

## Appendix K: Excluded studies

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## K.1 Does the use of clinical assessment, urine culture, a residual urine estimate or a bladder diary/frequency volume chart change the management of patients with neurological disease?

### K.1.1 Clinical Studies excluded

Author/title	Reason for exclusion
Borg H, Holmdahl G, Olsson I et al. Impact of spinal cord malformation on bladder function in children with anorectal malformations. <i>Journal of Pediatric Surgery</i> . 2009; 44(9):1778-1785. Ref ID: BORG2009	No relevant outcomes
Chandiramani VA, Palace J, Fowler CJ. How to recognize patients with parkinsonism who should not have urological surgery. <i>British Journal of Urology</i> . 1997; 80(1):100-104. Ref ID: CHANDIRAMANI1997	No relevant outcomes
Jensen AE, Hjeltnes N, Berstad J et al. Residual urine following intermittent catheterisation in patients with spinal cord injuries. <i>Paraplegia</i> . 1995; 33(12):693-696. Ref ID: JENSEN1995	No relevant outcomes
Persun ML, Ginsberg PC, Harmon JD et al. Role of urologic evaluation in the adult spina bifida patient. <i>Urologia Internationalis</i> . 1999; 62(4):205-208. Ref ID: PERSUN1999	No relevant outcomes
Sammour ZM, Gomes CM, Barbosa ER et al. Voiding dysfunction in patients with Parkinson's disease: impact of neurological impairment and clinical parameters. <i>Neurourology &amp; Urodynamics</i> . 2009; 28(6):510-515. Ref ID: SAMMOUR2009	No relevant outcomes
Sasani M, Asghari B, Asghari Y et al. Correlation of cutaneous lesions with clinical radiological and urodynamic findings in the prognosis of underlying spinal dysraphism disorders. <i>Pediatric Neurosurgery</i> . 2008; 44(5):360-370. Ref ID: SASANI2008	No relevant outcomes
Tins B, Teo HG, Popuri R et al. Follow-up imaging of the urinary tract in spinal injury patients: is a KUB necessary with every ultrasound? <i>Spinal Cord</i> . 2005; 43(4):219-222. Ref ID: TINS2005	No relevant outcomes
Vaidyanathan S, Hughes PL, Soni BM. A comparative study of ultrasound examination of urinary tract performed on spinal cord injury patients with no urinary symptoms and spinal cord injury patients with symptoms related to urinary tract: do findings of ultrasound examination lead to changes in clinical management? <i>TheScientificWorldJournal</i> . 2006; 6:2450-2459. Ref ID: VAIDYANATHAN2006	No relevant outcomes

### K.1.2 Economic Studies excluded

Author/title	Notes
Weber A M, Taylor R J, Wei J T, Lemack G, Piedmonte M R, and Walter M D. The cost-effectiveness of preoperative testing (basic office assessment vs urodynamics) for stress urinary incontinence in women. <i>British Journal of Urology International</i> , 2002.	Non-neurogenic population of patients; US perspective
Weber A M and Walters M D. Cost-effectiveness of urodynamic testing before surgery for women with pelvic organ prolapse and stress urinary incontinence. <i>American Journal of Obstetrics and Gynecology</i> , 2000	Non-neurogenic population of patients; US perspective

## K.2 Does the use of the urodynamics (filling cystometry, leak point pressure measurements, pressure-flow studies of voiding, video

## urodynamics) direct treatment or stratify risk of renal complications (such as hydronephrosis).

### K.2.1 Clinical studies excluded

Author/title	Reason for exclusion
Decter RM, Bauer SB, Khoshbin S et al. Urodynamic assessment of children with cerebral palsy. <i>Journal of Urology</i> . 1987; 138(4 Pt 2):1110-1112. Ref ID: DECTER1987	No relevant outcome data
Gomelsky AL. Urodynamic patterns following ischemic spinal cord events. <i>Journal of Urology</i> . 2003; 170(1):122-125. Ref ID: GOMELSKY2003	No relevant outcome data
Groenendijk PM, Nyeholt AA, Heesakkers JP et al. Urodynamic evaluation of sacral neuromodulation for urge urinary incontinence. <i>BJU International</i> . 2008; 101(3):325-329. Ref ID: GROENENDIJK2008	Non-neurogenic population
Gunasekera WS, Richardson AE, Seneviratne KN et al. Detrusor hyperreflexia in neurogenic bladder disorders caused by localized partial lesions of the spinal cord and cauda equina. <i>Surgical Neurology</i> . 1983; 20(1):63-66. Ref ID: GUNASEKERA1983	No relevant outcome data
Gupta AT. Urodynamic profile in myelopathies: A follow-up study. <i>Annals of Indian Academy of Neurology</i> . 2009; 12(1):35-39. Ref ID: GUPTA2009	Relationship between urodynamics and neurological recovery
Houser EE, Bartholomew TH, Cookson MS et al. A prospective evaluation of leak point pressure, bladder compliance and clinical status in myelodysplasia patients with tethered spinal cords. <i>Journal of Urology</i> . 1994; 151(1):177-180. Ref ID: HOUSER1994	No relevant outcome data
Kang HS, Wang KC, Kim KM et al. Prognostic factors affecting urologic outcome after untethering surgery for lumbosacral lipoma. <i>Childs Nervous System</i> . 2006; 22(9):1111-1121. Ref ID: KANG2006	No post-operative urodynamic data
Kumar R, Singhal N, Gupta M et al. Evaluation of clinico-urodynamic outcome of bladder dysfunction after surgery in children with spinal dysraphism - a prospective study. <i>Acta Neurochirurgica</i> . 2008; 150(2):129-137. Ref ID: KUMAR2008	No relevant outcome data
Macejko AM, Cheng EY, Yerkes EB et al. Clinical urological outcomes following primary tethered cord release in children younger than 3 years. <i>Journal of Urology</i> . 2007; 178(4 Pt 2):1738-1742. Ref ID: MACEJKO2007	No relevant outcome data
McGuire EJ, Savastano JA. Urodynamic findings and clinical status following vesical denervation procedures for control of incontinence. <i>Journal of Urology</i> . 1984; 132(1):87-88. Ref ID: MCGUIRE1984	No relevant outcome data
Moiyadi AV, Devi BI, Nair KP. Urinary disturbances following traumatic brain injury: clinical and urodynamic evaluation. <i>Neurorehabilitation</i> . 2007; 22(2):93-98. Ref ID: MOIYADI2007	Reporting on asymptomatic urodynamic abnormalities
Nitti VW, Adler H, Combs AJ. The role of urodynamics in the evaluation of voiding dysfunction in men after cerebrovascular accident. <i>Journal of Urology</i> . 1996; 155(1):263-266. Ref ID: NITTI1996	No relevant outcome data
Pannek J, Greving I, Tegenthoff M et al. Urodynamic and rectomanometric findings in patients with spinal cord injury. <i>Neurourology &amp; Urodynamics</i> . 2001; 20(1):95-103. Ref ID: PANNEK2001	No relevant outcome data
Patki PW. Lower Urinary Tract Dysfunction in Ambulatory Patients With Incomplete Spinal Cord Injury. <i>Journal of Urology</i> . 2006; 175(5):1784-1787. Ref ID: PATKI2006	No relevant outcome data
Pesce F, Castellano V, Finazzi AE et al. Voiding dysfunction in patients with	No relevant outcome

Author/title	Reason for exclusion
spinal cord lesions at the thoracolumbar vertebral junction. Spinal Cord. 1997; 35(1):37-39. Ref ID: PESCE1997	data
Reitz A, Haferkamp A, Wagener N et al. Neurogenic bladder dysfunction in patients with neoplastic spinal cord compression: adaptation of the bladder management strategy to the underlying disease. Neurorehabilitation. 2006; 21(1):65-69. Ref ID: REITZ2006	Decision based on underlying disease and urodynamic testing
Rendeli C, Ausili E, Tabacco F et al. Urodynamic evaluation in children with lipomenigocele: timing for neurosurgery, spinal cord tethering and followup. Journal of Urology. 2007; 177(6):2319-2324. Ref ID: RENDELI2007	Evaluation of timing of surgery
Sidi AA, Peng W, Gonzalez R. Vesicoureteral reflux in children with myelodysplasia: natural history and results of treatment. Journal of Urology. 1986; 136(1 Pt 2):329-331. Ref ID: SIDI1986	Review of authors experience of managing vesicoureteral reflex
Smith CP, Kraus SR, Nickell KG et al. Video urodynamic findings in men with the central cord syndrome. Journal of Urology. 2000; 164(6):2014-2017. Ref ID: SMITH2000	No relevant outcome data
Tarcan T, Bauer S, Olmedo E et al. Long-term followup of newborns with myelodysplasia and normal urodynamic findings: Is followup necessary? Journal of Urology. 2001; 165(2):564-567. Ref ID: TARCAN2001	No relevant outcome data

### K.2.2 Economic studies excluded

Author/title	Notes
Weber A M, Taylor R J, Wei J T, Lemack G, Piedmonte M R, and Walter M D The cost-effectiveness of preoperative testing (basic office assessment vs urodynamics) for stress urinary incontinence in women. British Journal of Urology International, 2002.	Non-neurogenic population of patients; US perspective
Weber A M and Walters M D. Cost-effectiveness of urodynamic testing before surgery for women with pelvic organ prolapse and stress urinary incontinence. American Journal of Obstetrics and Gynecology, 2000.	Non-neurogenic population of patients; US perspective

## K.3 Does provision of information and support regarding the different management systems improve patient outcomes?

### K.3.1 Clinical studies excluded

Author/title	Reason for exclusion
Martins G, Soler ZASG, Batigalia F, Moore KN. Clean intermittent catheterisation. Educational booklet directed to caregivers of children with neurogenic bladder dysfunction. J Wound Ostomy Continence Nurs 2009; 36: 545-549.	No relevant outcomes
O'Hara L, Cadbury H, De Souza L, Ide L. Evaluation of the effectiveness of professionally guided self-care for people with multiple sclerosis living in the community: a randomised controlled trial. Clinical rehabilitation 2002; 16: 119-128	No relevant outcomes and the intervention was not directed at urinary management.
Eames S, Hoffmann T, Worrall L, Read S. Stroke patients' and carers' perception of barriers to accessing stroke information. Top Stroke Rehabil 2010; 17: 69-78	Concerned with perceived barriers to information access rather than the effects of information on outcomes.

