

DRY-BED TRAINING: RAPID ELIMINATION OF CHILDHOOD ENURESIS*

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(Received 21 January 1974)

Summary—Enuresis has been treated with moderate effectiveness by the urine-alarm method which requires many weeks of training. The present procedure used a urine-alarm apparatus but added such features as training in inhibiting urination, positive reinforcement for correct urinations, training in rapid awakening, increased fluid intake, increased social motivation to be nonenuretic, self-correction of accidents, and practice in toileting. After one all-night training session, the 24 enuretic children averaged only two bedwettings before achieving fourteen consecutive dry nights and had no major relapses. Little or no reduction in bedwetting occurred within the first two weeks for matched-control enuretics who were given the standard urine-alarm training. The results of a control-procedure showed that the new procedure did not involve Pavlovian conditioning. The new method appears to be a more rapid, effective and different type of treatment for enuresis.

About 10 per cent of all children are enuretic at the age of 6 yr. and some are still enuretic as teenagers. When enuresis is eliminated, the child's emotional adjustment has been found to be improved (Lovibond, 1964). The most effective treatment for enuresis is the urine-alarm technique which was first used extensively by Mowrer and Mowrer (1938) based on their Pavlovian conditioning analysis. A loud buzzer (UCS) sounds as soon as a specially constructed bed pad is moistened by urine. The procedure requires several weeks or months, has a relatively high relapse rate, but is initially effective for as many as 80-90 per cent of enuretics (see reviews by Lovibond, 1964; Jones, 1960; Yates, 1970).

Very recently, a new procedure, the Dry-Bed procedure, has been developed from an operant model rather than a respondent model and has been used with profoundly retarded adult enuretics who were institutionalized (Azrin, Sneed and Foxx, 1973). This Dry-Bed procedure required only one night of intensive training followed by use of the urine-alarm apparatus for as little as one week. Some of the major features of the intensive training procedure were (1) large fluid intake to increase the desire to urinate, (2) hourly awakenings, (3) teaching the client to awaken to mild prompts, (4) practice in going to the toilet, (5) reinforcement for urinating in the toilet at night, (6) use of the urine-alarm apparatus to signal a bedwetting, and (7) training in awareness of the dry vs. wet condition of the bed. When an accident occurred, the client received verbal disapproval, he was required to change the bed sheets, and he was required to practice arising from the bed to walk to the toilet. After one night of intensive training, the urine-alarm apparatus remained on the bed until one week elapsed without an accident. During that time, accidents received the same treatment, but the other procedures were omitted. Bedwetting virtually ceased within only 2 or 3 days after the intensive training.

* The research was supported by the Illinois Department of Mental Health. We wish to thank Afton Jarvis and Dorothy Millard for serving as trainers. Reprints may be obtained from any of the authors at the Behavior Research Laboratory, Anna State Hospital, 1000 North Main Street, Anna, Illinois 62906, U.S.A.

The surprisingly rapid success of the Dry-Bed procedure with the retarded adults led the authors to believe that even greater success might be achieved with non-retarded enuretic children (Azrin *et al.*, 1973). Surprisingly, preliminary results indicated greater difficulty with the normal children. One plausible reason was that the adults had already achieved some degree of control as evidenced by their wetting their beds only 50 per cent of the time rather than the typical 100 per cent for the normal enuretic child. A second apparent reason was that the sleeping parent did not react to a signalled bedwetting as reliably as did the night-duty attendants for the retarded residents in the institution. The procedure was, therefore, modified. To ensure the awakening of the parent, a buzzer was located in the parent's bedroom in addition to the usual buzzer in the enuretic's bedroom. Other procedural changes were made to capitalize on the greater understanding and co-operation of the non-retarded child. The child was given lengthy verbal instruction and explanations regarding the procedure. He was required to answer questions about the procedure, he was taught to engage in the required practice trials with a minimum of supervision and he was given training in deliberately delaying his urination similar to that used by Kimmel and Kimmel (1970). A second change that was natural to the home, rather than the institutional situation, was for the parent to require the child to toilet himself at the time that the parent went to sleep for the night, thereby easing the child's problem of inhibiting his urine throughout the remainder of the night.

The Dry-Bed procedure and its present modifications were devised with the view that the elimination of bedwetting was an operant process rather than Pavlovian conditioning. To evaluate this view, the present study included a procedure in which the unconditioned stimulus, the buzzer, was not present in the child's room, but only in the parent's bedroom. If the treatment process depended on Pavlovian conditioning, this omission of the UCS buzzer for the child should not result in conditioning since the remoteness of the parent's bedroom rendered the sound of the buzzer faint, if at all audible to the sleeping child. Conversely, if bedwetting did cease when the UCS buzzer was omitted, Pavlovian conditioning could not be responsible for the decrease.

