<http://www.ncbi.nlm.nih.gov/pubmed/18806195>
- Ghoniem G, Stanford E, Kenton K, Ahtari C, Goldberg R, Mascarenhas T, Parekh M, Tamussino K, Tosson S, Lose G, Petri E. Evaluation and outcome measures in the treatment of female urinary stress incontinence: International Urogynecological Association (IUGA) guidelines for research and clinical practice. *Int Urogynecol J Pelvic Floor Dysfunct* 2008;19(1):5-33.
<http://www.ncbi.nlm.nih.gov/pubmed/18026681>
- Ngninkeu BN, van Heugen G, di Gregorio M, Debie B, Evans A. Laparoscopic artificial urinary sphincter in women for type III incontinence: preliminary results. *Eur Urol* 2005;47(6):793-7; discussion 797.
<http://www.ncbi.nlm.nih.gov/pubmed/15925075>
- Shaikh S, Ong EK, Glavind K, Cook J, N'Dow JM. Mechanical devices for urinary incontinence in women. *Cochrane Database Syst Rev* 2006;19(2):CD001756.
<http://www.ncbi.nlm.nih.gov/pubmed/16625547>

An exhaustive reference list is available for consultation on line at the society website (<http://www.uroweb.org/professional-resources/guidelines/>) and on the guidelines CD-rom version.

6. URINARY INCONTINENCE IN FRAIL / OLDER MEN AND WOMEN*

Healthy older persons should be offered a similar range of treatment options as younger persons. Frail / older persons, however, require a different approach. Their evaluation must address the potential role of co-morbidity, current medications (prescribed, over-the-counter, and/or naturopathic), and functional and/or cognitive impairment for the management of UI. Studies and intervention in frail / older people should consider the degree of bother to the patient and/or carer, their goals for care, level of co-operation, and the overall prognosis and life expectancy. Effective management to meet the goals of care should be possible for most frail elderly persons.

6.1 History and symptom assessment

6.1.1 General principles

Because frail / older men and women have a very high prevalence of UI, active case finding and screening for UI should be done in all frail / older persons (grade of recommendation: A). The history should identify co-morbid conditions and medications likely to cause or worsen UI.

Recommendations for evaluation

Recommendations	GR
Rectal examination for faecal loading or impaction	C
Functional assessment (mobility, transfers, manual dexterity, ability to successfully toilet)	A
Screening test for depression	B
Cognitive assessment to assist in planning management	C

GR = grade of recommendation

The mnemonic DIAPPERS (Delirium, Infection, Atrophic vaginitis, Pharmaceuticals, Psychological condition, Excess urine output, Reduced mobility, Stool impaction) includes some co-morbid conditions and factors to be considered. Two alterations from the original mnemonic should be noted; they are:

- atrophic vaginitis does not by itself cause UI and should not be treated solely for the purpose of decreasing UI alone (grade of recommendation: B).
- current consensus criteria for diagnosis of UTIs are both poorly sensitive and non-specific in nursing-home residents (level of evidence: 2).

The patient and/or their carer should be asked directly about:

- the degree of bother of UI (grade of recommendation: B).
- goals for UI care (dryness, specific decrease in symptom severity, quality of life, reduction of co-morbidity, decreased care burden) (grade of recommendation: B).
- the likely level of co-operation with management (grade of recommendation: C).

It is also important to consider the patient's overall prognosis and remaining life expectancy (grade of recommendation: C).

All patients must be screened for haematuria (grade of recommendation: C), as it is not known if treatment of otherwise asymptomatic bacteriuria and pyuria is beneficial (no recommendation possible). Such treatment may cause harm by increasing the risk of antibiotic resistance and causing severe adverse effects, such as *Clostridium difficile* colitis (grade of recommendation: C). There is insufficient evidence to recommend a clinical stress test in frail / older persons.

6.1.2 Nocturia

For frail / older people with bothersome nocturia, assessment should focus on identifying the potential underlying cause(s), including (grade of recommendation: C):

- nocturnal polyuria
- primary sleep problem (including sleep apnoea)
- conditions resulting in a low voided volumes (e.g. elevated post-voiding residual) co-morbidity.

A bladder diary (frequency-volume chart) or wet checks may be useful in the evaluation of patients with nocturia (grade of recommendation: C). Wet checks can be used to assess UI frequency in long-term care residents (grade of recommendation: C).

* This section of the guidelines focuses on frail / older men and women. It has been based on the recommendations of the ICI committee chaired by Catherine Dubeau.

