Review Article

The Diagnosis and Treatment of Enuresis and Functional Daytime Urinary Incontinence

Alexander von Gontard, Eberhard Kuwertz-Bröking

Summary

Background: Elimination disorders in childhood are common and treatable. Approximately 10% of 7-year-olds wet the bed at night, and 6% are affected by incontinence during the daytime. Two main types of disturbance are distinguished: nocturnal enuresis and functional (i.e., non-organic) daytime urinary incontinence. Each type contains a wide variety of subtypes. Effective treatment requires precise identification of the subtype of elimination disorder.

Methods: This review is based on a selection of current publications, including principally the German S2k-AWMF guideline and the recommendations of the International Children's Continence Society (ICCS).

Results: Diagnostic assessment focuses on the clinical picture, is non-invasive, and can be carried out in most health care settings. If the child is suffering from multiple types of elimination disorder at once, then fecal incontinence or constipation is treated first, daytime urinary incontinence next, and enuresis last. 20–50% of children with elimination disorders have a comorbid mental disorder that also needs to be treated. With standard urotherapy, 56% of patients with daytime urinary incontinence become dry within a year. This conservative, symptom-oriented approach consists of educating the patient and his or her parents to promote behavior changes with respect to drinking and micturition. Elements of specific urotherapy are provided only if indicated. For enuresis, the treatment of first choice is alarm therapy, with which 50–70% of the affected children become dry. Pharmacotherapy, e.g., with desmopressin, can be a helpful adjunctive treatment. In intractable cases, training techniques have been found useful.

Conclusion: Childhood elimination disorders can be treated effectively after targeted diagnostic evaluation and the establishment of specific indications for treatment. In view of the emotional distress these disorders cause, the associated physical and mental disturbances, and their potential persistence into adolescence, they should be evaluated and treated in affected children from the age of five years onward.

Cite this as:

von Gontard A, Kuwertz-Bröking E: The diagnosis and treatment of enuresis and functional daytime urinary incontinence. Dtsch Arztebl Int 2019; 116: 279–85. DOI: 10.3238/arztebl.2019.0279

Elimination disorders are common, well treatable childhood disorders, associated with high levels of distress and increased rates of psychiatric and other comorbid disorders (1). Despite a spontaneous recovery rate of 15% per year, they can continue into adolescence (2, 3). Therefore, early and effective treatment is important. The prerequisite for an effective therapy is a precise, specific diagnosis of the respective elimination disorder. Two major groups can be distinguished: nocturnal enuresis and daytime urinary incontinence. About 10% of seven-year-olds wet at night, and up to 6% during the day (4).

The classification systems of ICD-10 (5) and DSM-5 (6) are not up-to-date and do not allow the different subtypes of elimination disorder to be adequately differentiated (7). As a result, the new international classification system of the International Children's Continence Society (ICCS) (8) has become particularly important, as it takes into account the current state of research.

The purpose of this article is to provide a current, practical review of the workup and treatment of these common disorders. For further details, please refer to current English and German textbooks (9–11).

Methods

This selective review is based on current literature, the recommendations of the ICCS (8), and the interdisciplinary, consensus-based German S2K-AWMF guideline on enuresis and functional (non-organic) urinary incontinence (12).

Results

Classification: Enuresis and urinary incontinence

The ICCS distinguishes between frequent, intermittent forms of wetting, which are predominantly non-organic, and the rare, continuous forms of incontinence, which predominantly have organic causes (e.g., structural, neurogenic, infectious, or other pediatric illnesses) (8, 12). Two main groups can be distinguished for intermittent incontinence: nocturnal enuresis, and functional daytime urinary incontinence (Table 1). Nocturnal enuresis (or simply enuresis) refers to any intermittent wetting during sleep, which includes the afternoon nap. Non-organic (functional) daytime

Department of Child and Adolescent Psychiatry, Psychotherapy and Psychosomatics, Saarland University Medical Center, Homburg, Germany: Prof. Dr. med. Alexander von Gontard
Formerly: Department of Pediatrics, Pediatric Nephrology, University Hospital Münster, Münster, Germany: Dr. med. Eberhard Kuwertz-Bröking

TABLE 1

General criteria and definitions of the ICCS (8)

