SUPPLEMENTARY DIGITAL MATERIAL 1

Supplementary Table I.—Characteristics and outcomes of studies included in the systematic review.

Authors Years	Study design; Evidence levels	Characteristics of patients	Symptoms	Diagnostic tools	Therapeutic approaches	Duration of treatment	Follow up	Results	Risk of bias
Canbaz 2017	Retrospective study; Level 2	21 pt, 5 males and 16 female pt; 42.7±6.9 y	Urge incontinence, urgency, and frequency	Frequency, nocturia, urgency, urge incontinence, voided volume. OAB-q, OAB-V8, ICIQ-SF	Percutaneous Posterior Tibial Nerve Stimulation (PTNS)	12 consecutive weekly sessions	3-6-9 and 12 months	Frequency, incontinence, urgency episodes, and nocturia decreased daily. Voided volume improved	High risk
De Seze 2011	Prospective study; Level 2	70 patients, 51 women and 19 men 48.3±10.2 y	Symptoms of an overactive bladder	QOL, urgency, frequency, maximum cystometric capacity,	Transcutaneous posterior tibial nerve stimulation (PTNS)	Daily sessions of 20 min	3 months	Clinical improvement of symptoms of the patients	Low risk

				reflex volume					
Engeler 2015	Prospective study; Level 2	17 pt, 13 female pt, 4 male pt. 46.2 (range 16.9-74.6 y)	Refractory neurogenic lower urinary tract dysfunction	Voided volume, post void residual, frequency, incontinence	Sacral neuromodulation	Implantation of neuromodulator	Assessment after 6 months and then each year. 24 months, 6 years	Chronic sacral neuromodulation is effective and safe	Unclear risk
Ferreira 2019	Clinical trial; Level 1	Group A: 15 females pt, 38.6 ± 13.5 y Group B: 15 females pt, 49.8 ± 16.5 y	Urinary incontinence	EDSS, perineal sensitivity; OAB-q, Cutaneous anal reflex; Genital dystopia; voluntary contraction; Stress test with loss of urine,	Group A: Traditional exercises + intravaginal electrostimulation Group B: Traditional exercises	Twice a week for 6 months	6 months	Rehabilitation plus electrostimulation engendered better results than exercise alone	Low risk

				Qualiveen questionnaire ; PERFECT					
Fjorback 2007	Prospective study; Level 2	12 pt, 7 men, 5 females pt 46 y (range: 32–63 y)	Symptoms of Detrusor Overactivity	Bladder volume at first contraction and maximum detrusor pressure	Posterior Tibial Nerve Stimulation (PTNS)	Acute assessment	Acute assessment	Electrical stimulation of posterior tibial nerve has no acute effects.	Low risk
Gobbi 2011	Prospective study; Level 2	18 pt, 2 male, 16 female pt 46,6±13 y	Symptoms of detrusor overactivity, dyssynergia	EDSS, frequency, nocturia, urgency, voided volume, residual, QoL, VAS	Percutaneous posterior tibial nerve Stimulation (PTNS)	30 min, once a week for 12 sessions	3 months	PTNS is effective, safe and well-tolerated	Low risk
Kabay, 2008	Prospective study; Level 2	29 pt, 12 male, 17 female pt 46.5±8.5 y	Urge incontinence, urgency,	EDSS, cystometry capacity	Percutaneous posterior tibial nerve	-	-	PTNS is effective to suppress detrusor	Low risk

			and frequency		stimulation (PTNS)			overactivity in MS patients	
Kabay 2009	Prospective study; Levels 2	19 pt, 6 male, 13 female pt 44.9 ± 8,3 y	Symptoms of neurogenic detrusor overactivity	Voided volume, detrusor contraction, pressure and capacity, maximal flow rate	Percutaneous Posterior Tibial Nerve Stimulation (PTNS)	30 min once a week for 3 months	3 months	PTNS results in prominent improvements on the clinical and urodynamic outcome	Low risk
Khan 2010	Clinical trials; Levels 1	58 pt Group A: 24 pt Group B 34 Control 49.9 ± 8.6 y	Detrusor overactivity , sphincter dyssynergia , poor bladder compliance, urinary retention	EDSS, IIQ, QOL	Treatment group received personalized, multidisciplinary rehabilitation program. Control group maintenance program only	2-3 session/week for 6 weeks. Continue with maintenance program for 12 months	12 months	The treatment group compared with the control group showed improvement in IIQ	Low risk
Lucio 2010	Clinical trials; Levels 1	27 pt, Group A 13 pt	Frequency, urgency, urge	PERFECT, EDSS, capacity,	Pelvic Floor Muscle	Twice a week for 12 weeks	3 months	PFMT is an effective approach	Low risk