6.1.3 Post-void residual (PVR) volume

A post-void residual volume (PVR) is impractical to obtain in many care settings. However, there is compelling clinical experience for measuring PVR in selected frail / older persons with:

- diabetes mellitus (especially if longstanding)
- prior episodes of urinary retention or history of high PVR
- recurrent UTIs
- medications that impair bladder emptying (e.g. anticholinergics)
- chronic constipation
- persistent or worsening UI despite treatment with antimuscarinics
- prior urodynamic study demonstrating detrusor underactivity and/or bladder outlet obstruction (grade of recommendation: C).

Treatment of co-existing conditions (e.g. constipation) and stopping anticholinergic drugs may reduce PVR. There is no consensus regarding what constitutes 'high' PVR in any population. A trial of catheter decompression may be considered in patients with PVR > 200–500 mL, in whom high PVR may be a major contributor to UI or bothersome frequency (grade of recommendation: C).

6.2 Clinical diagnosis

The most common types of UI in frail / older persons are urgency UI, stress UI, and mixed UI (in frail / older women). Frail / older persons with urgency UI often have concomitant detrusor underactivity with an elevated PVR in the absence of outlet obstruction, a condition called detrusor hyperactivity with impaired contractility during voiding (DHIC). There is no published evidence that antimuscarinics are less effective or cause retention in persons with DHIC (no recommendation possible).

6.3 Initial management

Initial treatment should be individualised and influenced by goals of care, treatment preferences, and estimated remaining life expectancy, as well as the most likely clinical diagnosis (grade of recommendation: C).

In some patients, it is important to recognise that contained UI (e.g. managed with pads) may be the only possible outcome for UI that persists after treatment of contributing co-morbidity and other factors. This is especially true for frail persons with no or minimal mobility (i.e. require the help of at least two persons to transfer), advanced dementia (i.e. unable to state their own name), and/or nocturnal UI.

Conservative and behavioural therapies for UI include:

- lifestyle changes (grade of recommendation: C)
- bladder training in fit or alert patients (grade of recommendation: B)
- prompted voiding for frail and cognitively impaired patients (grade of recommendation: A).

For selected, cognitively intact, frail persons, pelvic muscle exercises may be considered, but they have not been well studied in this population (grade of recommendation: C).

6.3.1 Drug therapy

Any drug treatment should be started with a low dose and titrated with regular review, until the desired improvement has been achieved or there are adverse effects.

Recommendations for drug therapy in frail / older men and women with UI

Recommendations	GR
• A trial of antimuscarinic drugs may be considered as an adjunct to conservative therapy of UUI	A-C, depending on agent
• Similarly, alpha-blockers may be cautiously considered in frail men with suspected outlet obstruction from prostate disease	C
• Because DDAVP (vasopressin) carries a high risk of clinically significant hyponatraemia, it should not be used in frail / older persons to treat nocturia or nocturnal polyuria	A

GR = grade of recommendation

6.4 Ongoing management and reassessment

Urinary incontinence can usually be managed successfully using a combination of the above approaches. However, if initial management does not provide sufficient improvement in UI, then the next step should be to reassess the patient for contributing co-morbidity and/or functional impairment and to treat it.

6.5 Specialised management

Specialist referral should be considered if the initial assessment finds that a frail / older person with UI has:

- Other significant factors (e.g. pain, haematuria)
- UI symptoms that cannot be classified as urgency, stress, or mixed incontinence, or other complicated co-morbidity, which the primary clinician is unable to address (e.g. dementia, functional impairment)
- An insufficient response to initial management.

The type of specialist will depend on local resources and the reason for referral. Surgical specialists could include urologists or gynaecologists. Patients with functional impairment could be referred to a geriatrician or physical therapist. Continence nurse specialists may be helpful for homebound patients. The decision to refer a patient should take into account the goals of care, patient/carer's desire for invasive therapy, and estimated life expectancy.

