

Treatment Options for Neurogenic Bladder, Bowel, and Sexual Function

Study Details	Type of Study	Number of Studies or Subjects	Inclusion/Exclusion Criteria	Outcome Measures and Time Frame	Description of Intervention	Results	Conclusion
<p>Title: Urinary Incontinence in neurological disease: management of lower urinary tract dysfunction in neurological disease¹</p> <p>Year: 2012</p> <p>Authors: Simon Harrison, Christine Anderson, Alison Bardlsey, Noreen Barker, Amelia Denny, Clare Fowler,</p>	Clinical Practice Guideline	Not applicable	Not applicable	Not applicable	Not applicable	<p>Bladder Storage¹:</p> <ul style="list-style-type: none"> - Can occur as a result of neurogenic detrusor overactivity or reduced bladder compliance - Those with SCI are at a higher risk for renal deterioration <p>Treatments for Bladder Storage¹:</p> <ol style="list-style-type: none"> 1. Behavioral <ul style="list-style-type: none"> - Used in those with cognitive impairments or early stages following acute neurological injury to re-establish continence and micturition cycle - Timed voiding - Prompted voiding - Habit re-training: determining individual's toileting pattern and developing personalized 	There are several treatment approaches to enhance bladder storage and bladder emptying in patients with neurological disease and urinary incontinence. ¹ The best treatment options are based multiple factors such as the sex of the individual, response to medication, severity of injury, and severity of symptoms. ¹

<p>Laura Graham, Judith Jesky, Doreen McClurg, Keith MacDermott, Susan Orme, Paul Tophill Julie Vickerman, Alun Williams, Sue Woodward, Ann Pallett, Joanne Mangnall</p>						<p>toileting schedule to prevent involuntary voiding</p> <ul style="list-style-type: none"> - Recommended for individuals with SCI <p>2. Drug</p> <ul style="list-style-type: none"> - Antimuscarinic drugs (anticholinergics) for detrusor overactivity - Botulinum toxin type A: unclear duration and adequacy of response, expensive - Both are recommended in individuals with SCI <p>3. Surgical</p> <ul style="list-style-type: none"> - Augmentation cystoplasty: open abdomen and expose bladder, and bladder size is increased by addition of part of intestine - Augmentation = excision of detrusor muscle. Requires intermittent catheterization b/c w/o detrusor, bladder is not able 	
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						<p>to empty completely.</p> <ul style="list-style-type: none">- High association with morbidity- Recommended in individuals with non-progressive neurologic diseases <p>Pelvic Floor Treatments¹:</p> <ul style="list-style-type: none">- Recommend its use for individuals with lower urinary tract dysfunction that have the potential to voluntarily contract the pelvic floor.- Should be used after specialist pelvic floor assessment and consider the use of combining treatment with biofeedback and/or electrical stimulation. <p>Urethral tape/sling surgery¹:</p> <ul style="list-style-type: none">- Autologous fascial sling surgery is appropriate for people with neurogenic stress incontinence.	