### K.3.2 Economic studies excluded

No economic studies were identified that compared the cost effectiveness of different strategies for the provision of information about the management of neurological lower urinary tract dysfunction.

## K.4 Do behavioural management programmes (timed voiding, voiding on request, prompted voiding, bladder retraining, habit retraining, urotherapy) compared with a) each other b) usual care, improve outcomes?

### K.4.1 Clinical studies excluded

Author/title	Reason for exclusion
Christ KF, Kornhuber HH. Treatment of neurogenic bladder dysfunction in multiple sclerosis by ultrasound-controlled bladder training. Arch Psychiatr Nervenkr. 1980; 228(3):191-195. Ref ID: CHRIST1980	Wrong intervention
Comarr AE. A more socially acceptable bladder training device. Journal of Urology. 1963; 90:337. Ref ID: COMARR1963	Wrong intervention
Comarr AE. A self-managed bladder training device for tetraplegics. Journal of Urology. 1956; 76(2):200-202. Ref ID: COMARR1956	Wrong intervention
Comarr AE, KARCHAK A, SNELSON R. An improved bladder training device. Journal of Urology. 1963; 90:335-336. Ref ID: COMARR1963A	Wrong intervention
Comarr AE. Another self-managed bladder training device for tetraplegics. Journal of Urology. 1957; 78(1):89-92. Ref ID: COMARR1957	Wrong intervention
Decter RM, Snyder P, Rosvanis TK. Transurethral electrical bladder stimulation: initial results. Journal of Urology. 1992; 148(2 Pt 2):651-653. Ref ID: DECTER1992	Wrong intervention
Dumoulin C, Korner BN, Tannenbaum C. Urinary incontinence after stroke: does rehabilitation make a difference? A systematic review of the effectiveness of behavioral therapy. Topics in Stroke Rehabilitation. 2005; 12(3):66-76. Ref ID: DUMOULIN2005	Waiting for paper
Garcia JG, Lam C. Treating urinary incontinence in a head-injured adult. Brain Injury. 1990; 4(2):203-207. Ref ID: GARCIA1990	Non-RCT
Hagglund D. A systematic literature review of incontinence care for persons with dementia: the research evidence. J Clin Nurs. 2010; 19(3-4):303-312. Ref ID: HAGGLUND2010	Studies included in Cochrane review
Herr-Wilbert IS, Imhof L, Hund-Georgiadis M et al. Assessment-guided therapy of urinary incontinence after stroke. Rehabilitation Nursing. 2010; 35(6):248-253. Ref ID: HERRWILBERT2010	Multiple interventions applied at the same time
Jirovec MM, Templin T. Predicting success using individualized scheduled toileting for memory-impaired elders at home. Research in Nursing and Health. 2001; 24(1):1-8. Ref ID: JIROVEC2001	Study included in Cochrane review
Kaplan WE, Richards I. Intravesical transurethral electrotherapy for the neurogenic bladder. Journal of Urology. 1986; 136(1 Pt 2):243-246. Ref ID: KAPLAN1986A	Wrong intervention
Kornhuber HH, Schutz A. Efficient treatment of neurogenic bladder disorders in multiple sclerosis with initial intermittent catheterization and ultrasound-controlled training. Eur Neurol. 1990; 30(5):260-267. Ref ID: KORNHUBER1990	Wrong intervention
Lancioni GE, Singh NN, O'Reilly MF, Sigafoos J, Bosco A, Zonno N, Badagliacca F. Persons with mild or moderate Alzheimer's disease learn to use urine alarms and prompts to avoid large urinary accidents. Research in Developmental	Different outcomes covered

Author/title	Reason for exclusion
Disabilities 2011; 32: 1998-2004	
Madersbacher H, Pauer W, Reiner E et al. Rehabilitation of micturition in patients with incomplete spinal cord lesions by transurethral electrostimulation of the bladder. Eur Urol. 1982; 8(2):111-116. Ref ID: MADERSBACHER1982	Wrong intervention
Menon EB, Tan ES. Bladder training in patients with spinal cord injury. Urology. 1992; 40(5):425-429. Ref ID: MENON1992	Non-RCT
SULLIVAN FJ, BORS E. A self-help device for bladder training of tetraplegic patients. Journal of Urology. 1960; 84:431-432. Ref ID: SULLIVAN1960	Wrong intervention
Thomas LH, Cross S, Barrett J et al. Treatment of urinary incontinence after stroke in adults. Cochrane Database of Systematic Reviews. 2008;(1):CD004462. Ref ID: THOMAS2008	Relevant studies are available as abstracts only
Tries J. The use of biofeedback in the treatment of incontinence due to head injury. J Head Trauma Rehabil. 1990; 5(4):91-100. Ref ID: TRIES1990	Discussion paper
Vaughan CP, Juncos JL, Burgio KL et al. Behavioral therapy to treat urinary incontinence in Parkinson disease. Neurology. 2011; 76(19):1631-1634. Ref ID: VAUGHAN2011	Non-RCT

#### K.4.2 Economic studies excluded

No relevant economic evaluations comparing behavioural management programmes with each other or with usual care were identified.

### K.5 What is the safety and efficacy of antimuscarinics compared with a) placebo or treatment as usual b) other antimuscarinics for the treatment of incontinence due to neurological disease/overactive bladder due to neurological disease?

#### K.5.1 Clinical studies excluded

Author/title	Reason for exclusion
Ab E, Dik P, Klijn AJ et al. Detrusor overactivity in spina bifida: how long does it need to be treated? Neurourology & Urodynamics. 2004; 23(7):685-688. Ref ID: 664	Sample size < 20
Amark P, Eksborg S, Juneskans O et al. Pharmacokinetics and effects of intravesical oxybutynin on the paediatric neurogenic bladder. British Journal of Urology. 1998; 82(6):859-864. Ref ID: 582	Sample size < 20
Amend B, Hennenlotter J, Schafer T et al. Effective treatment of neurogenic detrusor dysfunction by combined high-dosed antimuscarinics without increased side-effects. European Urology. 2008; 53(5):1021-1028. Ref ID: 676	Quasi RCT
Bennett N, O'Leary M, Patel AS et al. Can higher doses of oxybutynin improve efficacy in neurogenic bladder? Journal of Urology. 2004; 171(2:Pt 1):749-751. Ref ID: 697	Wrong comparison. Dose escalation study
Buyse G, Verpoorten C, Vereecken R et al. Intravesical application of a stable oxybutynin solution improves therapeutic compliance and acceptance in children with neurogenic bladder dysfunction. Journal of Urology. 1998; 160(3:Pt 2):1084-1087. Ref ID: 706	Sample size < 20
Buyse G, Verpoorten C, Vereecken R et al. Treatment of neurogenic bladder dysfunction in infants and children with neurospinal dysraphism with clean intermittent (self)catheterisation and optimized intravesical oxybutynin	Sample size < 20