6.5.1 Surgical approaches to UI in frail / older men and women

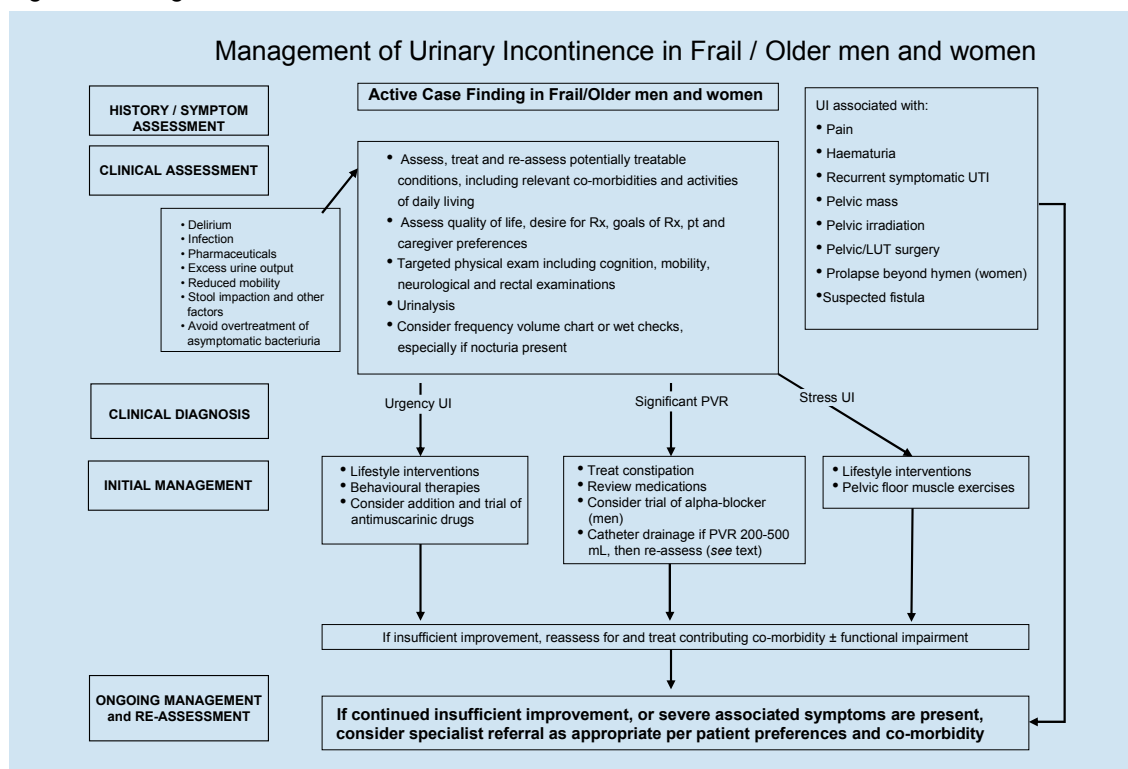
Age itself is not a contraindication to incontinence surgery (grade of recommendation: C). Before surgery is considered, all patients should undergo the following.

Recommendations for patient care prior to surgery

Recommendations	GR
• Evaluation and treatment for any co-morbidity, medications and cognitive and/or functional impairment that may be contributing to UI and/or could compromise the outcome of the planned surgery. For example, artificial sphincter should not be placed in men with dementia, who cannot manage the device on their own	C
• An adequate trial of conservative therapy followed by reassessment of the need for surgery	C
• A discussion with the patient and/or carer to make sure that the anticipated surgical outcome is consistent with the preferred goals of care in the context of the patient's remaining life expectancy	C
• Urodynamic testing because the clinical diagnosis may be inaccurate	B
• Pre-operative assessment and peri-operative care to establish risks for, and to minimise, common post-operative complications in the elderly, such as:	
- delirium and infection	A
- dehydration and falls	C