METHOD

Subjects

Twenty-six children were obtained as clients in response to a newspaper advertisement that offered free treatment for bedwetters 3 yr of age or older. The only two children excluded were one who had a suspected medical problem, and one whose father did not desire a training effort. The average age was 8 yr, including three children under 6 yr of age. Nineteen were boys and seven were girls. All but one child, IQ of 70, had apparently normal intelligence. All but two had been wetting every night since infancy. Even these two exceptions had been fairly consistent bedwetters during the previous year, and prior to that time they had never remained dry for more than two months. Virtually all of the parents had sought medical assistance, and two had enrolled their children in a commercial training program with limited success.

Experimental design

The experimental design, as outlined in Table 1, provided a within-subject as well as a between-subjects comparison between the standard urine-alarm method and the new Dry-Bed procedure. The 26 children were divided into 13 pairs matched for age, sex and

frequency of bedwetting. Within each pair, the children were randomly assigned by a coin flip to the Control Group (Standard Urine-Alarm Procedure) or the Experimental Group (Dry-Bed Procedure). The first seven pairs were in Experiment I, whereas the subsequent six pairs were in Experiment II. The two Experimental Groups and the two Control Groups were very comparable to each other with respect to age (7.5 ± 0.5 yrs), to sex (about a 2:1 ratio of boys to girls) and to mean frequency of bedwetting (95 ± 5 per cent of the time). The Dry-Bed procedure was used in both Experiment I and II. In Experiment I, the urine-alarm sounded in the parents' bedroom as well as in the child's room, thereby providing the additional likelihood of awakening the parent (see Table 1). In the Dry-Bed procedure of Experiment II, the urine-alarm sounded only in the parents' room and not in the child's room, thereby providing an evaluation of the Pavlovian interpretation which requires the use of the alarm to condition the child. The within-subjects comparison was provided (see Table 1) by instituting the Dry-Bed procedure for the children in the control group after two weeks of training by the standard urine-alarm procedure.

Table 1.

		1st two weeks	After 1st two weeks
Exp. I	Experimental Group:	Dry-Bed Procedure (Parent-and-Child Alarm)	Dry-Bed Procedure (Parent-and-Child Alarm)
	Control Group:	Standard Conditioning Procedure (Child-Only Alarm)	Dry-Bed Procedure (Parent-and-Child Alarm)
Exp. II	Experimental Group:	Dry-Bed Procedure (Parent-Only Alarm)	Dry-Bed Procedure (Parent-Only Alarm)
	Control Group:	Standard Conditioning Procedure (Child-Only Alarm)	Dry-Bed Procedure (Parent-Only Alarm)

Apparatus

The urine-alarm apparatus was a commonly used and commercially available bed pad (Montgomery Ward, catalog No. 53A21530). It consisted of two aluminum foil sheets connected to a battery and separated by a sheet of absorbent cloth. When the child urinated, the urine passed through the perforations of the upper sheet of aluminum foil and was absorbed by the cloth, thereby causing a small electrical current to flow between the metal sheets and triggering the buzzer in the circuit box that was connected by wires to the metal sheets. In its usual application, the buzzer was located within 6 ft of the child's bed (Child-Only Alarm Procedure). For the Dry-Bed procedure of Experiment I, a second buzzer was added that was located in the parents' bedroom such that bedwetting caused both buzzers to sound simultaneously (Parent-and-Child Alarm Procedure). For the Dry-Bed procedure of Experiment II, the buzzer sounded only in the parents' bedroom and not in the child's room (Parent-Only Alarm Procedure).

Control group (Standard Urine-Alarm Procedure)

The children in the control group received training as described in the written instructions of the commercially available urine-alarm apparatus. The procedure incorporated the principal features of the standard urine-alarm conditioning method used in previously reported applications. Before the enuretic child went to bed, he was told by his parents that they were displeased with his bedwetting. The urine-alarm was placed in the bed such

Table 2. Dry-Bed procedure

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- I. Intensive training (one night)**
- (A) *One hour before bedtime*
1. Child informed of all phases of training procedure
 2. Alarm placed on bed
 3. Positive practice in toileting (20 practice trials)
 - (a) child lies down in bed
 - (b) child counts to 50
 - (c) child arises and attempts to urinate in toilet
 - (d) child returns to bed
 - (e) steps (a), (b), (c) and (d) repeated 20 times
- (B) *At bedtime*
1. Child drinks fluids
 2. Child repeats training instructions to trainer
 3. Child retires for the night
- (C) *Hourly awakenings*
1. Minimal prompt used to awaken child
 2. Child walks to bathroom
 3. At bathroom door (*before* urination), child is asked to inhibit urination for one hour (omit for children under 6)
 - (a) if child could not inhibit urination
 - (i) child urinates in toilet
 - (ii) trainer praises child for correct toileting
 - (iii) child returns to bed
 - (b) if child indicated that he could inhibit urination for one hour
 - (i) trainer praises child for his urinary control
 - (ii) child returns to bed
 4. At bedside, the child feels the bed sheets and comments on their dryness
 5. Trainer praises child for having a dry bed
 6. Child is given fluids to drink
 7. Child returns to sleep
- (D) *When an accident occurred*
1. Trainer disconnects alarm
 2. Trainer awakens child and reprimands him for wetting
 3. Trainer directs child to bathroom to finish urinating
 4. Child is given Cleanliness Training
 - (a) child is required to change night clothes
 - (b) child is required to remove wet bed sheet and place it with dirty laundry
 - (c) trainer reactivates alarm
 - (d) child obtains clean sheets and remakes bed
 5. Positive Practice in correct toileting (20 practice trials) performed immediately after the Cleanliness Training
 6. Positive Practice in correct toileting (20 practice trials) performed the following evening *before* bedtime
- II. Post training supervision (begins the night after training)**
- (A) *Before bedtime*
1. Alarm is placed on bed
 2. Positive Practice given (*if* an accident occurred the previous night)
 3. Child is reminded of need to remain dry and of the need for Cleanliness Training and Positive Practice if wetting occurred
 4. Child is asked to repeat the parent's instructions
- (B) *Night-time toileting*
1. At parents' bedtime, they awaken child and send him to toilet
 2. After each dry night, parent awakens child 30 minutes earlier than on previous night
 3. Awakening discontinued when they are scheduled to occur within one hour of child's bedtime
- (C) *When accidents occurred, child receives Cleanliness Training and Positive Practice immediately upon wetting and at bedtime the next day*
- (D) *After a dry night*
1. Both parents praise child for not wetting his bed
 2. Parents praise child at least 5 times during the day
 3. Child's favorite relatives are encouraged to praise him

