

# Practice Parameter for the Assessment and Treatment of Children and Adolescents With Enuresis

## ABSTRACT

Enuresis is a symptom that is frequently encountered in child psychiatric evaluations. Careful assessment is required to identify specific urologic, developmental, psychosocial, and sleep-related etiologies. For most children with enuresis, however, a specific etiology cannot be determined. Treatment then involves supportive approaches, conditioning with a urine alarm, or medications—imipramine or desmopressin acetate. The psychosocial consequences of the symptom must be recognized and addressed with sensitivity during the evaluation and treatment of enuresis. *J. Am. Acad. Child Adolesc. Psychiatry*, 2004;43(12):1540–1550. **Key Words:** practice parameters, practice guidelines, child and adolescent psychiatry, enuresis, bedwetting.

Enuresis is a common psychosomatic symptom that presents both alone and in conjunction with other disorders in children and adolescents. It is a symptom with a number of possible etiologies. A variety of treatments that span the boundaries of child and adolescent psychiatry, psychology, pediatrics, and urology have been shown to be effective. The complexity in both assessment and treatment associated with what often appears to be a benign and common symptom suggests the utility of practice parameters for clinicians confronting the problem in their patients.

These guidelines are applicable to the evaluation and treatment of child and adolescent patients. This document presumes a basic medical background in pathophysiology and familiarity with normal child development and the principles of child psychiatric diagnosis. An Executive Summary follows immediately;

the main text of the practice parameter is presented subsequently.

## EXECUTIVE SUMMARY

This summary provides an overview of the assessment and treatment recommendations contained in the Practice Parameter for the Assessment and Treatment of Children and Adolescents With Enuresis. This summary includes many of the most important points and recommendations that are in these practice guidelines. However, the treatment and assessment of enuretic patients require the consideration of many important factors that cannot be conveyed fully in a summary, and the reader is encouraged to review the entire document. Each recommendation in the executive summary is identified as falling into one of the following categories of endorsement, indicated by an abbreviation in brackets after the statement. These categories indicate the degree of importance or certainty of each recommendation.

“Minimal Standards” [MS] are recommendations that are based on substantial empirical evidence (such as well-controlled, double-blind trials) or overwhelming clinical consensus. Minimal standards are expected to apply more than 95% of the time, i.e., in almost all cases. When the practitioner does not follow this standard in a particular case, the medical record should indicate the reason.

“Clinical Guidelines” [CG] are recommendations that are based on empirical evidence (such as open

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*This parameter was developed by Gregory Fritz, M.D., and Randy Rockney, M.D., and the Work Group on Quality Issues: William Bernet, M.D., Chair, Valerie Arnold, M.D., Joseph Beitchman, M.D., R. Scott Benson, M.D., Oscar Bukstein, M.D., Joan Kinlan, M.D., Jon McClellan, M.D., David Rue, M.D., Jon Shaw, M.D., and Sandra Stock, M.D., AACAP staff: Kristin Kroeger Prakowski. This parameter was made available to the entire AACAP membership for review in September 2001 and was approved by the AACAP Council in June 2002. It is available to AACAP members on the World Wide Web ([www.aacap.org](http://www.aacap.org)).*

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trials, case studies) and/or strong clinical consensus. Clinical guidelines apply approximately 75% of the time. These practices should always be considered by clinicians, but there are exceptions to their application.

“Options” [OP] are practices that are acceptable but not required. There may be insufficient empirical evidence to support recommending these practices as minimal standards or clinical guidelines. In some cases they may be the perfect thing to do, but in other cases they should be avoided. If possible, the practice parameter will explain the pros and cons of these options.

“Not Endorsed” [NE] refers to practices that are known to be ineffective or contraindicated.

## DEFINITIONS

Enuresis is defined in the *DSM-IV-TR* as the repeated voiding of urine into the bed or clothes at least twice per week for at least three consecutive months in a child who is at least 5 years of age. The *DSM-IV-TR* definition also considers a child to be enuretic if the frequency or duration is less, but there is associated distress or functional impairment. *Nocturnal enuresis* refers to voiding during sleep; *diurnal enuresis* defines wetting while awake. *Primary enuresis* occurs in children who have never been consistently dry through the night, whereas *secondary enuresis* refers to the resumption of wetting after at least 6 months of dryness.

## ETIOLOGY AND CLINICAL PRESENTATION

There is a clear genetic component to enuresis. Compared with a 15% incidence of enuresis in children from nonenuretic families, 44% and 77% of children were enuretic when one or both parents, respectively, were themselves enuretic. Data are accumulating that link foci on two chromosomes with enuresis.