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						<ul style="list-style-type: none">- Do not routinely use synthetic tapes and slings in people with neurogenic stress incontinence because there is a risk of urethral erosion. <p>Artificial Urinary Sphincter¹</p> <ul style="list-style-type: none">- Consider surgery to insert an artificial urinary sphincter in people with neurogenic stress incontinence only when an alternative procedure is less likely to control- Bladder storage function can deteriorate in some people after treatment. <p>Bladder Emptying¹:</p> <ul style="list-style-type: none">- Many patients with neurogenic bladders are dependent on the use of either intermittent catheterization or an indwelling catheter.- Distal urethral sphincterotomy has	
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						<p>been used to manage SCI men.</p> <ul style="list-style-type: none">- Electrical stimulation of nerve roots has also been developed for individuals with complete spinal cord lesions.- In individuals with suprasacral spinal cord lesions, detrusor sphincter dyssynergia is common and impairs bladder emptying. <p>Bladder Emptying Treatments¹:</p> <ul style="list-style-type: none">- Alpha blockers are not appropriate for treatment of bladder emptying problems caused by neurological disease. <p>Management of Catheter Valves¹:</p> <ul style="list-style-type: none">- Catheter valves and drainage bags are similar in cost and both used in current practice. However,	
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						<p>drainage bags are cheaper.</p> <p>Management with ileal conduit diversion¹:</p> <ul style="list-style-type: none">- Ileal conduit urinary diversion involves intra-abdominal surgery. Essentially this surgical procedure creates a stoma or artificial opening (urostomy) when drainage of urine through the bladder and urethra is not possible.- Recommended when individuals with neurogenic lower urinary tract dysfunction have major problems with urinary management. <p>Treatment to prevent Urinary Tract Infection (UTI)¹:</p> <ul style="list-style-type: none">- Those with neurogenic lower urinary tract dysfunction are at an increased risk for UTI due to	
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						<p>incomplete bladder emptying, vesico-ureteric reflux, and catheter use</p> <ul style="list-style-type: none">- Renal damage can be a consequence of UTI- Some ways include increased fluid intake and attention to hygiene.- Prophylactic long-term antibiotic administration has been used historically but it is currently being questioned due to multi-drug resistance bacteria.- Recommend not using routine antibiotic prophylaxis for UTI in people with neurogenic lower urinary tract infection. <p>Renal Impairment¹</p> <ul style="list-style-type: none">- Discuss with patient and family members about the increased risk for renal complications. Need to look out for the	
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						<p>following symptoms: loin pain, urinary tract infection, and hematuria.</p> <ul style="list-style-type: none">- Indwelling catheters are associated with higher risks of renal complications than other forms of bladder management (intermittent self-catheterization) <p>Bladder Stone¹:</p> <ul style="list-style-type: none">- Discuss with patient and family members about increased risk for bladder stones. Look out for the following symptoms: recurrent infection, recurrent catheter blockages, or hematuria- Indwelling catheters are associated with higher risk compared to other forms of bladder management.- If patient reports s/s, refer to cystoscopy.	
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						<p>Bladder Cancer: ¹</p> <ul style="list-style-type: none"> - Discuss with patient and family members that there can be an increased risk for bladder cancer, especially in those with a long history of neurogenic lower urinary tract dysfunction and complicating factors (recurrent UTIS). Look out for s/s: hematuria - Arrange urgent investigation with urinary tract imaging and cystoscopy for those with hematuria, increased frequency of UTI, or unexplained lower urinary tract symptoms 	
