

## Behavioral Treatment for Enuresis

ARTHUR C. HOUTS

### OVERVIEW

Based on principles of learning and conditioning, urine alarm treatment for simple bedwetting is one of the oldest triumphs of modern behavior therapy. Urine alarm treatment is by far the most effective current treatment and costs considerably less than alternative medication treatments (Houts, 2000; Houts, Berman, & Abramson, 1994; Mikkelsen, 2001). This chapter reviews over 20 years of work to improve this basic behavior therapy and to make it more widely available. We also discuss factors that have impeded the dissemination of this treatment. Our approach is called full-spectrum home training (FSHT). Psychologists should collaborate with pediatricians and family doctors to offer this treatment.

### **Monosymptomatic Primary Enuresis**

Bedwetting is a problem for 1 out of every 10 secondary school-age children. The prevalence at 6 years old is about 15% and declines to about 1% among 18-year-olds. Only 15 of every 100 can be expected to "outgrow" the problem in a year. Many will have to deal with the interference for years. Continued bedwetting leads to restricted social activities, embarrassment about a family secret, and possibly diminished confidence and interpersonal comfort. Given that a 4-month course of urine alarm treatment can permanently fix the problem in about 75% of these children, this treatment should be pursued once a child is 6 years old and poised for important emotional and social developmental milestones. In 20-plus years, my students and I have screened, treated, or supervised more than 1,500 cases. I have never met or heard of a child who preferred to keep wetting. The unfortunate fact is that most parents do not know what to do, and many get bad advice from the professionals they consult.

Of the 7 to 10 million bedwetting children in the United States, about 85% are monosymptomatic primary enuretics (MPEs). They have no medical problems, they wet only at night, and they have never been dry for at least 6 consecutive months. MPEs are ideal candidates for behavioral treatment. Children who have daytime wetting need more



medical attention and may enter behavioral treatment when the daytime wetting is resolved. Children who have onset or secondary bedwetting also need more careful medical screening and evaluation for distress associated with the return of bedwetting. Definitions of secondary enuresis vary, but most consider bedwetting to be secondary if the child has been consistently dry for 6 months or longer and then has resumed regular bedwetting. Provided these secondary enuretic children have no current complications, they may also be successfully treated with FSHT.

All children referred for treatment should receive a basic physical examination and urinalysis from either their pediatrician or their family doctor. Consultation with a pediatric urologist can be useful to obtain a bladder and renal sonogram to rule out structural problems. Again, 90% will have no medical complications, but no one wants to have a child fail behavioral treatment because an easily curable infection was overlooked.

### Active Avoidance Learning and the Urine Alarm

All children start out wetting the bed, and some fail to stop. Most stop without special help. On average, children attain daytime control of urination at 2½ years old, and nighttime control generally follows within 1 year. When a child continues regular bedwetting beyond 4½ years old, the child may have missed a developmental window for acquiring the responses needed to be dry at night. For practical reasons, behavioral treatment is generally not instituted until a child is 5 years old or older. Children acquire nighttime control either by waking up and going to the bathroom or by inhibiting urination at the first signals of a full bladder. Learning either response is facilitated by the natural discomfort of a wet bed. If for any number of reasons (e.g., sleeping for long periods and habituating to the discomfort of a wet bed) a child repeatedly fails to respond to the aversive conditions of a wet bed, the child will fail to learn the avoidance responses needed to maintain a dry bed. Continued bedwetting, then, is a failure to learn how to be dry from the naturally occurring conditions of development. From a biobehavioral perspective, MPE is caused by an interaction between delays in physical development that are genetically transmitted and behavioral histories that can either facilitate or further delay those active avoidance responses needed to maintain a dry bed (Houts, 1991; Lovibond, 1963).

Urine alarm treatment is one way to re-create the conditions that lead a child to perform the active avoidance response of inhibiting urination during sleep. The alarm is an aversive stimulus that produces a conditioned avoidance response of contracting the pelvic floor along with the external sphincter of the bladder neck. This active avoidance response is maintained by negative reinforcement. As long as the response is made, the child avoids having to wake and avoids the wet bed. This model is consistent with findings from nighttime recording of pelvic floor activity. Norgaard observed that when nighttime wetting was avoided, children aborted detrusor contractions by spontaneously contracting the muscles of the pelvic floor (Norgaard, 1989). In contrast, episodes of wetting without arousal were preceded by relaxation of the pelvic floor. In other words, when nighttime wetting was avoided, children were inhibiting bladder contractions by spontaneously contracting the muscles of the pelvic floor.

As applied to the urine alarm, the pelvic floor activity that occurs when a child either arouses to or sleeps through the sensation of a full bladder is a conditioned response, obtained by startling the child with the urine alarm. Specifically, the sound of the alarm may startle the child, thus causing contraction of the muscles of the pelvic floor. Over time, this physiological response becomes conditioned as the child's body responds to a

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### Bladder Capacity

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### Family Involvement

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full bladder and associated contractions with pelvic floor contraction in order to avoid being startled by the alarm and having to awaken. We obtained indirect evidence for this formulation in a study of children who completed daytime pelvic floor electromyography (EMG) assessments over the course of urine alarm treatment. Compared to those who failed to become completely dry, those who did become dry showed a steady increase in average peak voltage over the 16-week course of treatment even though their initial muscular response was weaker. In other words, the EMG assessments confirmed that muscle conditioning did in fact occur in those children who became dry with urine alarm treatment. Responders as compared to nonresponders appeared to acquire more pelvic floor reactivity and responsiveness (Scott, 1993). These findings support the view that the urine alarm works by training the child to make an inhibitory pelvic floor response during sleep. More direct confirmation can be obtained if future investigations assess pelvic floor reactivity during sleep as urine alarm treatment progresses.