Definition	
Enuresis (or nocturnal enuresis)	Intermittent (non-continuous) wetting during sleep (including nap)
Non-organic (functional) urinary incontinence (diurnal enuresis = obsolete)	Daytime intermittent wetting (awake period)
Wetting during sleep and awake periods	Two diagnoses: subform of enuresis and of daytime urinary incontinence
Criteria	
Exclusion of organic causes (neurogenic, structural, or other medical causes)	
Chronological minimum age of 5.0 years	
Duration of at least 3 months	
Frequency of at least one episode per month ≥ 4 episodes/week: frequent wetting < 4 episodes/week: infrequent wetting < 1 episode/month: symptom but not a disorder	

ICCS, International Children's Continence Society

urinary incontinence is defined by intermittent wetting during awake periods. The term diurnal enuresis is obsolete. If children wet during both daytime and nighttime, they will receive two appropriate diagnoses. Organic causes have to be ruled out as further criteria. The child must be at least five years old and wet at least once a month over a period of three months (8). If urinary incontinence or enuresis occurs less frequently than once a month, it is referred to as a symptom but not as a disorder. Frequent wetting is characterized by at least four episodes per week (8).

Four different subtypes of enuresis can be distinguished (Table 2). Primary enuresis is present if the child has never been dry for at least six months. Secondary enuresis is diagnosed if a child starts wetting the bed again after having been dry for at least six months. Children presenting with secondary enuresis have often experienced stressful life events and also have a higher rate of mental disorders (of about 40%–75%) (13). However, both forms are treated in the same way. The important distinction is based on the presence of signs of bladder dysfunction (14). A child who wets at night without signs of bladder dysfunction is said to have a monosymptomatic enuresis. A child with symptoms such as urgency, postponement, dyscoordination, constipation, or fecal incontinence is said to have non-monosymptomatic enuresis. This differentiation influences the therapy, as bladder dysfunction should be treated first in non-monosymptomatic enuresis (14).

The classification of daytime functional urinary incontinence is more extensive and complicated. The ICCS distinguishes between three common and six rare forms (Table 3) (8). Overactive bladder, or urge

urinary incontinence, presents with sudden urge symptoms, or pollakiuria, voiding more than seven times a day (depending on the amount of fluid intake), small micturition volumes, and holding maneuvers (11, 12). Voiding postponement is a type of incontinence with low micturition frequency (with three or fewer voidings per day), as well as the habitual delay of micturition in certain situations through the use of holding maneuvers, such as pelvic floor tension, crossing the legs, squatting, and sitting on the heels (11, 12). Detrusor sphincter dyscoordination (or dysfunctional voiding) is a disorder of the voiding phase, in which the external sphincter is not relaxed during voiding, but paradoxically contracted. Straining at the onset of micturition and interrupted urinary flow are typical hallmarks (11, 12).

Stress incontinence is characterized by the leakage of small volumes during increased intra-abdominal pressure. It is extremely uncommon in children but can also occur in adolescence. In giggle incontinence, large volumes of urine are voided reflexively. With an underactive bladder, the bladder can be completely emptied only by applying pressure to the abdomen. With vaginal reflux, girls lose urine for the first few minutes after micturition. The cause is an influx of urine into the vagina during micturition. In functional obstruction, the urine flow is hampered by non-organic causes. With an increased daytime urinary frequency, urgency symptoms can temporarily develop but usually recede.

General diagnostics

For most children with elimination disorders, standard diagnostic assessment is sufficient to detect incontinence and comorbid disorders and to rule out organic causes (Box) (12). The diagnosis should be clinically oriented and comprehensive, but noninvasive. A crucial component is a detailed medical history, starting with the current symptoms, the course to date, and the developmental and family history. The medical history information can be supplemented by questionnaires for wetting (15). A micturition protocol should always be carried out, as the identification of specific subforms of incontinence is often only possible through objective parameters. Fluid intake and urine volumes are measured and recorded over a 48-hour period, including voiding times and any associated symptoms. Wetting frequency should then be recorded for at least two weeks, and better for four weeks (using a chart or calendar).