		Control group 14 pt 34.7±8.8 y	urinary incontinence, nocturnal enuresis, nocturia, hesitancy, slow stream, incomplete emptying	compliance, maximal flow rate, frequency, voided volume	Training (PFMT)				
Lucio 2011	Clinical trial; Levels 1	Group A: 18 female pt Group B: 17 female controls 35 y (range 20-49 y)	Overactive bladder symptoms	ICIQ-SF, QoL, EDSS, OAB-V8, PERFECT	Pelvic floor muscle training (PFMT) with home exercises, *versus* perineometer inside the vagina with no exercise.	Twice / week for 30 min for 12 weeks	3 months	There was improvement in the QoL and reduction of overactive bladder symptoms for women who did the PFMT.	Low risk
Lucio 2014	Clinical trial; Levels 1	30 pt Group A: 10 Group B: 10 Group C: 10	Lower urinary tract symptoms	PFM function, PFM tone, FSFI	Group A: PFMT+ EMG biofeedback Group B:	30 min of treatment sessions twice per week	3 months	PFMT alone or in combination with NMES or TTNS	Low risk

		45.5 y (range 27-54 y)		questionnaire, PERFECT; EDSS, VAS	PFMT+ EMG biofeedback and NMES Group C: PFMT+EMG biofeedback+ PTNS			contributes to the improvement of arousal, lubrication, satisfaction and improves the score of FSFI	
Lucio 2016	Clinical trial; Level 1	30 female pt Group A: 10 Group B: 10 Group C: 10 43.5 y (range 42-52 y)	Lower urinary tract symptoms	24-hour pad test, 3-day bladder diary, strength and muscle tone, urodynamic studies, EDSS, OAB-V8, ICIQ-SF, Qualiveen instrument	Group A: PFMT + EMG biofeedback + NMES Group B: PFMT + EMG biofeedback +NMES Group C: PFMT + EMG biofeedback + PTNS	50-minute treatment sessions twice per week	3 months	PFMT alone or in combination with NMES or TTNS is effective	Low risk
McClurg 2006	Clinical trial; Levels 2)	30 female pt 50,5 y (range 33-67 y)	Urinary symptoms	EMG, 3-day Voiding Diary, 24-	Group 1: PFTA	Stimulation at clinic	0, 9 weeks;	Group 3 demonstrated superior benefit	Low risk

				hour Pad-Test, Uroflowmetry, IIQ, UDI, KHQ, MSQoL54	Group 2: PFTA+EMG Biofeedback; Group 3: PFTA +EMG Biofeedback +NMES	(weekly) was initially for 5 min, increasing to a maximum of 30 min for 9 weeks	4, 6 months	in the number of leaks and pad test than Group 2, with Group 1 showing less improvement when compared to week 0	
McClurg, Ashe 2008	Clinical trial; Levels 1	74 pt, Group A 37 pt, 26 female, 11 male Group B 37 pt, 31 female, 6 male pt	Symptoms of lower urinary tract dysfunction	Incontinence Impact Questionnaire, Urinary distress inventory, he International Prostate Symptom Score, VAS, Multiple Sclerosis Impact Scale, Barthel index	Neuromuscular Electrical Stimulation	9 weeks	0, 9 weeks; 4, 6 months	Active Neuromuscular Electrical Stimulation, Pelvic Floor Muscle Training and EMG Biofeedback could alleviate symptoms of lower urinary tract Dysfunction in MS	Low risk

