



PRIMARY NOCTURNAL ENURESIS IN CHILDREN: ISSUES, SYMPTOMS AND MANAGEMENT

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Abstract

Enuresis is the persistent inability to control urination that is not consistent with one's development age. Also known as urinary incontinence, the condition is common in children, with anywhere from 2-10% of children affected. Nocturnal enuresis is more commonly known as bedwetting. Primary nocturnal enuresis is the recurrent involuntary passage of urine during sleep by a child aged 5 years or older, who has never achieved consistent nighttime dryness. 2.6% of children aged 7½ years wet their bed on two or more nights a week. Children with more frequent wet nights are more likely to have a persistent problem and benefit from early identification and investigation. The main symptom of enuresis remains the inappropriate elimination of urine, involuntarily or intentionally. Enuresis may be co-morbid with mood and emotional disorders. It has a high level of co-morbidity with attention deficit hyperactivity disorder. Anxiety, expression and insomnia are experienced by persons who have elimination disorders related to distress and social stigma. More girls experience daytime enuresis while more boys experience night-time enuresis, or bedwetting. Low self-esteem is common in children suffering from enuresis. Since uncontrolled elimination is associated with babies, children feel ashamed when they experience an incontinence event because they cannot control their bladder. The most common therapeutic approaches to enuresis are conditioning therapy with a moisture alarm and pharmacotherapy, which involves taking desmopressin. Alarm therapy, behaviour therapy, bladder training exercises, long term monitoring, motivational therapy, responsibility training, positive reinforcement systems, medication as well as various alternative therapies like Chinese acupuncture, diet therapy, hypnotherapy and psychotherapy would definitely help children to overcome the problem of nocturnal enuresis.

Key Words: *Enuresis, Children, Self-Esteem, Desmopressin, Alarm Therapy, Reinforcement.*

Introduction

Enuresis is the persistent inability to control urination that is not consistent with one's development age. Also known as urinary incontinence/bed wetting, the condition is common in children, with anywhere from 2-10% of children affected. Nocturnal enuresis is more commonly known as bedwetting. Primary nocturnal enuresis is the recurrent involuntary passage of urine during sleep by a child aged 5 years or older, who has never achieved consistent nighttime dryness. This may further be subdivided into children who have enuresis only at night and those who also have daytime symptoms (urgency, frequency, or daytime wetting). Enuresis is considered primary when bladder control has never been attained and secondary when incontinence reoccurs after at least six months of continence. Primary nocturnal enuresis (PNE) is the most common form of bedwetting. Bedwetting counts as a disorder once a child is old enough to stay dry, but continues either to average at least two wet nights a week with no long periods of dryness or to not sleep dry without being taken to the toilet by another person (APA, 2013).

The DSM-5 has widened the scope of the criteria for enuresis. In the past, four criteria for enuresis were universally applied, but currently, the DSM-5 recognizes different subtypes of enuresis and their different clinical symptoms. The three main types of enuresis are *nocturnal* (night-time) only, *diurnal* (daytime) only, and *nocturnal and diurnal*. Nocturnal enuresis is more common in boys. Elimination often takes place in the first one third of the night, which could be caused by behaviour (inadequate elimination before bedtime), high levels of stress or anxiety, or an underlying physical issue (the bladder does not completely fill). Diurnal enuresis is more likely to happen in the afternoon when a child is at school or with playmates, and thus can be a source of embarrassment and teasing from peers. With nocturnal and diurnal enuresis, occurrences happen any time, whether day or night.

Some studies report that boys wet the bed more frequently than do girls, but this finding has been disputed by other reports (Howe & Walker, 1992). One study notes that 80 percent of children with enuresis wet the bed only at night, and approximately 20 percent also have some daytime wetting (Friman & Warzak, 1990).

Epidemiology

- At age 4½, 30% of children still wet the bed, 21% infrequently (less than two times per week) and 8% of these more frequently (Butler & Heron, 2008; NICE Clinical Guideline, 2010).
- 2.6% of children aged 7½ years wet their bed on two or more nights a week (Caldwell, Deshpande, & Von Gontard, 2013).



- Children with more frequent wet nights are more likely to have a persistent problem and benefit from early identification and investigation.
- The prevalence of nocturnal enuresis is 0.5-2% for adults (Caldwell, Deshpande, & Von Gontard, 2013).