Author/title	Reason for exclusion
hydrochloride therapy. <i>European Journal of Pediatric Surgery</i> . 1995; 5(SUPPL. 1):31-34. Ref ID: 614	
Cameron AP, Clemens JQ, Latini JM et al. Combination Drug Therapy Improves Compliance of the Neurogenic Bladder. <i>Journal of Urology</i> . 2009; 182(3):1062-1067. Ref ID: 46	Wrong comparison. No drug vs two or three drug combinations (drugs not all antimuscarinics)
Cartwright PC, Coplen DE, Kogan BA et al. Efficacy and safety of transdermal and oral oxybutynin in children with neurogenic detrusor overactivity. <i>Journal of Urology</i> . 2009; 182(4):1548-1554. Ref ID: 714	Wrong comparison. Transdermal vs oral
Chapple CR, Khullar V, Gabriel Z et al. The effects of antimuscarinic treatments in overactive bladder: an update of a systematic review and meta-analysis. [Review] [52 refs]. <i>European Urology</i> . 2008; 54(3):543-562. Ref ID: 739	Population not neurological disease
Ellsworth PI, Borgstein NG, Nijman RJ et al. Use of tolterodine in children with neurogenic detrusor overactivity: relationship between dose and urodynamic response. <i>Journal of Urology</i> . 2005; 174(4:Pt 2):1647-1651. Ref ID: 776	Wrong comparison. Dose escalation study
Ersoz M, Yildiz N, Akyuz M et al. Efficacy of combined oral-intravesical oxybutynin hydrochloride treatment for patients with overactive detrusors and indwelling urethral catheters. <i>Rehabilitation nursing : the official journal of the Association of Rehabilitation Nurses</i> . 2010; 35(2):80-86. Ref ID: 94	Sample size < 20
Ethans KD, Nance PW, Bard RJ et al. Efficacy and safety of tolterodine in people with neurogenic detrusor overactivity. <i>Journal of Spinal Cord Medicine</i> . 2004; 27(3):214-218. Ref ID: 778	Sample size < 20
Franco I, Horowitz M, Grady R et al. Efficacy and safety of oxybutynin in children with detrusor hyperreflexia secondary to neurogenic bladder dysfunction. <i>Journal of Urology</i> . 2005; 173(1):221-225. Ref ID: 398	Results of study 2 excluded due to sample size < 20
George J, Tharion G, Richard J et al. The effectiveness of intravesical oxybutynin, propantheline, and capsaicin in the management of neuropathic bladder following spinal cord injury. <i>TheScientificWorldJournal</i> . 2007; 7(pp 1683-1690):-1690. Ref ID: 191	Sample size < 20
Greenfield SP, Fera M. The use of intravesical oxybutynin chloride in children with neurogenic bladder. <i>Journal of Urology</i> . 1991; 146(2 ( Pt 2)):532-534. Ref ID: 1131	Sample size < 20
Grigoleit U, Murtz G, Laschke S et al. Efficacy, Tolerability and Safety of Propiverine Hydrochloride in Children and Adolescents with Congenital or Traumatic Neurogenic Detrusor Overactivity-A Retrospective Study. <i>European Urology</i> . 2006; 49(6):1114-1121. Ref ID: 297	The conditions under which reference standards as well as the time intervals between reference and during-treatment assessment, varied widely between patients
Guerra LA, Moher D, Sampson M et al. Intravesical oxybutynin for children with poorly compliant neurogenic bladder: a systematic review. <i>Journal of Urology</i> . 2008; 180(3):1091-1097. Ref ID: 70	Included a master's thesis in the review. Other relevant studies included
Haferkamp A, Staehler G, Gerner HJ et al. Dosage escalation of intravesical oxybutynin in the treatment of neurogenic bladder patients. <i>Spinal Cord</i> . 2000; 38(4):250-254. Ref ID: 803	Wrong comparison. Dose escalation study
Hebjorn S. Treatment of detrusor hyperreflexia in multiple sclerosis: a double-blind, crossover clinical trial comparing methantheline bromide (Banthine), flavoxate chloride (Urispas) and meladrazine tartrate (Lisidonil). <i>Urologia Internationalis</i> . 1977; 32(2-3):209-217. Ref ID: 259	Wrong drug intervention (two drugs not in BNF)



Author/title	Reason for exclusion
Holland AJA, King PA, Chauvel PJ et al. Intravesical therapy for the treatment of neurogenic bladder in children. Australian and New Zealand Journal of Surgery. 1997; 67(10):731-733. Ref ID: 602	Sample size < 20
Horstmann M, Schaefer T, Aguilar Y et al. Neurogenic bladder treatment by doubling the recommended antimuscarinic dosage. Neurourology & Urodynamics. 2006; 25(5):441-445. Ref ID: 834	Wrong comparison. Non RCT of low vs high dose
Isik AT, Celik T, Bozoglu E et al. Trospium and cognition in patients with late onset Alzheimer disease. Journal of Nutrition, Health & Aging. 2009; 13(8):672-676. Ref ID: 838	Wrong intervention. Trospium vs trospium and/or galantamine
Jewart RD, Green J, Lu CJ et al. Cognitive, behavioral, and physiological changes in Alzheimer disease patients as a function of incontinence medications. American Journal of Geriatric Psychiatry. 2005; 13(4):324-328. Ref ID: 840	Sample size < 20
Kaefer M, Pabby A, Kelly M et al. Improved bladder function after prophylactic treatment of the high risk neurogenic bladder in newborns with myelomeningocele. Journal of Urology. 1999; 162(3:Pt 2):1068-1071. Ref ID: 844	Wrong comparison. Early vs later initiation of therapy
Kasabian NG, Vlachiotis JD, Lais A et al. The use of intravesical oxybutynin chloride in patients with detrusor hypertonicity and detrusor hyperreflexia. Journal of Urology. 1994; 151(4):944-945. Ref ID: 633	Sample size < 20
Kennelly MJ, Lemack GE, Foote JE et al. Efficacy and safety of oxybutynin transdermal system in spinal cord injury patients with neurogenic detrusor overactivity and incontinence: an open-label, dose-titration study. Urology. 2009; 74(4):741-745. Ref ID: 864	Wrong comparison. Dose escalation study
Kim YH, Bird ET, Priebe M et al. The role of oxybutynin in spinal cord injured patients with indwelling catheters. Journal of Urology. 1997; 158(6):2083-2086. Ref ID: 869	Non-RCT
Lobo ED, Quinlan T, O'Brien L et al. Population pharmacokinetics of Orally administered duloxetine in patients: Implications for dosing recommendation. Clinical Pharmacokinetics. 2009; 48(3):189-197. Ref ID: 7	Wrong pharmacological intervention
Mahanta K, Medhi B, Kaur B et al. Comparative efficacy and safety of extended-release and instant-release tolterodine in children with neural tube defects having cystometric abnormalities. Journal of Pediatric Urology. 2008; 4(2):118-123. Ref ID: 907	Wrong comparison. Extended vs instant-release tolterodine
Mizunaga M, Miyata M, Kaneko S et al. Intravesical instillation of oxybutynin hydrochloride therapy for patients with a neuropathic bladder. Paraplegia. 1994; 32(1):25-29. Ref ID: 634	Sample size < 20
O'Leary M, Erickson JR, Smith CP et al. Effect of controlled-release oxybutynin on neurogenic bladder function in spinal cord injury. Journal of Spinal Cord Medicine. 2003; 26(2):159-162. Ref ID: 491	Sample size < 20
Pannek J, Sommerfeld HJ, Botel U et al. Combined intravesical and oral oxybutynin chloride in adult patients with spinal cord injury. Urology. 2000; 55(3):358-362. Ref ID: 961	Wrong comparison. Oral vs oral plus intravesical oxybutynin therapy
Pannek J, Diederichs W, Botel U. Urodynamically controlled management of spinal cord injury in children. Neurourology and Urodynamics. 1997; 16(4):285-292. Ref ID: 604	Sample size < 20
Prasad KVR, Vaidyanathan S. Intravesical oxybutynin chloride and clean intermittent catheterisation in patients with neurogenic vesical dysfunction and decreased bladder capacity. British Journal of Urology. 1993; 72(5 II):719-722. Ref ID: 635	Sample size < 20
Saito M, Watanabe T, Tabuchi F et al. Urodynamic effects and safety of modified intravesical oxybutynin chloride in patients with neurogenic detrusor	Sample size < 20

Author/title	Reason for exclusion
overactivity: 3 Years experience. International Journal of Urology. 2004; 11(8):592-596. Ref ID: 432	
Singh G, Thomas DG. Intravesical oxybutynin in patients with posterior rhizotomies and sacral anterior root stimulators. Neurourology and Urodynamics. 1995; 14(1):65-71. Ref ID: 625	Sample size < 20
Stohrer M, Murtz G, Kramer G et al. Efficacy and tolerability of propiverine hydrochloride extended release compared to immediate release in patients with neurogenic detrusor overactivity (Abstract number 448). Proceedings of the 39th Annual Meeting of the International Continence Society (ICS), 2009 Sep 29 - Oct 3, San Francisco, CA. 2009; Ref ID: 1130	Wrong comparison. Extended versus immediate release
Szollar SM, Lee SM. Intravesical oxybutynin for spinal cord injury patients. Spinal Cord. 1996; 34(5):284-287. Ref ID: 1055	Sample size < 20
Vaidyanathan S, Soni BM, Brown E et al. Effect of intermittent urethral catheterization and oxybutynin bladder instillation on urinary continence status and quality of life in a selected group of spinal cord injury patients with neuropathic bladder dysfunction. Spinal Cord. 1998; 36(6):409-414. Ref ID: 589	Sample size < 20
Youdim K, Kogan BA. Preliminary study of the safety and efficacy of extended-release oxybutynin in children. Urology. 2002; 59(3):428-432. Ref ID: 520	Included non-neurogenic patients