A full physical examination is required for each child, especially for the abdomen, spine, anal and genital regions, and the lower extremities. In the sonographic assessment, the functional parameters of residual volume, bladder wall thickness, and rectal diameter are of particular importance. For urinalysis, examination with test strips is usually sufficient. Because of the high degree of comorbidity of psychiatric disorders, at least screening with standardized broadband behavioral questionnaires should be carried out

TABLE 2

Overview of forms of nighttime wetting (8)

	Longest period of dryness <6 months	Longest period of dryness >6 months
General	Primary nocturnal enuresis (PNE)	Secondary nocturnal enuresis (SNE)
No daytime bladder dysfunction	Primary monosymptomatic nocturnal enuresis (PMNE)	Secondary monosymptomatic nocturnal enuresis (SMNE)
With daytime bladder dysfunction	Primary non-monosymptomatic nocturnal enuresis (PNMNE)	Secondary non-monosymptomatic nocturnal enuresis (SNMNE)

TABLE 3

Forms of functional daytime urinary incontinence with the most important clinical symptoms according to ICCS (8)

Forms of urinary incontinence	Most important clinical symptoms
Common forms	
Overactive bladder/urge incontinence	Urgency symptoms, increased micturition frequency >7 times/day, small volumes of voided urine
Urinary incontinence with voiding postponement	Infrequent micturition <4-times per day, habitual delay of micturition, large volumes of voided urine
Detrusor sphincter dyscoordination (dysfunctional voiding)	Straining at the beginning of micturition, interrupted urine flow
Rare forms	
Stress incontinence	Wetting by coughing, sneezing, increased abdominal pressure, small volumes
Giggle incontinence	Wetting by laughing, large volumes, complete voiding
Underactive bladder	Interrupted urine flow, voiding only after applying intraabdominal pressure
Vaginal reflux (better, influx)	Wetting 5–10 minutes after micturition due to influx of urine during micturition in the vagina
Functional obstruction	Impediment of and reduction in urine flow
Increased daytime urinary frequency	Benign, temporary disorder with urge symptoms and increased frequency of micturition

ICCS, International Children's Continence Society

(1, 15). Further investigations, such as urine flow measurement (uroflowmetry) with or without electromyogram (EMG) of the pelvic floor (using adhesive electrodes), can be required, for instance for the diagnosis of detrusor sphincter dyscoordination. More invasive urological diagnostic procedures, such as cystoscopy, are especially necessary in cases of suspected organic causes (*Box*).

After completion of the diagnostic evaluation, a diagnosis should be made regarding the respective subtypes of enuresis, functional daytime urinary incontinence, and comorbid disorders, especially fecal incontinence and constipation. This comprehensive diagnosis is especially important if there are multiple elimination disorders. The following sequence should be observed for effective treatment: first, fecal incontinence or constipation is treated, followed by daytime urinary incontinence and lastly, enuresis (12).

To increase cooperation and compliance, all comorbid disorders should also be treated, especially psychiatric disorders such as attention deficit/hyper-

activity disorder (ADHD), behavioral disorders, and depressive and anxiety disorders (1, 16). Overall, clinically relevant comorbid psychiatric disorders affect 20%–30% of children with enuresis, 20%–40% of those with daytime urinary incontinence, and 30%–50% of those with fecal incontinence (1). Children with intellectual disabilities show higher rates of enuresis and urinary incontinence (17). Comorbid nephrological findings include urinary tract infections and vesicoureteral reflux episodes. Comorbid sleep disorders should also be considered (12).

General therapy

The foundation for treating elimination disorders is based on non-invasive, behavioral therapy, which may be supplemented by pharmacotherapy if indicated (12). The generic term for all conservative, non-surgical, and non-pharmacological treatment procedures for lower urinary tract dysfunction is urotherapy (8). This treatment strategy for bladder dysfunction is established and accepted internationally. Numerous elements of

BOX

Standard program and extended assessment according to the AWMF (Association of the Scientific Medical Societies in Germany) guidelines (12)

● **Standard assessment**

- history
- questionnaires
- micturition protocol
- documentation of wetting, bowel emptying patterns, fecal smearing, fecal incontinence (2–4 weeks, recording on chart)
- physical examination
- ultrasound (kidneys and urinary tract, bladder wall thickness, rectal diameter, post-void residual urine)
- urine status (dip stick)
- child and adolescent psychiatric evaluation or screening with behavioral questionnaires

● **Extended assessment**

as indicated:

- urine bacteriology
- uroflowmetry (if necessary, with electromyography)
- further assessment by pediatric urology, pediatric gastroenterology, child and adolescent psychiatry, and pediatric nephrology

urotherapy are based on principles of cognitive behavioral therapy, such as behavior plans, motivational enhancement, and cognitive restructuring.