Symptoms of Enuresis

Under DSM-5, the main symptom of enuresis remains the inappropriate elimination of urine, involuntarily or intentionally. Enuresis may be co-morbid with mood and emotional disorders. It has a high level of co-morbidity with attention deficit hyperactivity disorder (ADHD). Anxiety, expression and insomnia are experienced by persons who have elimination disorders related to distress and social stigma.

The DSM-5 criteria for enuresis are as follows (APA, 2013):

- Repeated voiding of urine into bed or clothes (whether involuntary or intentional).
- Behaviour must be clinically significant as manifested by either a frequency of twice a week for at least 3 consecutive months or the presence of clinically significant distress or impairment in social, academic (occupational), or other important areas of functioning.
- Chronological age is at least 5 years of age (or equivalent developmental level).
- The behaviour is not due exclusively to the direct physiological effect of a substance (such as a diuretic, antipsychotic or SSRI) or to incontinence uncured as a result of polyuria or during loss of consciousness.
- All of the DSM-5 criteria must be met in order to diagnose an individual.
- These symptoms must not be due to a general medical condition.

Specific types: nocturnal (night-time) only, diurnal (daytime) only, nocturnal and diurnal.

Risk Factors of Enuresis

Under the age of five, inappropriate elimination of urine or faeces is common as children are potty trained and learn to control voiding behaviour. Urinary incontinence is considered enuresis by the DSM-5 when a child is five years of age or older. The incident rate of nocturnal enuresis declines by age as the child moves into adolescence, decreasing from 20% in five-year-olds to 2% in adulthood (Ju et al., 2013). More girls experience daytime enuresis while more boys experience night-time enuresis, or bedwetting. In adolescence twice as many boys than girls experience enuresis. Daytime enuresis often takes place towards the end of the school day in children, most likely because they are too preoccupied by school or play to take a urine break.

Low self-esteem is common in children suffering from enuresis. Since uncontrolled elimination is associated with babies, children feel ashamed when they experience an incontinence event because they cannot control their bladder. The condition affects interpersonal relationships. Parents' quality of life is also affected. Mothers experience higher levels of anxiety and depression and worry that their children may suffer from slower development (Ju et al., 2013). In children, measures of depression, sleep quality, academic performance and health have been shown to decline with age, resulting in a decreasing quality of life (Üçer & Gümüş, 2013).

The causes of enuresis are multifaceted. Enuresis has been linked to anxiety, slow development, and medical conditions. Underlying physical problems include the increase of urine volume through vasopressin release during sleep, bladder abnormalities such as small functional size or hyperactivity, and inability to fill the bladder during sleep due to inadequate arousal (Patel et al., 2012). Patel et al. also find that a number of factors implicate an emotional component in enuresis. Enuresis can be triggered by separation from a parent, the birth of a sibling or family conflict. The higher incidence of enuresis in orphanages could be explained by emotional factors or less toilet training. The high co-morbidity of enuresis with ADHD is consistent with a higher incidence of development delays in children with enuresis.

Enuresis may result from a variety of organic conditions, such as disturbed cerebral control of the bladder (Goin, 1998), neurological dysfunction, other medical factors such as medication side effects (Took & Buck, 1996), or having a small functional bladder capacity and a weak urethral sphincter (Dahl, 1992). One group of researchers reported that 11 percent of their enuretic patients had disorders of the urinary tract (Watanabe et al., 1994). However, most investigators have pointed to a number of other possible causal factors: (1) faulty learning, resulting in the failure to acquire inhibition of reflexive bladder emptying; (2) personal immaturity, associated with or stemming from emotional problems; (3) disturbed family interactions, particularly those that lead to sustained anxiety, hostility, or both; and (4) stressful events (Haug Schnabel, 1992). For example, a child may regress to bed-wetting when a new baby enters the family and becomes the centre of attention.

Diagnosis of Enuresis

A careful history should be obtained and a thorough physical examination should be performed to look for causes of



complicated enuresis in children who present with bed-wetting. Causes of complicated enuresis include spinal cord abnormalities with associated neurogenic bladder, urinary tract infection, posterior urethral valves in boys, and ectopic ureter in girls. In addition, children who have chronic constipation or encopresis may present with bed-wetting.

Parents should be questioned about their family history and the child's medical history. Careful questioning of parents and children can be extremely helpful in determining the type of enuresis and a possible cause or contributing factors.