Sleep studies have demonstrated a random pattern of wetting that occurs in all stages of sleep in proportion to the amount of time spent in each stage. A subgroup of enuretic patients has been identified in whom there is no arousal to bladder distention and an unusual pattern of uninhibited bladder contractions before the enuretic episode. The dysfunctional arousal system during sleep may be a key etiologic factor for this subgroup of children. One specific sleep disorder, sleep apnea stemming from upper airway obstruction, has been associated with enuresis.

Developmental immaturity, including motor and language milestones, is relevant in the etiology of enuresis for some children, although the mechanism is unknown.

Identifiable psychological factors are clearly contributory in a minority of children with enuresis. These children are most frequently secondary enuretics who have experienced a stress, such as parental divorce, school trauma, sexual abuse, or hospitalization; their enuresis is a regressive symptom in response to the stress or trauma. Psychological factors can also be seen as etiologically central in the rare instance in which family disorganization or neglect has resulted in there never having been a reasonable effort made at toilet training. Other signs of neglect are usually evident in these cases.

## ASSESSMENT

When enuresis is identified, either as the chief complaint or as an incidental part of an evaluation for another problem, the psychiatric assessment must be expanded to include enuresis-specific elements [MS]. In every instance, both the parents and the child should be interviewed, and sensitivity to the emotional consequences of the symptom should be high. The enuresis-specific history should explore every aspect of urinary incontinence, with a thorough review of the genitourinary and neurologic systems [MS]. A thorough physical examination is essential; enlarged adenoids or tonsils, bladder distention, fecal impaction, genital abnormalities, spinal cord anomaly, and neurologic signs should be noted [MS]. Routine laboratory tests need only include urinalysis and possibly urine culture; more invasive tests are pursued only with specific indications [CG]. First-morning specific gravity may be helpful in predicting who will respond to desmopressin acetate (DDAVP) treatments [OP]. A 2-week baseline record of wet and dry nights is useful [CG].

## TREATMENT

Treatment is based on the findings of the assessment. Positive findings on history, physical examination, or laboratory tests are indications for specific treatments. Daytime wetting, abnormal voiding (unusual posturing, discomfort, straining, or a poor urine stream), a history of urinary tract infections or evidence of infection on urinalysis or culture, and genital abnor-

malties are indications for urologic referral and treatment [MS]. A history of constipation, encopresis, or palpable stool impaction suggests mechanical pressure on the bladder. Disimpaction and treatment leading to a healthy bowel regimen will often eliminate the enuresis [CG]. Snoring and enlarged tonsils or adenoids may signal sleep apnea and indicate specific treatment. Surgical correction of upper airway obstruction has led to improvement or cure of enuresis [CG].

Psychosocial problems directly contributory to enuresis (as opposed to co-occurring with or resulting from the symptom) are relatively rare. Enuresis can be assumed to be of psychological origin when a previously dry child begins wetting during a period of stress (e.g., parental divorce, out-of-home placement, school trauma, abuse, hospitalization). At an early age, control struggles between parent and child may focus on urination patterns as a "battlefield"; this struggle serves to maintain the enuresis symptom as the child matures. In the uncommon instance in which family disorganization or neglect has resulted in a failure to toilet train the child, the symptom is seen to have psychosocial etiology. Individual psychotherapy, crisis intervention, and family therapy are specific psychological treatments applied on an individual basis [CG]. Effective treatment of the underlying psychological problem eliminates the enuresis in such cases.

When the history and physical examination do not suggest a specific etiology and the urinalysis results are completely normal, uncomplicated monosymptomatic primary nocturnal enuresis is treated with nonspecific approaches. Supportive approaches should always include education, demystification, and ensuring that parents do not punish the child for enuretic episodes [MS]. Journal keeping, fluid restriction, and night awakening may also fit in the category of nonspecific supportive approaches [OP].

Conditioning, using a modern, portable, battery-operated alarm along with a written contract, thorough instruction, frequent monitoring, overlearning, and intermittent reinforcement before discontinuation, makes this behavioral treatment highly effective as the first line of treatment with cooperative, motivated families [MS].

Two medications, imipramine and DDAVP, have proven efficacy in the treatment of enuresis [OP]. Imipramine in a single bedtime dose of 1.0 to 2.5 mg/kg has been used for many years if conditioning

treatment fails or is not feasible. Many studies document 40% to 60% effectiveness, although the relapse rate is as high as 50%. The mechanism of action of imipramine in treating enuresis is unknown and not conclusively related to blood level. Because of the possibility of cardiac arrhythmia associated with tricyclic antidepressants, including imipramine, a pretreatment electrocardiogram may be obtained to detect an underlying rhythm disorder (even though the highest dose used to treat enuresis is lower than the dose commonly used to treat depression).

