ENURESIS

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Enuresis constitutes a very common group of disorders in childhood that occur world-wide at approximately the same rate. 10% of all 7-year-olds, wet the bed at night and 2% to 3% during the day. Despite a high remission rate, still 1% to 2% of all adolescents are affected by nocturnal enuresis and less than 1% by daytime wetting. The vast majority of elimination disorders are functional, i.e., not due to neurological, structural or medical causes (von Gontard & Neveus, 2006).

Enuresis is associated with emotional distress in both children and parents, which is reversible once children become dry. Achieving continence is therefore the main goal of treatment and will lead to an improvement of self-worth and self-confidence (Longstaffe et al, 2000). On the other hand, 20%-40% of all children with enuresis have additional, comorbid psychological disorders, not only externalising conditions such as attention deficit hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD) but also internalising disorders such as depression. These comorbid conditions require separate assessment and treatment – in addition to the symptom-oriented treatment of the child's elimination disorder.

Most types of enuresis can be treated effectively with counselling and cognitive-behavioural approaches but some may require additional medication. These therapies can in most cases be provided in primary care outpatient settings – provided that they are based on a correct diagnosis and that child and parents are given adequate professional care with sufficient time. The aim of this chapter is to provide a practical approach to the assessment and treatment of children with enuresis that can be implemented in different settings even in those with limited resources.

DEFINITION AND CLASSIFICATION

Enuresis is defined by both ICD-10 (World Health Organisation, 2008) and DSM-IV-TR (American Psychiatric Association, 2000) as involuntary (or even intentional) wetting in children 5 years of age or older after organic causes have been ruled out. The wetting must have persisted for at least three months to be considered a disorder. According to ICD-10, enuresis is diagnosed if wetting occurs two times a month in children under 7 years of age and once a month in children 7 years and older. The criteria according to DSM-IV is less precise: the voiding must occur at least twice per week or else must cause clinically significant distress or impairment in social, academic (occupational) or other important areas of functioning. Both ICD-10 and DSM-IV-TR describe nocturnal, diurnal or combined enuresis – no other subtypes are included. Also, ICD-10 excludes a diagnosis of enuresis if other psychiatric disorders are present. Both ICD-10 and DSM-IV-TR are outdated and do not reflect newer research findings in this field. Unfortunately, the proposed DSM-5 criteria are not very useful and may even constitute a step back from DSM-IV. The Children's Continence Society (ICCS) (Neveus et al., 2006) has proposed newer, more practical suggestions, which are being revised in 2012. The aim is to provide simple, descriptive clinical terms that can be used in all settings world-wide.

According to the ICCS criteria, *enuresis* denotes an intermittent (i.e., not continuous) wetting during sleep in children after their fifth birthday. The term *nocturnal* can be added for clarity (i.e., enuresis and nocturnal enuresis are

Table C.4.1 Definitions according to the Children's Continence Society

Symptom	Disorder
• Intermittent wetting during sleep • Age 5 or more	Enuresis or nocturnal enuresis
• Daytime wetting • Age 5 or more	Urinary incontinence or daytime urinary incontinence (not "diurnal enuresis"). In most cases functional.

synonyms). Daytime wetting is termed *urinary incontinence*, which can be organic (structural, neurogenic or due to other physical causes) or functional. As the vast majority of cases are functional, most children with daytime wetting would be considered to have some form of functional urinary incontinence. According to these criteria, the term *diurnal enuresis* is obsolete and should be avoided. If children wet during sleep and during the day, they would receive two diagnoses: enuresis *and* urinary incontinence.

The classification of enuresis is simple. Only two aspects need to be considered: the longest dry period and if lower urinary tract symptoms are present:

- *Primary enuresis* means that the child has been dry for less than 6 months (or not at all)
- *Secondary enuresis* means that a relapse after a dry period of at least 6 months has occurred.

The dry period can occur at any age; also, it does not matter if it came about spontaneously or was achieved by treatment. This distinction is important because children with *secondary enuresis* have experienced stressful life-events (such as separation of parents, birth of siblings, etc.) more often and have higher rates of comorbid psychiatric disorders (Järvelin et al, 1990; von Gontard et al, 2011b). These issues have to be considered in assessment and treatment, otherwise the treatment of primary and secondary enuresis is exactly the same.

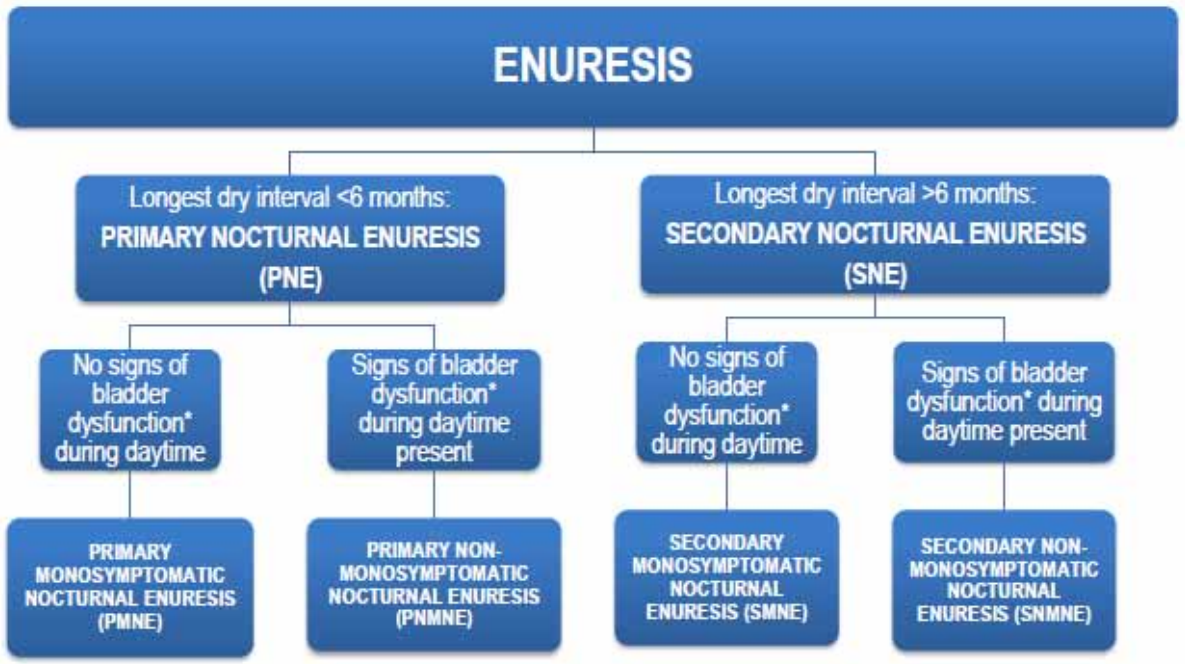
The presence of lower urinary tract symptoms is more important as it carries implications for treatment. Children who wet during sleep and do not have daytime symptoms suggesting disturbances of bladder function are suffering from *monosymptomatic* enuresis. In other words, they wet at night but bladder storage and emptying is completely normal (i.e., children go to the toilet 5-7 times during the day, do not postpone micturition with the use of holding manoeuvres, do not experience urge symptoms and can empty their bladders without problems). In these cases, treatment can focus on the wetting episodes during sleep without further preliminary procedures.

Children who have lower urinary tract symptoms and may have gastrointestinal symptoms, such as constipation and soiling, have *non-monosymptomatic* enuresis. In non-monosymptomatic nocturnal enuresis, daytime symptoms have to be treated first before addressing the night-time wetting. The terms monosymptomatic and non-monosymptomatic are based entirely on history and verified by voiding diaries, i.e., are based on clinical assessment only (von Gontard & Neveus, 2006).

James Joyce wet his bed. The first page of Joyce's *Portrait of the Artist as a Young Man* contains the following: "when you first wet the bed it is warm and then it gets cold. His mother put on the oilsheet. That had the queer smell" (Gill, 1995).

Portrait by Robert Amos
www.robertamos.com

Figure C.4.1 Classification of nocturnal enuresis according to the Children's Continence Society



*Daytime incontinence, increased/decreased day-time voiding frequency, urgency, voiding postponement, holding manoeuvres, intermittent urine stream, interrupted flow, constipation, encopresis, etc.

The classification of daytime urinary incontinence is more complex. Most types are functional – organic urinary incontinence is rare and can be due to structural, neurogenic or other medical causes. The three main syndromes of functional urinary incontinence are:

- Urge incontinence
- Voiding postponement, and
- Dysfunctional voiding.

Rare types include: stress incontinence, giggle incontinence, detrusor underactivity and others. Each one of these types of urinary incontinence has typical symptoms.

Urge:
The strong, sudden need to urinate.

Urge incontinence or overactive bladder is characterised by urge symptoms, increased micturition frequency and small voided volumes. By contrast, low micturition frequency and postponement of micturition is typical in *voiding postponement*. In both cases children employ holding manoeuvres to avoid wetting.

Dysfunctional voiding is a disorder of the emptying phase: instead of relaxing the sphincter muscle, it is contracted paradoxically. Straining and an interrupted urine stream are indicative of this disorder.