Parents often are not fully aware of their child's daily voiding habits. Thus, a voiding diary may need to be maintained for a week or more. The family should keep track of how many times the child voids during the day and how many nights the child wets the bed.

Management of Enuresis

Finding a cure for enuresis is a priority for both mother and child. Some daycares will reject a child or insist on parental or caregiver support for a child with enuresis or encopresis (the passage of faeces in inappropriate places). A person with voiding postponement can be treated through behavioural therapy. A person with urge incontinence experiences sudden urges to urinate, which requires a more in-depth exploration of the underlying physical and psychological causes. The most important reason for treating enuresis is to minimize the embarrassment and anxiety of the child and the frustration experienced by the parents. Most children with enuresis feel very much alone with their problem. Family members with a history of enuresis should be encouraged to share their experiences and offer moral support to the child.

Goals of Treatment: The goals of interventions for nocturnal enuresis include (Kiddoo, 2007; Schmitt, 1997):

- To stay dry on particular occasions (e.g., sleepover).
- To reduce the number of wet nights.
- To reduce the impact of enuresis on the child and family.
- To avoid recurrence.

Conditioning Therapy: The most common therapeutic approaches to enuresis are conditioning therapy with a *moisture alarm and pharmacotherapy*, which involves taking desmopressin. An enuresis alarm has a moisture sensor to alert the child of the start of urination. Desmopressin is a synthetic (man-made) version of the hormone that regulates the production of urine, called vasopressin. It helps to reduce the amount of urine produced by the kidneys. Often, a combined therapy is used. Family commitment to supporting these therapies is critical to their success. A survey of studies on the two therapies showed a larger relapse rate for desmopressin. However, in some studies alarm therapy had a higher dropout rate, which likely reflects the greater support required by parents and health care professionals (Perrin, Sayers, & While, 2013).

Alarm therapy offers the possibility of sustained improvement of enuresis and should be considered for every patient. It is reported to alleviate bedwetting by increasing nocturnal bladder capacity or by enhanced arousal; it does not reduce nocturnal urine output. The alarm should be attached at bedtime to the underwear or pajamas in a position chosen to permit prompt sensing of wetness. Although most children with enuresis do not awaken to the alarm, they often stop emptying the bladder. When the alarm sounds, a parent must help the child wake to full consciousness and attend to the bathroom to finish voiding. After the sheets and underwear or pajamas are changed, the child should be returned to bed and the alarm reset.

Behavioural Therapy: Increasingly, behavioural therapy (BT) and positive reinforcement is being applied. In a Korean study about a third more parents preferred pharmacotherapy over behavioural therapy. The attitudes of the parents can affect the treatment outcomes. A Swedish study determined that successful BT required supportive parents and a motivated child, and about 6 months of therapy (Üçer & Gümüş, 2013).

Another method of behavioral conditioning involves waking the child two to three hours after he or she has gone to sleep, eliciting a conditioned response of waking when the bladder is full. It may be possible to condition older children to wake to void by using an alarm clock (or mobile phone alarm). The success rate of this technique is unknown. Most parents who use this technique report having difficulties in gaining their child's cooperation with this program.

Bladder-Training Exercises: It is possible that functional bladder capacity may be reduced in children with enuresis, causing premature bladder emptying during the night (Starfield & Mellits, 1968). Urodynamic studies have not demonstrated a reduced functional bladder capacity in children with enuresis (Whiteside & Arnold, 1975). However, in some children with a small bladder capacity, the use of bladder-retention training during the day may help increase bladder capacity at night. This training is accomplished by having the child hold his or her urine for increasing periods of time. In one study of children undergoing six months of bladder-retention training, 66 percent of children reported some improvement, and 19 percent



experienced complete resolution of symptoms. Bladder capacity increased significantly in patients who responded to this therapy. However, this is the only study to document such improvements, and results from this study must be validated by more data (Starfield & Mellits, 1968).

Long-Term Monitoring: Children should be assessed several months after the initial appointment to monitor progress and to fine-tune the treatment recommendations. Children who do not show any improvement, notwithstanding the best efforts of the child and family, should be referred to a pediatric urology or nephrology program for assessment and to determine whether further investigations are required and whether other treatment options should be implemented.