### Bladder Capacity and Maintenance of Dry Nights

Some bedwetting may be due to developmental delays in bladder capacity. In our original formulation of FSHT, we regarded this problem as a complicating factor rather than a primary cause of bedwetting. Subsequent evidence suggests that there may be a small proportion whose bedwetting is due primarily to the fact that their bladders cannot accommodate the volume of urine they produce at night. These are likely to be children who wet multiple times each night, and they are likely to be that small proportion who actually do fail to produce normal amounts of antidiuretic hormone at night. We have continued to use retention control training or bladder stretching exercises to address this problem. Others have used desmopressin acetate (DDAVP) medication to provide synthetic antidiuretic hormone, thereby reducing the volume of urine produced at night (Bradbury & Meadow, 1995). Whether one approaches this from the standpoint of increasing capacity or reducing the volume produced, the evidence is clear that such approaches alone are not sufficient to end bedwetting (Houts et al., 1994). The alarm is essential.

If nothing is done to prevent relapse, resumption of bedwetting after successful urine alarm treatment may be as high as 40% within a year. In FSHT we address the problem by building in overlearning as a relapse-reduction procedure. In our early studies, we followed the standard procedure of having the child consume 16 ounces of water immediately before going to bed. This happened after the child attained 14 dry nights in a row and continued until the child attained another 14 in a row. We replicated the previous findings of cutting the relapse rate in half, from 40% down to 20% (Young & Morgan, 1972). Recently, we modified the overlearning procedure to gradually increase the amount of water consumed before bedtime. This gradual overlearning has reduced the relapse rate in half once again, from 20% down to just less than 10%. Urine alarm treatment without some specific measure to prevent relapse is not the best treatment. Overlearning is a practical way to solve this limitation, and gradual overlearning is most effective.

### Family Involvement

As with almost any child problem, behavioral treatment for bedwetting requires concerted and cooperative effort from the entire family. Most treatment failures are due to non-compliance with the procedures, which can occur for a variety of reasons. The most de-



manding part of FSHT is training a child to wake to the alarm within the first 4 weeks of treatment. Many children require parental assistance to wake up. Parents have to be committed to waking the child and requiring the child to get out of bed before turning off the alarm. A family environment of cooperation and firm resolve is essential. Children, too, have to be ready to do the hard work of getting up whenever the alarm sounds.

Fortunately, most MPEs come from families that have the resources and skills to implement behavioral treatment. Put another way, enuresis is not an epidemiological marker for family dysfunction. Obviously, in cases in which there is significant marital discord, extreme distress in the primary caretakers, chaotic family structure, parental neglect or abuse, and significant child conduct disorder, such problems must be resolved before implementing behavioral treatment for bedwetting. Routine use of screening instruments for marital distress and child conduct disorder can identify such problematic cases. We have used the Locke-Wallace Marital Adjustment Test (Locke & Wallace, 1959) and the Child Behavior Checklist (Achenbach, 1996). Such measures can provide normative-based assessments of marital satisfaction and child externalizing problems.

In FSHT we use a behavioral contracting procedure between parents and children to promote cooperation and to clarify family rules for assisting the child. Siblings are included in the family contract so that they will know how to help and what to avoid. In extended families and blended families, all are included in the contracting process provided they spend significant time with the child in the nighttime. Provided that there is consistency and follow-through in each household, children who share multiple households can be successful. As with any behavioral intervention implemented by parents and caretakers, it is essential that the adults cooperate to provide structure and support.

### CHARACTERISTICS OF THE TREATMENT PROGRAM

FSHT includes four components: (1) basic urine alarm treatment, (2) cleanliness training, (3) retention control training, and (4) overlearning. The components are presented in an integrated manual for parents to follow, and a contract between parents and children forms the basis for implementing the treatment.<sup>1</sup>

#### The Family Support Agreement

Table 22.1 reproduces the Family Support Agreement. Parents and children complete this as a trainer illustrates what to do for each step. Children are instructed to follow the rule to get out of bed and stand up before turning off the alarm. Parents are told never to turn off the alarm for the child. The steps involved in cleanliness training are displayed on a wall chart (Daily Steps to a Dry Bed) placed in the child's room. The chart also displays a record of progress and is colored in as either wet or dry for each day. Parents are instructed to have the child go through with the full procedure of remaking the bed even if the sheets are not wet, something that typically happens in the latter part of training with newer body-worn alarms. Some children are difficult to arouse in the first 4 weeks. It is imperative that the child be awakened so that the child turns off the alarm. Even if this means that a parent must share the room with the child in the early phase of alarm treatment, training the child to awaken to the alarm is crucial. Children can do some rather remarkable things in their sleep, and it is important to give parents an easy way to determine if their child is truly awake. Short-term memory tasks such as choosing a pass-



