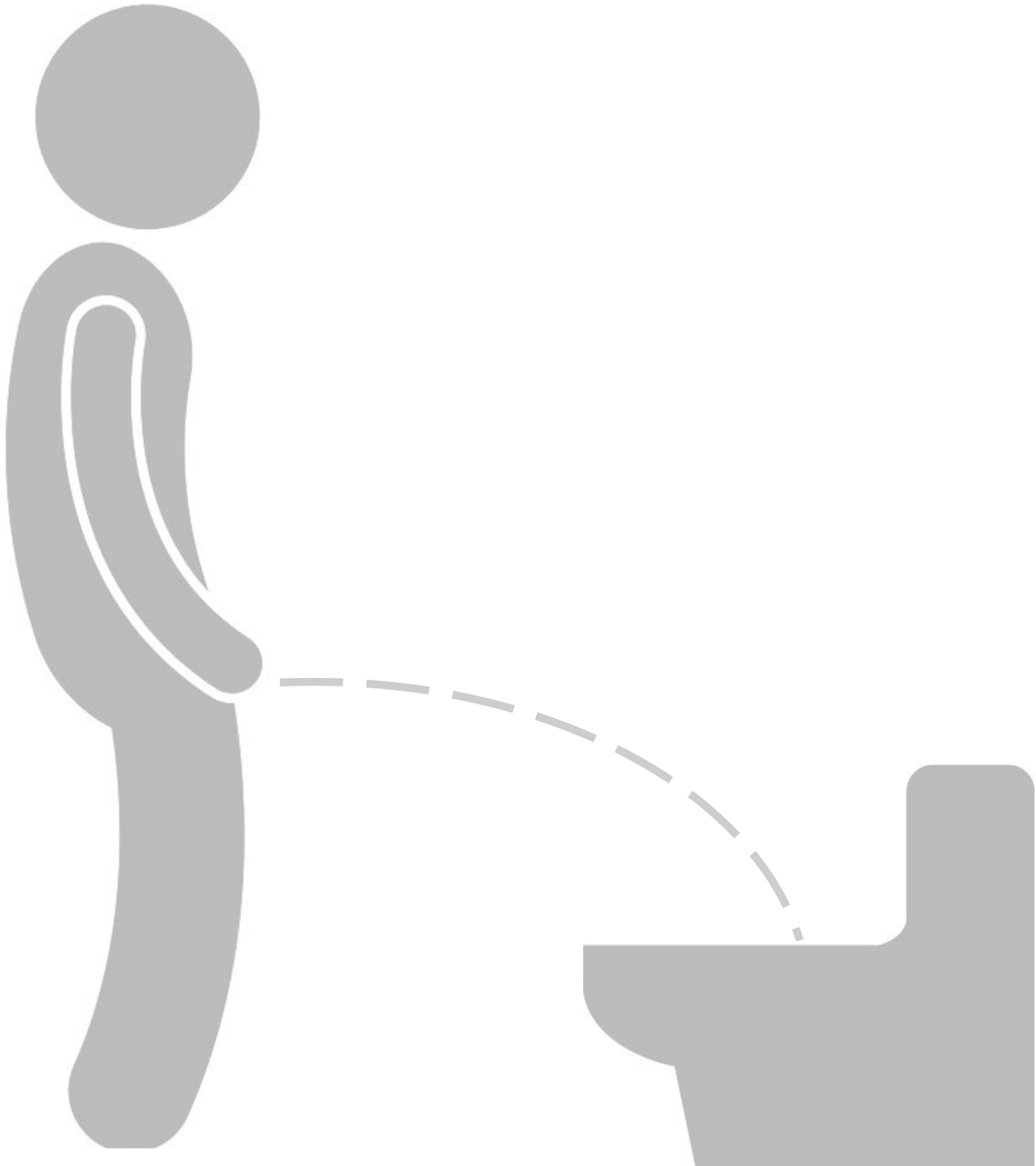