DDAVP is a synthetic analogue of the antidiuretic hormone (ADH) vasopressin, which decreases urine production at night when taken at bedtime. It is administered orally in 0.2-mg tablets in doses of 0.2 to 0.6 mg nightly or, less commonly, intranasally as a spray in doses of 10 to 40  $\mu$ g (one to four sprays) nightly; the lowest effective dose is determined empirically with each child. Water intoxication is a rare side effect but is serious enough to merit electrolyte monitoring if intercurrent illness complicates the picture during treatment [CG]. Studies of DDAVP have reported success rates of 10% to 65% and relapse rates as high as 80%. DDAVP can be prescribed for short periods, such as when the child is going to camp. Long-term administration has *not* been associated with depression of endogenous ADH secretion. The combination of DDAVP and a sustained-release anticholinergic agent may be more effective than DDAVP alone [OP].

Bladder-stretching exercises to increase functional bladder capacity have been used without consistent evidence of effectiveness, and the effort not to void despite considerable urgency is unpleasant for both the child and the family [NE]. Despite anecdotal reports, there is no empirical evidence to suggest efficacy of hypnotherapy, dietary manipulation, and desensitization to allergens [NE].

## LITERATURE REVIEW

This practice parameter is based on an extensive review published as a chapter by the primary authors and used with permission (Fritz and Rockney, 1997). The existing world literature for the past 50 years was considered in the preparation of this parameter to place the problem in context and to provide a historical perspective. To ensure an up-to-date list of references, a *Med-*

line search covering the period 1997–1999 was conducted in January 2000. The search yielded 144 articles through the use of “enuresis” as the text word. More than 350 references were reviewed; 50 of the most relevant are included in the bibliography of this document.

## DEFINITIONS

Enuresis is defined in the *DSM-IV-TR* as the repeated voiding of urine into the bed or clothes at least twice a week for at least three consecutive months in a child who is at least 5 years of age. The *DSM-IV-TR* definition includes voluntary as well as involuntary voiding, although most research studies exclude children who voluntarily or intentionally wet their bed or clothes. The *DSM-IV-TR* definition also considers a child to be enuretic if the frequency or duration is less, but there is associated distress or functional impairment. *Nocturnal enuresis* refers to voiding during sleep; *diurnal enuresis* defines wetting while awake. *Primary enuresis* occurs in children who have never been consistently dry through the night, whereas *secondary enuresis* refers to the resumption of wetting after at least 6 months of dryness.

## BRIEF HISTORY

The history of the symptom of enuresis, as summarized in Glicklich's (1951) review, reveals a thread of punitive and desperate interventions that have been applied by frustrated adults for centuries to children who persistently wet the bed. Our approach has evolved beyond such “treatments” as cauterization of sacral nerves, penile ligation, inflated vaginal balloons to compress the bladder neck, and electric shocks to the genitalia. Nonetheless, family embarrassment, parental anger at what they see as “a willful child,” and insensitive peers can together make life miserable for a child with enuresis (Schulpen, 1997). In the extreme, persistently wet clothes or bedding may actually precipitate episodes of physical or emotional abuse from an adult who lacks appropriate control and feels pushed “to the end of the rope” by the enuresis. Chronic anxiety, impaired self-esteem, and delayed developmental steps such as attending camp or sleeping at a friend's house may occur as secondary problems. Frequently, the psychological and developmental damage may actually be

more significant and devastating to the child than the symptom of enuresis itself.

## EPIDEMIOLOGY

The reported prevalence of enuresis at different ages varies considerably because of inconsistencies in the definition of enuresis, differences in the method of data collection, and characteristics of the population sampled. Nocturnal incontinence occurs in 12% to 25% of 4-year-old children, 7% to 10% of 8-year-old children, and 2% to 3% of 12-year-old children (Spee van der Wekk et al., 1998). It remains a problem even in late teenage years, when 1% to 3% may still be wetting the bed (Feehan et al., 1990). Primary enuresis is twice as common as secondary enuresis. The ratio of the incidence of enuresis in boys versus girls is 2:1; enuresis is more common at all ages in lower socioeconomic groups and in institutionalized children. The spontaneous cure rate is 14% to 16% annually, as reported in the long-term study of Forsythe and Redmond (1974) of 1,129 children. The spontaneous cure rate appears to change at around 4 years of age: 30% of the 2- to 4-year-olds who wet the bed may become dry in the next year compared with the fairly steady spontaneous cure rate of 14% to 16% in older children. This change in the spontaneous cure rate lends support to the view that enuresis can be considered a clinical problem after the age of 4 or 5 years; before that time, it is essentially a normal variant unless, as described later, specific causes are identified.