A distinction can be made between standard and specific urotherapy (*Table 4*). According to a meta-analysis, 56% of patients can attain dryness within one year with standard urotherapy, with a spontaneous remission rate of 15% (2). This procedure includes the following elements: information and demystification, instructions for optimal bladder voiding and defecation behavior, instructions for drinking and eating habits, documentation of symptoms and rates, and regular care and support (2, 8, 12). Specific urotherapy comprises various procedures, such as alarm therapy or biofeedback training, which require a specific therapeutic indication (12). Urotherapy can be used on an outpatient basis in almost all cases. Effective training programs have been developed for children and adolescents with refractory urinary incontinence that can be carried out individually or in groups (18, 19).

Special therapy

In addition to these general recommendations for therapy, each case of elimination disorder requires a specific approach, as briefly summarized in the following.

Enuresis

In non-monosymptomatic enuresis, treatment of the concomitant bladder dysfunction should be carried out first and follow the principles of functional urinary incontinence therapy. For example, if there are symptoms of urgency, they will be treated as in urinary urgency incontinence (14). Treatment of secondary enuresis needs to take into account the increased rate of psychiatric disorders associated with this condition; otherwise, it should be treated as primary enuresis (11–13).

The first step is a standard urotherapy with documentation of wetting frequency using a bladder diary, usually over four weeks (12). This alone helps 15% of the children to become dry; therefore, according to data from a Cochrane review, this should be the first line of therapy (20, 21). If this is not sufficient, alarm therapy is by far the therapy of choice, proven by many randomized controlled trials and meta-analyses (22–24). Performed correctly, about 70% of the children attain dryness, and 50% stay dry over the long term (22). Body-worn devices and bed devices are equally effective (22). Wireless alarms can be helpful in special situations. Alarm therapy requires the cooperation of parents and the child. The child should place the device and switch it on every night. On dry nights, no alarm is triggered. If wetting occurs, an acoustic alarm and/or vibration will be triggered. The child should wake up completely and finish voiding into the toilet. The device is then attached again, and the event is documented. Treatment continues until the child remains dry for 14 consecutive days, with a maximum treatment duration of 16 weeks (see *Figure* for the therapy algorithm). According to a new retrospective study, 76% of children attain dryness within 9 weeks of treatment, with a relapse rate of 23% (25).

Pharmacotherapy of enuresis

The second line option is pharmacotherapy with desmopressin, an antidiuretic hormone (ADH) analogue (24). About 30 to 60 minutes before falling asleep, tablets of 0.2–0.4 mg, or melt tablets of 120–240 µg, are administered orally. Because of the rare adverse effect of water intoxication, the fluid intake should not exceed 250 mL afterwards (12). If the child does not attain dryness after four weeks, the medication should be discontinued. If the effects are positive, desmopressin can be taken for three months (see also *Figure*), after which an attempt at withdrawal should be made without tapering doses. With desmopressin, about 30% of children attain complete dryness, and 40% partial dryness; however, the relapse rate is about 50% (22, 26).

If one of these methods does not work, it is recommended to switch to the other method (e.g., if there is no response to alarm therapy, desmopressin should be tried; if desmopressin is ineffective, alarm therapy should be tried) (24). A combination of alarm therapy and desmopressin is not useful (22). A meta-analysis

TABLE 4

Differences between standard and specific urotherapy (8, 12)

Elements of standard urotherapy	
Explanation, information, demystification	<ul style="list-style-type: none"> – Physiology of bladder – Description of normal bladder function as maturation – Characterization of bladder dysfunction (pathophysiology) – Consideration of comorbidities – Possible treatment strategies
Instructions for optimal micturition behavior	<ul style="list-style-type: none"> – Instructions for micturition – Micturition in a timely, relaxed, and pressure-free manner – Timed voiding – Promotion of bladder awareness exercises
Instructions for regular bowel emptying	
Instructions for drinking and eating habits	
Use of protocol systems	<ul style="list-style-type: none"> – Charts for wet and dry nights – Bowel management and voiding plans – Calendar system
Support and guidance	<ul style="list-style-type: none"> – Regular contacts – Enhancing motivation – Availability of the therapeutic teams
Elements of specific urotherapy	
Alarm therapy	
Pelvic floor exercises	
Biofeedback training	
Electrostimulation (e.g. TENS)	
Clean intermittent catheterization (single-use)	

TENS, transcutaneous electrical nerve stimulation

comparing both therapeutic options showed that alarm therapy performed better (odds ratio [OR]: 1.53) for achieving partial success. Additionally, the long-term success rate is much better (OR: 2.89), and the relapse rate is lower (OR: 0.25) (27).