TABLE 22.1. Family Support Agreement of FSHT

1. \_\_\_\_\_ AND \_\_\_\_\_ agree to do the training just like it is described in order to reach the goal of a dry bed.
2. Everyone agrees to follow the program for at least 84 days (12 weeks). Children who wet more than once a night will probably take longer to be completely dry.
3. The whole family agrees not to punish, scold, ridicule or even say anything negative about "bedwetting" during the training.
4. Both parents and child understand that training is most effective when the child is not overtired or stressed. Therefore \_\_\_\_\_ AND \_\_\_\_\_ agree that \_\_\_\_\_ P.M. is a reasonable bedtime, and \_\_\_\_\_ agrees to go to bed at that time every night.
5. NO RESTRICTIONS ON LIQUIDS. \_\_\_\_\_ will be allowed to drink as much liquid as desired at all times.
6. Parents and family agree to provide support, help and understanding to \_\_\_\_\_. They will praise him/ her when dry and provide encouragement that progress will be made. However, they understand that the training itself includes sufficient pressure and agree they will not urge him/her to try harder or do better.
7. Parents and family agree not to complain about the effects of the training on them or about the urine alarm, but to support and help instead. \_\_\_\_\_ also agrees not to complain about the training and to cooperate fully.
8. The family will provide a relatively stress-free environment at home during training. During the training, parents will not ask the child to do extra jobs around the house.
9. \_\_\_\_\_ AND \_\_\_\_\_ agree to participate in Self-Control Training once a day during the hours of \_\_\_\_\_ and \_\_\_\_\_ as explained in the Parent Guide.  
Parents will give \_\_\_\_\_ in money for each success according to the Reward Schedule for Self-Control Training.
10. \_\_\_\_\_ agrees to follow the procedure of Cleanliness Training as outlined on the wall chart and to put wet sheets and underwear in \_\_\_\_\_. Parents agree to keep clean sheets and clean underwear in the \_\_\_\_\_ in the child's room for him/her to use when remaking the bed.
11. Parents agree to wake \_\_\_\_\_ immediately if the buzzer rings and he/she does not wake up. IT IS ESSENTIAL THAT THE PERSON RESPONSIBLE FOR WAKING THE CHILD WILL BE ABLE TO HEAR AND BE AWAKENED BY THE ALARM. NOTHING ELSE SHOULD BE DONE TO WAKE THE CHILD DURING THE NIGHT. The alarm must do this.
12. Parents agree to check the batteries regularly and to have replacement batteries ready when needed. Parents will also check the absorbent pockets for wear and replace these when needed.
13. \_\_\_\_\_ AND \_\_\_\_\_ agree that ONLY \_\_\_\_\_ WILL TOUCH THE ALARM, except for alarm testing as described above.
14. Parents agree to assume all responsibilities associated with training for a dry bed as spelled out in the Parent Guide. \_\_\_\_\_ agrees to follow the Daily Steps to a Dry Bed outlined on the wall chart.
15. OVERLEARNING. When \_\_\_\_\_ has been dry for 14 consecutive nights, the Overlearning procedures will be followed until the child is dry for 14 more nights in a row. Overlearning will be explained when the child gets 14 dry nights in a row.
16. It is understood that every child has an occasional wet bed, especially when sick or under stress. DO NOT WORRY ABOUT THIS. TELL YOUR CHILD NOT TO WORRY.

\_\_\_\_\_  
(Child's Signature)

\_\_\_\_\_  
(Parent's Signature)

\_\_\_\_\_  
(Parent's Signature)

\_\_\_\_\_  
(Witness or Other Family Member)

Note. Parents and children complete this form during demonstrations of how each step is to be carried out. Explanations of the procedures are provided at each step. Completing all 16 items takes about 90 minutes.



word each night before bedtime or asking the child to spell a familiar word backwards are simple ways to determine whether the child is fully awake.

Retention control training is done once a day, and the child is given money for postponing urination for increasing amounts of time in a step-by-step fashion up to a 45-minute holding time. The total amount of money the child receives for reaching all 15 3-minute incremented goals is \$6.25. Children are encouraged to save the money in a prominent place to remind them of their accomplishments. Parents may have difficulty monitoring this activity and often need assistance with scheduling the procedure. Retention control training ends when the child attains the 45-minute goal, typically within 3 weeks.

The first goal of treatment is to attain 14 consecutive dry nights in a row. This takes an average of 8–12 weeks. With children who wet more than once a night, the average time to this first goal is 16–20 weeks. Overlearning begins immediately and is an essential ingredient for preventing relapse.

Our gradual overlearning begins by determining a maximum amount of water. The maximum is 1 ounce for each year of age plus 2 ounces. For example, the maximum amount for an 8-year-old child is 10 ounces. Children then begin by drinking 4 ounces of water 15 minutes before bedtime. If they remain dry for 2 nights while drinking 4 ounces, the amount increases to 6 ounces. If they remain dry for 2 nights at 6 ounces, the water is increased to 8 ounces. The water increases continue in this fashion, 2 ounces more for every 2 consecutive dry nights, until the child's maximum reached. The child continues to drink this maximum until he or she attains 14 consecutive dry nights. In the event a child wets, and most do at least once, a simple rule is followed. The child goes back to whatever amount was consumed on the immediate last dry night and continues with that amount until he or she remains dry 5 nights in a row. If the child is not already at the maximum, the procedure continues as before, increasing by 2 ounces for every 2 dry nights. The goal remains 14 dry nights in a row during overlearning. Some children end up having all 14 of those dry nights at the maximum amount, but this is not required for the relapse prevention effect.

### **Optional Waking Schedule**

Occasionally, it may be necessary to disrupt the child's sleep routine with a waking schedule to achieve the 14-consecutive-dry-nights goal. Parents are told to wake their child hourly using a minimal amount of prompting throughout the first night. Each time the child is awakened, he or she is praised for a dry bed and encouraged to void in the toilet. Any time the child wets the bed and consequently activates the alarm, the cleanliness training program is followed. The second night the child is awakened only once, 3 hours after falling asleep. From the second night forward, the waking schedule continues with the child being awakened only once each night. Following a dry night, the parents wake the child 30 minutes earlier than the previous night. If the child wets during the night, the time of waking remains the same as the previous night. The nightly waking schedule ends when the scheduled time for awakening the child is 30 minutes immediately following bedtime. The waking schedule resumes only if the child has 2 or more wet nights in 7 days. When resumption is necessary, the waking schedule begins at 3 hours after bedtime and decreases in the same manner (Azrin, Sneed, & Foxx, 1973; Bollard & Nettelbeck, 1982). The waking schedule is not a routine part of FSHT and is only indicated when there are extreme difficulties in training a child to awaken to the alarm.