<p>Title: Neurogenic bladder in spinal cord injury patients²</p> <p>Year: 2015</p>	Narrative Review	Not applicable.	Not applicable.	Not applicable	Not applicable	<p>Conservative management for neurogenic bladder²:</p> <p>Choices influenced by convenience for patient and ability to maintain continence. Patients using clean intermittent catheterization for SCI-</p>	Clean intermittent catheterization appears to be the preferred method of

<p>Author: Waleed Al Taweel, Raouf Seyam</p>						<p>related neurogenic bladder dysfunction often report lower health related quality of life.</p> <p>Patient Education²:</p> <ul style="list-style-type: none"> - Should occur immediately (less than 50% of patients have good knowledge prior to discharge) <p>Credé maneuver²:</p> <ul style="list-style-type: none"> - Not recommended as primary method for bladder emptying - Potential Complications: high bladder pressure, abdominal bruising, hernia, and hemorrhoids <p>Clean Intermittent Catheterization²:</p> <ul style="list-style-type: none"> - Preferred method of emptying in SCI patients - Improve self-care and reduces barriers to sexual intercourse - Done every 4 – 6 hours with pre- 	<p>conservative bladder management compared to indwelling catheters due to the increased risk of infection and adverse outcomes.²</p>
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						<p>lubricated hydrophilic catheter</p> <p>Indwelling catheter²:</p> <ul style="list-style-type: none">- Not recommended in SCI unless patients cannot self-catheterize (quadriplegia or urethral abnormalities)- High risks for UTI, renal impairment, bladder stone formation, urethral stricture, urethral erosion, and bladder cancer- Suprapubic or urethral- Suprapubic has advantages such as ease of management for hygiene and catheter changes and higher patient satisfaction when compared to urethral <p>Anticholinergic medications²:</p> <ul style="list-style-type: none">- First line of therapy for neurogenic	
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						<p>detrusor overactivity</p> <ul style="list-style-type: none">- Can increase bladder capacity, reduce bladder pressure, and improve compliance and QOL <p>Surgical management to promote urine storage²</p> <ul style="list-style-type: none">- Botulinum toxin- Cystoplasty: bladder augmentation and urinary diversion- Augmentation cystoplasty/enterocystoplasty: augmentation with ileal segment is effective and safe in patients with SCI. Complications include mucus, bladder calculi, bacterial colonization, vitamin B12 deficiency.- Gastrocystoplasty: for those with chronic renal impairment. Complications include hematuria	
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						<p>and metabolic alkalosis.</p> <ul style="list-style-type: none">- Auto augmentation (detrusor myectomy/myotomy)- Seromuscular enterocystoplasty <p>Surgical management to increase bladder outlet resistance²:</p> <ul style="list-style-type: none">- Artificial urinary sphincter: for stress urinary incontinence- Transobturator tape procedure: used to treat female stress incontinence- Puboprosthetic sling: <p>Facilitation of bladder emptying²:</p> <ul style="list-style-type: none">- Antimuscarinics and catheterizations- Urinary diversion <p>Other surgical approaches²</p> <ul style="list-style-type: none">- Neuromodulation/electrical stimulation- Nerve grafting/nerve transfer- Muscle grafts- Urethral stents	
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						- Bladder tissue engineering	
<p>Title: Improvements in bladder, bowel, and sexual outcomes following task-specific locomotor training in human spinal cord injury³</p> <p>Year: 2018</p> <p>Author: Charles H. Hubscher, April N. Herrity, Carolyn S. Williams, Lynnette R. Montgomery, Andrea M. Willhite, Claudia A. Angeli,</p>	Prospective cohort study	<p>8 patients with chronic SCI</p> <p>3 females</p> <p>9 males</p> <p>Age ranged from 22 – 39 (mean age 27.4 years)</p> <p>Years post injury ranged from 1.9 – 13 (4.4 average)</p> <p>6 participants had AIS Grade A</p> <p>2 participants had AIS Grade B</p>	<p>Inclusion criteria³:</p> <ul style="list-style-type: none"> - Stable medical condition without cardiopulmonary disease or dysautonomia - No painful musculoskeletal dysfunction, unhealed fracture, contracture, pressure sore or urinary tract infection that might interfere with training - No untreated psychiatric disorders or ongoing drug abuse - Clear indication that the period of spinal shock is concluded determined by presence of muscle tone, DTRs or muscle spasms, and discharged from inpatient rehabilitation - Non-progressive supra-sacral SCI - Bladder and sexual dysfunction as a result of SCI - 18 years of age 	<p>Measured just prior to training and after 80 intervention training sessions.