Motivational Therapy: Motivational therapy for the treatment of nocturnal enuresis involves reassuring the parents and the child, removing the guilt associated with nocturnal enuresis and providing emotional support to the child. Child's self-esteem must be preserved since nocturnal enuretic children face problems ranging from being teased by siblings, being punished by parents, and being afraid that friends will find out. The child should be instructed about taking responsibility for his or her nocturnal enuresis. In other words, children with nocturnal enuresis should be helped to understand the condition and to realize that while they did not cause the problem, they do have a role in the treatment plan. Positive reinforcement for desired behavior should be instituted. One way to carry out a program of motivational therapy is to set up a diary and chart, with a reward system for each night the child stays dry.

The cure, or resolution rate for children receiving motivational therapy has been estimated to be only 25 percent (a figure close to the 15 percent rate of spontaneous resolution), yet up to 70 percent of children with primary nocturnal enuresis show marked improvement (Marshall, Marshall, & Lyon, 1973). Long-term follow-up is necessary, however, and a relapse rate of approximately 5 percent has been reported (Rushton, 1989).

Positive Reinforcement Systems: In one positive reinforcement system, the child puts stickers on a chart or earns points for every night he or she remains dry. Once a certain number of stickers or points have been earned, the child is given a prize. Another technique uses a connect-the-dots picture. The child connects two dots for every dry night. When the picture is completed, the child receives a prize.

Responsibility Training: With this technique, the child is given age-appropriate responsibility, in a non-punitive way, for the consequences of bed-wetting. Younger children may be asked to strip wet linens from the bed, whereas older children may be expected to do the laundry.

Complementary and Alternative Therapies: It is worthwhile to review several alternative therapies that have produced impressive results in the treatment of enuresis. An Egyptian study researching the effectiveness of *Chinese acupuncture* on nocturnal enuresis reported a 92% cure and 8% failure rate following treatment and 12-month follow-up (El-Koumy, El-Sayed, & Salama, 2011). There is some evidence that *psychotherapy* is more effective than alarm, and *medicinal herbs* are more effective than desmopressin (Huang, Shu, Huang, & Cheuk, 2011).

Diet therapy also may be an option for some patients. Children with high-sugar and caffeine intake may be more prone to enuretic episodes. Foods suspected to be contributing agents for enuresis include dairy products, chocolate and citrus fruits and juices (Esperanca & Gerarrd, 1969). *Hypnotherapy* and psychotherapy are also treatment modalities that have not been widely used in children with primary nocturnal enuresis. Hypnotherapy has had good success rates in limited trials, but there has been no long-term follow-up.

Medication: Pharmacologic therapy plays an important role in the treatment of nocturnal enuresis. Three pharmacologic approaches are currently considered: desmopressin acetate, anticholinergic medications, and imipramine. Pharmacologic therapy for the treatment of primary nocturnal enuresis is usually reserved for use in children older than seven years of age. Two approaches to drug therapy can be used. One approach is to increase bladder capacity. The other is to reduce the amount of urine produced by the kidneys. Again, a careful examination and medical history, including a history of previous treatment, should be performed before drug therapy is initiated by the physician. Parents should not expect immediate results and should be made aware of the potential side effects of the medications. Because both the parent(s) and the physician are generally reluctant to use medication as a first-line treatment, drug therapy is often reserved for use in children who have shown no success with other treatment modalities.

Prognosis of Enuresis

The majority of patients who do not have a serious neurological defect or severe learning difficulties can expect to achieve nocturnal continence sooner or later. Primary enuresis without daytime symptoms resolves in approximately 15% of children each year (NICE Clinical Guideline, 2010). Even after dry nights have been reliably achieved, the occasional 'accident' is still



to be expected and is no cause for concern unless there is apparent regression. Those with a family history of late nocturnal continence, those with behavioural disorders and those with developmental delay will take longer. Boys tend to take longer than girls but all cases are highly variable.

In 1% of patients enuresis will persist into adulthood (NICE Clinical Guideline, 2010). One study found that children with the most severe form of bedwetting are likely to persist with the problem (Butler & Heron, 2008). A typical scenario is after a night of heavy consumption of beer. The alcohol causes deep sleep and the volume puts the bladder under great stress among adults. DSM-5 reports an overall positive prognosis for enuresis. Enuresis is typically resolved in adolescence and has a small 1% incident rate in adulthood (APA, 2013). Nonetheless, it can create severe psychological stress for a child and may have a physical cause and should be treated. The longer enuresis persists, the higher the risk of the frequency of urination increasing.

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