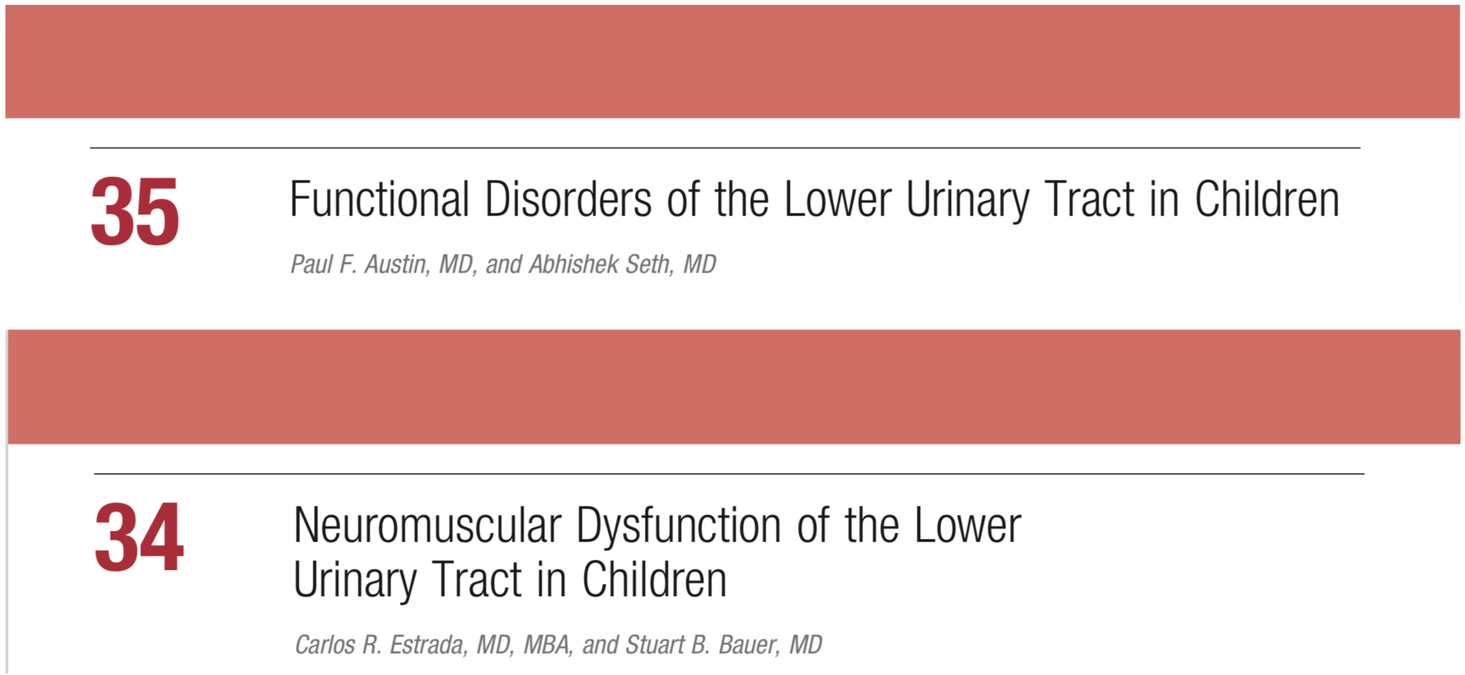
Pediatric Voiding Dysfunction