#### K.5.2 Economic Studies excluded

Author/title	Notes
Cardozo L, Thorpe A, Warner J, and Sidhu M. The cost-effectiveness of solifenacin vs fesoterodine, oxybutynin immediate-release, propiverine, tolterodine extended-release and tolterodine immediate-release in the treatment of patients with overactive bladder in the UK National Health Service. British Journal of Urology International, 2010.	Non-neurogenic population of patients; UK perspective
Pradelli L and Iannazzo S. Solifenacin in the treatment of overactive bladder syndrome in Italian patients: pharmacoeconomic evaluation. Journal of Medical Economics, 2009.	Non-neurogenic population of patients; Italian perspective
Milsom I, Axelsen S, Kulseng-Hansen S, Mattiasson A, Nilsson C G, and Wickstrom J. Cost-effectiveness analysis of solifenacin flexible dosing in patients with overactive bladder symptoms in four Nordic countries. Acta Obstetrica et Gynecologica Scandinavica, 2009.	Non-neurogenic population of patients; perspective of four Nordic countries
Hakkaart L, Verboom P, Phillips R, and Al M J. The cost utility of solifenacin in the treatment of overactive bladder. International Urology & Nephrology, 2009.	Non-neurogenic population of patients; UK perspective
Speakman M, Khullar V, Mundy A, Odeyemi I, and Bolodeoku J. A cost-utility analysis of once daily solifenacin compared to tolterodine in the treatment of overactive bladder syndrome. Current Medical Research and Opinion, 2008.	Non-neurogenic population of patients; UK perspective
Ko Y, Malone D C, and Armstrong E P. Pharmacoeconomic evaluation of antimuscarinic agents for the treatment of overactive bladder. Pharmacotherapy, 2006.	Non-neurogenic population of patients; US perspective
Hughes D A and Dubois D. Cost-effectiveness analysis of extended-release formulations of oxybutynin and tolterodine for the management of urge incontinence. Pharmacoeconomics, 2004.	Non-neurogenic population of patients; UK perspective
Jumadilova Z, Varadharajan S, Girase P, and Ollendorf D A. Retrospective evaluation of outcomes in patients with overactive bladder receiving tolterodine versus Oxybutynin. American Journal of Health-System Pharmacy, 2006.	Non-neurogenic population of patients (95% of patients); US perspective

Author/title	Notes
Getsios D, Caro J J, Ishak K J, El-Hadi W, Payne K, O'Connell M, Albrecht D, Feng D, and Dubois D. Oxybutynin extended release and tolterodine immediate release: a health economic comparison. <i>Clinical Drug Investigation</i> , 2004.	Non-neurogenic population of patients; UK perspective
Getsios D, Caro J J, Ishak K J, Hadi El W, and Payne K. Canadian economic comparison of extended-release oxybutynin and immediate-release tolterodine in the treatment of overactive bladder. <i>Clinical Therapeutics</i> , 2004.	Non-neurogenic population of patients; Canadian perspective
Guest J F, Abegunde D, and Ruiz F J. Cost effectiveness of controlled-release oxybutynin compared with immediate-release oxybutynin and tolterodine in the treatment of overactive bladder in the UK, France and Austria. <i>Clinical Drug Investigation</i> , 2004.	Non-neurogenic population of patients; UK, French, and Austrian perspectives
Kobelt G, Jonsson L, and Mattiasson A. Cost-effectiveness of new treatments for overactive bladder: the example of tolterodine, a new muscarinic agent. A Markov model. <i>Neurourology and Urodynamics</i> , 1998.	Non-neurogenic population of patients; Swedish perspective

## K.6 What is the safety and efficacy of detrusor injections of botulinum toxin type A or B compared with a) usual care b) antimuscarinics in neurological disease?

### K.6.1 Clinical studies excluded

Author/title	Reason for exclusion
Abdel-Meguid TA. Botulinum toxin-a injections into neurogenic overactive bladder-to include or exclude the trigone? A prospective, randomized, controlled trial. <i>Journal of Urology</i> . 2010; 184(6):2423-2428. Ref ID: ABDELMEGUID2010	Trial comparing trigone vs non-trigone injections
Akbar M, Abel R, Seyler TM et al. Erratum: Repeated botulinum-A toxin injections in the treatment of myelodysplastic children and patients with spinal cord injuries with neurogenic bladder dysfunction ( <i>BJU International</i> (2007) 100 (639-645)). <i>BJU Int</i> . 2007; 100(3):719. Ref ID: AKBAR2007A	Erratum of included study
Albavera-Hernandez C, Rodriguez JM, Idrovo AJ. Safety of botulinum toxin type A among children with spasticity secondary to cerebral palsy: A systematic review of randomized clinical trials. <i>Clin Rehabil</i> . 2009; 23(5):394-407. Ref ID: ALBAVERAHERNANDEZ2009	Treatment for spasticity
Chen YH, Kuo HC. Botulinum A toxin treatment of urethral sphincter pseudodyssynergia in patients with cerebrovascular accidents or intracranial lesions. <i>Urologia Internationalis</i> . 2004; 73(2):156-161. Ref ID: CHEN2004	Non-RCT
DasGupta R, Murphy FL. Botulinum toxin in paediatric urology: a systematic literature review. [Review] [38 refs]. <i>Pediatr Surg Int</i> . 2009; 25(1):19-23. Ref ID: DASGUPTA2009	Studies included
Dykstra DD, Sidi AA. Treatment of detrusor-sphincter dyssynergia with botulinum A toxin: A double-blind study. <i>Archives of Physical Medicine and Rehabilitation</i> . 1990; 71(1):24-26. Ref ID: DYKSTRA1990	Treatment regimen no longer used
Franco I, Landau-Dyer L, Isom-Batz G et al. The Use of Botulinum Toxin A Injection for the Management of External Sphincter Dyssynergia in Neurologically Normal Children. <i>Journal of Urology</i> . 2007; 178(4 SUPPLEMENT):1775-1780. Ref ID: FRANCO2007A	Non-neurological population
Gallien P, Reymann JM, Amarenco G et al. Placebo controlled, randomised, double blind study of the effects of botulinum A toxin on detrusor sphincter dyssynergia in multiple sclerosis patients. <i>J Neurol Neurosurg Psychiatry</i> . 2005;	Injections into the detrusor sphincter

Author/title	Reason for exclusion
76(12):1670-1676. Ref ID: GALLIEN2005	
Grise P, Ruffion A, Denys P et al. Efficacy and tolerability of botulinum toxin type a in patients with neurogenic detrusor overactivity and without concomitant anticholinergic therapy: Comparison of two doses. Eur Urol. 2010; 58(5):759-766. Ref ID: GRISE2010	Dose comparison study
Herschorn S, Gajewski J, Ethans K et al. Botulinum toxin A in patients with neurogenic detrusor overactivity: preliminary results from a Canadian multicentre randomized trial (Abstract number: Poster# 50). Neurourol Urodyn. 2009; 28(2):138-139. Ref ID: HERSCHORN2009	Exclude (abstract with no details of randomisation, allocation concealment, blinding or drop-outs)
Hori S, Patki P, Attar KH et al. Patients' perspective of botulinum toxin-A as a long-term treatment option for neurogenic detrusor overactivity secondary to spinal cord injury. BJU Int. 2009; 104(2):216-220. Ref ID: HORI2009	Non-RCT (study included patients who had only one injection)
Kulaksizoglu H, Parman Y. Use of botulinim toxin-A for the treatment of overactive bladder symptoms in patients with Parkinsons's disease. Parkinsonism and Related Disorders. 2010; 16(8):531-534. Ref ID: KULAKSIZOGLU2010	Non-RCT
Kuo HC. Therapeutic Satisfaction and Dissatisfaction in Patients With Spinal Cord Lesions and Detrusor Sphincter Dyssynergia Who Received Detrusor Botulinum Toxin A Injection. Urology. 2008; 72(5):1056-1060. Ref ID: KUO2008	Non-RCT
Naidu K, Smith K, Sheedy M et al. Systemic adverse events following botulinum toxin A therapy in children with cerebral palsy. Dev Med Child Neurol. 2010; 52(2):139-144. Ref ID: NAIDU2010	Treatment for spasticity
Panicker J, Khan S, Game X et al. PAW26 Are the beneficial effects of Botulinum toxin for refractory detrusor overactivity in multiple sclerosis sustained with repeat injections? Journal of Neurology, Neurosurgery & Psychiatry. 2010; 81(11):e30-e31. Ref ID: PANICKER2010A	Abstract (insufficient detail)
Schurch B, de SM, Denys P et al. Botulinum toxin A (Botox®) in neurogenic urinary incontinence: results from a multi-centre randomised, controlled trial (Abstract). Neurourology & Urodynamics. 2004; 23(5/6):609-610. Ref ID: SCHURCH2004B	Abstract of included paper
Stoehrer M, Wolff A, Kramer G et al. Treatment of neurogenic detrusor overactivity with botulinum toxin A: The first seven years. Urologia Internationalis. 2009; 83(4):379-385. Ref ID: STOEHRER2009	Non-RCT

### K.6.2 Economic studies excluded

Author/titles	Reason for exclusions
Kalsi V, Popat R, Apostolidis A, Kavia R, Odeyemi IAO, Dakin HA et al. 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. European Urology. 2006; 49(3):519-527	Potentially serious limitations and partial applicability.
Padmanabhan P, Scarpero H, Milam D, Dmochowski R, Penson D. Five year cost analysis of intra-detrusor injection of botulinum toxin type A and augmentation cystoplasty for refractory neurogenic detrusor overactivity. Journal of Urology. (Padmanabhan, Scarpero, Milam, Dmochowski, Penson) NashvilleTNUnited States 2010; 183(4 Suppl.):e136	Potentially serious limitations and partial applicability.