GR = grade of recommendation

Figure 5: Management of UI in the frail / older men and women



6.6 REFERENCES*

- Baztan JJ, Arias E, Gonzalez N, de Prada MIR. New-onset urinary incontinence and rehabilitation outcomes in frail older patients. *Age Ageing* 2005;34(2):172-5.
<http://www.ncbi.nlm.nih.gov/pubmed/15713862>
- Morrison A, Levy R. *Fraction of Nursing Home Admissions Attributable to Urinary Incontinence: Value in Health*. Blackwell Publishing Ltd, 2006, vol. 9, pp. 272-274.
- Boyington J, Howard D, Carter-Edwards L, Gooden K, Erdem N, Jallah Y, Busby-Whitehead J. Differences in resident characteristics and prevalence of urinary incontinence in nursing homes in the southeastern United States. *Nurs Res* 2007;56(2):97-107.
<http://www.ncbi.nlm.nih.gov/pubmed/17356440>
- Anger JT, Saigal CS, Pace J, Rodríguez LV, Litwin MS. True prevalence of urinary incontinence among female nursing home residents. *Urology* 2006;67(2):281-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16461078>
- Inouye SK, Studenski S, Tinetti ME, Kuchel GA. Geriatric syndromes: clinical, research, and policy implications of a core geriatric concept. *J Am Geriatr Soc* 2007;55(5):780-91.
<http://www.ncbi.nlm.nih.gov/pubmed/17493201>
- Dubeau CE. Beyond the bladder: management of urinary incontinence in older women. *Clin Obstet Gynecol* 2007;50(3):720-34.
<http://www.ncbi.nlm.nih.gov/pubmed/17762420>
- Griffiths D, Derbyshire S, Stenger A, Resnick N. Brain control of normal and overactive bladder. *J Urol* 2005;174:1862-7.
- Tadic SD, Griffiths D, Schaefer W, Resnick NM. Abnormal connections in the supraspinal bladder control network in women with urge urinary incontinence. *Neuroimage* 2008;39(4):1647-53.
<http://www.ncbi.nlm.nih.gov/pubmed/18089297>
- Griffiths D, Tadic SD. Bladder control, urgency, and urge incontinence: Evidence from functional brain imaging. *NeuroUrol Urodyn* 2007.
- Andrews-Hanna JR, Snyder AZ, Vincent JL, Lustig C, Head D, Raichle ME, Buckner RL. Disruption of large-scale brain systems in advanced aging. *Neuron* 2007;56(5):924-35.
<http://www.ncbi.nlm.nih.gov/pubmed/18054866>
- Pfisterer MH, Griffiths DJ, Schaefer W, Resnick NM. The effect of age on lower urinary tract function: a study in women. *J Am Geriatr Soc* 2006;54(3):405-12.
<http://www.ncbi.nlm.nih.gov/pubmed/16551306>
- Taylor JA, III, Kuchel GA. Detrusor underactivity: Clinical features and pathogenesis of an underdiagnosed geriatric condition. *J Am Geriatr Soc* 2006;54(12):1920-32.
<http://www.ncbi.nlm.nih.gov/pubmed/17198500>
- Taylor J, III. Null mutation for macrophage migration inhibitory factor (MIF) is associated with less aggressive bladder cancer in mice. *BMC Cancer* 2007;7:135.
<http://www.ncbi.nlm.nih.gov/pubmed/17650334>
- Pfisterer MH, Griffiths DJ, Rosenberg L, Schaefer W, Resnick NM. The impact of detrusor overactivity on bladder function in younger and older women. *J Urol* 2006;175(5):1777-83.
<http://www.ncbi.nlm.nih.gov/pubmed/16600758>
- Yang J, Yang SH, Huang WC. Functional correlates of Doppler flow study of the female urethral vasculature. *Ultrasound in Obstet Gynecol* 2006;28(1):96-102.
<http://www.ncbi.nlm.nih.gov/pubmed/16758440>
- Siracusano S, Bertolotto M, Cucchi A, Lampropoulou N, Tiberio A, Gasparini C, Ciciliato S, Belgrano E. Application of ultrasound contrast agents for the characterization of female urethral vascularization in healthy pre- and postmenopausal volunteers: preliminary report. *Eur Urol* 2006;50(6):1316-22.
<http://www.ncbi.nlm.nih.gov/pubmed/16831513>
- Liang C, Chang SD, Chang YL, Wei TY, Wu HM, Chao AS. Three-dimensional power Doppler measurement of perfusion of the periurethral tissue in incontinent women -- a preliminary report. *Acta Obstet Gynecol Scand* 2006;85(5):608-13.
<http://www.ncbi.nlm.nih.gov/pubmed/16752242>
- Clobes A, DeLancey JO, Morgan DM. Urethral circular smooth muscle in young and old women. *Am J Obstet Gynecol* 2008;198(5):587.e1-e5.
- Trowbridge ER, Wei JT, Fenner DE, Ashton-Miller JA, Delancey JO. Effects of aging on lower urinary tract and pelvic floor function in nulliparous women. *Obstet Gynecol* 2007;109(3):715-20.
<http://www.ncbi.nlm.nih.gov/pubmed/17329525>
- Kenton K, Lowenstein L, Simmons J, Brubaker L. Aging and overactive bladder may be associated with loss of urethral sensation in women. *NeuroUrol Urodyn* 2007;26(7):981-4.