Stress incontinence is rare in children – in contrast to adults. Wetting during coughing, sneezing (i.e., any increase of intra-abdominal pressure) and small volumes are typical. *Giggle incontinence* is characterised by wetting during laughing, large volumes with apparently complete emptying. *Detrusor underactivity*, a decompensation of the detrusor muscle, is marked by an interrupted stream; consequently, emptying the bladder is possible only by straining.

Table C.4.2 Classification of daytime wetting (functional urinary incontinence) and key distinguishing symptoms

Type	Key symptoms
Urge incontinence (overactive bladder)	• Urge • Frequency more than 7 times per day • Small volume voided
Voiding postponement	• Infrequent micturition (< 5 times per day) • Postponement
Dysfunctional voiding	• Straining to initiate and during micturition • Interrupted stream of urine
Stress incontinence	• Wetting during coughing, sneezing • Small volumes
Giggle incontinence	• Wetting during laughing • Large volumes with apparently complete emptying
Detrusor underactivity	• Interrupted stream • Emptying of bladder possible only by straining

As daytime urinary incontinence (and non-monosymptomatic enuresis) can be identified by altered rates of micturition frequency and volume, it is helpful to know the normal values (these are only an approximation), which are shown in Table C.4.2. Normally, children void 5 to 7 times a day. The normal voided volume in millilitres can be calculated by adding one to the age of the child and multiplying by 30. For example a normal amount of micturition in an 8 year old child would be: 8 + 1 = 9; 9 x 30 = 270 ml.

Approximate normal values in childhood

Micturition frequency

- 5-7 times per day

Voided volumes

- (age + one) multiplied by 30ml

The aim of treatment is to achieve long-term continued and complete dryness, not just a reduction of symptoms. Regrettably, this is not achieved in all cases; for some children and families, however, a reduction in the frequency of episodes can provide relief and has been shown to improve self-esteem (Longstaffe et al, 2000).

EPIDEMIOLOGY

Enuresis is 2-3 times more common than daytime urinary incontinence; it is 1.5 to 2 times more common in boys than girls. Prevalence of night wetting decreases with increasing age: 20% in 4 year olds, 10% in 7 year olds, 1%-2% in adolescents, and 0.3%-1.7% among adults (von Gontard & Neveus, 2006). Prevalence depend on how enuresis is defined, especially on the number of wet nights required. In a large population study of 8151 children aged 7½ years, 15.5% had nocturnal enuresis (boys 20.2%, girls 10.5%). Frequent enuresis, defined by two or more wet nights per week, affected only 2.6% of them (boys 3.6%, girls 1.6%) (Butler et al, 2005). Primary is more common than secondary enuresis, with comparable rates at the age of 7 years (Fergusson et al, 1986). Monosymptomatic enuresis is twice (68.5%) as common as non-monosymptomatic enuresis (31.5%) (Butler et al, 2006).

Daytime urinary incontinence is 1.5 times more common in girls than boys (Bower et al, 1996; Hellström et al, 1990); 2%-3% of 7 year olds and less than 1% of adolescents wet during the day (Hellström et al, 1990; Largo et al, 1978). In a UK population study of 13,973 children, the rates of infrequent (less than 2 times per week) and frequent (more than 2 times per week) were respectively: 13.6% and 1.9% at the age of 4½; 7.8% and 1.5% at 5½; 9.7% and 1.0% at 6½; 6.9% and 1.0% at 7½; 4.4% and 0.5% at 9½ years (Swithinbank et al, 2010). Different trajectories can be identified:

- Children with chronic, persistent incontinence over many years
- Children with relapses and
- A group with a continuous spontaneous remission rate (Heron et al, 2008).

Urge incontinence is the most common, affecting 4% of 7-year olds, especially girls (Hellström et al, 1990). Voiding postponement is the second most common type based on clinical studies. Population-based rates for the other types are lacking.

Click on the picture to hear two children share their experience of bedwetting.

The prevalence of nocturnal enuresis is comparable world-wide:

- 4.3% of Chinese children and adolescents aged 6-16 years (Liu et al, 2000)
- 8% of children aged 6-11 years in Taiwan (Chang et al, 2011)
- 14.9% of children aged 5-7 years in Turkey (Erdogan et al, 2007)
- 15% of children and adolescents in Saudi Arabia (Kalo & Bella, 1996)
- 17.4% of 7 years olds in Sudan (Rahim & Cederblad, 1986)
- 20.8% of children and adolescents aged 6-15 years in Ethiopia, including daytime incontinence (Desta et al, 2007).

Variation in rates is probably due to different definitions, modes of assessment and possible underreporting due to social desirability, particularly in the Chinese and Taiwanese studies.

Only a few studies have reported daytime urinary incontinence. For example, 16.6% of Korean children aged 5-13 years had overactive bladder, 4.5% daytime incontinence and 6.4% enuresis (Chung et al, 2009).

CLINICAL PRESENTATIONS

Typical symptoms of *monosymptomatic enuresis* are: deep sleep and difficult arousal (Wolfish et al, 1997), increased urine volume at night (polyuria) with large wetted volumes. The typical presentation is a child who is extremely difficult to wake and who wets the bed with large amounts of urine. In contrast, bladder function during the day is completely normal.

Children with a *non-monosymptomatic enuresis* have the same symptoms but, in addition, have signs similar to those with daytime urinary incontinence (except wetting). This means that some go to the toilet infrequently and postpone micturition with holding manoeuvres, others have signs of urgency and frequency, while others have to strain and the urine stream is interrupted. Also, urinary tract infections (UTI's), constipation and encopresis are possible.

Children with *secondary enuresis* have higher rates of comorbid behavioural and emotional disorders (von Gontard et al, 1999). A relapse can be precipitated by stressful life-events such as separation or divorce of parents (Järvelin et al, 1990). Otherwise, they do not differ from those with primary enuresis.

Children with *urge incontinence* are characterised by:

- High micturition frequency (more than 7 times per day with short intervals in between)
- Urge symptoms, sometimes with sudden, intensive urge
- Incontinence with small micturition volumes, increasing with tiredness, e.g., during the afternoon
- Holding manoeuvres such as contracting pelvic floor muscles, pressing thighs together, holding abdomen, jumping from one leg to the next, sitting on heel, squatting with the heel pressed against the perineum (curtsey sign)
- Vulvovaginitis, perigenital dermatitis
- Urinary tract infections

Typical signs of voiding postponement are:

- Low micturition frequency (less than 5 times per day)
- Postponement of micturition in certain situations (school, play, reading, television). With increasing postponement and fullness of bladder, holding manoeuvres are instituted (as in urge incontinence) until wetting cannot be avoided.
- Constipation and encopresis are common.

Voiding postponement is characterised by:

- Repeated straining at the beginning and during micturition
- Intermittent and fractioned urine flow
- Incomplete bladder emptying with residual urine and UTI's
- Stool retention, constipation and encopresis
- Vesico-ureteral reflux.

Clinical symptoms of *stress incontinence* are wetting during situations that result in increased intra-abdominal pressure (coughing, sneezing, play and sports). *Giggle incontinence* is associated with cataplexy, i.e., motor contractions can be visible. The incontinence is initiated by laughing and often cannot be stopped until the bladder is empty. Children with *underactive bladder* have infrequent micturitions (less than 5 times per day), a large bladder with incomplete emptying and large residual volumes.

ETIOLOGY AND RISK FACTORS

Genetic and neurobiological factors interact with environmental influences in the pathogenesis of elimination disorders. While some have a marked genetic component (monosymptomatic enuresis and urge incontninence), in others both genetic and environmental factors are involved (secondary enuresis), while some are mostly environmentally determined (voiding postponement).

Enuresis

Enuresis is a genetically determined maturational disorder of the central nervous system (von Gontard et al, 2001; 2011a); 70% to 80% of all children with enuresis have affected relatives. The concordance rates are higher among mono- than di-zygotic twins (Bakwin, 1973). The recurrence risk for a child to be affected by enuresis is 40 % if one parent and 70 % if both parents had been enuretic (Bakwin 1973). Most cases are consistent with with an autosomal dominant mode

The fundamental idea that children willfully control their thought processes during sleep and the proposition that such cognitive control accounts for bedwetting are simply not plausible. If such propositions were true, then why do we have a history of 3,500 years of parents and professionals talking to children about stopping bedwetting with little or no results? The one treatment that we know to work reliably, the urine alarm, does not require cognitive control and most likely works via a process of active avoidance conditioning […] It is disturbing enough to think that talking therapy for enuresis may make a comeback, but it is even more disturbing to consider […] that the most effective treatment known for children's bedwetting is rarely promulgated by our current health care system (Houts, 2000).

of inheritance; only one third of cases are sporadic (von Gontard et al, 2001). Several loci on chromosomes 12, 13 and 22 have been identified in linkage studies – irrespective of the type of enuresis (von Gontard et al, 2001). Candidate genes have not been identified yet. A genetic predisposition for enuresis remains life-long and can be reactivated by risk factors, even in adulthood (Hublin et al, 1998).

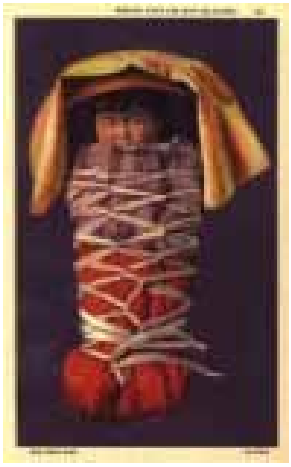
Children with enuresis have more neurological "soft signs" and need longer to complete motor tasks (von Gontard et al, 2006). In contrast, sleep architecture is not affected. Enuresis occurs in non-REM sleep phases, i.e. it is not associated with dreaming (enuresis during REM sleep is the exception). Enuresis occurs predominantly in the first third of the night – some children even wet the bed 10 minutes after falling asleep. The mean latency is 3 hours (Neveus et al, 1999). This explains why some children with enuresis wet even during daytime naps.