## K.7 What is the safety and efficacy of augmentation cystoplasty compared with a) Botulinum toxin b) usual care in neurological disease c) urinary diversion?

### K.7.1 Clinical studies excluded

Author/title	Reason for exclusion
Bennett CJ, Bennett JK. Augmentation cystoplasty and urinary diversion in patients with spinal cord injury. <i>Physical medicine and rehabilitation clinics of North America</i> 1993; 4: 377-389	Narrative review
Chartier-Kastler EJ, Ruud Bosch JLH, Perrigot M, Chancellor MB, Richard F, Denys P. Long term results of sacral nerve stimulation (S3) for the treatment of neurogenic refractory urge incontinence related to detrusor hyperreflexia. <i>2000; 164: 1476-1480</i>	Incorrect intervention used – augmentation cystoplasty not included.
Ivancic V, DeFoor W, Jackson E, Alam S, Minevich E, Reddy P, Sheldon C. Progression of renal insufficiency in children and adolescents with neuropathic bladder is not accelerated by lower urinary tract reconstruction. <i>The Journal of Urology</i> 2010; 184: 1768-1774	Non-neurological population
Wiener JS, Antonelli J, Shea AM et al. Bladder augmentation versus urinary diversion in patients with spina bifida in the United States. <i>Journal of Urology</i> . 2011; 186(1):161-165. Ref ID: WIENER2011	No relevant outcomes

### K.7.2 Economic studies excluded

No relevant economic evaluations comparing augmentation cystoplasty with usual care in neurological disease were identified.

## K.8 Does pelvic floor muscle training with or without electrical stimulation or biofeedback compared with treatment as usual, improve outcomes?

### K.8.1 Clinical studies excluded

Author/title	Reason for exclusion
de Ridder D, Vermeulen C, De SE et al. Clinical assessment of pelvic floor dysfunction in multiple sclerosis: Urodynamic and neurological correlates. <i>Neurourol Urodyn</i> . 1998; 17(5):537-542. Ref ID: DERIDDER1998	No relevant outcomes
Ishigooka M, Hashimoto T, Izumiya K et al. Electrical pelvic floor stimulation in the management of urinary incontinence due to neuropathic overactive bladder. <i>Frontiers of Medical and Biological Engineering</i> . 1993; 5(1):1-10. Ref ID: ISHIGOOKA1993	Not MS or stroke population
Ishigooka M, Hashimoto T, Hayami S et al. Electrical pelvic floor stimulation: a possible alternative treatment for reflex urinary incontinence in patients with spinal cord injury. <i>Spinal Cord</i> . 1996; 34(7):411-415. Ref ID: ISHIGOOKA1996	Not MS or stroke population
Khan F, Pallant JF, Pallant JI et al. A randomised controlled trial: outcomes of bladder rehabilitation in persons with multiple sclerosis. <i>J Neurol Neurosurg Psychiatry</i> . 2010; 81(9):1033-1038. Ref ID: KHAN2010	Multiple interventions implemented at the same time
Killam PE, Jeffries JS, Varni JW. Urodynamic biofeedback treatment of urinary incontinence in children with myelomeningocele. <i>Biofeedback and Self Regulation</i> . 1985; 10(2):161-171. Ref ID: KILLAM1985	Wrong patient population
Klarskov P, Heely E, Nyholdt I et al. Biofeedback treatment of bladder	Pelvic floor muscle training

Author/title	Reason for exclusion
dysfunction in multiple sclerosis. A randomized trial. Scandinavian Journal of Urology and Nephrology Supplementum. 1994; 157:61-65. Ref ID: KLARSKOV1994	plus behavioural therapy given to all subjects
McClurg D, Lowe-Strong A, Ashe RG. The benefits of pelvic floor muscle training in people with multiple sclerosis and lower urinary tract dysfunction. Journal of the Association of Chartered Physiotherapists in Women's Health. 2008;(103):21-28. Ref ID: MCCLURG2008A	Subjects were the same as in included study
Middaugh SJ, Whitehead WE, Burgio KL, Engel BT. Biofeedback in treatment of urinary incontinence in stroke patients. Biofeedback and self-regulation 1989; 14: 3-19	Observational study
Porena M, Costantini E, Rociola W et al. Biofeedback successfully cures detrusor-sphincter dyssynergia in pediatric patients. Journal of Urology. 2000; 163(6):1927-1931. Ref ID: PORENA2000	Non neurological population
Thomas LH, Cross S, Barrett J et al. Treatment of urinary incontinence after stroke in adults. Cochrane Database of Systematic Reviews. 2008;(1):CD004462. Ref ID: THOMAS2008	Papers included in the review
Tibaek S, Gard G, Jensen R. Is there a long-lasting effect of pelvic floor muscle training in women with urinary incontinence after ischemic stroke? A 6-month follow-up study. International Urogynecology Journal. 2007; 18(3):281-287. Ref ID: TIBAEK2007	Results the same as for Tibaek S, Jensen R, Lindskov G et al. Can quality of life be improved by pelvic floor muscle training in women with urinary incontinence after ischemic stroke? A randomised, controlled and blinded study. International Urogynecology Journal. 2004; 15(2):117-123. Ref ID: TIBAEK2004

### K.8.2 Economic studies excluded

No relevant economic evaluations comparing pelvic floor muscle training (with or without electrical stimulation or biofeedback) with usual care were identified.

## K.9 What is the safety and efficacy of urethral tape and sling surgery compared with a) bladder neck closure b) usual care in neurological disease?

### K.9.1 Clinical studies excluded

Author/title	Reason for exclusion
Ghoniem GM. Bladder neck wrap: a modified fascial sling in treatment of incontinence in myelomeningocele patients. Eur Urol. 1994; 25(4):340-342. Ref ID: GHONIEM1994	No relevant outcomes
Gosalbez R, Castellan M. Defining the role of the bladder-neck sling in the surgical treatment of urinary incontinence in children with neurogenic incontinence. World J Urol. 1998; 16(4):285-291. Ref ID: GOSALBEZ1998	Discussion paper
Snodgrass WT, Elmore J, Adams R. Bladder neck sling and appendicovesicostomy without augmentation for neurogenic incontinence in	Patients included in Snodgrass W, Barber T. Comparison of bladder

Author/title	Reason for exclusion
children. Journal of Urology. 2007; 177(4):1510-1514. Ref ID: SNODGRASS2007	outlet procedures without augmentation in children with neurogenic incontinence. Journal of Urology. 2010; 184(4 Suppl):1775-1780. Ref ID: SNODGRASS2010
Ghoniem GM. Bladder neck wrap: a modified fascial sling in treatment of incontinence in myelomeningocele patients. Eur Urol. 1994; 25(4):340-342. Ref ID: GHONIEM1994	No relevant outcomes

### K.9.2 Economic studies excluded

No relevant economic evaluations comparing urethral tape and sling surgery with bladder neck closure were identified.

## K.10 What is the safety and efficacy of artificial urinary sphincter compared with other treatments in neurological disease?

### K.10.1 Clinical studies excluded

Author/title	Reason for exclusion
Abdill CK, Rivas DR, Chancellor MB. Transurethral placement of external sphincter wire mesh stent for neurogenic bladder. SCI Nurs 1994 Jun;11:38-41.	Involves a stent used to keep the bladder neck open for improved urine removal, not an artificial sphincter to reduce incontinence
Chancellor MB, Karusick S, Erhard MJ, et al. Placement of a wire mesh prosthesis in the external urinary sphincter of men with spinal cord injuries. Radiology 1993 May;187:551-5.	Involves a stent used to keep the bladder neck open for improved urine removal, not an artificial sphincter to reduce incontinence
Chancellor MB, Rivas DA, Abdill CK, et al. Prospective comparison of external sphincter balloon dilatation and prosthesis placement with external sphincterotomy in spinal cord injured men. Archives of Physical Medicine & Rehabilitation 1994 Mar;75:297-305.	Involves a stent used to keep the bladder neck open for improved urine removal, not an artificial sphincter to reduce incontinence
Chancellor MB, Rivas DA, Linsenmeyer T, et al. Multicenter trial in North America of UroLume urinary sphincter prosthesis. J Urol 1994 Sep;152:924-30.	Involves a stent used to keep the bladder neck open for improved urine removal, not an artificial sphincter to reduce incontinence
Chancellor MB, Rivas DA, Abdill CK, et al. Management of sphincter dyssynergia using the sphincter stent prosthesis in chronically catheterized SCI men. J Spinal Cord Med 1995 Apr;18:88-94.	Involves a stent used to keep the bladder neck open for improved urine removal, not an artificial sphincter to reduce incontinence

Author/title	Reason for exclusion
Dave S, Pippi Salle JL, Lorenzo AJ, et al. Is long-term bladder deterioration inevitable following successful isolated bladder outlet procedures in children with neuropathic bladder dysfunction? J Urol 2008 May;179:1991-6.	Bladder outlet procedures not described.
Juan Garcia FJ, Salvador S, Montoto A, et al. Intraurethral stent prosthesis in spinal cord injured patients with sphincter dyssynergia. Spinal Cord 1999;37:54-7.	Involves a stent used to keep the bladder neck open for improved urine removal, not an artificial sphincter to reduce incontinence
Kryger JV, Gonzalez R, Spencer Barthold J. Surgical management of urinary incontinence in children with neurogenic sphincteric incompetence. The Journal of Urology 2000; 163: 256-263	Narrative review
Rivas DA, Chancellor MB, Bagley D. Prospective comparison of external sphincter prosthesis placement and external sphincterotomy in men with spinal cord injury. J Endourol 1994 Apr;8:89-93.	Involves a stent used to keep the bladder neck open for improved urine removal, not an artificial sphincter to reduce incontinence

#### K.10.2 Economic studies excluded

No relevant economic evaluations comparing the use of the artificial urinary sphincter with sling surgery or usual care were identified.