A third-line choice, which requires close monitoring due of an increased rate of adverse effects, is using a tricyclic antidepressant, such as imipramine (approved from age 5). Using imipramine leads to one dry night more per week than using a placebo, but there is a high rate of relapse after its discontinuation (28).

Functional (non-organic) urinary incontinence

For children who wet during the day, standard urotherapy plays a special role; this includes intensive counseling on micturition and drinking habits (2, 29). Apart from this, every single subform of urinary incontinence requires a specific approach. In this context, only the three common issues are discussed here.

Urge incontinence / overactive bladder

For urge urinary incontinence, the focus is on cognitive training. Children are instructed to perceive the urinary urgency on time, to go to the bathroom, and to void without using holding maneuvers. The dry or wet episodes are then recorded in a chart. Based on clinical observation, standard urotherapy with accompanying

documentation is sufficient for about one-third of children (11).

Further procedures are required for two-thirds of children. Either pharmacotherapy or transcutaneous electrical nerve stimulation (TENS) are effective. Selecting the option is left to the parents and the children (12).

In pharmacotherapy, anticholinergic drugs improve symptoms in as many as 60% of the cases (12). The drug of first choice is propiverine, with a maximum dosage of 0.8 mg / kg body weight / day (maximum 15 mg / day) in two doses. Special attention should be paid to typical adverse effects, such as constipation, residual urine, tachycardia, dry mouth, reddening of the skin, behavior changes, and concentration disorders. A second-line agent is oxybutynin, at a dosage of 0.3–0.6 mg / kg body weight / day (maximum 15 mg / day) in two to three doses, with a slightly higher rate of side effects. If there is no response to one of these standard medications (which are approved for children), then therapy should be switched to using the other one. Other anticholinergics include trospium chloride (approved for children ≥ 12 years of age), tolterodine, solifenacin, and others approved for adults only (12).

Using TENS with adhesive electrodes placed on the sacral surface is non-invasive and should be

FIGURE

Algorithm for diagnostic and therapy of nocturnal enuresis (11)
BW, body weight; IMI, imipramine

performed daily for several weeks. According to many studies and meta-analyses, it is effective for about 30%–80% of children (30, 31), although it should be noted that the interventions and study participants were not always comparable in these studies.

Urinary incontinence with voiding postponement

In addition to standard urotherapy, increasing the voiding frequency is important for voiding postponement (32). Children are asked to go to the restroom at least seven times a day without stress and to record this in a chart. Due to the high rate of comorbidities, especially with oppositional defiant disorder (ODD) or ADHD, cooperation can be difficult. In these cases, concomitant behavioral therapy may be useful (32). Pharmacotherapy is only indicated for comorbid ADHD.

Detrusor sphincter dyscoordination (dysfunctional voiding)

Intensive standard urotherapy is very important particularly for dysfunctional voiding (33). The most effective, specific form of therapy for this disorder is biofeedback treatment (33, 34). This can be performed as pure uroflow, pure EMG, or combined uroflow and EMG biofeedback. The basic principle is the feedback and cognitive processing of physiological processes of urine flow (uroflow) and pelvic floor tension (EMG). Pure EMG biofeedback can also be carried out at home with leased devices. According to a review, biofeedback methods improve continence in 80% of children, although the evidence level of this study was considered to be low (34).

Summary and outlook

The primary focus is on non-invasive urotherapy, which contains many elements of cognitive behavioral therapy. If indicated, this can be accompanied by targeted pharmacotherapy. Comorbid somatic and psychiatric disorders should be treated separately. For many children with elimination disorders, treatment can be provided in the primary care setting. For complicated or chronic courses and in case of comorbidities, an interdisciplinary approach in specialized centers is recommended.