## ETIOLOGY AND CLINICAL PRESENTATION

An overview of the development of urinary control in children is basic to understanding the symptom of enuresis. Urinary continence is obtained in three sequential steps: enlargement of the bladder capacity, voluntary control of the sphincter muscles, and voluntary control of the micturition reflex. In the first 2 years of life, voiding occurs in a reflex fashion: bladder distention results in detrusor contraction and sphincter relaxation via a spinal cord reflex arc. The sensation of bladder fullness develops in the second year, and the critical ability to control the sphincter muscles voluntarily occurs by 3 years of age. The final step is gaining the ability to inhibit the micturition reflex, after which urinary continence can be achieved. There is a consis-

tent sequence of attainment of continence in children. Bowel control during sleep is attained first. This usually is followed by bladder and bowel control during wakefulness and, last, bladder control at night. Girls typically achieve each of these milestones before boys.

Most early studies of children with enuresis revealed reduced functional bladder capacity (the volume that produces the sensation of needing to void), although more recent cystometric studies have shown normal nocturnal bladder capacity in children with enuresis (Norgaard, 1989; Starfield, 1968). The formula "age in years + 2 = the functional bladder capacity in ounces" is a generally accepted approximation of an individual child's functional bladder capacity (Koff, 1983). Uninhibited bladder contractions, similar to the infantile pattern, are identified more commonly in urodynamic studies of enuretic than nonenuretic children. The relationship between these contractions and actual enuretic episodes, however, is as yet unclear.

#### GENETIC ASPECTS

Genetics undoubtedly plays a role in the clinical presentation of enuresis. Bakwin (1973) showed that, compared with a 15% incidence of enuresis in children from nonenuretic families, 44% and 77% of children were enuretic when one or both parents, respectively, were enuretic. Approximately one third of fathers and one fifth of mothers of children with enuresis were themselves enuretic as children. It is, in fact, unusual for a child with primary functional nocturnal enuresis not to have a close relative who was also enuretic. Recent Scandinavian linkage studies have identified a locus for enuresis on chromosome 13 (ENUR 1) and another (ENUR 2) on chromosome 12, although the relationship of either locus to the pathophysiology of enuresis remains unknown (Arnell et al., 1997; Eiberg et al., 1995). These studies also confirm the heterogeneity of enuresis, pointing to the inevitability of conflicting findings and varying responses in clinical studies. The development and perhaps even sleep aberrations of children with enuresis (described below) may be manifestations of the same genetic predisposition.

#### SLEEP PATTERNS

Parents of children with enuresis usually describe the children as very difficult to awaken (although parents

rarely attempt to awaken nonenuretic children, who also sleep very soundly). A recent study showing that a louder tone was required to awaken enuretic than nonenuretic children lends empirical support to this observation (Jenkins et al., 1996). Enuresis has been reported in association with specific sleep disorders, including narcolepsy and sleep apnea syndrome, and was thought to be a disorder of arousal from deep sleep (Broughton, 1968). A series of studies reported from several sleep laboratories indicate a random pattern of wetting that occurs in all stages of sleep in proportion to the amount of time spent in each stage (Mikkelsen et al., 1980; Norgaard et al., 1989). The studies of Watanabe and Azuma (1989) of overnight EEG and cystometry in enuretic patients have identified three patterns. One pattern, labeled type I, was associated with a detectable EEG response to bladder distention (short of awakening) and no bladder contractions before the enuretic episode. Type IIa showed no EEG response whatsoever in response to bladder distention and no bladder contractions, a pattern common to young infants. Type IIb enuretic subjects also showed no signs of arousal on EEG, but an unstable cystometrogram during sleep was indicative of uninhibited bladder contractions leading up to the enuretic episode. The question of how the arousal system may be dysfunctional in a subgroup of children with enuresis needs further exploration, although at this point a sleep disorder cannot be defined as a major etiologic factor in enuresis.

#### DEVELOPMENTAL DELAY

Pediatricians commonly accept the theory of developmental delay or immaturity in the attainment of central control of bladder function as the primary etiology of enuresis. Starfield (1972) found that the functional bladder capacity was less in children with enuresis than in nonenuretic sibling controls, and urodynamic data on uninhibited bladder contractions tend to support the impression that enuresis is caused by an immature voiding pattern. Other reports of an increased incidence of physical characteristics suggest developmental immaturity, including lower average height and lower mean bone age, in enuretic than in nonenuretic children (Shaffer, 1985). Late sexual maturation has been associated with a higher prevalence of enuresis among adolescents, and there is a greater incidence of enuresis in children who were de-

layed in the attainment of motor and language milestones as well (Gross and Dornbusch, 1982). Although the mechanism is not specified beyond these associations, developmental immaturity seems to be relevant in the etiology of primary enuresis for many children.