- Kenton K; Simmons J; FitzGerald MP; Lowenstein L; Brubaker L. Urethral and bladder current perception thresholds: normative data in women. *J Urol* 2007;178(1):189-92;discussion192. <http://www.ncbi.nlm.nih.gov/pubmed/17499783>
- Lawrence J; Lukacz ES; Nager CW; Hsu JW; Luber KM. Prevalence and co-occurrence of pelvic floor disorders in community-dwelling women. *Obstet Gynecol* 2008;111(3):678-85.
- Talasz H; Himmer-Perschak G; Marth E; Fischer-Colbrie J; Hoefner E; Lechleitner M. Evaluation of pelvic floor muscle function in a random group of adult women in Austria. *Int Urogynecol J* 2008;19(1):131-5. <http://www.ncbi.nlm.nih.gov/pubmed/17876492>
- Jundt K; Kiening M; Fischer P; Bergauer F; Rauch E; Janni W; Peschers U; Dimpfl T. Is the histomorphological concept of female pelvic floor and its changes due to age and vaginal delivery correct? *Neurourol Urodyn* 2005;24(1):44-50. <http://www.ncbi.nlm.nih.gov/pubmed/15573382>
- Fox J; Fletcher JG; Zinsmeister AR; Seide B; Riederer SJ; Bharucha AE. Effect of aging on anorectal and pelvic floor functions in females. *Dis Colon Rectum* 2006;49(11):1726-35.
- Pal L; Hailpern SM; Santoro NF; Freeman R; Barad D; Kipersztok S; Barnabei VM; Wassertheil-Smoller S. Association of pelvic organ prolapse and fractures in postmenopausal women: analysis of baseline data from the Women's Health Initiative Estrogen Plus Progestin trial. *Menopause* 2008;15(1):59-66. <http://www.ncbi.nlm.nih.gov/pubmed/18257143>
- Grady D; Herrington D; Bittner V; Blumenthal R; Davidson M; Hlatky M; Hsia J; Hulley S; Herd A; Khan S; Newby LK; Waters D; Vittinghoff E; Wenger N; HERS Research Group. Cardiovascular disease outcomes during 6.8 years of hormone therapy: Heart and Estrogen/progestin Replacement Study follow-up (HERS II). *JAMA* 2008;288:49-57. <http://www.ncbi.nlm.nih.gov/pubmed/12090862>
- Tan J; Lukacz ES; Menefee SA; Luber KM; Albo ME; Nager CW. Determinants of vaginal length. *Am J Obstet Gynecol* 2006;195(6):1846-50.
- Mishra V; Allen DJ; Nicolaou C; Sharif H; Hudd C; Karim OM; Motiwala HG; Laniado ME. Does intraprostatic inflammation have a role in the pathogenesis and progression of benign prostatic hyperplasia? *BJU Int* 2007;100(2):327-31. <http://www.ncbi.nlm.nih.gov/pubmed/17617139>
- Juthani-Mehta M; Tinetti M; Perrelli E; Towle V; Van Ness P; Quagliarello V. Diagnostic accuracy of criteria for urinary tract infection in a cohort of nursing home residents. *J Am Geriatr Soc* 2007;55(7):1072-7. <http://www.ncbi.nlm.nih.gov/pubmed/17608881>
- Cigolle CT; Langa KM; Kabeto MU; Zhiyi T and Blaum CS: Geriatric Conditions and Disability: The Health and Retirement Study. *Ann Intern Med* 2007;147(3):156-64. <http://www.ncbi.nlm.nih.gov/pubmed/17679703>
- Rait G; Fletcher A; Smeeth L; Brayne C; Stirling S; Nunes M; Breeze E; Ng ES; Bulpitt CJ; Jones D; Tulloch AJ. Prevalence of cognitive impairment: results from the MRC trial of assessment and management of older people in the community. *Age Ageing* 2005;34(3):242-8. <http://www.ncbi.nlm.nih.gov/pubmed/15863409>
- Mecocci P; von Strauss E; Cherubini A; Ercolani S; Mariani E; Senin U; Winblad B; Fratiglioni L. Cognitive impairment is the major risk factor for development of geriatric syndromes during hospitalization: results from the GIFA study. *Dement Geriatr Cogn Disord* 2005;20(4):262-9. <http://www.ncbi.nlm.nih.gov/pubmed/16103670>
- Huang A; Brown J; Thom D; Fink H; Yaffe K. Study of Osteoporotic Fractures Research Group. Urinary incontinence in older community-dwelling women: the role of cognitive and physical function decline. *Obstet Gynecol* 2007;109(4):909-16. <http://www.ncbi.nlm.nih.gov/pubmed/17400853>
- Pantoni L. Leukoaraiosis: from an ancient term to an actual marker of poor prognosis. *Stroke* 2008;39:1401-3. <http://www.ncbi.nlm.nih.gov/pubmed/18340098>
- Pantoni L; Garcia JH. The significance of cerebral white matter abnormalities 100 years after Binswanger's report. A review. *Stroke* 2005;26(7):1293-301. <http://www.ncbi.nlm.nih.gov/pubmed/17604429>
- Wullner U; T. Schmitz-Hubsch GA; R. Fimmers; A. Spottke; W. H.Oertel; G. Deuschl TK; K. Eggert on behalf of the KNP e.V. Autonomic dysfunction in 3414 Parkinson's disease patients enrolled in the German Network on Parkinson's disease (KNP e.V.): the effect of ageing. *Eur J Neurol* 2007;14: 1405-8.