### Minimal Visit and Multiple Visit Protocols

We have implemented this treatment in single-visit and dual-visit protocols with comparable results. In the single-visit protocol, the entire program is covered in one 90-minute session during which parents and children complete the Family Support Agreement and observe a demonstration for how to implement each component. In the dual-visit protocol, we cover the first nine items of the Family Support Agreement, which takes about 30 minutes. We devote the other 30 minutes to building rapport and presenting information to the family about the problem of bedwetting. This information emphasizes the learning basis of the therapy and the fact that learning the new skills will take time and patience on the part of the whole family. In the second 60-minute visit we review the preceding week's records for retention control training and demonstrate the alarm. The family then continues retention control training and begins home implementation of the urine alarm.

Regardless of how the treatment is introduced, follow-up contact is important. We have achieved good results with minimal contact, such as having biweekly phone contact. Somewhat better results can be expected with more therapist contact. This can take the schedule of two initial visits followed by a 30-minute visit within the first 2 weeks of starting the urine alarm. Thereafter, half-hour visits can be scheduled about every 3 weeks to provide encouragement and to solve minor problems. We have also implemented the protocol in which the start of overlearning triggers a return visit. Much depends on the circumstances of the particular child and family. FSHT can be implemented with as few as one or two visits. Rarely have I ever conducted the treatment with more than six visits over the course of 16–20 weeks.

### Group and Individual Session Formats

FSHT has been successfully delivered in both group and individual therapy formats. As summarized later, we have replicated the effectiveness of group-administered FSHT in a series of five studies. With the exception of differing relapse rates due to different forms of overlearning in these five trials, outcomes were comparable. In these studies, families attended group training sessions held in university classrooms large enough to accommodate up to 10 families at a single training demonstration. Due to developmental differences and the fact that some older children feel embarrassed in the presence of much younger children, we typically formed groups separately for children 12 years old and older. Presentations to adolescents differ in terms of how much the child is placed in charge of implementing the behavioral procedures. In most cases, these young people are highly motivated and want to "train themselves" with minimal assistance from adults.

Individual administration of FSHT has been conducted by numerous practitioners who have requested and used the treatment materials over the past 20 years.<sup>2</sup> In that same period, I have collected effectiveness data on individual administration using both single-visit and dual-visit initial training sessions. Those outcome data are presented here and suggest results comparable to those achieved via group administration of the FSHT protocol.

The decision to proceed with individual as opposed to group administration of FSHT is largely practical and economical. Many solo practitioners may not have access to a classroom-style facility to conduct groups attended by as many as 30 people. Also, insurance reimbursement for behavioral treatment is highly variable, and some plans may dictate individual as opposed to group therapy or offer financial incentives for one



as opposed to the other. One of the true tragedies of the current U.S. healthcare system is that third-party providers almost always reimburse for medication treatments that are more expensive and less effective, and they may not provide any reimbursement for behavioral treatment.

### **Reinforcing Accomplishments and Reducing Frustrations**

Although we have shown that effective behavioral treatment can be delivered in a cost-efficient manner using minimal contact and group delivery, it is important to note that our study protocols always included regular contact with the child and family during the course of treatment, even if that contact was confined to phone consultations. Again, the major weakness of any behavioral treatment is lack of compliance often due to the difficulty of implementing the treatment procedures with particular cases. General therapeutic skills and practical problem solving are needed to forestall noncompliance and premature dropout.

A focus on reinforcing accomplishments during treatment is helpful. Children who wet multiple times each night get easily discouraged. These families need to understand that it will take 12 to 16 weeks as opposed to the average of 8 to 12 weeks for the child to achieve the first 14 consecutive dry nights. Also, multiple wettings mean multiple awakenings with all the attendant work. Informing such children that their first goal is to get from multiple wettings to a single wetting episode each night adjusts their expectations and prevents some of the frustration.

Pointing out that progress can be measured by monitoring the size of wet spots helps parents and children to focus on the process and recognize that even though every night has been a "wet night," the child is responding more readily to the alarm. As the size of the wet spot gets smaller and smaller, the child is learning to make the active avoidance response sooner and sooner. Dry nights are sure to follow. In focusing on the goal of attaining 14 consecutive dry nights, parents and children often need to be reminded of the overall picture. Even though a child may not have reached the 14-night goal, he or she may have been 90% dry for the past 6 weeks. This can give the family a more positive perspective and encouragement to proceed. The goal of attaining 14 dry nights in a row can be frustrating, especially when a child gets 13 in a row and then wets on the 14th night. I tell children that of some 1,500 cases I have seen, no one has ever failed to be dry if he or she got 13 in a row and then wet. All those children went on to complete the treatment.

Many children enjoy the challenge of overcoming bedwetting, and it is easy to engage their competitive spirit to positive ends. Some bring their wall charts to each follow-up visit to show off their progress. Others set goals of beating the 42-day record for completing FSHT. As long as their goals are not outlandish and beyond reach, this energetic approach to getting rid of the problem is useful because the child's motivation can be directed to accomplishing the daily tasks of behavioral treatment.

Parents often want to add other incentives to the FSHT program, and this is not typically a good idea. What can be helpful is to redirect this urge to teach the parents to use contingent praise for completion of the various tasks involved in behavioral treatment. Praising children for their hard work of waking to the alarm, remaking the bed, and taking the soiled linens to the laundry is directly beneficial. Outcome-related rewards such as a new mattress or new bed upon completion of the program can be helpful but are not essential. We emphasize the inherent attraction of no longer wetting the bed, and children understand instantly that this is a big reinforcer.



### Relapse Prevention and Follow-up

Carrying out the overlearning procedure can be especially challenging for children who have struggled and finally attained the first 14 dry nights in a row. Children and their parents often fear the prospect of overlearning because they fear that once a child wets again, the child will never recover and be dry at night. We typically tell such parents and children that overlearning is designed precisely to show them that their fear is unwarranted. In this regard it is important to emphasize that almost all children wet at least once during overlearning. The process of having a programmed relapse can produce the effect of building confidence in both parents and child.