Conflict of interest statement

Prof. von Gontard has received third-party funds from Novartis as study support for self-initiated research, and author honoraria from the publishing companies Hogrefe, Kohlhammer, Wiley, and Max Keith Press.

Dr. Kuwertz-Bröking declares that no conflict of interest exists.

Manuscript submitted on 22 July 2018, revised version accepted on 26 February 2019

Translated from the original German by Dr. Veronica A. Raker.

References

1. von Gontard A, Baeyens D, van Hoecke E, Warzak WJ, Bachmann C: Psychological and psychiatric issues in urinary and fecal incontinence. *J Urol* 2011; 185: 1432–6.
2. Schäfer SK, Niemczyk J, von Gontard A, Pospeschill M, Becker N, Equit M: Standard urotherapy as first-line intervention for daytime incontinence: a meta-analysis. *ECAP* 2018; 27: 949–64.
3. Forsythe WI, Redmond A: Enuresis and spontaneous cure rate. Study of 1129 enuretics. *Arch Dis Child* 1974; 49: 259–63.

4. Wright A: The epidemiology of childhood incontinence. In: Franco I, Austin P, Bauer S, von Gontard A, Homsy Y (eds.): *Pediatric incontinence: evaluation and clinical management*. Oxford: Wiley-Blackwell 2015; 37–66.
5. World Health Organisation (WHO), Dilling H, Mombour W, Schmidt MH, Schulte-Markwort E: *ICD-10 Internationale Klassifikation psychischer Störungen. Diagnostische Kriterien für Forschung und Praxis* (6th edition). Bern: Hogrefe 2016.
6. American Psychiatric Association, Falkai P, Wittchen HU: *Diagnostisches und statistisches Manual psychischer Störungen – DSM-5*. Göttingen: Hogrefe 2015.
7. von Gontard A: The impact of DSM-5 and guidelines for assessment and treatment of elimination disorders. *ECAP* 2013; 22 (Suppl 1): 61–7.
8. Austin PF, Bauer S, Bower W, et al.: The standardization of terminology of bladder function in children and adolescents: update report from the Standardization Committee of the International Children's Continence Society (ICCS). *Neurourol Urodyn* 2016; 35: 471–81.
9. Franco I, Austin P, Bauer S, von Gontard A, Homsy Y (eds.): *Pediatric incontinence: evaluation and clinical management*. Oxford: Wiley-Blackwell 2015.
10. von Gontard A: *Leitfaden Enkopresis*. Göttingen: Hogrefe 2010.
11. von Gontard A: *Leitfaden Enuresis*. Göttingen: Hogrefe 2018.
12. Kuwertz-Bröking E, von Gontard A: Enuresis und nicht-organische (funktionelle) Harninkontinenz bei Kindern und Jugendlichen (S2k Leitlinie). AWMF online 2015. <https://www.awmf.org/leitlinien/detail/II/028-026.html> (last accessed on 14 March 2019)
13. von Gontard A, Plück J, Berner W, Lehmkuhl G, Mauer-Mucke K: Clinical behavioral problems in day and night wetting children. *Pediatr Nephrol* 1999; 13: 662–7.
14. Franco I, von Gontard A, De Gennaro M: Evaluation and treatment of nonmonosymptomatic nocturnal enuresis: a standardization document from the International Children's Continence Society. *J Pediatr Urol* 2013; 9: 234–43.
15. Chase J, Bower W, Gibb S, Schaeffer A, von Gontard A: Diagnostic scores, questionnaires, quality of life and outcome measures in pediatric continence: a review of available tools from the International Children's Continence Society. *J Pediatr Urol* 2018; 14: 98–107.
16. von Gontard A, Equit M: Comorbidity of ADHD and incontinence in children—a review. *ECAP* 2015; 24: 127–40.
17. von Gontard A: Urinary and faecal incontinence in children with special needs. *Nat Rev Urol* 2013; 10: 667–74.
18. Equit M, Sambach H, Niemczyk J, von Gontard A: *Ausscheidungsstörungen bei Kindern und Jugendlichen – ein Therapieprogramm zur Blasen- und Darmschulung*. Göttingen: Hogrefe 2013.
19. Konsensusgruppe Kontinenzschulung im Kindes- und Jugendalter, Kuwertz-Bröking E, Bachmann H, Steuber C (eds.): *Einnässen im Kindes- und Jugendalter – Manual für die standardisierte Diagnostik, (Uro-)Therapie und Schulung bei Kindern und Jugendlichen mit funktioneller Harninkontinenz* (2nd edition). Lengerich: Pabst 2017.
20. Devlin JB, O'Cathain C: Predicting treatment outcome in nocturnal enuresis. *Arch Dis Child* 1990; 65: 1158–61.
21. Glazener CMA, Evans JHC: Simple behavioural and physical interventions for nocturnal enuresis in children. *Cochrane Database Syst Rev* 2004; 2: CD003637.
22. Glazener CMA, Evans JHC, Peto RE: Alarm interventions for nocturnal enuresis in children. *Cochrane Database Syst Rev* 2005; 2: CD002911.
23. NICE clinical guideline 111: Nocturnal enuresis – the management of bedwetting in children and young people. London: National Institute for Health and Clinical Excellence 2010.
24. Nevéus T, Eggert P, Macedo A, et al.: Evaluation of and treatment for monosymptomatic enuresis: a standardization document from the International Children's Continence Society. *J Urol* 2010; 183: 441–7.
25. Apos E, Schuster S, Reece J, et al.: Enuresis management in children: retrospective clinical audit of 2861 cases treated with practitioner-assisted bell-and-pad alarm. *J Pediatr* 2018; 193: 211–6.

