



Bedwetting

Bedwetting (nocturnal enuresis - **NE**) is a common problem, affecting an estimated 5 to 7 million children in the United States. It occurs three times more often in boys than in girls. Fortunately generally effective treatments are available.

Definitions

NE is the involuntary loss of urine that occurs only at night. It is normal voiding that happens at an inappropriate and socially unacceptable time and place. Over the years, various terms have been used to describe wetting problems, this practice has created confusion.

Children are not considered to have problems with bedwetting until they have reached five years of age. Mentally disabled children should have reached a mental age of four years before they are considered to have a problem with NE. For the diagnosis of NE to be established, a child five to six years old should have two or more bed-wetting episodes per month, and a child older than six years of age should have one or more wetting episodes per month.

Background

At five years of age, 15 to 25 percent of children wet the bed. With each year of maturity, the percentage of bed-wetters declines by 15 percent. Hence, 8 percent of 12-year-old boys and 4 percent of 12-year-old girls are enuretic; only 1 to 3 percent of adolescents are still wetting their bed. From 15 to 25 percent of bed-wetters have secondary enuresis, but the treatment approach and anticipated response are the same.

CAUSE

A single explanation for NE has not been found. The current belief is that the condition is multifactorial or due to many factors. Numerous factors have been investigated, and various theories have been proposed.

Genetic And Familial Factors

Genetic predisposition is the most frequently supported etiologic variable. One review found that when both parents were enuretic as children, their offspring had a 77 percent risk of having NE. The risk declined to 43 percent when one parent was enuretic as a child, and to 15 percent when neither parent was enuretic. Another investigation found a positive family history in 65 to 85 percent of children with NE. If the father was enuretic as a child, there is a 7

fold risk for the child; if the mother was enuretic, there is a 5 fold risk for the child.

Familial factors that have been found to have **no relationship** to the achievement of continence include social background, stressful life events, and the number of changes in family constellation or residences.

Psychologic Conditions

Nocturnal enuresis was once thought to be a psychologic condition. It now appears that psychologic problems are the result of NE and not the cause. Children with NE have not been found to have an increased incidence of emotional problems. For most children, bed-wetting is not an act of rebellion.

Bladder Problems

Studies attempting to establish bladder problems as the cause of NE have been contradictory. Extensive urodynamic testing has shown that bladder function falls within the normal range in children with NE. However, one investigation found that while real bladder capacity is identical in children with and without NE, functional bladder capacity (the volume at which the bladder empties itself) may be less in those with enuresis.

No correlation has been found between any narrowing of the urinary tract or opening and bed-wetting. Furthermore, structural or anatomic abnormalities rarely present solely as NE.

Arginine Vasopressin

It has been postulated that normal development may include the establishment of a circadian rhythm in the secretion of arginine vasopressin, the anti-diuretic hormone. A night time rise in this hormone would decrease the amount of urine produced at night. It may be that children with NE are delayed in achieving this normal rise in arginine vasopressin and, thus, may develop increased night time urine production which overwhelms the bladder's ability to retain urine until morning.

Sleep Disorders

Neither increased night time urine production nor a diminished functional bladder capacity adequately explains why children with nocturnal enuresis do not wake up to use the bathroom. Controversy has existed for many years about whether NE reflects a sleep disorder.

In most studies, sleep electroencephalograms have demonstrated no differences or only nonspecific changes in children with and without NE. When

surveyed, however, parents consistently maintain that their children with NE are "deep sleepers," compared with their offspring who are not bed-wetters. Other surveys have found that children with NE are more subject to "confused awakenings," such as night terrors or sleepwalking, than children who do not wet the bed.

DIAGNOSIS

A careful medical history of the child, and a thorough family history should be obtained from the parents, looking specifically for a history of NE. A thorough physical examination should be performed by your Family Doctor to look for any medical 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 stool holding may present with bed-wetting.

Because parents are often not fully aware of their child's daily voiding habits, 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.

Children with NE have a normal physical examination. However, your physician needs to check carefully for signs that might signal other problems that can present with bed-wetting. Gait should be evaluated for evidence of a subtle neurologic defect. The flanks and abdomen should be palpated for masses, including an enlarged bladder. The lower back should be inspected for skin lesions or an asymmetric crease between the buttocks, which could suggest a spinal cord malformation such as a variant of spina bifida.

A urine test is performed to assess the concentration and urinary glucose level. It also can determine the presence of infection or blood in the urine.

If the findings of the physical examination and urinalysis are negative and the history does not suggest a secondary cause of NE, no further work-up is needed. If urinalysis reveals evidence of infection, the child should be evaluated for vesicoureteral reflux. The currently recommended work-up is a voiding cystourethrogram and renal ultrasound examination.

TREATMENT

Non Medication Treatments

Bed-Wetting Alarm. The concept of using an alarm that emits a sound when a child wets the bed was first introduced in 1938. **The bed-wetting alarm has been shown to be the most effective treatment for nocturnal enuresis.**

Compared with other skill-based or pharmacologic treatments, the bed-wetting alarm has a higher success rate (75 percent) and a lower relapse rate (41 percent).

The alarm appears to work by negative reinforcement or avoidance. It goes off and awakens the child during voiding; the child gets out of bed and finishes voiding in the toilet or holds urine until later. For resolution of nocturnal enuresis, the bed-wetting alarm may need to be used for up to 15 weeks.

Unfortunately, treatment with bed-wetting alarms has a fairly high dropout rate - up to 30 percent! Possible predictors of a poor response include an unstable or chaotic family situation, behavior problems in the child, an anxious mother, and lack of concern about bed-wetting on the part of the parents or child.