#### PSYCHOSOCIAL FACTORS

Enuresis has been considered a symptom of psychological disturbance, despite the lack of evidence beyond theoretical position statements and anecdotal reports. At the same time, there is clear evidence that the rate of psychiatric disorders in children with enuresis is higher than the rate found in nonenuretic groups (Shaffer, 1985). Most children with enuresis show no symptoms of emotional or behavioral disturbance. Among those who do, it is frequently difficult to determine whether the relationship between the enuresis and the psychological problem has etiologic relevance or is either coincidental or occurring in response to the symptom of enuresis. That psychological improvement has been noted to occur after successful treatment of enuresis suggests that, at least in some cases, the psychological disturbance is in reaction to the symptom. There is no evidence that the converse—symptom substitution after resolution of enuresis—ever occurs (there are no reports in the literature). Stress and/or anxiety at critical developmental periods may delay the attainment of dryness in a manner similar to the effect on other developmental milestones.

Although no prospective studies are available, both premature or coercive toilet training and overindulgent efforts have been examined in relation to enuresis. The symptom has been described as the child's efforts at retaliation against the parents or as symptomatic of an infantilized, overly dependent relationship on the caregiver. Enuresis also has been variously described in the psychiatric literature as a masturbatory equivalent, an expression of bisexuality, or the somatic expression of a defect in body image. It has also been reported to appear in previously dry children after sexual molestation. Given the present state of our understanding, it is reasonable to conclude that for a small subgroup of children with enuresis, the symptom has a psychological etiology. Those children most frequently have secondary enuresis and have experienced a stress, such as parental divorce, school trauma, sexual abuse, and hospitalization; their enuresis is a regressive symptom response to the stressor trauma.

Pharmacologic treatment of other disorders may result in enuresis as a side effect of a medication that the child is taking. Medications such as lithium, valproic acid, clozapine, and theophylline have been reported to cause secondary enuresis, although this side effect is relatively uncommon.

The other situation in which psychological factors can be seen to be etiologically central is in the rare instance in which family disorganization or neglect has resulted in there never having been a reasonable effort made at toilet training. The child presents with primary enuresis and no other discernible etiologic factors evident beyond the negligent family history and associated psychosocial disturbance.

#### ASSESSMENT

Children can present with enuresis as a symptom of major or minor concern to a variety of physicians, including pediatricians, urologists, family practice physicians, and child and adolescent psychiatrists. Reasons for presenting to one physician over another are variable and generally unsystematic; it also has been shown that as few as 38% of children with enuresis had seen *any* physician about their symptom (Foxman et al., 1986). Child and adolescent psychiatrists are most likely to encounter enuresis incidentally as part of a psychiatric assessment for another presenting problem. When enuresis is identified, the psychiatric assessment must be expanded to include the enuresis (specific elements are described below). In every instance, sensitivity to the emotional consequences of the symptom of enuresis and thoroughness to avoid missing even its uncommon causes must be guiding principles of the evaluation.

The assessment of enuresis begins with an extensive history, focusing on the symptom itself and involving both the patient in an individual interview and the parents privately as well. Optimally, a 2-week baseline record of the enuresis pattern is obtained before the initial evaluation visit. Not infrequently, this baseline monitoring is associated with a dramatic improvement. It also serves as a standard against which the success of subsequent interventions can be gauged.

The initial history should explore every aspect of the urinary incontinence, and the genitourinary and neurologic systems reviews must be especially thorough. The frequency, time of day, course of the symptom,

relationship of wetting to environmental changes, onset of the symptom, and concurrence of dribbling, dysuria, frequency, and urgency should be explored specifically. The child's reaction to the symptom and interest in working on it should be assessed (because without significant motivation, treatment is rarely successful). The family's response to the symptom, i.e., who takes responsibility for it, how open and matter-of-fact they are about the symptom, and the degree of embarrassment, should all be assessed. Developmental history should be obtained in some detail to rule out the possibility of developmental delays in other areas as well as subtle neurologic symptoms. Night waking, snoring, and upper airway obstruction are important symptoms of sleep apnea and should be specifically assessed. The sleeping arrangements for the child at home should be explored. The physician must be alert to the possibility of previous or ongoing inappropriate sexual contact. The history also should focus on the family history of enuresis. When the family history is discussed in the evaluation, it is not unusual for teenagers with enuresis to learn for the first time that one of their parents was enuretic until a similar age. Medications that the child is taking should also be delineated because of the possibility that the enuresis is a medication side effect. Finally, the patient and the parents should be questioned about previous evaluations and attempts at therapy. Previous use of the conditioning alarm or medications may have been undertaken, but the thoroughness, dosage, and length of time that the treatment was monitored should be assessed before it is concluded that the treatments have had a sufficient trial to be judged ineffective.