</p> <p>Urodynamic Investigation (UDS)³:</p> <p>Performed by same registered nurse pre-post-training</p> <p>Cystometry</p> <p>Abdominal pressure via rectal balloon catheter</p> <p>Pelvic Floor EMG</p> <p>Detrusor Pressures</p>	<p>Activity Based Training</p> <p>80 daily sessions of locomotor training (LT) on a treadmill with body-weight support (BWS) – 1-hour session or LT plus stand training – 1 hour each per day/ 3 hours between sessions³</p> <p>Suspension via harness and lift was set to the minimum amount before limb buckling³</p>	<ul style="list-style-type: none"> - Reported involuntary urine leakage (incontinence) decreased from a rate of 62.5% to 37.5% .³ - Reported bladder emptying at night (nocturia) reduced from 57% to 28.5%.³ - Reported that bladder emptying during waking hours reduced from average of 5.0 ± 1.4 to 5.0 ± 0.8.³ - Reported urinary tract impairment unrelated to spinal change, bladder emptying method, and anticholinergic medication use was unchanged following intervention.³ - As a group, there was 35% decrease in leak point pressure during cystometry from pre- to post-training.³ 	<p>Activity based locomotor training using body-weight support can improve bladder function in patients with chronic spinal cord injury and urinary incontinence.³</p>

<p>Susan J. Harkema</p>		<p>3 participants had AIS Grade C</p> <p>1 participant had AIS Grade D</p> <p>5 had thoracic level of injury (T4 or T5)</p> <p>3 had cervical level of injury (C4 or C5)</p>		<p>Volume of water and bladder pressure during first sensation of full bladder, first urge to void, and maximum capacity</p> <p>Blood pressure, HR, O2 sat during UDS every minute to assess for autonomic dysreflexia</p> <p>Questionnaires³ International Spinal Cord Injury Data Sets Questionnaires for Urodynamics and Lower Urinary</p>	<p>Therapists provided manual assistance to ensure appropriate equal weight bearing³</p> <p>Treadmill speeds were a normal range for walking (0.89 – 1.34 m/s)³</p> <p>Speeds varied 25% of time to challenge nervous system adaptation (changes from 0.5 - 0.75 m/s)³</p>	<ul style="list-style-type: none"> - Gender effect for first sensation fill volumes in males (21.65 ± 78.4 ml) versus females (57.5 ± 55.9 ml).³ - Bladder capacity (p=.02), voiding efficiency (p=.046), leak point pressure (p<.01), detrusor contraction area (p=.016), and detrusor contraction duration (p=.019) significantly improved following training.³ - Bowel questionnaires found a significant improvement in reported frequency of fecal incontinence (p=.022).³ - No significant changes were found for sexual questionnaires.³ 	
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				<p>Tract Function, Bowel Function, Female Sexual and Reproducti ve function, Male Sexual Function.</p> <p>Urodynami cs and Lower Urinary Tract Function includes average number of nightly bladder emptying/d ay³</p> <p>Bowel Function includes expansion of average time to defecate³ Female Sexual and Reproducti</p>			
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				<p>ve function includes 19-item Female Sexual Function Index (FSFI) that is divided into 6 domains (desire, arousal, lubrication, orgasm, satisfaction , and pain)³</p> <p>Male Sexual function included 15-item International Index of Erectile Function (IIEF) that is divided into 5 domains (erectile function, orgasmic function, sexual desire, intercourse</p>			
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				satisfaction , and overall satisfaction) ³			