Another cited reason for the relatively high dropout rate is that adults who used the alarms as children, even those who were cured of bed-wetting, remember the treatment period as the worst time of their life. However, a study conducted at a referral center found that when parents were given a choice of treatment method, more than 90 percent of those who selected the alarm had used such an alarm when they were children!

Improved technology has made the bed-wetting alarm a more attractive option than in the past. Alarms are now smaller and lighter, and they can be equipped with a buzzer, rather than a sound alarm, for children who do not respond to an alarm sound or for households in which an alarm disrupts the sleep of others. A number of currently available bed-wetting alarms are listed below.

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 way that does not seem to be like punishment, 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.

Other Approaches. Various non medication treatments have been shown to have a positive effect on bed-wetting in small studies but have not been extensively studied. These approaches include an elimination diet, hypnosis, retention control (i.e., holding urine for progressively longer periods), biofeedback, acupuncture, scheduled awakenings, and caffeine restriction.

Medication Treatment

Desmopressin (DDAVP) and imipramine (Tofranil) are the primary drugs used in the treatment of NE. Pharmacologic treatment is not recommended for children under six years of age.

Desmopressin. A synthetic analog of arginine vasopressin, desmopressin works by decreasing urine volume at night and by decreasing intravesicular pressure. The drug comes in a nasal spray or tablet. Treatment using the nasal spray is initiated with one spray in one nostril at bedtime. If necessary, the dosage can be increased slowly under your physician's close supervision. The tablet is also taken at bedtime, and if necessary, the dose may also be titrated upward slowly under your doctor's supervision.

As a rule, desmopressin is well tolerated. Side effects may include nasal irritation, nosebleeds, and headache, though they are generally mild. In one study, however, six children withdrew because of emotional disturbances, including aggressive behavior and nightmares, which cleared up when the medication was discontinued.

A systematic review found that desmopressin reduced the number of wet nights more effectively in children older than nine years and in children who had the fewest number of wet nights. The studies examined in the review found that frequency of wetting decreased anywhere from 10 to 91 percent, but that only 24.5 percent of children achieved complete dryness!

Once desmopressin therapy is stopped, relapse rates can range from 80 to 100 percent. If children respond to desmopressin, treatment is continued for three to six months. To minimize the possibility of relapse, the drug should be discontinued very slowly!

Imipramine. The mechanism for the benefits of imipramine in the treatment of NE is not understood. One theory is that one of the side effects of the drug may result in a decrease in bladder contractility that leads to increased bladder filling and thereby improved total bladder capacity. Imipramine provides some benefit in approximately half of children with NE. However, only 25 percent experience complete elimination of enuresis, a rate that is only slightly better than that for placebo when the 15 percent spontaneous remission rate is taken into consideration!

Following the discontinuation of imipramine, relapse rates are also high. Side effects occur frequently enough that imipramine probably should not be considered a first-line treatment for NE. However, if other treatments fail, imipramine, given once daily one hour before bedtime, can be used in the following age-related doses: 25 mg in six- to eight-year-old children, 50 mg in eight- to 12-year-old children, and 75 mg in teenagers. Depending on the

patient's age, the maximum dose is 0.9 to 1.5 mg per kg. After three to six months of treatment, imipramine should be discontinued slowly. The dose is decreased by one half for two weeks, and then the reduced dose is then given every other night for an additional two weeks and stopped.

Developing a Treatment Plan

Unfortunately, one study found that up to a third of parents had used punishment as their primary means of dealing with bed-wetting. I hope that this educational piece has helped you to understand the causes of NE, and that punishment is NOT the answer! To reiterate - please understand that bed-wetting is a common problem, and that blame or shame play no part in its treatment! With your physician's guidance you can foster a sense of optimism for beating this frustrating problem while at the same time giving your child the responsibility for achieving control over his or her urination at night!

Sometimes the very process of seeking help leads to improvement of NE! One study comparing the use of desmopressin plus behavior therapy, placebo plus behavior therapy, and desmopressin therapy alone found improvement in all three groups in the first weeks after enrollment - before the actual study had even begun!!

Information obtained from the initial voiding diary may give some very important clues about the best choice of initial treatment. The child who voids frequently during the day (seven times or more), voids small amounts, has few or no dry nights during the week, and wets the bed more than once a night is more likely to have low functional bladder capacity. This child may benefit most from the use of a bed-wetting alarm. On the other hand, the child who has a normal voiding pattern during the day, voids large amounts at night, and wets only one to two nights per week may have an increased night time urine production and therefore may be an appropriate candidate for desmopressin therapy. A child who fails one treatment modality is likely to benefit from another treatment - so **don't give up**.

The timing of treatment must be individualized for your child, and it is important that your child be motivated to take an active role. The younger the child, the more fragile his or her motivation may be. The depth of motivation can be assessed by assigning your child the task of keeping the voiding log, and if your child seems inadequately motivated, it may be best to postpone treatment until the child is ready so you will meet with success.

Continence training should be part of any treatment plan! Given its higher success rate and lower relapse rate, an alarm system should be considered as first-line treatment for many if not most children. Desmopressin is rapidly effective, but sole use of the drug neglects continence skills. The alarm system and desmopressin can be used in combination.

Resources:

- **Wet-Stop Alarm - Palco Labs: www.palcolabs.com, or 800-346-4488**
- **Nytone Alarm - Nytone: www.nytone.com, 801-973-4090**