Table 2. Non-pharmacologic Treatment of Neurogenic Bladder

BEHAVIORAL	
Fluid and caffeine regulation, Timed voiding	Adjust fluid intake if catheterized volumes > 500 mL. Adapted to patient's voiding diary, fluid intake, PVRs, and urodynamics parameters.
TECHNIQUES TO FACILITATE BLADDER EMPTYING	
Triggered Reflex Voiding	
Crede (bladder compression) and Valsalva (abdominal straining)	Not recommended when DSD present: Risks high bladder pressures. Avoid in reflux, urethral pathology and UTI. Consider in lower motor neuron injuries (areflexic bladders) or those who had sphincterotomy.
Reflex voiding	Can generate unacceptably high bladder pressures. Needs hand skills or willing caregiver to apply collecting device
Catheterization	
Intermittent catheterization	Safe and effective; perform 4-6 x/day with goal catheterized volumes < 500 mL Needs sufficient hand skills or willing caregiver. Avoid in urethral pathology; high fluid intake regimen; bladder capacity < 200 mL; development of AD with bladder filling in spite of treatment; poor cognition, motivation, and compliance.
Indwelling catheterization 1. Transurethral 2. Suprapubic catheter	Consider in patients with poor hand skills, high fluid intake, cognitive impairments, elevated detrusor pressures, or need for temporary management of vesicoureteral reflux Use if no blockade or urethral/bladder neck erosion. Use if urethral pathology/catheter obstruction is present or for difficult catheter insertion.
EXTERNAL APPLIANCES	
Condom catheters, incontinence underwear and pads	Use to achieve social continence
SURGICAL	
Endourethral stents or transurethral sphincterotomy	For patients with DSD who void reflexively, have insufficient hand skills or lack caregiver assistance to perform intermittent catheterization. Patients rely on external catheter for continence.
Bladder augmentation	Patients with overactive small capacity detrusor.
Urinary diversion (example: ileovesicostomy)	Consider if other methods are not feasible or failure of all other treatment. Usually necessitates an external collecting device
Electric sacral stimulation (usually performed with selective sacral rhizotomy)	Electrical stimulation causes bladder contraction. Consider in patients with bladder retention and overactive bladder who have failed other treatment
OTHER PROCEDURES	
Injections: Botulinum Toxin Type A	For overactive bladder/detrusor overactivity, sometime also used for overactive sphincters
Neuromodulation: 1. Percutaneous tibial nerve stimulation (PTNS) 2. Transcutaneous tibial nerve stimulation (TTNS) 3. Transcutaneous electrical spinal cord neuromodulator (TESCoN)	 Stimulation of the posterior tibial nerve inhibits detrusor activity Minimally invasive, useful in medically refractory overactive bladder Stimulation of the dorsal surface or dorsal roots of the spinal cord promoted detrusor storage and voiding The efficacy of this device is being studied in SCI