### K.11 What is the safety and efficacy of alpha adrenergic antagonists compared with a) other adrenergic antagonists b) placebo/usual care for the treatment of incontinence due to neurological disease?

#### K.11.1 Clinical studies excluded

Study	Rationale for exclusion
Amark P, Beck O. Effect of phenylpropanolamine on incontinence in children with neurogenic bladders. A double-blind crossover study. Acta Paediatrica. 1992; 81(4):345-350. Ref ID: AMARK1992	Drug not in BNF
Bennett JK, Foote J, El-Leithy TR et al. Terazosin for vesicosphincter dyssynergia in spinal cord-injured male patients. Molecular Urology. 2000; 4(4):415-420. Ref ID: BENNETT2000	Observational study
Delauche-Cavallier MC, Richard JM, Buzelin M et al. Alpha-blocker therapy with alfuzosin in neurogenic bladder disease. Neurourology & Urodynamics. 1993; 12(4):343-344. Ref ID: DELAUCHECAVALLIER1993	Abstract
Delauche-Cavallier MC, Costa P, Robain R et al. Efficacy and tolerability of 3 doses of intravenous alfuzosin in neurogenic bladder disease. Neurourology & Urodynamics. 1993; 12(4):344-345. Ref ID: DELAUCHECAVALLIER1993A	Abstract
Hachen HJ. Clinical and urodynamic assessment of alpha-adrenolytic therapy in patients with neurogenic bladder function. Paraplegia. 1980; 18(4):229-240. Ref ID: HACHEN1980	Observational study
Husmann DA. Use of sympathetic alpha antagonists in the management of pediatric urologic disorders. [Review] [49 refs]. Current Opinion in Urology. 2006; 16(4):277-282. Ref ID: HUSMANN2006	Review
Kakizaki H, Ameda K, Kobayashi S et al. Urodynamic effects of alpha1-blocker tamsulosin on voiding dysfunction in patients with neurogenic bladder.	Observational study



Study	Rationale for exclusion
International Journal of Urology. 2003; 10(11):576-581. Ref ID: KAKIZAKI2003	
Sakakibara R, Hattori T, Uchiyama T et al. Are alpha-blockers involved in lower urinary tract dysfunction in multiple system atrophy? A comparison of prazosin and moxisylyte. Journal of the Autonomic Nervous System. 2000; 79(2-3):191-195. Ref ID: SAKAKIBARA2000	Wrong drug comparison
Swierzewski SJ, III, Gormley EA, Belville WD et al. The effect of terazosin on bladder function in the spinal cord injured patient. Journal of Urology. 1994; 151(4):951-954. Ref ID: SWIERZEWSKI1994	Observational study
Vaidyanathan S.Rao. Possible use of indoramin in patients with chronic neurogenic bladder dysfunction. Journal of Urology 129 (1):96-101, 1983.	Observational study
Yamanishi T, Yasuda K, Homma Y et al. A multicenter placebo-controlled, double-blind trial of urapidil, an alpha-blocker, on neurogenic bladder dysfunction. European Urology. 1999; 35(1):45-51. Ref ID: YAMANISHI1999	Drug not in BNF
Yasuda K, Yamanishi T, Kawabe K et al. The effect of urapidil on neurogenic bladder: a placebo controlled double-blind study. Journal of Urology. 1996; 156(3):1125-1130. Ref ID: YASUDA1996	Drug not in BNF

#### K.11.2 Economic studies excluded

No relevant economic evaluations comparing alpha adrenergic antagonists with usual care were identified.

### K.12 What is the safety and efficacy of the catheter valve compared with urinary drainage bags in neurological disease?

No papers were ordered for this question

### K.13 What is the efficacy of the ileal conduit diversion compared with usual care in neurological disease?

#### K.13.1 Clinical studies excluded

Author/title	Reason for exclusion
Cass AS, Luxenberg M, Gleich P, Johnson F and Hagen S. Clean intermittent catheterisation in the management of the neurogenic bladder in children. The Journal of Urology 1984; 132: 526-528	Wrong intervention (intermittent catheterisation)
Stein R, Weisner C, Beetz R, Pfitzenmeir J, Schwarz M, Thuroff JW. Urinary diversion in children and adolescents with neurogenic bladder: the Mainz experience. Part II: Continent cutaneous diversion using the Mainz pouch I. Pediatric Nephrology 2005; 20: 926-931	Wrong intervention (continent diversion)

#### K.13.2 Economic studies excluded

No relevant economic evaluations comparing Urinary Diversion with sling surgery or usual care were identified.

## K.14 Do prophylactic antibiotics compared with a) no treatment b) other antibiotics reduce the risk of symptomatic urinary tract infections?

### K.14.1 Clinical evidence excluded

Author/title	Reason for exclusion
Brumfitt W, Smith GW, Hamilton-Miller JMT, et al. A clinical comparison between Macrochantin and trimethoprim for prophylaxis in women with recurrent urinary infections. <i>J Antimicrob Chemother</i> 1985;16:111-20.	Not a neurological population
Carlsen NLT, Hesselbjerg U, Glenting P. Comparison of long-term, low-dose pivmecillinam and nitrofurantoin in the control of recurrent urinary tract infection in children. An open, randomized, cross-over study. <i>J Antimicrob Chemother</i> 1985;16:509-17.	Not a neurological population
Everaert K, Lumen N, Kerckhaert W, et al. Urinary tract infections in spinal cord injury: prevention and treatment guidelines. <i>Acta Clin Belg</i> 2009 Jul;64:335-40.	Systematic review
Fried GW, Goetz G, Potts-Nulty S, et al. Prospective evaluation of antibiotic prophylaxis prior to cystometrogram and/or cystogram studies: Oral versus intramuscular routes. <i>Archives of Physical Medicine and Rehabilitation</i> 1996;77:900-2.	Not a neurological population
Gow JG. A comparative trial of hexamine Hippurate and hexamine mandelate in prevention of recurrent infection of the urinary tract. <i>The Practitioner</i> 1974; 213; 97-101	Not a neurological population
Kevorkian CG, Merritt JL, Ilstrup DM. Methenemine mandelate with acidification: An effective urinary antiseptic in patients with neurogenic bladder. <i>Mayo Clinic Proceedings</i> 1984; 59:523-529	Not a true antibiotic
Krebs M, Halvorsen RB, Fishman IJ, Santos-Mendoza N. Prevention of urinary tract infection during intermittent catheterisation. <i>The Journal of Urology</i> 1984; 131: 82-85	Not a true antibiotic
Lee BB, Haran MJ, Hunt LM, Simpson JM, Marial O, Rutkowski SB, Middleton JW, Kotsiou G, Tudehope M, Cameron ID. Spinal Injured neuropathic bladder antiseptis (SINBA) trial. <i>Spinal Cord</i> 2007; 45: 542-550	Not a true antibiotic
Kuhlemeier KV, Stover SL, Lloyd LK. Prophylactic antibacterial therapy for preventing urinary tract infections in spinal cord injury patients. <i>Journal of Urology</i> 1985 Sep;134:514-7.	Did not cover correct outcomes
Morton SC, Shekelle PG, Adams JL, et al. Antimicrobial prophylaxis for urinary tract infection in persons with spinal cord dysfunction. <i>Archives of Physical Medicine and Rehabilitation</i> 2002 Jan;83:129-38.	Systematic review
Mountokalakis T, Skounakis M, Tselentis J. Short-term versus prolonged systemic antibiotic prophylaxis in patients treated with indwelling catheters. <i>Journal of Urology</i> 1985 Sep;134:506-8.	Did not cover correct outcomes
Norberg A, Norberg B, Parkhede U, et al. Randomized double-blind study of prophylactic methenamine hippurate treatment of patients with indwelling catheters. <i>Eur J Clin Pharmacol</i> 1980 Nov;18:497-500.	Did not cover correct outcomes
Nunez U, Solis Z. Macrocrystalline nitrofurantoin versus norfloxacin as treatment and prophylaxis in uncomplicated recurrent urinary tract infection. <i>Current Therapeutic Research - Clinical and Experimental</i> 1990;48:234-45.	Not a neurological population
Pearman JW, Bailey M, Harper WE. Comparison of the efficacy of "Trisdine" and kanamycin-colistin bladder instillations in reducing bacteriuria during intermittent catheterisation of patients with acute spinal cord trauma. <i>Br J Urol</i> 1988 Aug;62:140-4.	Did not cover correct outcomes
van Poppel H, Willemen P, Wegge M, et al. Antibiotic cover of transurethral	Did not cover correct

Author/title	Reason for exclusion
maneuvers with ciprofloxacin and susceptibility behavior of pathogens in patients with neurogenic bladder. <i>Urologia Internationalis</i> 1990;45:342-5.	outcomes

#### K.14.2 Economic evidence excluded

No relevant economic evaluations comparing prophylactic antibiotics with usual care or no prophylactic antibiotics were identified.