<p>Title: Pelvic Floor Muscle training in spinal cord injury and its impact on neurogenic detrusor over-activity and incontinence⁴</p> <p>Year: 2015</p> <p>Author: N. Vásquez, SL Knight, J Susser, A Gall, PH Ellaway, MD Craggs</p>	Case Studies	<p>Two male patients</p> <p>Chronic/stable incomplete SCI with Neurogenic Detrusor over-activity (NDO) and incontinence⁴</p> <p>Subject 1⁴: 53 years old, C3 level acquired at 37 years old with grade ASIA D</p> <p>Subject 2⁴: 64 years old, T11 level acquired at age 42,</p>	Not applicable.	<p>Clinical evaluation performed before and after 6-week intervention.</p> <p>Evaluation comprised of⁴:</p> <p>Measures of strength and endurance of voluntary PFM contractions obtained from anal canal-pressure changes over 10 seconds of effort⁴</p>	<p>6-week program of pelvic floor muscle training (PFMT) with clinical assessments before and after treatment⁴</p> <p>40 PFM contractions divided into 4 sets (3 for prolonged contractions, 1 set with short contractions)⁴</p> <p>Asked to perform 3x/day in supine, sitting, and standing (if possible)⁴</p>	<p>Subject 1⁴:</p> <ul style="list-style-type: none"> - Improved strength by 118%. - Modified Oxford score showed 17% improvement. - PFM contractions suppressed NDO by 81%. - Reduced incontinence by 10% based on ICIQ-UI. <p>Subject 2⁴:</p> <ul style="list-style-type: none"> - Improved strength by 144%. - Modified Oxford score showed 17% improvement. - PFM contractions suppressed NDO by 16%. - No reduction in incontinence based on ICIQ-UI. 	<p>For some patients with chronic SCI, a PFMT program can have a positive effect on improving PFM voluntary control for reducing incontinence.⁴ Longer PFMT programs may be needed for SCI patients with more significant impairment s.⁴ PFMT programs may not be appropriate for all patients with SCI</p>

		ASIA C, anti-muscarinic medication and clean intermittent catheterization		Effect of those contractions on changes to detrusor pressure during NDO using cystometry ⁴ Physical Therapist performed internal assessment using Modified Oxford grading system. ⁴ Urinary incontinence assessed using International Consultation on Incontinence – Urinary Incontinence Questionnaire	Also educated to perform PFM contractions if they felt an urge to urinate ⁴		and incontinence and may benefit from alternative treatment approaches.
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				ire (ICIQ-UI). A score of 24 is “worst incontinence”. ⁴			
<p>Title: Neurogenic Bladder, Neurogenic Bowel, and Sexual Dysfunction in People with Spinal Cord Injury⁵</p> <p>Year: 2002</p> <p>Authors: Barbara T Benevento, Marca L Sipski</p>	Narrative Review	Not applicable	Not applicable	Not applicable	Not applicable	<p>Neurogenic Bladder⁵:</p> <p>Bladder drainage achieved via indwelling catheters, intermittent catheterizations, suprapubic catheters, condom catheters, or a combination⁵</p> <ul style="list-style-type: none"> - choice based on preference, sex of patient, level of injury, functional status, financial concerns, and desire for sexual intercourse⁵ <p>Pharmacologic management⁵:</p> <ul style="list-style-type: none"> - Anticholinergics: failure to store - Tricyclic antidepressants: increase bladder capacity, urethral resistance, and suppress uninhibited bladder contractions - Alpha adrenergics: failure to store 	There are several treatment options for neurogenic bladder, bowel, and sexual dysfunction in people with spinal cord injury including pharmacology, surgery, and conservative approaches. ⁵

						<ul style="list-style-type: none">- Estrogen: females with atrophy or urethral epithelium- Cholinergics: failure to empty- Alpha beta blockers: failure to empty- Side effects: especially in anticholinergics such as dry mouth and constipation (will require higher intakes of water which may make an indwelling catheter preferred) <p>Surgical Management⁵:</p> <ul style="list-style-type: none">- If catheters and medical management fail- Augmentation cystoplasty: remove portion of bladder and attach remaining bladder to larger segment of bowel- Denervation via cordectomy or rhizotomy- Neurogenic stimulation- Implanted artificial sphincter	
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						<ul style="list-style-type: none">- External sphincterotomy- Urethral stent placement <p>Conservative Management⁵:</p> <ul style="list-style-type: none">- Timed voiding- Pelvic Floor exercise- Biofeedback- Valsalva maneuver, suprapubic taping, Credé method, and anal stretch aid help with urinary retention <p><u>Neurogenic Bowel⁵:</u></p> <p>Pharmacologic management⁵:</p> <ul style="list-style-type: none">- Stool softener- Colonic Stimulants- Contract irritants- Bulk formers- Usual Bowel program consist of stool softener administered 3x/day- Colonic stimulant used for reflexic bowel and patient is placed in upright or left side lying and digital stimulation is performed until evacuation (can be used in conjunction	