台北慈濟醫院
趙梓辰



Outline

- Daytime urinary incontinence
- Enuresis
- Pediatric neurologic bladder dysfunction



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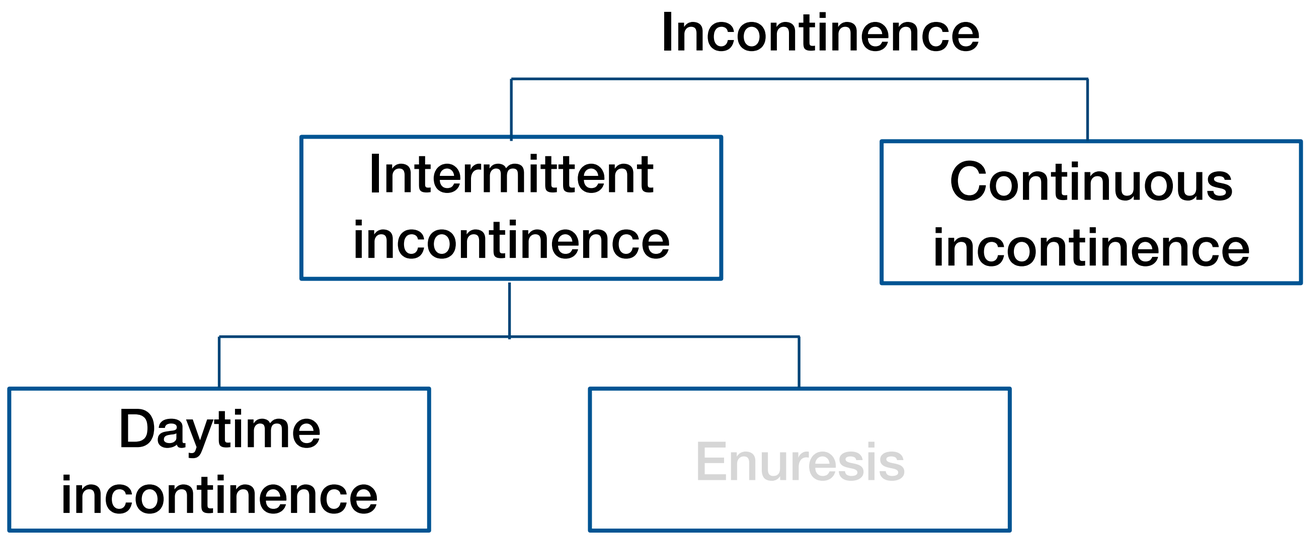
Daytime Urinary Incontinence



Definition

- Age > 5 years
- duration > 3 months
- an incontinence frequency of once a month

Etiology of DUI

Neurogenic Causes	Myelomeningocele
Anatomic causes	Ectopic ureter
	Posterior urethral valves
	Vaginal reflux
	Labial adhesion
Functional causes	Overactive bladder
	Voiding postponement
	Underactive bladder
	Dysfunctional voiding
	Giggle incontinence

Intermittent incontinence

Nocturnal enuresis (+) → Treat NMNE: behavior therapy, alarm, pharmacotherapy

1. History
2. Physical exam
3. Urine analysis & culture
4. Questionnaire: lower urinary tract symptoms, bowel function, psychiatric problems
5. Bladder diary
6. Uroflowmetry
7. PVR
8. Bladder ultrasound

Urinary tract infections (+) → Treat urinary tract infection

Bowel dysfunction (+) → Treat coexisting constipation & fecal incont.

Suspect psychiatric issues → Refer to pediatric psychiatrist for possible ADHD, depression and/or anxiety, & intellectual disability

Suspect endocrinologic disease → Refer to pediatric endocrinologist to rule out diabetes insipidus or diabetes

Suspect chromosome or genetic abnormalities → Refer to specialists

Standard urotherapy

Conservative treatment

- Urotherapy:
  - timed voiding (every 2 hours) self esteem
  - 40% possibility of cure
- Bowel dysfunction:
  - high fiber and increased fluid intake, laxatives

  → Relief of constipation resulted in disappearance of daytime urinary incontinence in 89% and enuresis in 63% of patients
- Biofeedback
- CIC

Pharmacotherapy

- Anticholinergic Agents (oxybutynin, solifenacin)
  - Current gold standard in the treatment of OAB.
  - increase in functional bladder capacity and compliance
  - AE: constipation, dry mouth, blurred vision, reduced sweating, flushing
- β3 agonist (mirabegron)

- α-Adrenergic Receptor Antagonists (off-label use)
  - smooth muscle relaxation and decreased bladder outlet resistance
- Botulinum Toxin
- Neuromodulation