The main mechanisms responsible for the development of enuresis include:

- Increased urine volume (polyuria) affects some, but not all children. This is associated with a circadian variation (but not lack) of the antidiuretic hormone (Rittig et al, 1989).
- Impaired arousal is another important factor (Wolfish et al, 1997). In standardised waking schedules with sounds of up to 120 decibels, only 9% of children with enuresis can be woken up – significantly fewer than controls. This means that children with enuresis do not wake up when their bladder is full.
- Finally, children have an inhibition deficit of the pontine micturition centre of the brainstem. When the bladder is full during sleep, they are not able to sufficiently suppress emptying (Koff, 1996).

In addition to local bladder dysfunction, the same factors are responsible for the development of *non-monosymptomatic enuresis*.

Psychosocial factors modulate genetic and neurobiological risks in different ways. The time of initiation and intensity of toilet training, for example, has no effect on the development of enuresis (Largo et al, 1978; 1996). Psychosocial factors play a minor role in primary enuresis, as the rate of psychological disorders and risk factors is not increased (Fergusson et al, 1986; Feehan et al, 1990). Children with secondary enuresis, however, have both higher rates of emotional and behavioural disorders as well as stressful life events prior to the relapse (Järvelin et al, 1990; Feehan et al, 1990). The age of school entry (5-6 years) is the most common age for relapse while parental separation or divorce is the most important life event (Järvelin et al, 1990).



In West Africa, children who wet the bed were "treated" by attaching a large frog to their waist, and this apparently frightened them into being dry. Among the Navaho tribe, one preferred treatment was a ritual that required enuretic children to stand naked over a burning bird's nest, and this was believed to produce a cure of bedwetting because birds did not soil their nests (Houts, 2000).

Urinary incontinence

Genetic factors play a role in daytime urinary incontinence as well. In a population-based study of 8230 children, the odds ratio for daytime incontinence increased by 3.28 if the mother and by 10.1 if the father was affected (von Gontard et al, 2011a). Linkage studies demonstrate a positive linkage to chromosome 17 (Eiberg et al, 2001). Urge incontinence is caused by spontaneous contractions of the detrusor during the filling phase of the bladder, which are not sufficiently inhibited by the central nervous system (Franco, 2007). Genetic factors also play a major role in giggle incontinence but not in the other types of incontinence.

Daytime continence is not influenced by early or intensive toilet training in general (Largo et al, 1996; 1978). However, psychosocial factors do play a major role in daytime incontinence (see section on comorbidity). Voiding postponement can be due to an acquired habit or as one of many oppositional symptoms as part of ODD (Kuhn et al., 2008).

COMORBIDITY

Enuresis

Overall, psychological disorders are 2 to 5 times more frequent in children with elimination disorders. In summary, 20%-30% of children with enuresis, 20%-40% of those with urinary incontinence, and 30-50% with encopresis have clinically relevant comorbid disorders (von Gontard et al, 2011b). Comorbidity rates are highest in children with secondary enuresis – up to 40% in population-based and 75% in clinic-based studies (Feehan et al, 1990; von Gontard et al, 1999). Children with non-monosymptomatic enuresis have more comorbid disorders than those with monosymptomatic enuresis (Butler et al, 2006).

ADHD is he most common comorbid disorder in enuresis. In a population study of 1379 children aged 6 years, 9.4% had clinically relevant ADHD symptoms compared to 3.4% of non-wetting children (von Gontard et al, 2011c). The rate of ADHD in enuretic children presented to a paediatric hospital was 28.3%, compared to 10.3% in a non-selected sample (Baeyens et al, 2006). Enuresis persisted longer in children with ADHD – 2 years later, 65% were still enuretic compared to 37% of controls (Baeyens et al, 2005). Enuresis in combination with ADHD is more difficult to treat due to non-compliance. With alarm treatment, 43% of those with comorbid ADHD were dry (versus 69% of those with enuresis alone) at 6 months and only 19% (versus 66%) at 12 months. The rate of non-compliance was 38% if both enuresis and ADHD co-existed (Crimmins et al, 2003).

Externalising disorders predominate but internalising conditions can also occur. In a British population-based study of 8242 children at the age of 7½ years, those with enuresis also suffered from separation anxiety (8.0%), social anxiety (70%), specific phobia (14.1%), generalised anxiety (10.5%), depression (14.2%), ODD (8.8%), conduct disorders (8.5%) and ADHD (17.6%) (Joinson et al, 2007).

Children with enuresis are not only afflicted with more comorbid disorders, they are also more distressed and show more subclinical symptoms, which often improve upon attaining dryness. Self-esteem can be affected and can improve under treatment – irrespective of treatment success (Longstaffe et al, 2000). Also, quality of life can be reduced by the enuresis (Bachmann et al, 2009). Both children and parents can be distressed by the enuresis.

Daytime urinary incontinence

Comorbidity rates among children with daytime urinary incontinence (30%-40%) are slightly higher than in children with enuresis (20%-40%) (von Gontard et al, 2011b). In a population-based study of 8242 children aged 7 ½ years, externalising disorders were prominent with significantly increased rates of ADHD (24.8%), ODD (10.9%) and conduct disorders (11.8%) (Joinson et al, 2006). In another population study, 36.7% of children with urinary incontinence had ADHD symptoms, in comparison to 3.4% of dry children (von Gontard

et al, 2011c). Adherence to treatment is lower in cases of urinary incontinence and ADHD: only 68% became dry, compared to 91% of controls with urinary incontinence without ADHD (Crimmins et al, 2003).

Children with urge incontinence have lower rates of comorbid disorders than those with voiding postponement (36% vs. 59%) but higher than controls (9%) (Kuhn et al, 2009). Children with urge incontinence predominantly have internalising disorders while the most typical disorder in voiding postponement is ODD (Kuhn et al, 2009). It would appear that comorbid disorders are a consequence of wetting in urge incontinence while ODD seems to be the underlying problem in voiding postponement. Much less is known about comorbidity in the other types of incontinence.

DIAGNOSIS

Assessment and a careful diagnosis are the bases for successful treatment – each subtype of enuresis and urinary incontinence responds best to its specific treatment. Assessment also means building a relationship with the child and parents that will become the foundation for the entire course of therapy. It is therefore advisable to take plenty of time for the first consultation with child and parents. More details on the diagnosis and treatment of all elimination disorders can be found in von Gontard and Neveus (2006), which is still the most comprehensive textbook on the topic, with both background information and practical procedures.

Assessment in enuresis and urinary incontinence

- History
- 48-hour frequency/ volume chart
- Questionnaires
- Paediatric physical examination
- Urinalysis
- Child psychiatric screening or assessment
- Sonography (if available).

Only if indicated

- Urine bacteriology
- Uroflowmetry and pelvic-floor EMG
- Other diagnostic procedures: radiological examinations, invasive urodynamics, cystoscopy, etc.

Most of the diagnostic process is based on simple, good clinical practice that can be delivered in most primary care settings. The most important step is a good and thorough history. The history will lead the clinician towards possible diagnoses which need to be followed up and enable the exclusion of many other conditions. An example of a detailed history with pertinent questions can be found in Appendix C.4.1.

Frequency-volume chart

The second most important step is a 48-hour frequency-volume chart. Parents are asked to observe, record and measure over 48 hours when and how much their child voids and drinks, as well as associated symptoms such as incontinence, holding manoeuvres, etc. Parents can be given a simple plastic measuring cup (which they will return at the next visit and that can be used many more times). This chart gives essential information for the diagnosis. In urge incontinence, for example, a micturition frequency of over 7 and small volumes (of 20-60ml) are typical; in voiding postponement, some children void only 2 or 3 times a day with large volumes of 400ml or more. Also, drinking habits can be assessed: most children with elimination disorders do not drink enough fluids (some only 400-600ml), while polydipsia is extremely rare. Most parents are not aware of their child's voiding and drinking habits and will not be able to provide this information when asked. An example of a chart is presented in Appendix C.4.2.

Questionnaires

Specific enuresis questionnaires are helpful to confirm and augment the information children and parents provide (see Appendix C.4.3). The 48-hour volume/frequency chart, however, is far more important than a questionnaire.

Physical examination

Each child should be examined physically at least once at the beginning of treatment. It is essential that organic causes of incontinence are ruled out. A full paediatric and neuorological exam is recommended. Children with daytime incontinence may require several examinations in the course of treatment, especially if UTI's and other complications occur. For most children with enuresis, especially with monosymptomatic enuresis, one exam will suffice.

Investigations

At least one urinalysis (with a urine stick) is recommended to be sure that no signs of bacteriuria and manifest UTI are present. This is especially important in daytime urinary incontinence; it is usually negative in children with monosymptomatic enuresis.