Every enuretic child needs a careful physical examination as part of the diagnostic evaluation. The genital focus of the symptom means that attention to issues of modesty, privacy, and the possible traumatic impact of the examination are especially important, but under no circumstances should treatment be started without an examination. The physical examination should emphasize the following: assessment of the patency of the nares and voice quality (for enlarged adenoids), examination of the nasal pharynx (for enlarged tonsils), palpation of the abdomen (for bladder distention, fecal impaction), examination of the genitalia (for abnormalities of the meatus, epispadias, phimosis, etc.), examination of the back (for a sacral dimple or other suggestion of a vertebral or spinal cord anomaly), and

a thorough neurologic examination to rule out subtle dysfunction associated with the symptom.

Every enuretic child should have a screening urinalysis. Clear urine on inspection, a negative dipstick (for leukocyte esterase and nitrite), and a negative microscopic examination have negative predictive values for urinary tract infection between 95% and 98% (Bullock et al., 2000; Goldsmith and Campos, 1990). Because no rapid method of urinalysis can exclude infection with 100% certainty and because of the logistic difficulty of obtaining a culture subsequent to the office visit, most physicians send a screening urine specimen for culture and urinalysis at the same time.

First-morning urine specific gravity has been proposed as a specific test for enuresis and as a way to predict which children might respond to DDAVP treatment. Based on the lack of nighttime and early-morning surges in ADH secretion, early-morning unconcentrated urine (specific gravity of less than 1.015) has been proposed as useful in distinguishing enuretic and nonenuretic children. Some studies have found significantly lower morning urine specific gravity in children with enuresis compared with controls (Mevorach et al., 1995), whereas others have failed to find such a difference (Salita et al., 1998).

Beyond urinalysis and, frequently, urine culture, further, more invasive tests are not routinely needed. Renal ultrasound and voiding cystourethrogram followed by intravenous pyelogram or cystoscopic evaluation are pursued only with specific indications obtained from the history (continuous wetting, abnormal voiding pattern, or recurrent urinary tract infections), physical examination, or positive results from the urinalysis or culture.

## TREATMENT

A thorough evaluation will identify a specific etiology or contributing disorder implying a specific, definitive treatment, for perhaps one third of children with enuresis. Most patients, however, will have no specific cause of the symptom diagnosed and will require generic treatment that is chosen on an individual basis depending on the child's and family's concerns, motivation, and intelligence. It is important to note that not all children with the symptom of enuresis require treatment. Many parents, after they are reassured that an underlying urological, medical, or psy-

chological problem is not present, do not request treatment or are not willing to accept either the risks or inconveniences associated with treatment.

A number of commonsense approaches to enuresis have evolved over time and can be considered supportive but unproven interventions. They include the following:

1. Educate parents about the prevalence of enuresis (to reduce their guilt), the relatively high spontaneous cure rate (to encourage hope), and the nonvolitional nature of the symptom (to avoid a punitive response or the development of a control struggle).
2. Encourage the keeping of a journal or a dry bed chart by the child (as a method of consciousness raising). Involving the child in changing the bed also serves this purpose.
3. Reduce fluids, and especially caffeinated beverages, before bedtime (to decrease the volume of urine produced during the night).
4. Awaken the child to void during the night (to preempt the symptom). Generally, given the enuretic child's sound sleeping ability, this does not lead to significant sleep disruption.

It should be noted that none of these approaches have empirical support for efficacy—one study even suggested that night lifting actually was less successful than no treatment—but all entail no risk or expense and have proven to be useful in individual cases. It is not clear whether effective supportive intervention acts through a placebo effect, anxiety reduction, or simply filling the time until a spontaneous cure occurs.

## CONDITIONING

Conditioning night awakening to the sensation of a full bladder is the most benign and successful of the generic treatments of enuresis. The conditioning paradigm has been used widely since its description in 1938 (Mowrer and Mowrer, 1938). A careful meta-analysis of decades of conditioning studies has shown an initial success rate (defined as a reduction to less than one wet night per month) of approximately 66%, with more than half the subjects experiencing long-term success (Houts et al., 1994). The few existing studies that compare conditioning with pharmacologic treatments have generally shown conditioning to be significantly more effective than imipramine (Wagner et al., 1982) and DDAVP (Wille, 1986).