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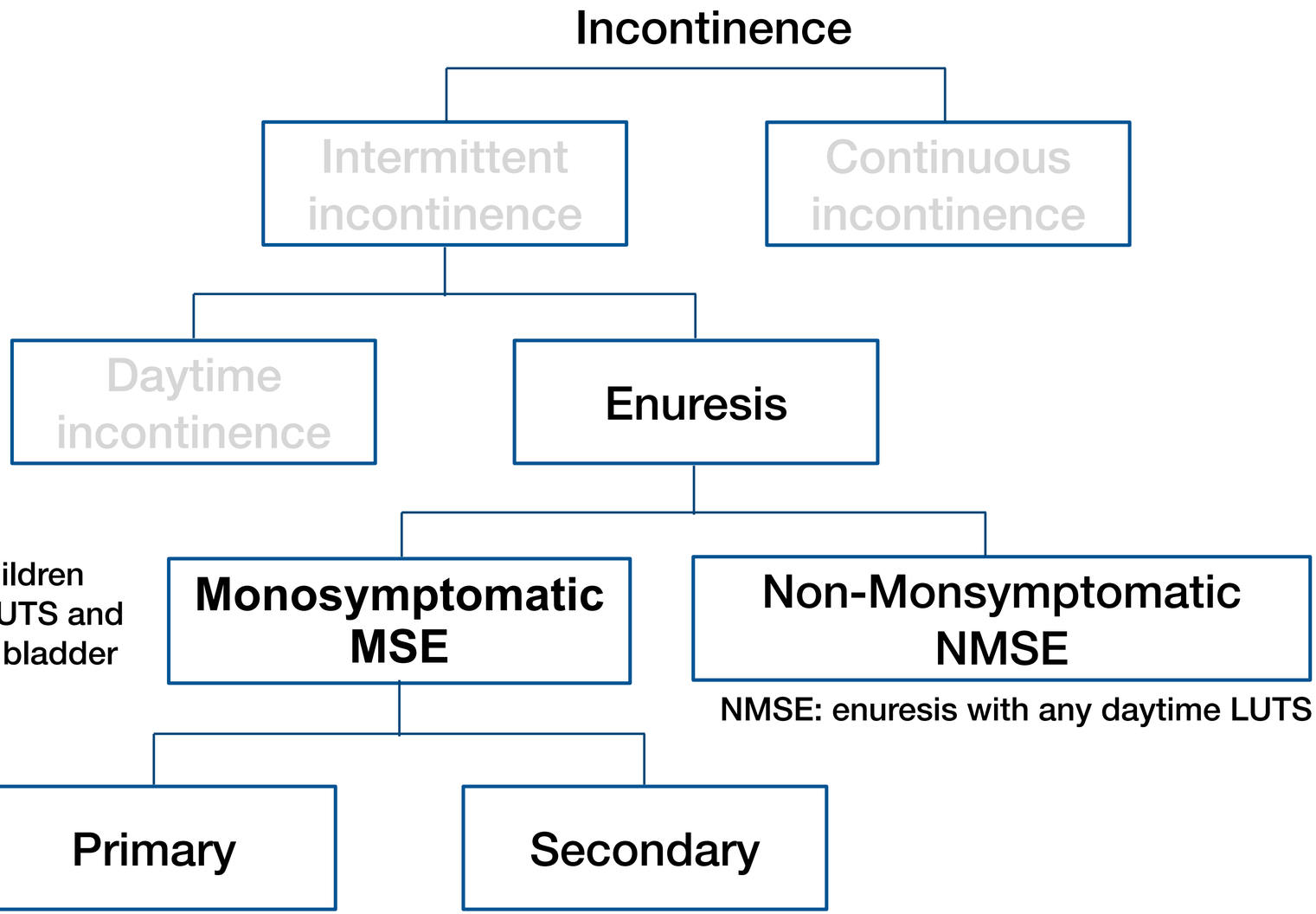
Enuresis



MSE: enuresis in children without any other LUTS and without a history of bladder dysfunction

NMSE: enuresis with any daytime LUTS

Never nighttime dryness (80%)

Enuresis after a dry period of at least 6 months

Epidemiology

- Decreased as age
  - The spontaneous resolution rate of enuresis is approximately 15% annually, such that only approximately 1% of teenagers will continue to be afflicted.