Overlearning is introduced by citing the data to the parents and child. The chance of a relapse without overlearning is 4 out of 10. In contrast, the chance of relapse is less than 1 out of 10 if the child does the gradual form of overlearning. The benefit of doing overlearning far outweighs the time and effort to complete it. Occasionally, a child simply cannot complete overlearning (i.e., he or she cannot get 14 consecutive dry nights during the drinking procedure). Although our outcome trials have been conducted under rigorous procedures that required completion of overlearning to be counted a treatment success, in the effectiveness work based on clinical flexibility, I have suspended overlearning if a child has not completed it within 8 weeks. In such cases, the child stops the nighttime drinking and simply continues with the alarm until he or she attains 14 consecutive dry nights without the drinking. The child then proceeds to follow-up. This does not seem to lead to any worse outcome and causes me to suspect that the benefit of overlearning as a relapse prevention procedure may be as much psychological as it is physiological. The added water load before bedtime forces almost all children to wet at least one night. When they go on to overcome this "setback," they gain new confidence in their ability to maintain a dry bed. This may also contribute to their confidence to accept invitations to sleep over away from home, a practice that is strongly encouraged once the treatment is completed.

Follow-up in FSHT has been for 1 year or more. In both the efficacy data and the effectiveness data, we have followed children for 3 months, 6 months, and 1 year. In the outcome studies we did not offer retreatment in the event of relapse because we were interested in estimating the relapse rates. In data collection efforts, our focus has been on relapse prevention rather than retreatment of relapsers, a procedure strongly recommended for clinical practice.

In clinical applications, we have offered retreatment in the event a child wet four or more times in 14 days. Parents and children were instructed to contact the clinic in the event of a relapse and to reinstate the alarm until the child was dry for 14 consecutive nights. Such retreatment permanently stops the recurrence in over 95% of cases.

One other note about follow-up bears mentioning. Children and families follow-up with clinicians long after the follow up period has passed. Over the past 20 years, I have received numerous postcards, letters, and greetings from parents and former adolescent clients who have themselves become parents. Helping a family overcome a child's bed-wetting problem is rewarding work, and the children and their families are typically grateful to have solved the problem.

### EVIDENCE FOR THE EFFECTS OF TREATMENT

We have been fortunate to have collected both efficacy and effectiveness data on FSHT. When compared to urine alarm procedures without any ancillary procedures such as retention control training and overlearning, FSHT is an improvement over the urine alarm



alone. In fact, it is not good practice to use the urine alarm without some form of relapse prevention. Our component's breakdown analysis of FSHT suggested that the addition of retention-control training to the package was helpful in getting the child to the first 14 dry nights in a row. Children who did the retention training as compared to those who did not attained the 14-night goal faster (Houts, Peterson, & Whelan, 1986). This is important in terms of motivating the family and speeding progress toward the ultimate goal of complete cessation of bedwetting.

### Controlled Outcome Trials in Group Format

Figure 22.1 summarizes 1-year follow-up results from six observations of FSHT. Four of these are from published studies and are indicated by their respective dates of publication (Houts, Liebert, & Padawer, 1983; Houts et al., 1986; Houts, Whelan, & Peterson, 1987; Whelan & Houts, 1990). The 1991 sample shows FSHT outcomes from an unpublished randomized clinical trial comparing FSHT to imipramine and oxybutynin. The 137 cases labeled 2000 have accumulated in our private enuresis clinic over a period of 14 years and represent effectiveness data from a clinical practice.

Based on the five efficacy trials, about three of every four children treated with FSHT can be expected to stop bedwetting at the end of the average of 12 weeks needed to complete the treatment. It is important to remember that these data were obtained under research protocol conditions in which flexibility of procedures was highly constrained. Further, these samples did not include secondary enuretics and children with clinically significant behavioral problems such as conduct disorder and attention-deficit/

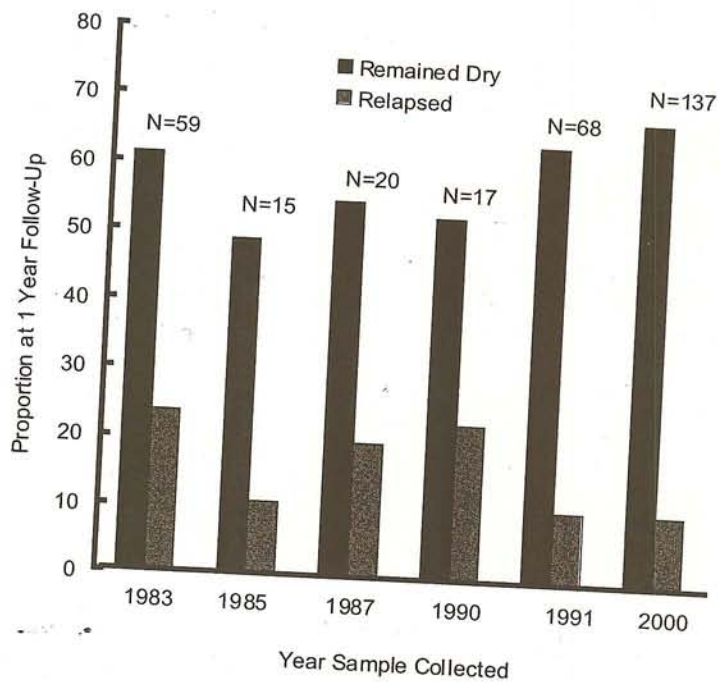


FIGURE 22.1. Mean percentage of children who remained dry or relapsed at 1-year follow-up with full-spectrum treatment for five samples. N = total sample size. "Relapse" was defined as 2 or more wet nights in 1 week.



hyperactivity disorder (ADHD). Single-parent households were represented in these data, as were low-income families. However, the samples did not include families with marked marital discord or clinically significant family dysfunction. Although these demographic limitations constrain the applicability of findings, it also should be remembered that these samples are quite representative of bedwetting children, most of whom do not have these additional problems.