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						<p>with Valsalva maneuver, push-ups, abdominal massage, or leaning forward)</p> <ul style="list-style-type: none">- Areflexic bowel involves gentle Valsalva maneuvers or manual evacuation in upright or side lying position <p>Surgical Approach⁵:</p> <ul style="list-style-type: none">- Colostomy- Ileostomy <p>Conservative approach⁵:</p> <ul style="list-style-type: none">- Biofeedback if have rectal sensation and voluntary sphincter contraction <p><u>Treatment of Sexual Dysfunction⁵:</u></p> <ul style="list-style-type: none">- No studies have focused on treatment of sexual dysfunction following SCI.- Research for erectile function is plenty.- Prosthesis for erection is available but has shown a	
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						<p>high rate of complications in men with SCI.</p> <ul style="list-style-type: none">- Another device is the vacuum erection device, but this presents with several precautions due to its restriction of blood flow (maximum use of 30 minutes and less aesthetically pleasing).- Injections of vasoactive drugs into the penis have also been used but with potential side effects of dysesthesias, priapism, seizures, and intracorporeal fibrosis.- Viagra has been shown to be affecting in facilitating erection in men with SCI. <p>Fertility⁵:</p> <ul style="list-style-type: none">- Impact is more severe for men than women.- Men following SCI often experience	
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						<p>poor sperm quality and ejaculatory dysfunction.</p> <ul style="list-style-type: none"> - Stimulation for ejaculation for insemination is often performed now via penile vibratory stimulation or electroejaculation. - Penile vibratory stimulation parameters that function best are an amplitude of 2.5 mm and frequency of 100 Hz. - Ability for women with SCI to conceive is thought to be unchanged. However, women with higher and more complete injuries are least likely to become pregnant compared to women with lower degrees of impairment. 	
Title: A systematic review of clinical studies on	Systematic Review and	11 studies included 3 Randomize	Utilized the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) Checklist ⁶ Inclusion criteria ⁶ :	Main study outcomes: ⁶	Interventional information ⁶ :	Three studies looking at transcutaneous electrical stimulation found that it was safe and effective for patients with SCI. ⁶ They	Transcutaneous electrical stimulation is a safe

<p>electrical stimulation therapy for patient's neurogenic bowel dysfunction after spinal cord injury⁶</p> <p>Year: 2018</p> <p>Authors: Yuling Deng, Yonghai Dong, Yun Liu, Qiong Zhang, Xihong Guan, Xiaodan Chen, Meng Li, Lei Xu, Cheng Yang</p>	<p>Meta-Analysis</p>	<p>d Controlled Trials</p> <p>8 before and after trials</p> <p>Moderate Bias Risk⁶</p>	<ul style="list-style-type: none"> - controlled clinical design on human population - subjects suffered a spinal cord injury/spina bifida/myelomeningocele/intervertebral disc/foraminal stenosis - intervention was electrical stimulation - Article reported diagnostic criteria of neurogenic bowel dysfunction - Outcomes included colonic transit time, stool consistency, stool frequency, anal-rectal pressure, subjective satisfaction, score of neurogenic bowel function - Language: English or Chinese 	<p>Colonic transit time</p> <p>Stool consistency</p> <p>Stool frequency</p> <p>Anal-rectal pressure</p> <p>Subjective satisfaction</p> <p>Score of neurogenic bowel function</p>	<p>Transcutaneous electrical stimulation</p> <p>Transrectal bowel stimulation</p> <p>Intravesical electrical stimulation</p> <p>Sacral nerve stimulation</p> <p>Dorsal genital nerve electrical stimulation</p> <p>Percutaneous tibial nerve stimulation</p> <p>Threshold nighttime electrical stimulation</p> <p>Implantable neuroprosthesis for</p>	<p>found this kind of stimulation could stimulate sympathetic and parasympathetic nerve fibers in bowel system and reduce pressures at internal and external anal sphincters.⁶ Also found reduction in difficulty of defecation and increased frequency of defecation.⁶</p> <p>One study looking at transrectal bowel electrical stimulation found that it significantly improved bowel function by improving control of intestinal tract, enhancing sense of need to defecate, reducing intestinal peristalsis, and reducing the rate of incontinence.⁶</p> <p>Mechanism of sacral stimulation is unknown but overall, it was found to be safe and effective.⁶</p>	<p>and effective treatment for patients with SCI with neurogenic bowel.⁶ The etiology of spinal cord injury and injury level will influence the effect of electrical stimulation in patients with neurogenic bowel.⁶ Despite promising findings, current literature requires larger sample sizes and consistent randomization and blinding in order to determine</p>