- Genetics
  - chromosomes 12, 13, and 22
  - autosomal dominant inheritance

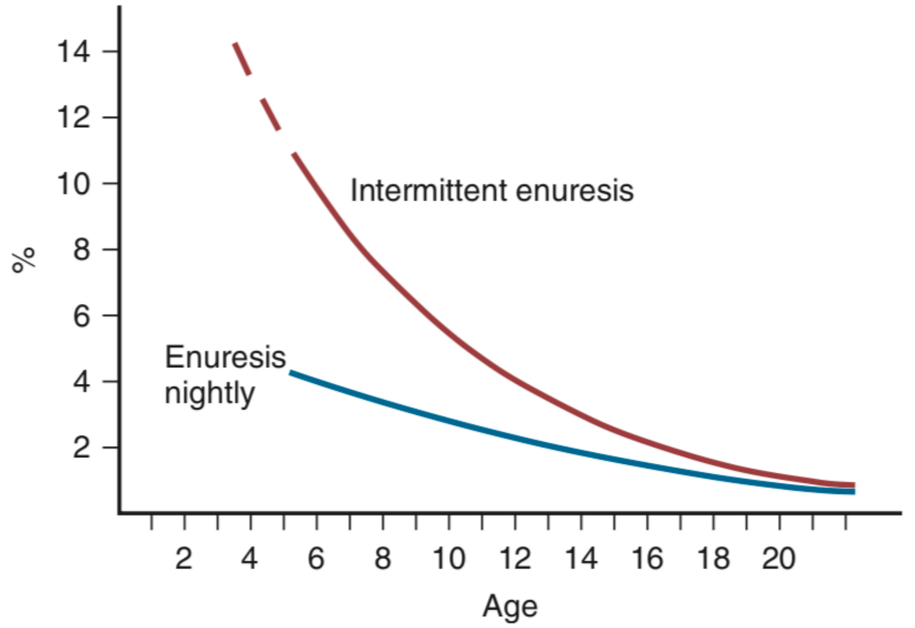
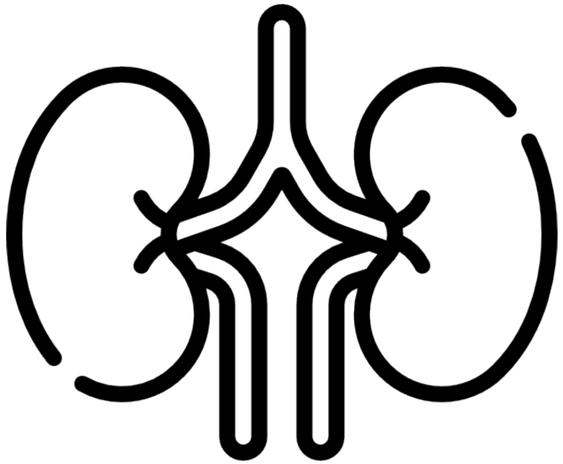


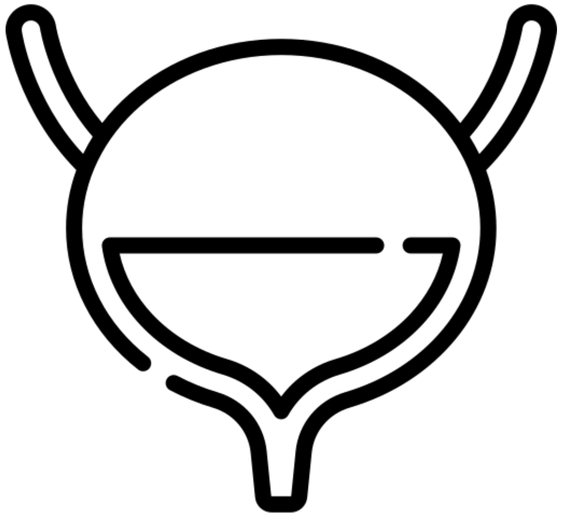
Fig. 35.1. Prevalence rate of enuresis from childhood through young adulthood. (From Austin PF, Nevéus T. Evaluation and management of enuresis. *AUA Update Series* 2012;XXI.)