The manner in which conditioning treatment is presented and monitored affects the success rate (Moffatt, 1997). Familiarity and confidence in conditioning approaches are important, and a casual or unenthusiastic introduction does not promote the commitment needed for a successful outcome. In contrast, a written contract, thorough instructions, and frequent (at least every 3 weeks) monitoring appointments enhance success (Houts, 1995). There is some evidence that children with the most frequent enuresis will respond best to conditioning treatment (Jensen and Krisensen, 1999).

Portable transistorized alarms that the child wears on the body have replaced the old bell-and-pad type, but the principle is the same. The first drops of urine moisten the fabric separating two electrodes, thereby completing the circuit and setting off the alarm that the child is wearing. Gradually the child awakens earlier and earlier in the course of the enuretic episode and the wet spot diminishes in size until the sensation of bladder fullness causes the child to awaken before wetting. Success is followed by overlearning and intermittent reinforcement in which the child uses the alarm every other day before discontinuing it. Few children awaken easily in the initial stages of conditioning treatment, and considerable parental investment is required. Lack of parental help to awaken the child to finish voiding in the toilet is a major reason for failure of the conditioning treatment. If sleeping arrangements, family support, and reliability of the adults to monitor the situation are not adequate, conditioning treatment will lead only to frustration. Lack of success with the approach in the past or a relapse after previous success does not preclude successful subsequent treatment with a conditioning device. Throughout the behavioral treatment, monitoring the increasing success with a sticker chart and reinforcing positive change is critical to maintaining the child's investment in the process.

## PSYCHOPHARMACOLOGY

Over the past 30 years, drug therapy for enuresis has involved imipramine primarily, with DDAVP a relatively recent addition. Imipramine has been used extensively for nocturnal enuresis despite the fact that the precise mechanism of action for enuresis is still poorly understood. Neither the anticholinergic effect nor the changes in sleep architecture (reduction in rapid eye movement sleep) have been shown to explain ad-

equately the effect of imipramine. Imipramine is effective 40% to 60% of the time; the relapse rate is significant (as high as 50%). The benefit of imipramine is seen more rapidly and at a lower dose than is common when the drug is used as an antidepressant. The usual dose range is 1.0 to 2.5 mg/kg per day in a single dose at bedtime (Mark and Frank, 1995). When effective, imipramine treatment is continued for 4 to 6 months. Recent reports of unexpected deaths due to cardiac arrhythmia in children taking imipramine or other tricyclic antidepressants suggest that a pretreatment electrocardiogram to determine an underlying rhythm disorder should be obtained, with periodic monitoring thereafter. Children usually tolerate the imipramine at low-dose levels and experience minimal anticholinergic or cardiovascular side effects. Studies of serum levels of imipramine and its metabolite, desipramine, in relation to enuresis efficacy have been inconclusive, with individual variation being the most striking finding (Fritz et al., 1994). At present, assessment of serum level is indicated only when there has been no effect despite a dose of 2.5 mg/kg per day. The most serious problem associated with imipramine is ingestion by the patient's younger siblings, leading to serious or fatal consequences.

DDAVP is a synthetic analogue of the ADH vasopressin and has come to be widely used in the treatment of enuresis. There is some evidence that the normal diurnal variation in ADH levels may be altered in some enuretic patients. Norgaard et al. (1985) demonstrated an absence of the normal nocturnal increase in ADH levels in children with enuresis compared with controls. It is postulated that this causes increased nighttime urine output that exceeds the functional bladder capacity and results in a wet bed. Whether this is the primary pathophysiologic etiology in most enuretic patients, as argued by Norgaard et al., is uncertain.

DDAVP is available in two forms: the initially developed nasal spray and a more widely used tablet. DDAVP nasal spray is administered intranasally at bedtime in doses of 10 to 40 µg nightly (one to four sprays). The oral form is available as a 0.2-mg tablet. Children with enuresis are started on one tablet before bedtime, and the dose is incrementally increased to two or three tablets at bedtime if the lower dose proves ineffective. The drug's duration is 10 to 12 hours, and there is a compensatory polyuria the following day after the effect wears off.