If available, sonography is a very useful, non-invasive tool. In addition to the detecting structural anomalies of the urinary tract, sonography can give valuable information regarding three functional changes:

- A thickened bladder wall (> 2.5mm) can be indicative of a hypertrophy of the bladder wall as a sign of bladder dysfunction or it can be due to UTI's
- Residual urine (>20ml) can be indicative of incomplete bladder emptying; and finally,
- An enlarged rectal diameter of more than 25mm can be a sign of stool retention and constipation.

Click on the picture to hear two mothers share their experience of bedwetting

However, even in Europe, sonography is not easily available in many countries and thus not routinely performed in children with enuresis and urinary incontinence. In complicated cases with recurrent UTI's it is definitely indicated.

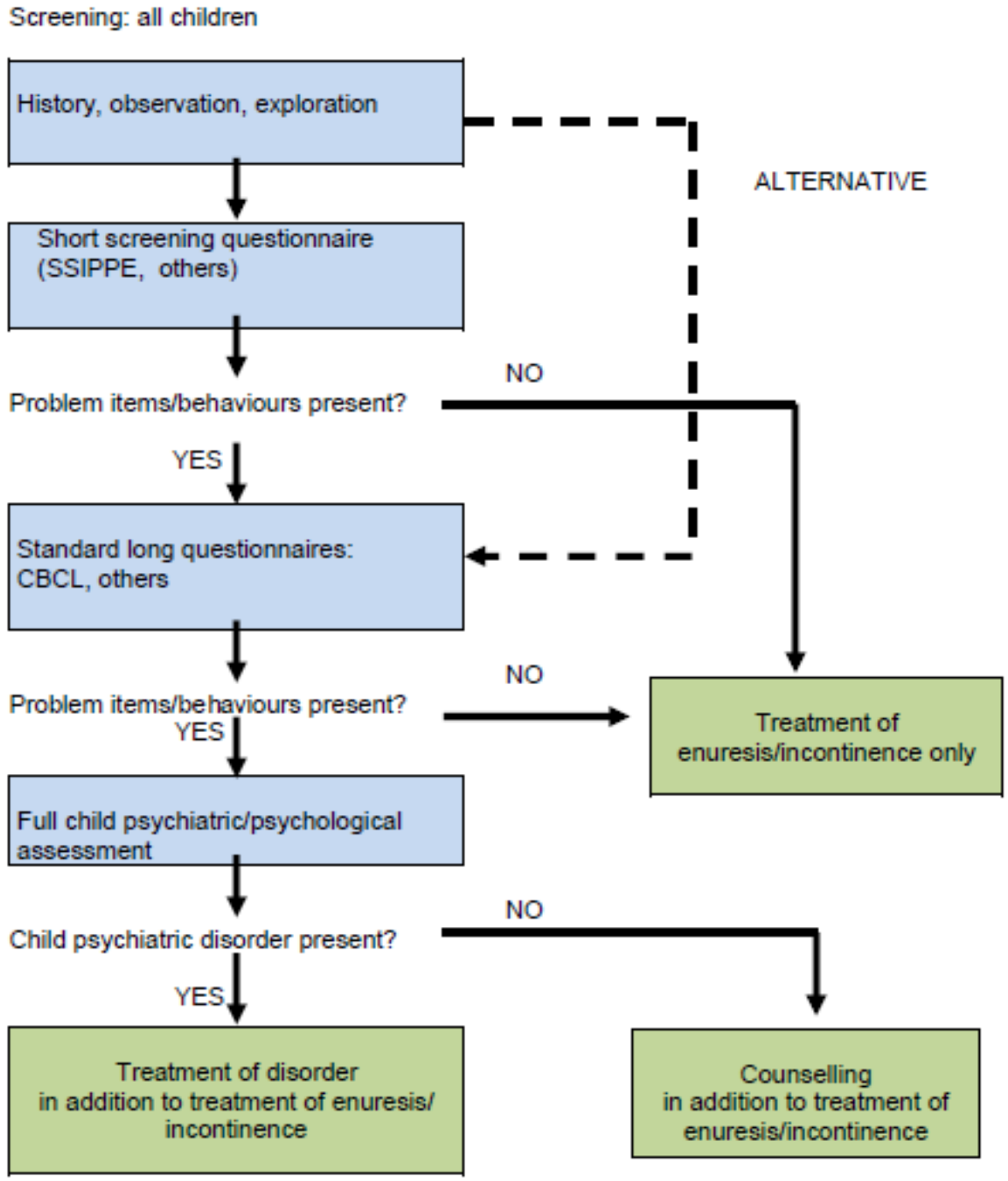
All other procedures are not routinely indicated. Uroflowmetry alone or combined with pelvic floor EMG is required for the diagnosis of dysfunctional voiding (Chase et al, 2011). So-called staccato (changes in flow rates) or fractioned (complete interruption of flow) are typical, combined with contractions of the pelvic floor. If not available, good clinical practice would be to listen and observe a child during the emptying of the bladder: one can hear and observe the straining as well as the waxing and waning of the urine stream.

All other, especially invasive, procedures should not be performed in children with enuresis or functional urinary incontinence unless they are absolutely indicated medically. Radiological and further urological investigations should be avoided as they are in most cases not necessary and can harm the child.

Psychiatric assessment

In a child psychiatric setting, a routine assessment regarding comorbid emotional and behavioural disorders is recommended. In all other settings (paediatric, urologic etc.) at least a screening with a validated and standardised parental questionnaire is recommended because of the high frequency of comorbid disorders (von Gontard et al, 2011b). This can be done in one or two stages, either by using a short screening questionnaire, such as the SSIPPE (Van Hoecke et al, 2007), first and a long questionnaire next, or by using a long questionnaire such as the CBCL (Achenbach, 1991). If many problem items are endorsed, a full assessment by a child psychologist or psychiatrist should follow. If comorbid disorders are present, they should be treated (see Figure C.4.1).

Figure C.4.1 Flow chart for assessment of psychological symptoms (subclinical) or disorders (clinical): specific treatment for enuresis/incontinence is the same for all children; those with symptoms require counselling, those with disorders need treatment (from von Gontard et al, 2011b)



Differential diagnosis

Somatic causes of urinary incontinence must be excluded. These include structural anomalies (such as epispadias, hypospadias, urethral valves, and other malformations of the urinary tract), neurologic conditions (such as spina bifida occulta, tethered-cord-syndrome, etc.) and other paediatric diseases (such as diabetes insipidus, diabetes mellitus). Comorbid emotional and behavioural disorders should be assessed in addition to the type of elimination disorder.

TREATMENT

Again, treatment of enuresis and urinary incontinence is based on simple, effective steps that can be delivered in many primary care settings. However, it is time-consuming as most interventions require cooperation of the child and parents. More detailed information is provided in von Gontard and Neveus (2006).

Enuresis

Several meta-analyses have shown conclusively that, overall, non-pharmacological interventions are more effective than medication, which also has its place if indicated (Houts et al, 1994; Lister-Sharp et al, 1997). The classic meta-analysis of Houts et al (1994) shows this quite clearly (Figure C.4.2).

General principles

Certain general principles should be followed for treatment:

- A child should be at least 5 years of age (the age required to diagnose enuresis and urinary incontinence), younger children do not require treatment
- Treatment should always be symptom-orientated, aimed at achieving continence (i.e., complete dryness). Primary psychotherapy for enuresis is not effective and not indicated. Comorbid disorders should be treated separately according to evidence-based recommendations
- When there are several concurrent disorders, encopresis and constipation should be treated first because some children will stop wetting once these problems have been dealt with
- Daytime incontinence should be treated first, as many children will stop wetting at night once the daytime problems have been treated
- In non-monosymptomatic enuresis, all daytime bladder problems should be tackled first (according to the principles of urinary incontinence) before starting the specific treatment of enuresis
- Primary and secondary enuresis are treated in the same way

The initial treatment steps are simple, non-specific aspects of "good practice":

- Counselling, support and provision of information
- Enhancing motivation and alleviating guilt feelings
- Educating about drinking and toileting habits: drinking more fluids during the day, taking time while on the toilet, sitting in a relaxed way, refraining from holding manoeuvres, etc.
- Discontinuing all ineffective measures such as punishing the child, fluid restrictions, waking and lifting, ineffective medication, other alternative medicine treatments

Recommendations to rate treatment outcome according to the Children's Continence Society (Neveus et al, 2006):