Key messages

- Enuresis and functional daytime urinary incontinence are frequent, well treatable disorders of childhood and adolescence.
- Comorbid disorders should be identified and treated.
- Urotherapy forms the basis of therapy for all elimination disorders.
- In enuresis, alarm therapy with an acoustic signal and/or vibration is the first-line choice of treatment; a second-line option is pharmacotherapy with desmopressin.
- Each subform of functional daytime urinary incontinence requires a specific therapeutic approach.

26. Glazener CMA, Evans JHC: Desmopressin for nocturnal enuresis in children. *Cochrane Database of Syst Rev* 2002; 3: CD002112.
27. Peng CC, Yan SS, Austin PF, Chang SJ: Systematic review and meta-analysis of alarm versus desmopressin therapy for pediatric monosymptomatic enuresis. *Sci Rep* 2018; 8: 16755.
28. Caldwell PH, Sureshkumar P, Wong WC: Tricyclic and related drugs for nocturnal enuresis in children. *Cochrane Database Syst Rev* 2016; 1: CD002117.
29. Chang SJ, van Laecke E, Bauer SB, et al.: Treatment of daytime urinary incontinence: a standardization document from the International Children's Continence Society. *Neurourol Urodyn* 2017; 36: 43–50.
30. Barroso U, Tourinho R, Lordelo P, Hoebeke P, Chase J: Electrical stimulation for lower urinary tract dysfunction in children: a systematic review of the literature. *Neurourol Urodyn* 2011; 30: 1429–36.
31. Wright A, Haddad M: Electrostimulation for the management of bladder bowel dysfunction in childhood. *Eur J Pediatr* 2017; 21: 67–74.
32. von Gontard A, Niemczyk J, Wagner C, Equit M: Voiding postponement in children—a systematic review. *ECAP* 2016; 25: 809–20.
33. Chase J, Austin P, Hoebeke P, McKenna P: The management of dysfunctional voiding in children: a report from the standardisation committee of the International Children's Continence Society. *J Urol* 2010; 183: 1296–302.
34. Desantis DJ, Leonard MP, Preston MA, Barrowman NJ, Guerra LA: Effectiveness of biofeedback for dysfunctional elimination syndrome in paediatrics: a systematic review. *J Pediatr Urol* 2011; 7: 342–8.

Corresponding author

Prof. Dr. med. Alexander von Gontard
Klinik für Kinder- und Jugendpsychiatrie,
Psychotherapie und Psychosomatik,
Universitätsklinikum des Saarlands,
66421 Homburg
alexander.von.gontard@uks.eu

Cite this as:

von Gontard A, Kuwertz-Bröking E: The diagnosis and treatment of enuresis and functional daytime urinary incontinence. *Dtsch Arztebl Int* 2019; 116: 279–85.
DOI: 10.3238/arztebl.2019.0279