At the 1-year follow-up, 6 of every 10 children are permanently dry. The lower relapse rates observed in the 1991 and 2000 samples were from children who did our gradual overlearning where they increased nighttime drinking in 2-ounce increments adjusted for their age. In the other samples, overlearning was done in the original fashion of having children consume 16 ounces of water regardless of age. We now consistently find that slightly less than 10% of children relapse using the gradual overlearning procedure.

### **Effectiveness Outcomes in Individual Format**

In the case of FSHT, effectiveness data mirror the efficacy data. The 137 cases from our private enuresis clinic were referred by pediatricians and pediatric urologists. More than in the research trials, this sample contained children with additional problems, most often ADHD. Such children were typically receiving stimulant medication and varying degrees of supportive behavior therapy either through the schools or from another practitioner. The issues in dealing with such children are the same when dealing with children who have other behavioral problems. Successful behavioral treatment for bedwetting requires child compliance with the procedures and supportive and cooperative parents. Parents who use coercive parenting and engage in repeated struggles with a noncompliant child cannot expect to be successful with FSHT. In fact, I tell them that I will not provide the treatment until they first clear up the other problems so that the child has a good chance for success with the bedwetting treatment.

In this context, I have also treated a number of secondary enuretics, children who resumed wetting after a period of 6 months or more of continuous continence. Again, excepting oppositional behavior and family dysfunction and discord, these children also respond well to FSHT and achieve outcomes comparable to those achieved by monosymptomatic primary enuretics. The issue with secondary enuresis is not the history of continence followed by recurrence of bedwetting. Instead, the issue is the family environment and ancillary child behavior problems. Absent the correlated child behavior and family difficulties, secondary enuretic children are good candidates for FSHT.

### **Important Research Directions**

In FSHT, we have not completely solved the problem of relapse, but we have come some distance in preventing relapse after successful treatment with the urine alarm. One thing that is needed is a quantitative study of the effects of retreatment of relapses. We may well be able to claim that behavioral treatment permanently cures over 90% of MPEs who follow through with the full treatment program. As it now stands, we can safely claim that most coveted outcome for about 70–75% of such cases.

There are true nonresponders to behavioral treatment. When one sets aside those cases in which the child defeats the alarm device and the parents fail to provide support and assistance, there are still some 10–15% of cases that do not respond despite the fact that they carry out the treatment to the fullest. What we need, and what we are not likely ever to get because there is no glory in it, is an intensive study of true treatment fail-



ures. This would be beneficial on the obvious front of improving treatment and screening for behavioral treatment. It would also be useful from an etiological point of view. Like most every other problem in the field of behavior, bedwetting is most likely the outcome of multiple causal pathways. Classifying the fallout from failure to respond to behavioral treatment could shed some light on the types of causal pathways not adequately addressed by urine alarm treatment. For example, some children never learn to awaken to the alarm. Such children may require a different type of alarm that is louder and might even provide tactile stimulation through vibration. A pioneer in the field, Dan Doleys once told me that he never had a child fail to awaken to the alarm because he used his own alarms built by a lab tech. These alarms used old school bells (D. Doleys, personal communication, April 30, 1990). Oddly enough, the first urine alarm was not an alarm at all but a spring-loaded metal bed that catapulted the child across the room when urine closed the pad contacts and activated a solenoid that released the bed frame (Mowrer, 1980). Waking the child at the correct time is both practically and theoretically important. Surely some of the nonresponders to behavioral treatment fail to arouse to the alarm, and methods for improving arousability are important to pursue. Technological innovations, behavioral additions such as the waking schedule, and pharmacological methods are all worth pursuing.

Another important type of failure is the child that continues multiple wetting and never moves to single-episode wetting. These children are most likely that subgroup which has a deficit in the natural production of antidiuretic hormone. They are also good candidates for combining behavioral treatment with synthetic antidiuretic hormone (Bradbury & Meadow, 1995; Sukhai, Mol, & Harris, 1989).

The role of airborne allergies and food allergies also merits further investigation. There are occasional references to the co-occurrence of these problems with bedwetting, but systematic investigations are lacking. With all of the aforementioned problems, the difficulty is the low base rate. It is difficult to accumulate a sufficient sample for study of the mechanisms relating such difficulties to bedwetting.

## HISTORY AND THE FUTURE

Behavioral treatment of childhood enuresis with the urine alarm is one of the best examples of a highly effective intervention for a widespread problem where the intervention has been based on laboratory-derived principles of learning and conditioning. As one of the oldest forms of 20th century behavior therapy, the object lesson offered by the history of this treatment is important for the 21st century. To understand where we are and where we might go, it is important to appreciate the history of psychological and medical treatment for enuresis. This history reflects the larger issues for empirically supported psychological treatments more generally. Will children of the 21st century be medicated for their difficulties to the exclusion of alternative and adjunctive behavioral interventions? What is it about our culture in the United States that makes pharmacotherapy so attractive and so easily sold? What does it take to make a treatment available once it has been shown to be effective?

### History of Urine Alarm Treatment

At the time that Mowrer faced the challenge of designing a solution to bedwetting, he was part of a group of Yale psychologists who were attempting to translate Hullian



learning theory into clinically relevant terms. In the height of the Great Depression even a Yale professor could not earn enough to make ends meet, so Mowrer and his wife took up residence in a home for misfit boys, many of whom wet the bed. As house parents, the burden of 12 or so wet beds every night was surely enough adversity to give birth to some invention. From the impracticality, not to mention the danger, of the spring-loaded bed, Mowrer reasoned his way to the urine alarm. Some version of the urine alarm that uses moisture pads placed on the bed has been in use since the first publication by the two Mowrers in 1938 (Mowrer, 1980; Mowrer & Mowrer, 1938). The Mowrers did not get a patent on the device, nor did they copyright the procedures in written manuals or books. In fact, they did not pursue the subject of enuresis beyond their seminal 1938 publication.