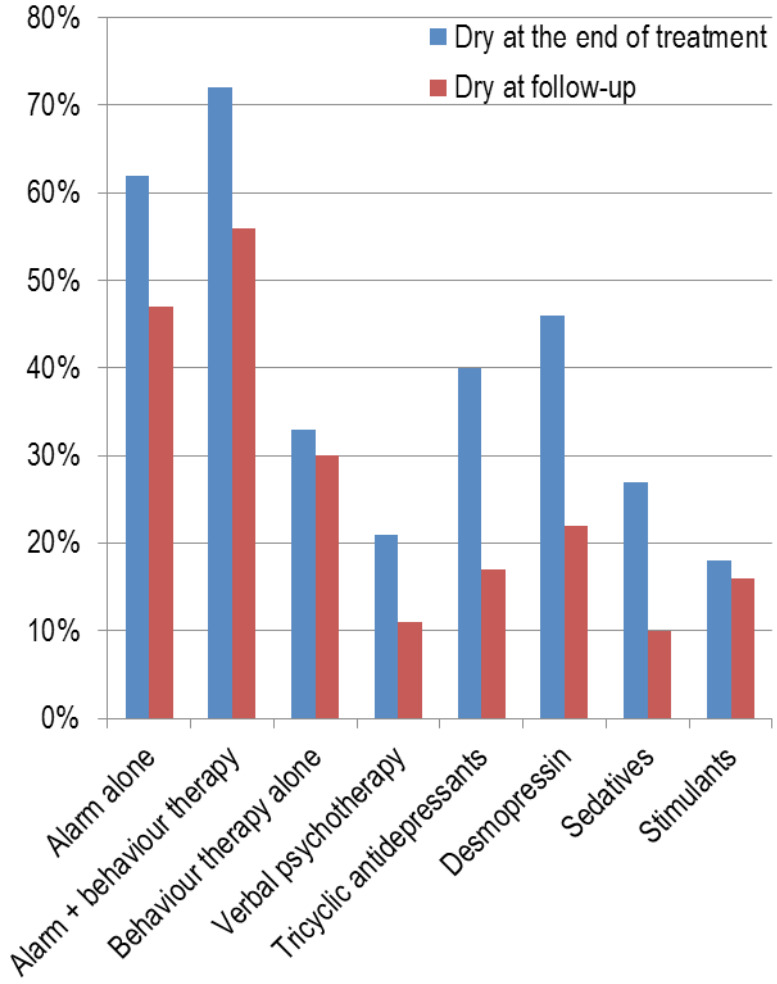
Initial outcome

- Non-response: 0 to 49% reduction
- Partial response: 50 to 89% reduction
- Response: >90% reduction
- Full response: 100% or less than 1 accident per month.

Long-term outcome

- Relapse: more than one episode per month
- Continued success: no relapse in 6 months after treatment
- Complete success: no relapse in two years after treatment

Figure C.4.2 Effectiveness of different treatment forms for nocturnal enuresis (% dry at the end of treatment and at follow-up) (Houts et al, 1994).



- A baseline period is then recommended with a simple observation and recording of wet and dry nights over a period of 4 weeks. Children are asked to draw a symbol for wet and dry nights (clouds and suns, stars, etc.) in a chart and bring it to the next consultation. An example of chart is depicted in Appendix C.4.4.

These simple measures will achieve dryness in 15-20% of cases without further intervention and are supported by evidence (Cochrane review of Glazener and Evans, 2004). If these simple interventions do not suffice, specific treatment is required.

Two main interventions are available: alarm treatment and pharmacotherapy. As alarm treatment is more effective and has the best long-term results, this should be the first line treatment if child and parent are motivated. As shown in Figure C.4.2, 62% of children are dry at the end of treatment and 47% at follow-up. Houts et al (1994) conclude that "urine alarm treatments should not only be considered the treatment of choice, but the evidence from this review suggests that cure rather than management is a realistic goal for the majority of children

suffering from nocturnal enuresis." A Cochrane review of 22 RCT's involving 1125 children concluded: "Alarm interventions are an effective treatment for nocturnal enuresis. Desmopressin and tricyclics appeared as effective while on treatment, but this effect was not sustained after treatment stopped and alarms may be more effective in the long run" (Glazener et al, 2005).

If alarm treatment cannot be implemented adequately, medication (desmopressin) is the second line treatment. If either method fails, a switch to the other treatment is recommended (Neveus et al, 2010) and was shown to be effective (Kwak et al, 2010).

Alarm treatment

An alarm consists of a pad or a metal sensor, which is connected to a bell by a wire. Once the sensor becomes wet, an electric circuit is closed and the alarm is set off. Alarms are very simple devices; they can be cleaned and used by different children many times over. Sterilisation is not required, as urine is per se a sterile fluid (unless UTI's are present), cleaning with a surface disinfectant is enough.

Two different types of alarms exist, body worn and bedside. In body worn alarms, the bell is attached to the night dress while the sensor is attached to the underpants. If desired, body worn alarms can be used with diapers. In bedside alarms, a metal foil or a cloth pad (with integrated wires) is placed under the top sheet of the bed and connected to an alarm next to the bed. Both alarms are equally effective. Therefore, children should decide which alarm they prefer.

The alarm should not just be prescribed but its functions demonstrated and shown directly during the consultation. Children should feel responsible for their treatment. Some instructions are extremely important and should be gone through in detail with parents and child:

1. Children are asked to go to the toilet before going to bed
2. The alarm is attached and switched on
3. In case of a dry night, nothing happens and the child can turn off the alarm the next morning. In case of wetting, the alarm is triggered and the child should wake up completely, either by themselves or with parental help
4. The child is asked to go to the toilet and urinate
5. The night dress and the bedding are changed and the alarm is reset.
6. The child should be actively involved in this process. If the child wets a second time during the night, the whole routine is repeated.
7. Parents are asked to record all relevant data in a chart (see Appendix C.4.5).

To be successful, the alarm must be used every night for a maximum of 16 weeks. Some children become dry in only a few weeks, most will require 8 to 10 weeks and some a little longer. After 14 consecutive dry nights, use of the alarm is discontinued and the child is considered to be dry. Parents are advised to restart alarm treatment if a relapse (two wet nights per week) happens, this occurs in up to 30% of cases.

The alarm treatment relies on operant conditioning and should be enhanced with other measures including positive reinforcement with praise and other rewards, as well as aversive consequences such as getting up, going to the

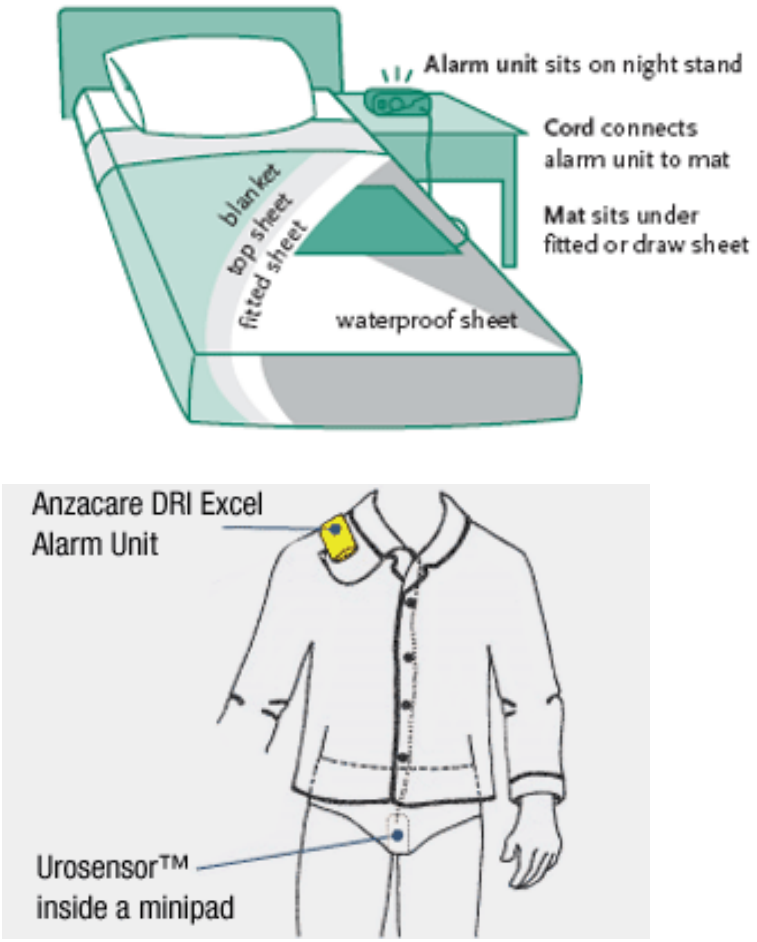


Figure C4.3 Two models of bed-wetting alarms

toilet and remaking the bed (Butler, 1994). Dryness can be achieved by two basic mechanisms: either children learn to wake up and go to the toilet (one third) or they sleep through the night without wetting (two thirds).

Usually, simple alarm treatment is sufficient. It can, however, be reinforced by additional means. A simple addition to the alarm is the so called "arousal training" by van Londen et al (1993). In arousal training the alarm is set up before sleep, the alarm is triggered, children are instructed to turn off the alarm within three minutes, go to the toilet and reset the alarm. If this is achieved correctly children are rewarded with two tokens, such as stickers. If this is not achieved, one token has to be returned. In younger children, we found it advisable to modify this training: children receive one token if they are successful but do not have to pay back a token, which would be too frustrating for them. Arousal training has been shown to be more successful than alarm alone. A well-known training program is "dry bed training" by Azrin et al (1974). This is a complicated, difficult to perform program which starts with an intensive night (in which the child is awaken once every hour until 1 am) followed by maintenance treatment. Meta-analyses have shown that "dry bed training" is no more effective than alarm treatment alone (Lister-Sharp et al, 1977). Therefore, it is not recommended.

The combination of alarm treatment and desmopressin cannot be recommended due to conflicting results. However, if a child has urge symptoms (i.e., a non-monosymptomatic enuresis) a combination of anticholinergic

medication (for example 2.5mg to 5mg Oxybutinin or Propiverin at night) is helpful, otherwise the alarm may go off several times per night and the outcome will be less favourable.

Medication

Indications for medication are:

- Unwillingness to undertake alarm treatment
- Lack of motivation in the children
- Family overwhelmed by demands such as a work situation, cramped housing, infants to care for, i.e., cooperation with alarm treatment is not possible
- Short-term dryness is required, e.g., for school outings.