Although water intoxication leading to a seizure is a potential problem, to date, serious side effects with DDAVP have been reported in only 11 cases (Donoghue et al., 1998). In 10 of those cases, complicating factors (e.g., excessive water drinking for hiccups, nasal polyps associated with cystic fibrosis, overdose) helped to explain the occurrence of hyponatremia as the proximate cause of the seizure. The manufacturer recommends monitoring serum electrolyte levels at least once early in treatment, but even if the sample is obtained early in the morning, a single electrolyte monitoring in an asymptomatic patient is unlikely to reveal abnormalities. However, intercurrent illnesses that might affect hydration status or alter drug absorption will inevitably occur in children who are taking DDAVP. Serum electrolyte levels should be monitored in such children who manifest unexplained symptoms. Headache, abdominal discomfort, nausea, and nasal congestion have been relatively rare side effects.

The reported success rates of DDAVP treatment for enuresis have ranged from 10% to 65%, but as many as 80% of patients relapse after treatment (Thompson and Rey, 1995). A history of nasal congestion or sinusitis, which likely impairs absorption, and the uncertainty of children to effectively administer a nasal spray have both led to a preference for the recently available oral form of the medication. Concern about the possibility of depression of endogenous ADH secretion with extended use of DDAVP does not seem to be warranted. Children who have used DDAVP for as long as 1 year have demonstrated the ability to concentrate their urine appropriately in response to a water deprivation challenge. There are no empirical guidelines as to how long to continue treatment in a child who responds to DDAVP. It seems reasonable at least to consider a trial of treatment at 3- to 6-month intervals. A recent study (Cendron and Klauber, 1998) has asserted the possibility that therapy with a combination of DDAVP and a sustained-release anticholinergic agent, hyoscyamine, may be more effective than DDAVP alone. More evidence is required, however, before this can be considered a standard treatment for enuresis.

#### PSYCHOTHERAPY

Psychotherapy is indicated only when a specific psychological issue associated with the onset of the symptom (in secondary enuresis) is identified or a control

struggle between parent and child is maintaining the symptom. Certainly, enuresis itself does not constitute an indication for psychotherapy beyond the supportive counseling mentioned earlier. Typical disorders associated with enuresis that may be amenable to psychotherapy include a situational reaction with prolonged regressive symptoms, a posttraumatic stress response, a separation-individuation conflict between the parent and child in which the wet bed is the focus, and particular impulse disorders of adolescents.

#### BLADDER TRAINING

Bladder training, in which daily stretching by retaining urine is intended to increase the functional bladder capacity, has been reported to be effective. The effort not to void despite considerable urgency is unpleasant for both the child and the family, making it a less desirable approach. Hypnotherapy has been reported to be successful in particular cases, but further research is needed regarding the application of this modality on a broad scale. The desperation that many parents feel regarding the symptom of enuresis makes them vulnerable to exploitation by purveyors of high-priced, "guaranteed" treatments that are essentially variants of the conditioning treatment. Parents frequently ask about allergies and dietary contributions to enuresis, and education about the insufficient evidence available at present is more useful than either desensitization or dietary manipulation.

#### CONFLICT OF INTEREST

As a matter of policy, some of the authors of this practice parameter are in active clinical practice and may have received income related to treatments discussed in this parameter. Some authors may be involved primarily in research or other academic endeavors and also may have received income related to treatments discussed in this parameter. To minimize the potential for this parameter to contain biased recommendations due to conflict of interest, the parameter was reviewed extensively by Work Group members, consultants, and Academy members; authors and reviewers were asked to base their recommendations on an objective evaluation of the available evidence. Authors and reviewers who believed that they might have a conflict of interest that would bias, or appear to bias, their work on this parameter were asked to notify the Academy.

#### SCIENTIFIC DATA AND CLINICAL CONSENSUS

Practice parameters are strategies for patient management, developed to assist clinicians in psychiatric decision-making. This parameter, based on evaluation of the scientific literature and relevant clinical consensus, describe generally accepted approaches to assess and treat specific disorders or to perform specific medical procedures. The validity of scientific findings was judged by design, sample selection and size, inclusion of comparison groups, generalizability, and agreement with other studies. Clinical consensus was determined through extensive review by the members of the Work Group on Quality Issues, child and adolescent psychiatry consultants with expertise in the content area, the entire Academy membership, and the Academy Assembly and Council.

This parameter is not intended to define the standard of care; nor should it be deemed inclusive of all proper methods of care or exclusive of other methods of care directed at obtaining the desired results. The ultimate judgment regarding the care of a particular patient must be made by the clinician in light of all the circumstances presented by the patient and his or her family, the diagnostic and treatment options available, and available resources. Given inevitable changes in scientific information and technology, this parameter will be reviewed periodically and updated when appropriate.

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