Patents were, however, obtained by several commercial manufacturers in the United States, and from the early 1940s to the present, various versions of the urine alarm device have been available from the Sears catalogue and from such chain department stores as J. C. Penney and Montgomery Ward. In the early 1950s, several companies were formed in the United States to sell treatment for bedwetting, and these companies featured their own alarm devices, which were typically "leased" to the family for an exorbitant price. The business model for these companies, some still in existence today, is to place sales personnel in certain regions and then blanket the region with advertisements. A salesman then comes to the home in response to returned postcards and attempts to sell the family a treatment program. Today the contract costs about \$2,000. The point is, these companies are still in business today, some 50 years later.

Where are the psychologists? Throughout the 1940s, theoretical interest in bedwetting took hold not in the United States but in the United Kingdom. Among the graduates of the first class of clinical psychologists trained at the Maudsley program organized by Eysenck were a number of investigators who went on to do empirical work in the field of conditioning treatment for enuresis. As an intellectual center for behavior therapy, this program attracted a number of students and postdoctoral fellows from around the world, thus spreading the word about conditioning treatment. The net effect of these developments is that within the National Health Service of the United Kingdom and throughout much of Australia, urine alarm treatment for enuresis is widely available. Intellectual interest in the principles of classical conditioning and avoidance learning spawned a keener awareness of conditioning treatment of enuresis and provided a solution to a problem that medical professionals had little success in treating.

By way of contrast, developments in the United States followed a different course. Interest in the problem of enuresis as a "laboratory" for testing various conditioning formulations did not take hold. Compared to the British and Australian empirical publications, relatively little work was conducted in the United States until the mid-1970s, when Azrin and his colleagues challenged the idea that the urine alarm worked by methods of classical conditioning (Azrin et al., 1973; Azrin & Thienes, 1978). When others failed to replicate the Azrin results and showed instead that the urine alarm was an essential component to successful behavioral treatment, the theoretical dispute about classical conditioning was largely settled (Bollard & Nettelbeck, 1982).

As graduate students in the late 1970s at Stony Brook University (then the State University of New York at Stony Brook), we enjoyed debates about classical versus operant conditioning explanations for urine alarm treatment. We followed the "experiments" (we did not call them clinical trials) with theoretical interest to see how the issues would be resolved by data. In retrospect, this intellectual interest in models of conditioning was probably atypical and was certainly short-lived in the broader scheme of training pro-



nience of urine alarm treatment and emphasize the safety of long-term use of DDAVP. They even question the durability of urine alarm treatment, as if we do not know fully well that urine alarm treatment is far more durable than DDAVP. Promoters of DDAVP routinely visit pediatricians. There is no comparable promotion for urine alarm treatment.

Promotion alone, however, does not account for the business success of DDAVP. Having the right cultural niche is also important, and this has been provided in the United States by popular culture and by the rise of managed health care.

### Popular Culture Disinformation and Managed Care

Another influence on misconceptions about treatment for bedwetting comes through popular culture in television advertisements for special underpants, a euphemism for diapers. Diaper manufacturers remind parents to discuss the problem with the child's doctor and point out that the doctor will tell them there are no guarantees with any treatment. The idea that wearing diapers might further habituate a child to the sensations of a wet bed that might otherwise prompt waking and learning to be dry is never mentioned. In fact, waiting until the child is 11 to 15 years old is the main message of the diaper purveyors. After all, the sooner a child stops bedwetting, the sooner their product is no longer needed. No wonder parents are confused. Television advertisements convey the message that wearing diapers is normal for an adolescent who wets the bed.

In addition to such confusing messages within popular culture, there is the influence of managed care on which treatments are supported for bedwetting. Managed care companies routinely pay for prescription medicines, and they often question "nonmedical" services. Most insurance plans have different reimbursement rates for care provided under mental health as opposed to physical health. Hence, psychologists who provide treatment for bedwetting receive a lower rate of reimbursement. Thus, even when behavioral treatment for bedwetting is covered by third-party payers, the immediate contingencies for parents are such that it is cheaper for the parents to get the more expensive and less effective medication treatment with DDAVP. These market forces have led to expanded ignorance of behavioral treatment on the part of both parents and professionals.

### Where Can We Go from Here?

Twenty years ago, I imagined that we might have an efficient delivery system for successful behavioral treatment of enuresis (Houts et al., 1983). We are far from that, but I remain hopeful. Several things are needed to bring about change in the routine treatment of bedwetting children.

First, behavioral treatment needs a sponsor that can compete with the pharmaceutical and diaper companies. The obvious organization is the American Psychological Association (APA). Psychologists developed urine alarm treatment, and they remain the most likely providers who have the requisite background to implement it successfully in both simple and complex cases. The APA or some division within the APA such as Pediatric Psychology should work together with the requisite medical associations to develop and publish a set of treatment guidelines for the care of enuretic children.

Second, through its accredited training programs, the APA should provide incentives for the teaching of behavioral treatment to new psychologists in training. Training programs may need to revamp their curricula so that students receive direct instruction in empirically supported child therapies, and the APA could facilitate this revamping with



grams in the United States. Within a decade, everything and everyone went "cognitive," so much so that a fellow graduate student who was interested in the theoretical implications of enuresis treatment and who had since gone on to teach at the University of Illinois remarked to me that he had to give up his interest because graduate students responded to the subject matter like a "wet blanket." Today, it is extremely rare to find a clinical psychology graduate student who has any interest in basic research in classical or operant conditioning, and most have little or no knowledge of the relevant literature. In my own department, there is no graduate-level course in learning, and this is fairly typical throughout the United States. The point is that unlike the British and Australian histories, in the United States there has never really been sustained intellectual interest in the problem of enuresis. This has contributed to the relative lack of widespread availability of urine alarm treatment from properly trained professionals.

Another important part of the historical picture concerns the role of medical professionals and the pharmaceutical industry in treatment for bedwetting.