There are two groups of medication with a clear antienuretic effect: desmopressin and tricyclic antidepressants (TCAs). Although both are effective, desmopressin has less side-effects and is therefore the preferred substance.

Desmopressin (1-deamino-8-D-arginine vasopressin, abbreviated DDAVP) is a synthetic analogue of the antidiuretic hormone (ADH). A reduction of wet nights or even dryness can be achieved in 70% of cases: 30% of children are full responders, 40% partial responders, and 30% non-responders (Neveus et al, 2010). After discontinuing medication most children relapse, so that desmopressin has a low curative potential (Neveus et al, 2010). According to van Kerrebroeck (2002), only 18%-38% of children remain dry 6 months after medication is withdrawn. Compared with the alarm, desmopressin has a distinctly lower curative effect in the long run.

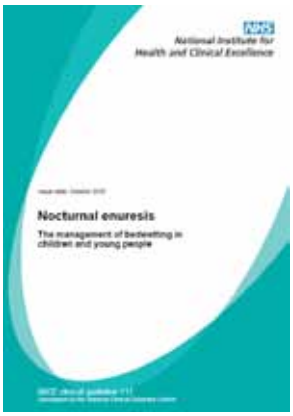
Desmopressin is taken in tablet form in the evenings only. The oral dosage is 0.2mg to 0.4mg. It is advisable to titrate the required dosis over 4 weeks, as shown in the chart in Appendix C.4.6. One starts with the low dosage of 0.2mg in the evening for two weeks. If the child is dry or a marked reduction of wet nights is documented one stays with this dosage. Otherwise, medication is increased

40 years of being treated for nocturnal enuresis

In the course of forty years I have consulted a wide range of experts in the hope of finding a solution to my nocturnal enuresis [...] Most of the GPs [family doctors] advised curtailment of drinking and methods of awakening in the night. The urologists performed various technical studies that showed no abnormalities. Alarm systems usually gave relief for a short period. Consultations with a naturopath and a homeopath yielded no benefits, and consequent disappointment resulted in new mental strain... I consulted a psychologist who, although unable to find anything abnormal in my personality, advised Pavlov's method of adaptation: immediately after waking with a wet bed, I was to take a cold shower as punishment for the “bad” behaviour. A urologist prescribed imipramine, despite its severe side effects including excessive sweating, dizziness, and a dry mouth. The psychiatrist used sandpit therapy to trace traumatic experiences in childhood: recognition and acceptance of precipitating experiences might, it was hoped, remove the cause of my enuresis. Two years of weekly sessions of 45 minutes had a major influence in my personality. Sandpit therapy, with its focus on the ego, changed me from a sociable to a self-centred individual. Again, the bedwetting was unaffected [...] Finally, after nearly four decades and many years of disappointing experiences I consulted Professor Janknegt, who suggested desmopressin (DDAVP)—an analogue of antidiuretic hormone. Used as a nasal spray once a night this brought immediate relief. Discontinuation of the spray immediately results in bedwetting. So far, there have been no side-effects […] Over the years, the intrinsic difficulties of nocturnal enuresis have been compounded by the effects of unsuccessful treatments.

De Graaf MJ. Lancet 1992, 340:957-958.

to 0.4mg in the evening. If children do not become dry with 0.4mg, they are considered to be non-responders and desmopressin is discontinued. Otherwise, one can continue with the required dosage for a maximum of 12 weeks, after which desmopressin should be stopped to check if the child can remain dry without medication. If a relapse occurs, desmopressin can be given for another 12 weeks and this regime can be continued for as long as indicated. Adverse effects are rare and not pronounced, like head and stomach aches, lack of appetite, etc. The most dramatic, though rare side effect is hyponatremia and water intoxication, which may require intensive care. Therefore it is important not to overdose and not to drink a large amount of fluids after taking the medication. Laboratory blood tests are not necessary.



Click on the picture to access the NICE guideline for the management of enuresis

Tricyclic antidepressants such as imipramine have a proven anti-enuretic effect and similar relapse rates as desmopressin. Due to cardiac arrhythmias even with therapeutic doses, a detailed family history, ECG before and during treatment and blood tests are recommended. A low dose of 10mg to 25mg in the evening (1mg per kg of body weight per day or less) is often sufficient. If higher doses are necessary, imipramine should be give 3 times a day and the medication slowly increased to a maximum of 3mg per kg of body weight per day. Due to side effects (and toxic effects in case overdosage), imipramine has become a third line treatment for severe therapy-resistant cases.

Urinary incontinence

The same basic principles as in the treatment of enuresis should be followed, e.g., provision of information, counselling, supporting and motivating both child and parent is essential.

The main focus in the treatment of *urge incontinence* is a symptom-oriented cognitive-behavioural approach aimed at a conscious control of the urge without the use of the pelvic floor muscles, i.e., holding manoeuvres (Vijverberg et al, 1997). Children are instructed to note when they feel an urge and go to the toilet right away without using holding manoeuvres. They are asked to document in a chart if their pants were dry (with the symbol of a flag, for example) or if they were wet (with the symbol of a cloud, for example). This means, that children should be allowed to go to the toilet in any situation, especially in kindergarten and school. If adhered to, the number of voidings is typically reduced first, followed by a reduction in the number of wet episodes.

This simple approach is sufficient for 1/3 of children; the other 2/3 will require additional medication. Monitoring – observing and documenting (i.e., the cognitive-behavioural component) – should continue throughout the therapy. Anticholinergic medication is indicated. Oxybutine is a well-known preparation available as generic drug in most countries. It should be introduced slowly to avoid side-effects up to an initial dosage of 0.3mg per kg of body weight per day in 3 doses (maximum daily dosage: 15mg). If not effective, it can be increased to 0.6mg per kg of body weight per day (maximum 15mg/day). Side-effects are dose-dependent and reversible. They include typical anticholinergic effects such as flushing, blurred vision, tachycardia, hyperactivity, dryness of the mouth, residual urine and constipation.

An alternative is propiverin, which unfortunately is not available in many countries. The dosage is a maximum of 0.8mg of body weight per day in two doses (with a total maximum of 15mg/day). Side effects are similar but possibly at a lower rate. If one of these two standard medications is not effective or is accompanied by too many side effects, a switch-over to the other medication is recommended. Other anticholinergic medications such as tolterodine, solifenacine and others are used in adults but are not recommended for standard treatment in children.

A symptom-oriented approach is indicated in all cases of *voiding postponement*. The first step is provision of information and psycho-education. Often, the association of voiding postponement, retention of urine and incontinence are not known to parents and children. Children and parents are instructed to increase the frequency of micturition. The goal is to go to the toilet seven times a day at regular intervals. Children should sit on the toilet in a relaxed way and take plenty of time. Micturitions in the toilet as well as wetting episodes are noted in a chart. Often this requires parents to send their child to the toilet. To increase motivation, a simple token system with positive reinforcements can be added. In older children, digital wrist alarm watches (or cell phones) can be of help. Intervals of 1½ to 3 hours are set to remind the child to go to the toilet. However, these approaches are often not sufficient because of the high behavioural comorbidity, especially with ODD, which requires additional treatment.

Click on the picture to access the website of the International Children's Continence Society (ICCS). Families and professionals can find in the website a variety of useful information and resources.

Treatment of *dysfunctional voiding* includes increasing motivation, cognitive-behavioural elements, relaxation and general drinking and toileting advice (Chase et al, 2010). If necessary, voiding frequency and oral fluids can be increased. Toilet re-training is initiated. It is recommended that children take a lot of time, sit in a relaxed manner on the toilet seat, spread their legs apart and have contact with the floor either directly or with a little foot stool. The children are asked to relax completely, initiate micturition without straining and simply let the urine flow until they have the feeling that the bladder is empty. The most specific and effective treatment is biofeedback – either with uroflowmetry or pelvic-floor EMG (Chase et al, 2010). Signals of the urine stream or pelvic floor contractions are presented to the child in real time either visually or acoustically. Many child-friendly programmes and animations are available. EMG-feedback can be performed at home under instruction; otherwise, biofeedback is limited to specialised outpatient departments and beyond the scope of most primary care services. Coordination and continence can be achieved in a few sessions in most children. Medication is not indicated (Chase et al, 2010).

Giggle incontinence is treated with a classical conditioning paradigm (Elzinga-Plomp et al, 1995) or with high-dose methylphenidate (due to the overlap with cataplexy and narcolepsy) (Sher & Reinberg, 1996). Stress incontinence is treated by physiotherapy or imipramine. Children with underactive bladder require an intensive training and often intermittent catheterisation. All of these rare disorders do require specialised treatment (see von Gontard & Neveus, 2006).

In therapy-resistant cases, structured group therapies have been successful (Equit et al, 2012). These combine counselling, provision of information, relaxation techniques, cognitive-behavioural, play and group therapy approaches.

COURSE

Enuresis has excellent long-term outcome with a high spontaneous remission rate – 13% per year – and effective treatments are available; 60% to 80% become dry with alarm treatment and 50% remain so on the long-term (Houts et al, 1994). Still, a small group of children have chronic enuresis with 1%-2% of adolescents affected. Nocturia (waking up at night and voiding) can be a residual symptom. The prevalence of enuresis overall is 1.7% in adults, with an 8-fold risk for enuresis if they had wetted as children (Hublin et al, 1998).