Pathophysiology



nocturnal polyuria

a disorder affecting arousal from sleep



a reduced nocturnal bladder capacity

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Standard urotherapy

Treatment

- Behavioral Therapy
  - the practice of good bladder and bowel habits
- Enuresis Alarm
  - fit for motivated families
  - without polyuria, with low PVR

Pharmacotherapy

- Desmopressin
  - nocturnal polyuria (nocturnal urine production >130% of EBC)
  - normal bladder reservoir (MVV > 70% EBC)
- Tricyclic Antidepressants (imipramine)
  - Decrease REM sleep, stimulate ADH secretion, relax the detrusor muscle
  - AE: overdose → heart problem
- Anticholinergics
  - combination therapy in the treatment of children who are refractory to DDAVP

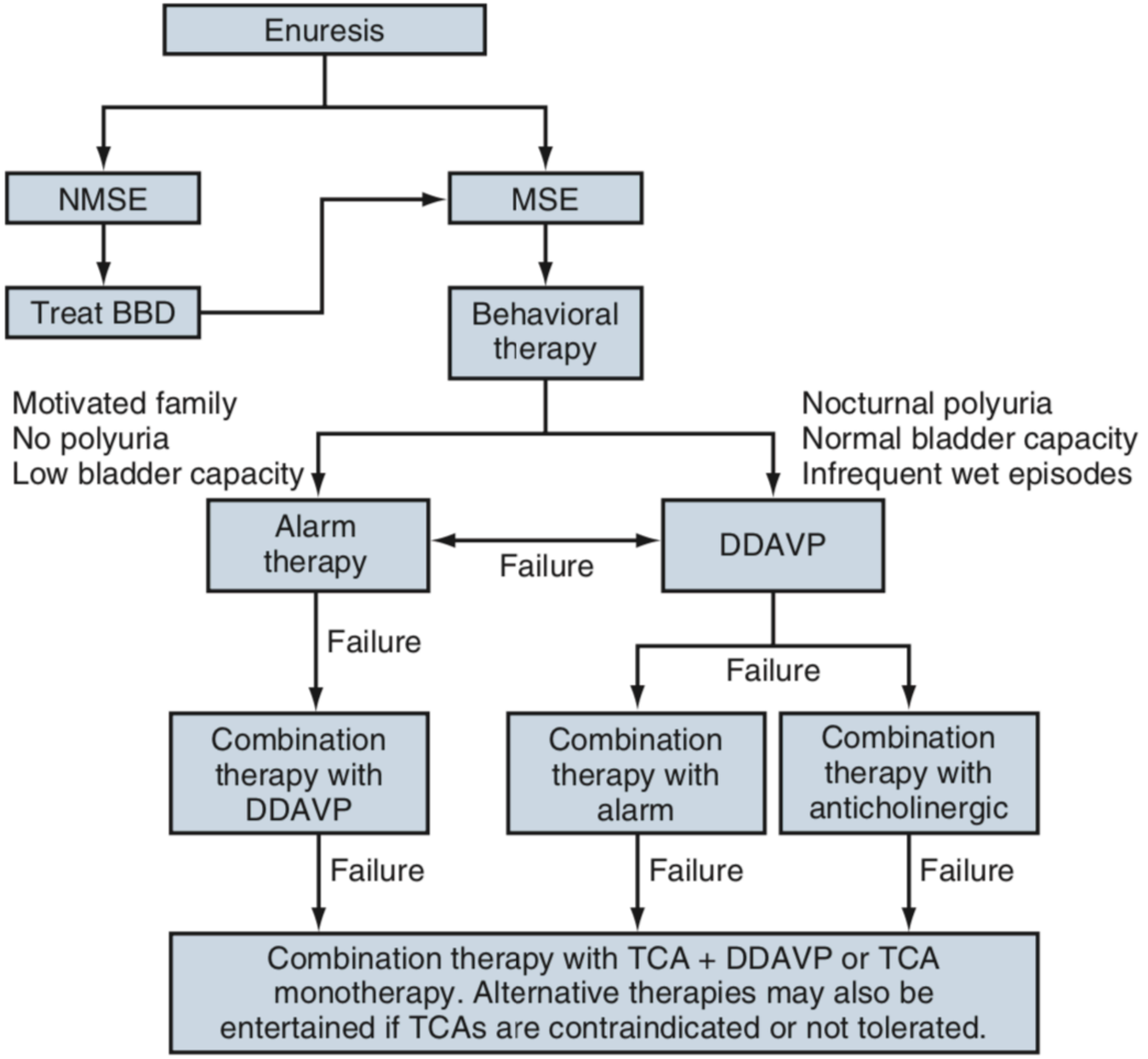

Fig. 35.3. Algorithm of the evaluation and treatment of a pediatric patient with enuresis. *BBD,* Bowel-bladder dysfunction; *DDAVP,* 1-desamino-8-D-arginine vasopressin (desmopressin); *MSE,* monosymptomatic enuresis; *NMSE,* nonmonosymptomatic enuresis; *TCA,* tricyclic antidepressant.

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Causes

- The most common cause of neurogenic bladder dysfunction in children is abnormal development of the spinal canal and spinal cord.
- Neural Tube Defects
  - folic acid deficiency
  - a strong familial risk

TABLE 34.1 Causes of Neuromuscular Dysfunction of the Lower Urinary Tract

CONGENITAL	ACQUIRED	
NEURAL TUBE DEFECT	**EXTENSIVE PELVIC SURGERY**	