### Recent History of Pharmaceutical Treatment

Prior to the introduction of DDAVP into the United States in 1989, the modal treatment recommended by medical doctors was to do nothing and wait for the child to outgrow the problem. If treatment was offered, most often it was an antidepressant, imipramine hydrochloride, which carried risks of poisoning and adverse cardiovascular events in overdose. Moreover, this treatment was not effective. Nevertheless, the medical community was generally not educated about behavioral treatment and among those few who were, providers were not readily available to deliver the treatment. Behavioral treatment was never integrated into primary care of enuretic children in the manner that had happened in the United Kingdom and Australia.

With the introduction of DDAVP into the culture of American medicine, this new and much safer medication offered primary care physicians the option to provide a treatment that was safe and that might be effective. As it turns out, the evidence clearly favors urine alarm treatment over DDAVP, but this has been practically negated by the powerful advertising campaigns of the drug company involved. The selling of DDAVP as a treatment for bedwetting is instructive, and to the extent that pharmaceutical companies can successfully sell medications for other problem behaviors, it does not bode well for the future of psychological treatments more generally. What is so fascinating about the case of treatment for enuresis is that an inferior and more expensive treatment has become the de facto standard of care even in a scientific climate that features "evidence-based medicine" and an economic climate that features "cost containment." How did this happen?

Pharmaceutical advertising has become very sophisticated. The obvious influences are easily recognized. Medical doctors in training receive gifts of all types. Physicians in practice are routinely visited by representatives who provide free samples, coffee mugs, pens, and even dinners and cruises called seminars. What is less obvious is the advertising that takes place in the form of studies and publications. When we examine the literature on enuresis over the past 15 years, there is an elephant in the library. The manufacturer of DDAVP has sponsored numerous publications and special issues of journals. The manufacturer has spent millions of dollars to conduct and publish research, much of which was designed to provide a rationale for the use of the product. The message is subtle but clear: Use the product instead of the urine alarm. What is left out of their messages is more telling than what is in them. Manufacturer materials refer to the inconve-



both carrot and stick. Providing programs with the training materials and publishing those materials on the Internet would make them widely available. Accreditation reviews can require evidence that students are instructed in empirically based therapies such as behavioral treatment for enuresis.

Third, advertising is clearly important. Organizations such as the APA can work with manufacturers of urine alarms to promote behavioral treatment. This can be done through print and media advertising.

Finally, adequate education of primary providers, mostly primary care physicians and pediatricians, remains to be accomplished. Hearing once vaguely about alarm treatment as a third-year medical student is no match for the constant bombardment of promotional materials from the pharmaceutical company once the student goes on to practice medicine. Psychologists and medical educators need to collaborate to find ways to convey to medical students the importance of research methodology in the assessment of claims for treatment efficacy. This includes the publication in medical journals of primary studies of behavioral treatment, something that has been sadly rare.

### SUMMARY AND CONCLUSIONS

Bedwetting is a problem for some 5 to 7 million secondary school-age children in the United States. This problem can be solved in most cases with some form of urine alarm treatment. FSHT is a behavior treatment that has been tested in several clinical trials and shown to be efficacious. This treatment has also been used in clinical settings and has been demonstrated to be effective. A key feature of FSHT is that it contains a modified overlearning procedure to prevent relapse, and this gradual approach to overlearning is both effective and practical.

Although it is of considerable theoretical interest to document how the urine alarm works, this type of investigation involving all-night sleep studies is expensive and unlikely to be pursued. Hypotheses regarding the role of antidiuretic hormone in bedwetting have been investigated extensively because the pharmaceutical companies that manufacture synthetic antidiuretic hormone have a vested interest in such studies. Despite such extensive study, there is little reason to believe that the etiology of bedwetting is some defect in production of naturally occurring antidiuretic hormone. At best such an etiological hypothesis might be true for about 10% of bedwetting children who wet multiple times each night.

In the larger scheme of healthcare delivery, the problem with behavioral treatment for bedwetting is that the treatment is not being delivered to children and families. There are economic and social structural barriers to making this treatment widely available. Unlike medication treatments and stop-gap approaches such as diapers, behavioral treatment for enuresis has no corporate backing. There is no sales force for behavioral treatment, and there is no advertising campaign. Behavioral treatment for bedwetting needs some form of institutional backing and promotion. A logical place for this to happen is with the APA, because psychologists have developed behavioral treatment, and APA is the most likely group trained to implement it. Ironically, the APA is currently engaged in a massive campaign to obtain prescribing privileges for psychologists. Regardless of what one thinks about the general issue of prescribing privileges for psychologists, obtaining such privileges for treatment of bedwetting would be a step backward. The history of treatment for bedwetting has some interesting lessons to teach regarding the relative role of medications as contrasted with conditioning-based behavior therapies. At least in the



case of bedwetting treatment, behavior therapy is the treatment of choice. Whether this will hold for other child problems remains to be seen. What is abundantly clear from the example of bedwetting is that establishing the superiority of one treatment over all others is no guarantee that the best treatment will be delivered in a market-driven healthcare economy.

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### NOTES

1. The 33-page manual for parents and wall chart for children is available on request from Arthur C. Houts, Department of Psychology, 202 Psychology Building, University of Memphis, Memphis, TN 38152. Telephone (901) 678-4685. E-mail [ahouts@bigfoot.com](mailto:ahouts@bigfoot.com). The cost is \$5 for postage and handling.

An affordable and durable body worn urine alarm, Wet Stop, is available from Palco Laboratories, 8030 Soquel Avenue, Santa Cruz, CA 95062; tel: (800) 346-4488.

2. I have maintained a list of professionals who requested the manual, and over the past 20 years this includes about 130 names. Unfortunately, I did not have the foresight to create a research network of practitioners who might report back their outcomes with FSHT. This is certainly possible with the advent of information technology and the Internet.

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