Studies of the long-term outcome of daytime incontinence are lacking. Urge incontinence seems to have the best prognosis, while voiding postponement, especially combined with ODD is difficult to treat. Daytime incontinence increases in adulthood with age, especially in women, although these are not necessarily a consequence of childhood incontinence.

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It is not known when enuresis became a medical problem, but it has been recognized as a disturbance of childhood necessitating medical treatment since the time of the Papyrus Ebers' which is dated 1550 BC. Juniper berries were the recommended treatment (Glicklich, 1951).

Appendix C.4.1

CLINICAL HISTORY

OF WETTING PROBLEMS AND POSSIBLE COMORBID DISORDERS

(von Gontard, 2001; von Gontard & Neveus, 2006, with permission)

PRESENTING SYMPTOMS

General introduction: Do you know why you and your parents are here today?

Time of wetting: Is it because you wet the bed or because your pants are wet during the day?

Start with the most important symptom, i.e., night or daytime problems

NOCTURNAL WETTING

Frequency of wetting: Do you wet the bed every night or are there dry nights? How many nights per week is your bed wet (or dry)?

Amount of wetting: Is the bed damp or completely wet?

Depth of sleep: How deep does your child sleep? Is it easy or difficult to wake him/her? What do you have to do to get you child awake? Does your child sometimes wake up at night to go to the toilet (nocturia)?

Dry intervals: What is the longest period of time that your child has been completely dry (days, weeks, months)? How old was your child then? Did anything happen around the time of the relapse that might have had an impact for your child to start wetting again?

Impact and distress: How is it for you when your bed is wet? Are you sad? Annoyed? Angry? Ashamed? Or do you feel it does not matter? Do you want to get dry? Are you willing to do something about it and put some effort into the therapy?

Social consequences: Have you been teased by somebody else about the wetting? Have you avoided sleeping over with friends or join in on outings with your school class because of that?

DAYTIME WETTING AND MICTURITION PROBLEMS DURING THE DAY

Frequency of wetting: Are your pants wet every day or do you also have dry days? How many days per week are your trousers wet? Does it happen that you wet during the day not once, but several times? How many times does it usually occur?

Amount of wetting: Are the pants damp or really wet? Can the wet spot be seen through the clothing?

Timing during the day: Do you usually wet during the morning, in the afternoon or on the evening?

Frequency of micturition: How often does your child go to the toilet during the day (3, 5, 10 or 20 times? (Normal range is 5 to 7 times per day).

Voiding postponement: Have you ever noticed that your child does not go to the toilet right away, but puts off the voiding for as long as possible? In which situations does this happen most often (for example: in school, coming home from school, while playing, while watching TV or during other activities)?

Holding manoeuvres: How do you notice that your child needs to go to the toilet? Does it seem to be absent-minded? What exactly does your child do to delay voiding? Have you ever noticed that he/she crosses their legs, jumps from one leg to the other, holds its tummy or genitals, squats or sits on its heels?

Urge symptoms Does it happen that your child feels a sudden and strong urge to go to the toilet (even though it goes to the toilet often)? For example, how long can you drive the car or go shopping, before your child has to go to the toilet? Do you have enough time to wait for the next rest room or do you have to stop right away to let your child void?

Dry intervals during the day: When did your child get dry during the day? Is your child still wetting during the day? What was the longest time period your child has ever been dry (days, weeks, months)? How old was your child then? Were important things happening at the time of the relapse that might have had an effect on your child to start wetting again?

Problems with micturition: Does your child have to strain at the beginning of micturition or does the urine come spontaneously? Is there one continuous stream when voiding or is the voiding interrupted? If it is interrupted, how many times? Does your child need to strain to get it going again?

Urinary tract infections: Does your child complain about pain during voiding? Does your child have to go the toilet more often than usual? How many urinary tract infections has your child had so far? When did the first infection occur? Has your child had infections with fever and pain in the kidney areas? Have the infections been treated with antibiotics? Has your child had long-term prophylaxis with antibiotics? Is taking medication at the moment? Has your child had skin infections in the genital area (dermatitis)?

Medical complications: Have there been other medical complications such as refluxes, operations, etc?

Eating and drinking habits: Please describe the eating habits of your child. Prefers biscuits, white bread other low fibre food? How much and what does your child drink each the day?

Attributions: What do you think is the cause of your child's wetting problem? Do you have any idea about how it happened? Have you ever felt guilty about it? Have you ever blamed yourself for it? Have you ever been blamed by others? Do you think your child is doing it on purpose? Who is distressed the most about the wetting: you or your child? What do you think should change? What are your expectations? Are you and your child willing to cooperate actively with treatment?

TREATMENT TRIALS

Previous therapy: What have you tried so far to get your child dry? (Ineffective forms of treatment) Fluid restriction, waking, holding, punishment, other measures? (Effective forms of treatment) Charts and calendars, rewards, alarm treatment, medication? Which medications(Minirin, Imipramine, others)? How were the treatment trials conducted, please describe for how long with what effects? Whom have you consulted for your child's wetting problem:

paediatrician, urologist, psychologist, psychiatrist, child guidance centres, etc.? Which investigations have been performed so far?

ENCOPRESIS

Soiling: Does your child sometimes soil his underwear? How many times per week does it happen? Are they large amounts or stool smearing? Does it happen only during the day or also at night? How does your child react when it soils? How old was your child when he became clean (stools in the toilet and not in the diapers)? Have there been any relapses in the past?

Toilet habits: How often does your child have bowel movements per week? Does it ever happen that it does not have bowel movements for several days in a row? Is your child constipated regularly? Is defecating painful? Has there been blood on the stools? What have you done about it so far?

THE CHILD PSYCHIATRIC HISTORY

The child psychiatric history is divided into the presenting symptom(s), personal and developmental history and the family history (see Chapter A.5). In most cases, parents and child are interviewed together – in this way differing views can be assessed easily. In some cases, it is best to interview parents alone (i.e., marital conflicts, abuse, etc.). In others, it can be useful to see and talk to the child alone, particularly older children. Some children are more open to talk about their problems when parents are not present.

PRESENTING SYMPTOMS

At the end of the wetting history, it is useful to ask an open question regarding other problem areas.

Other behavioural problems: Are there other areas in your child's behaviour that you are worried about? Please describe them in detail.

As in the history of the wetting problem, each presenting symptom should be dealt with in turn. The following points are worth considering.

Presenting symptoms: Please describe the problem in your own words in as much detailed as possible. How often does it occur? In which situations (at home, at school, with friends)? How does your child react? How do you react? When did it begin? How has it developed so far? Has it remained the same, got worse or diminished in intensity or frequency? What have you done about it so far? Has the child been seen or treated for the problem? Where, by whom and with which effect? What are your main worries? What would you like to change? How do you think this could change? What do you expect from this consultation?

It is also useful to ask a few general questions about possible problem domains that often occur in children and that might be missed by open questions. If parents answer positively, each of the problems need to be explored in detail.

OTHER PROBLEM AREAS

Externalising problems: Is your child restless, constantly fidgeting or too active? Is easily distracted? For how long can concentrate? Are there certain situations in which he finds it especially difficult to concentrate, for example at school? Does your child seem to act impulsively, without thinking? Is sometimes aggressive verbally, towards objects or people? How does your child respond to rules? Does he obey your rules? Is he oppositional? How does it react to your setting limits and saying no? Are there particular problem areas: homework, coming home too late, lying, stealing…?

Internalising problems: Is your child sad, unhappy or withdrawn? Has your child lost interest in play, seeing other children? Does she find it difficult to get an activity going? Does your child worry a lot? Are there problems with sleeping or eating? Is she afraid of certain objects, situations or animals (phobias)? Afraid of strangers, groups of children (social anxiety)? When you go away (separation anxiety)? Without apparent reason (generalised anxiety)? Has your child developed any peculiar habits, rituals or interests? Does she tend to repeat things in the same way?

PERSONAL AND DEVELOPMENTAL HISTORY

Pregnancy: Was the pregnancy planned (desired) or unexpected? What were your feelings during pregnancy? Were there medical complications? Did anything happen that you found stressful?

Birth: Was delivery at the expected date, too early, too late? Was it a spontaneous birth? Were there complications during or after birth? What was the birth weight of your child?

Infancy: Was your child breast-fed? For how long? If not, what were the reasons? Was your child a quiet, content or active baby (temperament)? Were there problems with feeding, weight gain, sleeping, excessive crying?

Motor development: When did your child start sitting, standing, walking freely?

Speech and language: When did your child say its first words (and which were they)? When did your child say its first two-word sentences? Were there any problems with articulation, the way sentences were formed (expressive language) or with understanding (receptive language)?

Kindergarten: When did your child enter kindergarten? Did he show problems staying there, i.e. about being away from you? Were there problems with other children or with teachers? If yes, please describe.

School: When did your child enter school? Which grade is he doing now? What type of school? Did he have to repeat a grade? Does he like to go to school? Please describe. What are his favourite subjects? What are the grades in the different subjects? Does your child have special problems with teachers? With other children? Please describe.

Leisure time: What does your child do during free time? What are his favourite games and type of play (role playing, construction games, activity games, computer games, etc.)? Are there planned activities? What are his interests and hobbies? Does he practice sports? Does your child have friends (how many and how close)? Does he spend his free time alone or with friends? What role does your child play in groups with other children of the same age?