### K.15 Does monitoring or do surveillance protocols improve patient outcomes?

#### K.15.1 Clinical studies included

Author/title	Reason for exclusion
Ahmad I, Granitsiotis P. Urological follow-up of adult spina bifida patients. <i>Neurourol Urodyn.</i> 2007; 26(7):978-980. Ref ID: AHMAD2007	Review paper
Babjuk M, Oosterlinck W, Sylvester R. et al. Guidelines on non-muscle-invasive bladder cancer (TaT1 and CIS). European Association of Urology 2012.	Consensus- based guideline
Bauer SB, Lais A, Scott RM. Continuous urodynamic surveillance of babies with myelodysplasia: implications for further neurosurgery. <i>Eur J Pediatr Surg.</i> 1992; 2 Suppl 1:35-36. Ref ID: BAUER1992	No relevant outcomes
Chao R, Clowers D, Mayo ME. Fate of upper urinary tracts in patients with indwelling catheters after spinal cord injury. <i>Urology</i> 1993; 42: 259-262	Author opinion on cystoscopy not based on study data
Dator DP, Hatchett L, Dyro FM et al. Urodynamic dysfunction in walking myelodysplastic children. <i>Journal of Urology.</i> 1992; 148(2 Pt 1):362-365. Ref ID: DATOR1992	Results of excretory urography, ultrasonography and cystourethrography not reported separately
El-Masri WS, Fellows G. Bladder cancer after spinal cord injury. Incidence, presentation, histology and prognosis compared with bladder cancer in the non-paralysed population. <i>Paraplegia</i> 1981; 19: 265-270	Author opinion on cystoscopy not based on study data
Groah SL, Weitzenkamp DA, Lammertse DP, Whiteneck GG, Lezotte DC, Hamman RF USA. Excess risk of bladder cancer in Spinal Cord Injury: Evidence for an association between Indwelling Catheter use and Bladder Cancer. <i>Archives Physical Med. And Rehab</i> 2002;. 83: 346-51	Data on numbers diagnosed with cystoscopy, but not compared to other methods
Kalisvaart JF, Katsumi HK, Ronningen LD, Hovey RM. Bladder cancer in spinal cord injury patients. <i>Spinal Cord.</i> 2010 ; 48:257-61.	Data on numbers diagnosed with cystoscopy, but not compared to other methods
Kamat AM, Karam JA, Grossman HB et al. Prospective trial to identify optimal bladder cancer surveillance protocol: reducing costs while maximising sensitivity. <i>BJU International</i> 2011; 1119-1124	Population had already had a history of bladder cancer.
Kaufman AM, Ritchey ML, Roberts AC et al. Decreased bladder compliance in patients with myelomeningocele treated with radiological observation. <i>Journal of Urology.</i> 1996; 156(6):2031-2033. Ref ID: KAUFMAN1996	No relevant outcomes
Khanna R, Sandhu AS, Doddamani D. Urodynamic management of neurogenic bladder in spinal cord injury. <i>Medical Journal Armed Forces India.</i> 2009; 65(4):300-304. Ref ID: KHANNA2009	No relevant outcomes

Author/title	Reason for exclusion
Lais A, Kasabian NG, Dyro FM et al. The neurosurgical implications of continuous neurourological surveillance of children with myelodysplasia. <i>Journal of Urology</i> . 1993; 150(6):1879-1883. Ref ID: LAIS1993	No relevant outcomes
Liptak GS, Campbell J, Stewart R et al. Screening for urinary tract infection in children with neurogenic bladders. <i>American Journal of Physical Medicine and Rehabilitation</i> . 1993; 72(3):122-126. Ref ID: LIPTAK1993	No relevant outcomes
Sipski ML, Estores IM, Alexander CJ et al. Lack of justification for routine abdominal ultrasonography in patients with chronic spinal cord injury. <i>J Rehabil Res Dev</i> . 2004; 41(1):101-108. Ref ID: SIPSKI2004	Abdominal ultrasound (most patients also underwent renal ultrasound but the results were not reported)
Stonehill WH, Dmochowski RR, Patterson AL, Cox CE. Risk factors for bladder tumors in spinal cord injury patients. <i>The Journal of Urology</i> 1996; 155: 1248-1250	Data on cystoscopy use for bladder cancer surveillance, but no mention of the number of patients screened.
Tanaka ST, Stone AR, Kurzrock EA. Transverse myelitis in children: long-term urological outcomes. <i>Journal of Urology</i> . 2006; 175(5):1865-1868. Ref ID: TANAKA2006	Wrong patient population
Thomsen F, Thorup J, Johnsen A. Hippuran renography and scintigraphy in children with myelomeningocele. <i>Eur Urol</i> . 1986; 12(1):12-15. Ref ID: THOMSEN1986	Intervention not specified in review protocol
Weld KJ, Wall BM, Mangold TA et al. Influences on renal function in chronic spinal cord injured patients. <i>Journal of Urology</i> . 2000; 164(5):1490-1493. Ref ID: WELD2000	No relevant outcomes

### K.15.2 Economic studies excluded

Author/title	Reason for Exclusion
Consortium for Spinal Cord Medicine (US). <i>Bladder Management for Adults with Spinal Cord Injury: A Clinical Practice Guideline for Health-Care Providers</i> , 2006	No recommendations made on diagnosis or follow up. Refers to the VHA Handbook 1176.1.
National Institute for Health and Clinical Excellence (UK England and Wales). <i>Parkinson's Disease. National clinical guideline for diagnosis and management in primary and secondary care</i> , 2006	No recommendations made on diagnosis or follow up.
Scottish Intercollegiate Guidelines Network (UK Scotland). <i>Management of patients with stroke: Rehabilitation, prevention and management of complications, and discharge planning. A national clinical guideline</i> , 2010	No recommendations made on follow up; recommendations made on assessment.
Fowler C J, et al. <i>A UK consensus on the management of the bladder in multiple sclerosis</i> , 2009	Recommendations made but not detailed enough to breakdown.
Tekgul et al. <i>European Association of Urology. Guidelines on Paediatric Urology</i> , 2009.	Recommendations made but not detailed enough to breakdown.
Abrams et al. <i>4th International Consultation on incontinence</i> , 2010.	No recommendations made on diagnosis or follow up

Author/title	Reason for Exclusion
Wyndaele et al. Neurologic urinary incontinence, 2010.	This paper documents the discussion in one of the working groups of the 4th international consultation. And makes no recommendations on follow up.

## K.16 What are the long term risks associated with the long term use of intermittent catheterisation, indwelling catheters and penile sheaths?

### K.16.1 Clinical studies excluded

Author/title	Reason for exclusion
Bennett CJ, Young MN, Darrington H. Differences in urinary tract infections in male and female spinal cord injury patients on intermittent catheterization. <i>Paraplegia</i> . 1995; 33(2):69-72. Ref ID: BENNETT1995B	Follow up < 1 year
Drake MJ, Cortina-Borja M, Savic G et al. Prospective evaluation of urological effects of aging in chronic spinal cord injury by method of bladder management. <i>Neurourology &amp; Urodynamics</i> . 2005; 24(2):111-116. Ref ID: DRAKE2005	No risks reported for patients using catheters
Gallien P, Nicolas B, Robineau S et al. Influence of urinary management on urologic complications in a cohort of spinal cord injury patients. <i>ARCH PHYS MED REHABIL</i> . 1998; 79(10):1206-1209. Ref ID: GALLIEN1998	Type of urologic complication not specified/ no relevant outcomes
Hall MK, Hackler RH, Zampieri TA et al. Renal calculi in spinal cord-injured patient: association with reflux, bladder stones, and foley catheter drainage. <i>Urology</i> . 1989; 34(3):126-128. Ref ID: HALL1989	No relevant outcomes
Kalisvaart JF, Katsumi HK, Ronningen LD et al. Bladder cancer in spinal cord injury patients. <i>Spinal Cord</i> . 2010; 48(3):257-261. Ref ID: KALISVAART2010	No separate outcomes for patients using catheters
Kurzycki L. Intermittent self-catheterisation in people with multiple sclerosis improves urinary symptoms and quality of life. <i>Australian and New Zealand Continence Journal</i> . 2006; 12(1):4. Ref ID: KURZYCKI2006	Abstract
Lin-Dyken DC, Wolraich ML, Hawtrey CE et al. Follow-up of clean intermittent catheterization for children with neurogenic bladders. <i>Urology</i> . 1992; 40(6):525-529. Ref ID: LINDYKEN1992	No relevant outcome data
Menon EB, Tan ES. Pyuria: index of infection in patients with spinal cord injuries. <i>British Journal of Urology</i> 1992; 69: 144-146	Length of follow up not stated
Oh SJ, Shin HI, Paik NJ et al. Depressive symptoms of patients using clean intermittent catheterization for neurogenic bladder secondary to spinal cord injury. <i>Spinal Cord</i> . 2006; 44(12):757-762. Ref ID: OH2006	No relevant outcomes
Parker L. Quality of life due to bladder management in spinal cord injured patients. <i>Disability &amp; Rehabilitation</i> . 2007; 29(20-21):1663. Ref ID: PARKER2007	Abstract
Pearman JW. Urological follow-up of 99 spinal cord injured patients initially managed by intermittent catheterisation. <i>Br J Urol</i> . 1976; 48(5):297-310. Ref ID: PEARMAN1976	No relevant outcomes
Perrouin-Verbe B, Labat JJ, Richard I et al. Clean intermittent catheterisation from the acute period in spinal cord injury patients. Long term evaluation of urethral and genital tolerance. <i>Paraplegia</i> . 1995; 33(11):619-624. Ref ID:	Unclear allocation of subjects to bladder management groups