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					stimulating sacral nerves and posterior		a consistent treatment effect in the SCI population with neurogenic bowel. ⁶
					Main mechanism of electrical stimulation therapy was to promote healthy function of intestines by increasing blood flow, promoting protein synthesis, reinforcing muscular strength, and regulating nerve transmission. ⁶		
Title: Effect of pelvic floor muscle training and	Randomized Controlled Trial	37 females were recruited, only 27 completed the study	Inclusion Criteria⁷: <ul style="list-style-type: none"> - Between the ages of 18 and 75 years old - incomplete spinal cord injury (SCI) 	Primary Outcome Measure⁷: change in total score on	Control Group: Each participant attended a screening visit with	12 weeks: No significant between-group differences were found at week 12, except for opening urethral pressure at rest (p=.018). Within-group	Authors concluded that "IVES with PFMT is not superior to PFMT alone

<p>intravaginal stimulation on urinary incontinence in women with incomplete spinal cord injury: an investigator-blinded parallel randomized clinical trial⁷</p> <p>Year: 2018</p> <p>Authors: Marlene Elmelund, Fin Biering-Soresnes, Ulla Due, Niels Klarskov</p>		<p>Average Age⁷: 55 years old</p> <p>Injury Level⁷: cervical (23%), thoracic (31%), lumbar (46%)</p> <p>ASIA Classification⁷: ASIA C (22%), ASIA D (74%), ASIA E (4%)</p> <p>Average Time Since Injury⁷: 11 years</p>	<ul style="list-style-type: none"> - urinary incontinence evidenced by a score of >8 on the International Consultation on Incontinence Questionnaire UI short form <p>Exclusion Criteria⁷:</p> <ul style="list-style-type: none"> - ASIA A or B completeness of injury - Unable to contract Pelvic floor muscles (PFMs) - Received botulinum toxin injection within the last year - Pregnant - Pacemaker use 	<p>International Consultation on Incontinence Questionnaire UI short form (ICIQ – UI- SF). This questionnaire contains questions regarding frequency, severity, and impact of UI on QoL.⁷ Scores range from 0 – 21 with a higher score indicating worse symptoms.⁷</p> <p>Secondary outcomes included⁷:</p> <ul style="list-style-type: none"> a change in opening urethral pressures 	<p>the primary investigator where they were examined using a digital vaginal and rectal examination to determine if they were able to perform a voluntary PFM contraction (an inclusion criterion for this study). If participants were eligible to continue in the study, they were randomized to either the control group (PFMT only) or the treatment</p>	<p>analyses found significant changes in the PFMT for the total score on ICIQ-UI-SF (p=.018), opening urethral pressure squeezing (p=.017), opening urethral pressure at rest (p=.03), and daily incontinence episodes (p=.03).</p> <p>24 weeks:</p> <p>No significant changes were found between-group differences in outcome measures at 24 weeks from baseline. The within-group analysis showed significant change from baseline in the PFMT group on the ICIQ-UI-SF (p=.016), number of daily incontinence episodes (p=.01), maximal functional bladder capacity (p=.031), and 24-hour pad test (p=.02). The PFMT + IVES group improved on ICIQ-OAB (p=.002).</p>	<p>in reducing UI, and PFMT should be recommended as the first-line conservative treatment of UI in women with incomplete SCI".</p> <p>The most promising evidence from the Elmelund et al. study is related to the frequency of daily urinary incontinence and scores on the ICIQ-UI-SF for the PFMT only group. Women who</p>