Illnesses: What illnesses, operations, hospital treatment, accidents, and allergies has your child had so far?

FAMILY HISTORY

Parents:	Age, occupation (educational achievemnt), illnesses. Marital relationship? Did you wet the bed as a child? How would you describe your relationship to your child?
Siblings:	Age. Biological siblings? School-grade, illnesses and wetting problems. How do your children relate to each other? Are there especially close bonds or rivalries?
Other relatives:	Did other relatives wet the bed as children? Other illnesses, especially psychiatric or kidney?

Regarding the problems of enuresis and urinary incontinence (as well as nocturia and micturition problems such as urge) we have made it a routine to draw a complete pedigree over three generations. Often, other relatives will be missed unless one asks directly and explicitly if they have wetted in the past (or currently).

It is usually best to end the history by asking one open question, such as "is there anything else we may have missed or that you think it may be important?"

Appendix C.4.2

FREQUENCY/ VOLUME CHART

(von Gontard & Neveus, 2006, with permission)

Instructions:

Dear parents,

To assess and treat the wetting problem of your child in the best possible way, we would be very thankful for your help and your observations.

Please fill out this chart on a day without school or kindergarten (weekend or holiday). You must note every time that your child goes to the toilet or wets him or herself. This should start on one morning and continue through to the next morning (24 hours). If possible, **please fill out two charts on two consecutive days**, this is even more useful.

Please talk to your child about it beforehand. You should not send your child to the toilet. Instead, he/she should tell you when he/she wants to go to the toilet and should urinate into a measuring cup. Please measure the amount of urine, record it and the time of day in the chart. You can discard the urine afterwards.

If your child needs to strain to start urinating of if the stream of urine is interrupted (e.g., stops and starts) please note this in the appropriate column in the chart (3rd from the left).

If your child wets his/her clothes, again please note the time and if they were wet (large amount of urine) or just damp (small amount).

If your child feels a sudden urge to go to the toilet, please note this with the time in the next column.

If you observe that your child crosses his/her legs, squats or tries to hold back the urine in any other way, please note this (with the time) in the column headed "Urge".

Finally, please measure and note the amount of ALL fluids your child drinks during the day (with times).

Thank you very much for your help!

48-HOUR-FREQUENCY/VOLUME CHART

Name_____ Date of birth_____

Date_____

Time of day	Urine volume (ml)	Straining/ interrupted stream	Wetting: damp/wet?	Urge	Comments/ observations	Drinking fluids (ml)

Appendix C.4.3

PARENT QUESTIONNAIRE
ENURESIS/URINARY INCONTINENCE

(Beetz, von Gontard, Lettgen, 1994; translated and adapted by von Gontard, 2003)

Name:_____ Date of birth:_____

Date:_____

DAYTIME WETTING	**YES**	**NO**
Does your child wet his/her clothes during the day?	[ ]	[ ]
Has your child ever been dry during the day?	[ ]	[ ]

If yes, for how long? _____ (weeks/months/ years)

And at which age? _____ (years)

On how many days a week does your child wet during daytime? _____(days per week)

How many times a day does your child wet?_____(times per day)

Is the clothing usually damp?	[ ]	[ ]
Is the clothing usually wet?	[ ]	[ ]
Does urine dribble constantly?	]	[ ]
Does your child wet his/her clothes immediately after having gone to the toilet?	[ ]	[ ]
Does your child notice when he/she wets?	[ ]	[ ]

NIGHTTIME WETTING	**YES**	**NO**
Does your child wet the bed (or diapers) during the night?	[ ]	[ ]
Has your child ever been dry during the night?	[ ]	[ ]

If yes, for how long? _____ (weeks/months/ years)

And at which age? _____ (years)

On how many nights a week does your child wet? _____(nights per week)

Is the bed usually damp?	[ ]	[ ]
Is the bed usually wet?	[ ]	[ ]
Does your child wake up to go to the toilet?	[ ]	[ ]
Does your child wake up after wetting the bed?	[ ]	[ ]
Is your child a deep sleeper, i.e. difficult to wake up?	[ ]	[ ]
Has any other member of your family wetted (day or night)?	[ ]	[ ]

If yes, who? _____

TOILET HABITS	**YES**	**NO**
How many times a day does your child void(on average)?_____(times/day)		
How long can your child manage without going		
to the toilet (during shopping, car trips, etc.)? _____(hours)		
Does your child go to the toilet him/herself if he/she needs to?	[ ]	[ ]
Do you have to send your child to the toilet?	[ ]	[ ]
If your child wants to pee, does he/she have to strain at the beginning or during voiding?	[ ]	[ ]
When your child voids, is the stream interrupted?	[ ]	[ ]
Does your child hurry and not take enough time for voiding?	[ ]	[ ]

OBSERVABLE REACTIONS	**YES**	**NO**
Does your child feel a sudden urge to go to the toilet?	[ ]	[ ]
When your child needs to void, does he/she have to rush to	[ ]	[ ]
the toilet immediately?	[ ]	[ ]
Does your child cross his/her legs, squat, sit on a heel, etc. to prevent wetting?	[ ]	[ ]
Does your child postpone going to the toilet as long as possible?	[ ]	[ ]
If, yes, in which situations (school, play, TV, etc.), please specify _____		

URINARY TRACT INFECTIONS	**YES**	**NO**
Has your child ever had a urinary tract infection?	[ ]	[ ]
If yes, how many _____(times)		
Has your child had urinary tract infections with fever?	[ ]	[ ]
Has your child been treated for an illness of the urinary tract?	[ ]	[ ]
If yes, please specify _____		

STOOL HABITS	**YES**	**NO**
Does your child have daily bowel movements?	[ ]	[ ]
If not, how many times/ week?_____(times/week)		
Is your child regularly constipated?	[ ]	[ ]
Does your child soil his/her underwear (during the day)?	[ ]	[ ]
Does your child soil during sleep?	[ ]	[ ]
If yes, small amounts (smear)	[ ]	[ ]
Or large amounts (stool)	[ ]	[ ]
How often does your child soil?_____(times/week)_____(times/month)		
Has your child previously had complete bowel control?	[ ]	[ ]
If yes, at what age _____(years)		

And for how long _____(months/years)

Does soiling occur in special situations?	[ ]	[ ]

If yes, please specify_____

BEHAVIOUR: WETTING	**YES**	**NO**
Is your child distressed by the wetting?	[ ]	[ ]
Are you distressed because of your child's wetting?	[ ]	[ ]
Has your child been teased because of the wetting?	[ ]	[ ]
Are there things your child did not do (school outings, sleeping over with friends) because of the wetting?	[ ]	[ ]
Does your child wet more often in stressful times?	[ ]	[ ]
Is your child cooperative and motivated for treatment?	[ ]	[ ]
If your child had been dry before, do you see any event that might be associated with the relapse?	[ ]	[ ]

If yes, please specify _____

What in your opinion is the reason for the wetting?

Please specify_____

BEHAVIOUR: GENERNAL	**YES**	**NO**
Does your child have difficulties obeying rules?	[ ]	[ ]
Is your child restless, on the go, easily distracted?	[ ]	[ ]
Does your child have difficulty concentrating?	[ ]	[ ]
Is your child sometimes anxious?	[ ]	[ ]
Is your child sometimes sad, unhappy, withdrawn?	[ ]	[ ]
Does your child have problems in school?	[ ]	[ ]

If yes, please specify _____

Does your child have problems in other areas?	[ ]	[ ]

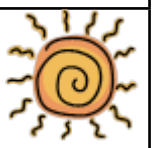
If yes, please specify_____

Appendix C.4.4

EXAMPLE OF NOCTURNAL ENURESIS BASELINE CHART

(Dry night recorded as 'sun', wet one as 'cloud'– or any other symbol chosen by the child)

This chart belongs to:_____

WEEK	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1.							
2.							
3.							
4.							

Appendix C.4.5

EXAMPLE OF A CHART TO MONITOR ALARM TREATMENT

(modified from Butler 1988)

IF DRY			IF WET					
Date	Dry	Got up and went to toilet without alarm	Time of alarm	Child awoke by him/herself		Amount of urine in bed (diaper) L=large M=medium S=small	Passed urine in toilet	
				Yes	No		Yes	No
Monday 10th	✓	✓						
Tuesday 11th			11.30	yes		M		✓
Wed 12th								

Appendix C.4.6

TITRATION CHART FOR ORAL DESMOPRESSIN

(von Gontard & Neveus, 2006)

1st and 2nd weeks: Desmopressin tablets: 0.2 mg (200µg) in the evening (one tablet)

Date	Dry	Amount of urine		Remarks
		Reduced	Same as before	
Monday 16	No	Yes		Did not want to go to school
Tuesday 17	Yes			Very happy

3rd and 4th weeks: Desmopressin tablets: 0.4mg (400µg) in the evening (two tablets)*
*If dry or marked reduction of wet nights → continue with this dose (0.2mg: one tablet)
*If not effective (no reduction of wet nights) → increase to 0.4mg (two tablets).

Date	Dry	Amount of urine		Remarks
		Reduced	Same as before	

*If dry or marked reduction of wet nights → continue with this dosis (0.4mg: two tablets)
*If not effective → discontinue (desmopressin non-responder)