- Balash Y, Peretz C, Leibovich G, Herman T, Hausdorff J, Giladi N. Falls in outpatients with Parkinson's disease. *J Neurol* 2005;252:1310-5.
<http://www.ncbi.nlm.nih.gov/pubmed/15895303>
- Fultz NH, Rahrig Jenkins K, Østbye T, Taylor JDH, Kabeto MU and Langa KM: The impact of own and spouse's urinary incontinence on depressive symptoms. *Soc Sci Med* 2005;60:2537-48.
<http://www.ncbi.nlm.nih.gov/pubmed/15814179>
- Yoshida Y, Kim H, Iwasa H, Kwon J, Sugiura M, Furuna T, Yoshida H and Suzuki T: Prevalence and characteristics of urinary incontinence in community-dwelling-elderly as determined by comprehensive health examination and interview for the prevention of geriatric syndrome and bed-ridden state. *Nippon Ronen Igakkai Zasshi* 2007;44:83-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17337859>
- Song H and Bae J: Prevalence of urinary incontinence and lower urinary tract symptoms for community-dwelling elderly 85 years of age and older. *J Wound Ostomy Continence Nurs* 2007;34: 535-41.
<http://www.ncbi.nlm.nih.gov/pubmed/17876216>
- Ko Y, Lin S, Salmon J and Bron M: The impact of urinary incontinence on quality of life of the elderly. *Am J Managed Care* 2005;11(4 Suppl):S103-S111.
<http://www.ncbi.nlm.nih.gov/pubmed/16161383>
- Nelson RL and Furner SE: Risk factors for the development of fecal and urinary incontinence in Wisconsin nursing home residents. *Maturitas* 2005;52:26-31.
<http://www.ncbi.nlm.nih.gov/pubmed/16143223>
- Landi F, Onder G, Cesari M, Zamboni V, Russo A, Barillaro C and Bernabei R: The Silvernet-HC study group. Functional decline in frail community-dwelling stroke patients. *J Neurol* 2006;13:17-23.
<http://www.ncbi.nlm.nih.gov/pubmed/16420389>
- Takazawa K and Arisawa K: Relationship between the type of urinary incontinence and falls among frail elderly women in Japan. *J Med Invest* 2005;52:165-71.
<http://www.ncbi.nlm.nih.gov/pubmed/16167534>
- Chen JS, March LM, Schwarz J, Zochling J, Makaroff J, Sitoh YY, Lau TC, Lord SR, Cameron ID, Cumming RG, Sambrook PN. A multivariate regression model predicted falls in residents living in intermediate hostel care. *J Clinical Epidemiol* 2005;58: 503-8.
<http://www.ncbi.nlm.nih.gov/pubmed/15845337>
- Becker C, Loy S, Sander S, Nikolaus T, Rissmann U and Kron M: An algorithm to screen long-term care residents at risk for accidental falls. *Aging Clin Exp Res* 2005;17:186-92.
<http://www.ncbi.nlm.nih.gov/pubmed/16110730>
- Woodford H and George J: NICE guidelines on urinary incontinence in women. *Age Ageing* 2007;36:349-50.
- DuBeau CE, Ouslander JG and Palmer MH: Knowledge and attitudes of nursing home staff and surveyors about the revised federal guidance for incontinence care. *Gerontologist* 2007;47:468-79.
<http://www.ncbi.nlm.nih.gov/pubmed/17766668>
- Fung C, Spencer B, Eslami M and Crandall C: Quality indicators for the screening and care of urinary incontinence in vulnerable elders. *J Am Geriatr Soc* 2007;55 Suppl 2:S443-S449.
<http://www.ncbi.nlm.nih.gov/pubmed/17910569>
- Wagg A, Potter J, Irwin P, Lowe D, Pearson M. National audit of continence care for older people: management of urinary incontinence. *Age Ageing* 2008;37:39-44.
- Wagg A, Mian S, Lowe D, Potter J, Pearson M. National audit of continence care for older people: results of a pilot study. *J Eval Clin Pract* 2005;11:525-32.
<http://www.ncbi.nlm.nih.gov/pubmed/16364105>
- van Gerwen M and Lagro-Janssen A. Diagnostic value of patient history and physical examination in elderly patients with urinary incontinence; a literature review [De diagnostische waarde van anamnese en lichamelijk onderzoek bij ouderen met urine-incontinentie; een overzicht van de literatuur]. *Ned Tijdschr Geneesk* 2006;150:1771-5. [article in Dutch]
- Jansen L and Forbes D: The psychometric testing of a urinary incontinence nursing assessment instrument. *J Wound Ostomy Continence Nurs* 2006;33(1):69-76.
<http://www.ncbi.nlm.nih.gov/pubmed/16444108>
- Ouslander JG, Griffiths PC, McConnell E, Riolo L, Kutner M and Schnelle J: Functional incidental training: a randomized, controlled, crossover trial in Veterans Affairs nursing homes. *J Am Geriatr Soc* 2005 Jul;53(7):1091-100.
<http://www.ncbi.nlm.nih.gov/pubmed/16108924>
- DuBeau C, Simon S, Morris JN. The Impact of urinary incontinence on quality of life in nursing home residents, 2006.