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				<p>during PFM contraction and at rest with urethral pressure reflectometry</p> <p>change in 3- day bladder diary parameters (daily episodes of UI, mean bladder capacity, max functional capacity, and the number of daily voiding episodes)</p> <p>24-hour pad test</p> <p>Total score on International Consultation on Incontinence</p>	<p>group (PFMT + IVES). After enrolment, all participants attended a second visit. This visit was conducted by a licensed pelvic floor physical therapist. The PFMT protocol involved instructing participants to perform 30 near-maximal contractions of 5 – 10 second duration followed by 10 seconds of rest (adjusted to the woman’s PFM function).</p>	<p>received PFMT alone showed significant improvements in the number of daily urinary incontinence episodes as well as the perceived impact of urinary incontinence on quality of life, as evidenced by scores on the ICIQ – UI – SF. The confidence intervals at follow-up appear to be relatively narrow for the frequency of incontinent episodes</p>
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				<p>e Questionnaire overactive bladder (ICIQ-OAB)</p> <p>Total score on International SCI QoL Basic Data Set (SCI-QoL). The ICIQ-OAB ranges from 0 – 56, with a higher score indicating worse symptoms.⁷ The SCI-QoL ranges from 0 – 30 with a higher number indicating greater satisfaction or quality of life.⁷</p> <p>Patient Global</p>	<p>After this second visit, participants were asked to continue training daily for 12 weeks and to complete a daily training diary. During this training period, all participants had two consultations with a physical therapist during week 4 and week 8 to assess compliance and accuracy of the training parameters. To ensure motivation, participants were also</p>	<p>and ICIQ-UI- SF respectively, (-1 --.2) and (-4.5 -- 0.6).</p>
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				<p>Impression of Improvement Scale (PGI-I)</p> <p>Outcome measures were evaluated at baseline, 12 weeks (immediately following intervention), and 24 weeks.</p>	<p>offered a phone consultation during weeks 2, 6, and 10.</p> <p>Experimental: The second visit was conducted by a licensed pelvic floor physical therapist. In the second visit, women in the PFMT combined with IVES group were instructed to perform the PFMT discussed previously while simultaneously using the IVES device. Participants were</p>		
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					<p>taught two programs using the IVES device. These programs had two intentions. The first was to help promote endurance and enhanced PFM strength and the second was to promote PFM relaxation. To enhance endurance and strength, intermittent stimulation parameters were set to a frequency of 40 Hz, a pulse width of 250 μs for 30 cycles</p>	
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					<p>within 7.5 to 10 minutes (5 – 10 sec of stimulation, 10 sec of rest). During electrical stimulation, participants were instructed to perform simultaneous PFM contractions. The relaxation continuous stimulation parameters were set to a frequency of 10 Hz, pulse width of 250 μs, for 10 to 20 minutes. During the stimulation, participants were instructed to relax their PFMs.</p>		
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					<p>After this second visit, participants were asked to continue training daily for 12 weeks and to complete a daily training diary. During this training period, all participants had two consultations with a physical therapist during week 4 and week 8. To ensure motivation, participants were also offered a phone consultation during weeks 2, 6, and 10. At</p>		
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					week 12, the participants returned the IVES device and were encouraged to continue with PFMT.		
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Conclusion: There are several treatment options for neurogenic bladder, bowel, and sexual dysfunction in people with spinal cord injury including pharmacology, surgery, and conservative approaches.^{1,2,5} Treatment selection is complex due to the influence of multiple factors on treatment effectiveness such as the sex of the individual, psychosocial factors, severity of injury, severity of symptoms, level of caregiver support, and insurance coverage.¹ Some physical therapy specific conservative treatments include pelvic floor muscle training, body-weight supported locomotion, and electrical stimulation.^{3,4,6,7} However, these interventions are not without limitation and should be selected on an individual basis following a thorough evaluation.

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