McClurg, Lowe-Stronge 2008	Clinical trial; Levels 1	37 pt, 11 male, 26 female pt 52.0±8.8 y	Lower urinary tract dysfunction	Bladder diary, pad test, uroflowmetry, International Prostate Symptom Score; VAS	PFMT and EMG biofeedback	9 weeks	9, 16, 24 weeks	9-week PFMT program improved the function of PFM, reduced the symptoms associated with lower urinary tract dysfunction and increased QoL in people with MS	Low risk
McClurg 2009	Clinical trial; Level 1	Group A: 37 pt Group B: 37 controls 11 male pt, 26 female pt >18 y	Symptoms associated with lower urinary tract dysfunction	Leakage of episode per day, symptoms questionnaires, pelvic floor muscle function using	Group A: PFMT + vaginal or anal electrical stimulation Group B: PFMT	EMG biofeedback at weekly clinic visit for 9 weeks	9,16, and 24 weeks	At 9 weeks, group A had significantly less incontinence, and lighter pads than group B. At 24 weeks, pad weights were the only	High risk

				Oxford, and EMG.				objective outcome that remained statistically significant.	
Rafii 2017	Clinical trial; Levels 1	50 pt, female pt 33 y (range 18-50 y)	Urinary incontinence	EDSS, ICIQ-SF, DASS-21	Pelvic Floor Muscle Training (PFMT)	Exercises 3 times a day for 12 consecutive weeks at home.	1, 2, 3 months	PFMT reduces urinary incontinence, stress, anxiety and depression	Low risk
Vahtera 1997	Clinical trial; levels 1	80 pt, 50 female, 30 male pt 42.4± 9.5 y	Symptoms of lower urinary tract dysfunction	EMG, post voided residual volume, EDSS	Pelvic floor muscle exercises (PFMT)	3-5 times a week for at least 6 months	3 weeks, 2-6 months	PFMT combined with electrical stimulation of the pelvic floor constitute an effective treatment for lower urinary tract dysfunction in	Low risk

								male MS patients	
Zecca, Digesu, Robshaw, Puccini 2014	Prospective study; Level 2	83 pt, 21 male, 62 female pt 49 y (range 22-72 y)	Symptoms of detrusor overactivity, detrusor sphincter dyssynergia, detrusor underactivity	3-day bladder diary, PPBC, PPIUS, KHQ, OAB-q	Percutaneous tibial nerve stimulation (PTNS)	30 min once a week for 12 weeks	3 months	A sensory response, alone or in combination with a motor response, is better associated with a successful outcome of PTNS than motor response alone	High risk
Zecca, Digesu, Robshaw, Sing 2014	Prospective study; Level 2	83 pt, 21 male, 62 female pt 49 y (range 22-72 y)	Lower urinary tract symptoms	Bladder diary, post-micturition residual of voiding	Percutaneous tibial nerve stimulation (PTNS)	30 min once a week for 12 weeks	24 months	Prolonged PTNS improves lower urinary tract symptoms	High risk

Patients pt; Years old y; Multiple Sclerosis MS; PERFECT P power, E endurance, R repetitions, F fast contractions, ECT every contraction timed; Overactive Bladder OAB; Electromyography EMG; Pelvic floor muscle PFM; Pelvic floor muscle training PFMT; Neuromuscular electrical stimulation NMES; Transcutaneous posterior tibial nerve stimulation TPTNS; Overactive Bladder Questionnaire OAB-q, Over-Active Bladder

Awareness Tool - 8-item OAB-V8, Incontinence Questionnaire Short Form ICIQ-SF, Quality of Life Questionnaires QoL; Multiple Sclerosis Quality of Life-54 Instrument MSQoL54; Kings Health QoL questionnaire KHQ; Expanded Disability Status Scale EDSS; Incontinence Impact Questionnaire IIQ-7; Female Sexual Function Index FSFI; Urogenital Distress Inventory UDI; King's Health Questionnaire KHQ; Pelvic Floor Training Advice PFTA; Depression, Anxiety and Stress Scale - 21 Items DASS-21; Patient perception of bladder condition PPBC; patient perception of intensity of urgency scale PPIUS.

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