- Fonda D, Abrams P. Cure sometimes, help always--a "continence paradigm" for all ages and conditions. *Neurourol Urodyn* 2006;25(3):290-2.
<http://www.ncbi.nlm.nih.gov/pubmed/16496393>
- Cai L, Lubitz J. Was there compression of disability for older Americans from 1992 to 2003? *Demography* 2007;44(3):479-95.
<http://www.ncbi.nlm.nih.gov/pubmed/17913007>
- Kincade JE, Dougherty MC, Carlson JR, Hunter GS and Busby-Whitehead J: Randomized clinical trial of efficacy of self-monitoring techniques to treat urinary incontinence in women. *Neurourol Urodyn* 2007;26(4):507-11.
<http://www.ncbi.nlm.nih.gov/pubmed/17366526>
- Townsend MK, Curhan GC, Resnick NM, Grodstein F. BMI, Waist Circumference, and Incident Urinary Incontinence in Older Women. *Obesity (Silver Spring)* 2008;16(4):881-6.
<http://www.ncbi.nlm.nih.gov/pubmed/18379564>
- Perrin L, Dauphinee SW, Corcos J, Hanley JA and Kuchel GA: Pelvic floor muscle training with biofeedback and bladder training in elderly women: a feasibility study. *J Wound Ostomy Continence Nurs* 2005;32(3):186-99.
<http://www.ncbi.nlm.nih.gov/pubmed/15931150>
- Palmer MH: Effectiveness of prompted voiding for incontinent nursing home residents. In: Melnyk BM, Fineout-Overholt E, eds. *Evidence-based practice in nursing & healthcare: a guide to the best practice*. Lippincott Williams & Williams, 2005, pp CD20-CD30.
- Ostaszkievicz J. A clinical nursing leadership model for enhancing continence care for older adults in a subacute inpatient care setting. *J Wound Ostomy Continence Nurs* 2006;33(6):624-9.
<http://www.ncbi.nlm.nih.gov/pubmed/17108772>
- Ostaszkievicz J, Roe B and Johnston L. Effects of timed voiding for the management of urinary incontinence in adults: systematic review. *J Adv Nurs* 2005;52(4):420-31.
<http://www.ncbi.nlm.nih.gov/pubmed/16268846>
- van Houten P, Achterberg W, Ribbe M. Urinary incontinence in disabled elderly women: a randomized clinical trial on the effect of training mobility and toileting skills to achieve independent toileting. *Gerontology* 2007;53(4):205-10.
<http://www.ncbi.nlm.nih.gov/pubmed/17347567>
- Campeau L, Tu L, Lemieux M, Naud A, Karsenty G, Schick E, Corcos J. A multicenter, prospective, randomized clinical trial comparing tension-free vaginal tape surgery and no treatment for the management of stress urinary incontinence in elderly women. *Neurourol Urodyn* 2007;26(7):990-4.
<http://www.ncbi.nlm.nih.gov/pubmed/17638307>
- Dalpiaz O, Primus G, Schips L. SPARC sling system for treatment of female stress urinary incontinence in the elderly. *Eur Urol* 2006;50(4):826-30; discussion 830-1.
<http://www.ncbi.nlm.nih.gov/pubmed/16687203>
- Britton A, Russell R. Multidisciplinary team interventions for delirium in patients with chronic cognitive impairment. *Cochrane Database Syst Rev* 2007;(2):CD000395.
<http://www.ncbi.nlm.nih.gov/pubmed/17636635>
- Cathcart P, van der Meulen J, Armitage J, Emberton M. Incidence of primary and recurrent acute urinary retention between 1998 and 2003 in England. *J Urol* 2006;176(1):200-4; discussion 204.
<http://www.ncbi.nlm.nih.gov/pubmed/16753401>
- Gehrich A: Stany MP, Fischer JR, Buller J, Zahn CM. Establishing a mean postvoid residual volume in asymptomatic perimenopausal and postmenopausal women. *Obstet Gynecol* 2007;110(4):827-32.
<http://www.ncbi.nlm.nih.gov/pubmed/17906016>
- Tang MWS, Kwok TCY, Hui E, Woo J. Intermittent versus indwelling urinary catheterization in older female patients. *Maturitas* 2006;53:274-281.
- Wu J, Baguley IJ. Urinary Retention in a General Rehabilitation Unit: Prevalence, Clinical Outcome, and the Role of Screening. *Arch Phys Med Rehabil* 2005 Sep;86(9):1772-7.
<http://www.ncbi.nlm.nih.gov/pubmed/16181941>
- Haylen B, Krishnan S, Schulz S, Verity L, Law M, Zhou J, Sutherst J. Has the true prevalence of voiding difficulty in urogynecology patients been underestimated? *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(1):53-6. Epub 2006.
<http://www.ncbi.nlm.nih.gov/pubmed/16596458>
- Lukacz E, DuHamel E, Menefee SA, Luber KM. Elevated postvoid residual in women with pelvic floor disorders: prevalence and associated risk factors. *Int Urogynecol J Pelvic Floor Dysfunct* 2007;18(4):397-400. Epub 2006.
<http://www.ncbi.nlm.nih.gov/pubmed/16804634>
- Pilloni S, Krhut J, Mair D, Madersbacher H, Kessler TM. Intermittent catheterisation in older people: a