Occult forms of neural tube defect (Lipomeningocele and other spinal dysraphisms)	Central nervous system insults	Cerebral palsy Conditions of the brain (tumors, infarcts, encephalopathies)
Sacral agenesis	Spinal cord insults	Trauma Transverse myelitis
Anorectal malformations		

Evaluation

- Initial postnatal ultrasound
  - renal echo
  - PVR
- At 3 months old
  - VUDS
  - VCUG
  - DMSA

→ Three categories of LUT dynamics may be detected:
  - dyssynergic with and without poor detrusor compliance (37%)
  - complete denervation (36%)
  - synergic (26%)

- Radiologic examination of the spine: MRI

Goal of treatment

- Preservation of renal function
  - Bladder filling pressures < 30 cm H_2O
  - Avoid Credé voiding

- Treat urinary/fecal continence, avoidance of UTI, and facilitation of sexual function and fertility

Management

TABLE 34.5 Strategies to Address Inadequate Bladder Storage in Children With Neurogenic Bladder Dysfunction

CAUSE OF INADEQUATE STORAGE	MINIMALLY INVASIVE TREATMENT OPTIONS	MORE INVASIVE TREATMENT OPTIONS
Low compliance	CIC Antimuscarinic therapy Overnight catheter drainage	Intravesical botulinum toxin Augmentation cystoplasty Urinary diversion
Low capacity	Antimuscarinic therapy Overnight catheter drainage	Intravesical botulinum toxin Augmentation cystoplasty Urinary diversion
Overactive bladder contractions	CIC Antimuscarinic therapy Overnight catheter drainage	Intravesical botulinum toxin Augmentation cystoplasty Urinary diversion
Low bladder outlet resistance	Sympathomimetic therapy	Bladder neck sling Bladder neck procedure Injection of bulking agents into bladder neck

CIC, Clean intermittent catheterization.