Author/title	Reason for exclusion
PERROUINVERBE1995	
Sekar P, Wallace DD, Waites KB et al. Comparison of long-term renal function after spinal cord injury using different urinary management methods. ARCH PHYS MED REHABIL. 1997; 78(9):992-997. Ref ID: SEKAR1997	No relevant outcomes
Shekelle PG, Morton SC, Clark KA et al. Systematic review of risk factors for urinary tract infection in adults with spinal cord dysfunction. [Review] [33 refs]. J Spinal Cord Med. 1999; 22(4):258-272. Ref ID: SHEKELLE1999	Papers included in evidence review
Stott DJ, Falconer A, Miller H, Tilston JC, Langhorne P. Urinary tract infection after stroke. Q J med 2009; 102: 243-249.	Follow up < 1 year
Vaidyanathan S, Soni BM, Gurpreet S et al. Protocol of a prospective cohort study of the effect of different methods of drainage of neuropathic bladder on occurrence of symptomatic urinary infection, and adverse events related to the urinary drainage system in spinal cord injury patients. BMC Urology. 2001; 1:2. Ref ID: VAIDYANATHAN2001	Study protocol
Van Kerrebroeck PE, Koldewijn EL, Scherpenhuizen S et al. The morbidity due to lower urinary tract function in spinal cord injury patients. Paraplegia. 1993; 31(5):320-329. Ref ID: VANKERREBROECK1993	No relevant outcomes
Unsal-Delialioglu S, Kaya K, Sahin-Onat S, Kulakli F, Culha C, Ozel S. Fever during rehabilitation in patients with traumatic spinal cord injury: analysis of 392 cases from a national rehabilitation hospital in turkey. J Spinal Cord med. 2010; 33: 243-248.	Follow up < 1 year
West DA, Cummings JM, Longo WE et al. Role of chronic catheterization in the development of bladder cancer in patients with spinal cord injury. Urology. 1999; 53(2):292-297. Ref ID: WEST1999	No outcomes reported according to type of bladder management

#### K.16.2 Economic studies excluded

No relevant economic evaluations comparing the short and long term use of intermittent catheterisation, indwelling catheters and penile sheath collection/pads were identified.

### K.17 For patients and their carers with lower urinary tract dysfunction associated with neurological disorders, what are the experiences of access to and interaction with services that address these issues?

#### K.17.1 Clinical studies excluded

Author/title	Reason for exclusion
Eames S, Hoffmann T, Worrall L et al. Stroke patients' and carers' perception of barriers to accessing stroke information. Topics in Stroke Rehabilitation. 2010; 17(2):69-78. Ref ID: EAMES2010	Reporting on access to information
Neal R, Linnane J. Improving access to continence services: action in Walsall. British Journal of Community Nursing. 2002; 7(11):567-3. Ref ID: NEAL2002	Population – patients with incontinence (proportion neurological not specified)

#### K.17.2 Economic studies excluded

No economic studies were identified that compared the cost effectiveness of different strategies for dealing with access to and interaction with services.

## K.18 What interventions or configuration of services improve outcomes when a patient is transferred from child to adult services?

### K.18.1 Clinical studies excluded

Author/title	Reason for exclusion
Binks JA, Barden WS, Burke TA, et al. What do we really know about the transition to adult-centered health care? A focus on cerebral palsy and spina bifida. Archives of Physical Medicine and Rehabilitation 2007 Aug;88:1064-73. Ref ID: BINKS2007A	Systematic review
Blum RW, Garell D, Hodgman CH, et al. Transition from child-centered to adult health-care systems for adolescents with chronic conditions. A position paper of the Society for Adolescent Medicine. Journal of Adolescent Health 1993 Nov;14:570-6. Ref ID: BLUM1993	Non-systematic review/opinion
Chisanga E. Applying specialist nurse skills to improve epilepsy adolescent transition services. British Journal of Neuroscience Nursing 2009 Jun;5:274-7. Ref ID: CHISANGA2009	Descriptive/opinion
Labhard S. Transitioning to adulthood with disabilities: a holistic approach. TOP SPINAL CORD INJ REHABIL 2010 Jul;16:1-16. Ref ID: LABHARD2010	Non-systematic review/opinion
Logan S. In the UK the transition from youth to adulthood of people with cerebral palsy is poorly planned and co-ordinated. Child Care Health Dev 1997;23:480-2. Ref ID: LOGAN1997 Reprint: In File	Brief review of the Stevenson 1997 paper.
Marn LM, Koch LC. The major tasks of adolescence: implications for transition planning with youths with cerebral palsy. Work 1999 Jul;13:51-8. Ref ID: MARN1999A	Non-systematic review/opinion
Mourtzinos A, Stoffel J. Management goals for the spina bifida neurogenic bladder: a review from infancy to adulthood. Urol Clin North Am 2010 Nov;37:527-35. Ref ID: MOURTZINOS2010	Non-systematic review/opinion
Peterson PM, Rauen KK, Brown J, et al. Spina bifida: the transition into adulthood begins in infancy. Rehabilitation Nursing 1994;19:229-38. Ref ID: PETERSON1994	Not about transition services
Rekate HL. The pediatric neurosurgical patient: the challenge of growing up. Semin Pediatr Neurol 2009;16:2-8. Ref ID: REKATE2009 surgeons to general or adult neurosurgical practices. 2009 Elsevier Inc. All rights reserved	Non-systematic review/opinion
Ried S. Transition of youth from pediatric to adult care: physician's perspective and recommendations. TOP SPINAL CORD INJ REHABIL 2010;16:38-47. Ref ID: RIED2010	Non-systematic review/opinion
Sawyer SM, Macnee S. Transition to adult health care for adolescents with spina bifida: research issues. Developmental Disabilities Research Reviews 2010;16:60-5. Ref ID: SAWYER2010	Non-systematic review/opinion
Simon TD, Lamb S, Murphy NA, et al. Who will care for me next? Transitioning to adulthood with hydrocephalus. Pediatrics 2009;124:1431-7. Ref ID: SIMON2009	Non-systematic review/opinion
Soanes C, Timmons S. Improving transition: a qualitative study examining the attitudes of young people with chronic illness transferring to adult care.	No neurological patients included in the cohort.

Author/title	Reason for exclusion
Journal of Child health care. 2004; 8: 102-112	
Stevenson CJ, Pharoah PO, Stevenson R. Cerebral palsy: the transition from youth to adulthood. Dev Med Child Neurol 1997 May;39:336-42. Ref ID: STEVENSON1997	Does not deal with the transition process
Tuffrey C, Pearce A. Transition from paediatric to adult medical services for young people with chronic neurological problems. J Neurol Neurosurg Psychiatry 2003 Aug;74:1011-3. Ref ID: TUFFREY2003	Non-systematic review
Vinchon M, Dhellemmes P. The transition from child to adult in neurosurgery. Advances and Technical Standards in Neurosurgery 2007;32:3-24. Ref ID: VINCHON2007A	Non-systematic review/opinion
Young NL. The transition to adulthood for children with cerebral palsy: what do we know about their health care needs? Journal of Pediatric Orthopaedics 2007;27:476-9. Ref ID: YOUNG2007A	Non-systematic review/opinion
Young NL, McCormick A, mills W, Barden W, Boydell K, Law M, Wedge J, Fehlings D, Mukherjee S, Rumney P, Williams JI. The Transition study: A look at Youth and Adults with Cerebral palsy, Spina Bifida and Acquired Brain Injury. Physical and Occupational therapy in Pediatrics 2006; 26:25-45.	Does not include transition
Zebracki K, Anderson CJ, Chlan KM, et al. Outcomes of adults with paediatric-onset spinal cord injury: longitudinal findings and implications on transition to adulthood. TOP SPINAL CORD INJ REHABIL 2010 Jul;16:17-25. Ref ID: ZEBRACKI2010	Non-systematic review/opinion

#### K.18.2 Economic studies excluded

No economic studies were identified that compared the cost effectiveness of different strategies for dealing with transitions.

#### K.19 What criteria or signs/symptoms should be used to refer patients for specialist assessment?

No search conducted