valuable alternative to an indwelling catheter? Age Ageing 2005;34(1):57-60.
<http://www.ncbi.nlm.nih.gov/pubmed/15537679>

- Omli R, Skotnes LH, Mykletun A, Bakke AM, Kuhry E. Residual urine as a risk factor for lower urinary tract infection: a 1-year follow-up study in nursing homes. J Am Geriatr Soc 2008;56(5):871-4.
<http://www.ncbi.nlm.nih.gov/pubmed/18331294>
- Cohen R, Wilkins KM, Ostroff R, Tampi RR. Olanzapine and acute urinary retention in two geriatric patients. Am J Geriatr Pharmacother 2007;5(3):241-6.
<http://www.ncbi.nlm.nih.gov/pubmed/17996664>
- Semaan W, Doyon J, Jolicoeur F, Duchesneau J. Dose-dependent urinary retention following olanzapine administration. Ann Pharmacother 2006;40(9):1693.
<http://www.ncbi.nlm.nih.gov/pubmed/16896022>
- Matsumoto M, Inoue K. Predictors of institutionalization in elderly people living at home: the impact of incontinence and commode use in rural Japan. J Cross Cult Gerontol 2007;22(4):421-32.
<http://www.ncbi.nlm.nih.gov/pubmed/17763930>

An exhaustive reference list is available for consultation on line at the society website (<http://www.uroweb.org/professional-resources/guidelines/>) and on the guidelines CD-rom version.

7. ABBREVIATIONS USED IN THE TEXT

This list is not comprehensive for the most common abbreviations.

AUS	artificial urinary sphincter
CaP	cancer of the prostate
CS	Caesarean section
BF	biofeedback
BOO	bladder outlet obstruction
BPO	benign prostatic obstruction
BT	bladder training
COX inhibitor	cyclo-oxygenase inhibitor
DHIC	detrusor hyperactivity with impaired contractility during voiding
DIAPPERS	Delirium, Infection, Atrophic vaginitis, Pharmaceuticals, Psychological condition, Excess urine output, Reduced mobility, Stool impaction
DO	detrusor overactivity
ESim	electrical stimulation
GR	grade of recommendation (modified Oxford system)
HIFU	high-intensity focused ultrasound
LE	level of evidence (modified Oxford system)
MStim	magnetic stimulation
MUI	mixed urinary incontinence
OAB	overactive bladder
PFMT	pelvic floor muscle training
PDE-5 inhibitor	phosphodiesterase-type 5 inhibitor
POP	pelvic organ prolapse
PVR	post-void residual (urine)
QoL	Quality of Life
RCT	randomised controlled trial
RP	radical prostatectomy
SUI	stress urinary incontinence
TURP	transurethral resection of prostate
TUIP	transurethral incision of the prostate (TUIP)
UPP	urethral pressure profile
UUI	urgency urinary incontinence
UTI	urinary tract infection
VC	vaginal cones

Conflict of interest

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