Table 2. *continued***III Normal routine—initiated after 7 consecutive dry nights**

- (A) *Urine-Alarm is no longer placed on bed*
 - (B) *Parents inspect child's bed each morning*
 - 1. *If bed is wet, child receives Cleanliness Training immediately and Positive Practice the following evening*
 - 2. *If bed is dry, child receives praise for keeping his bed dry*
 - (C) *If two accidents occur within a week, the Post-Training Supervision is reinstated*
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that when the child wet his bed, a loud alarm sounded in the circuit box located near the child's bed. The parent awakened the child, if had not already been awakened by the alarm, and sent him to the toilet to finish urination. The parent then required the child to wash his face to assure complete awakening. The parent reset the alarm, changed the wet sheets and returned the child to bed. During the next 2 weeks, the parent reacted to bedwettings in this same manner, the urine-alarm remaining on the bed during the 2-week period. On the first night, a trainer was present throughout the night (just as he was for the children in the Dry-Bed group), to explain the procedure to the parents and to assure that they followed the standard procedure in the event of a bedwetting.

Dry-Bed Procedure

Table 2 outlines the sequence of procedural steps in the Dry-Bed Procedure.

The training night. About an hour before bedtime, the parents and the child were given a complete description of the Dry-Bed procedure, and the rationale for each step, as well as a review of the advantages that would result from eliminating the bedwetting problem. In order to increase the frequency of urination, the child was then given a glass of his favorite drink, and the urine-alarm was placed on his bed. The child next performed the Positive Practice procedure, which was designed to establish in the child the habit of rousing and toileting himself. The child lay in bed with the lights off and slowly and silently counted to 50 (younger children counted to a lower number) at which time he arose, walked to the toilet and attempted to urinate. Then he returned to bed where he began counting again, repeating the procedure until 20 such trips were made. The parent remained outside of the room and counted the trips.

Then the child again drank as much as he could of his favorite drink, and he stated his understanding of the procedures to be followed that night, namely that he would be awakened hourly to practice going to the toilet rapidly and that, if he had an accident, he would change his bed sheets and practice toileting several times. The child then went to sleep.

Hourly awakenings. Every hour, the trainer awakened the child by using a minimal prompt needed for awakening. Occasionally the child could only be aroused by guiding him to a sitting position and gently shaking him. This guidance was faded out as soon as possible to a mere touch. Rarely, the bedroom light was turned on to assist in awakening the child. If, upon awakening, the child did not immediately walk to the bathroom, the trainer would first point toward the bathroom and then ask the child, "What did you promise to do when I woke you?". If the child still showed no signs of arising and walking to the bathroom, the trainer quickly guided him into the bathroom saying, "You have to hurry to the bathroom if you don't want to wet your bed!".

At the bathroom door, the trainer stopped the child and inquired whether he could inhibit urination for another hour. If the child replied that he could, the trainer praised him for his bladder control, and the child returned to bed. If the child answered that he could

not inhibit urination for an hour, the trainer tried to persuade him to inhibit urination for just a few minutes, after which he praised the child for his control and allowed him to urinate. Immediately following urination, the child was praised for correct toileting and returned to bed.

When the child arrived at his bed, he was directed to feel his sheets and was asked if they were dry. He was then praised for having kept his sheets dry and encouraged to keep them dry during the next hour. Finally, the child was asked to repeat his instructions for the next hourly toileting, was given another drink, and then was allowed to return to sleep.

Accidents during training

Whenever a bedwetting accident occurred, the urine-alarm sounded. The trainer immediately disconnected the alarm, awakened the child (if he was not already awake) and reprimanded him for having wet. The child was then directed to the bathroom to finish urination. When he returned to the bedroom, he was given Cleanliness Training which required him to change his pajamas, remove the wet sheets from the bed, wipe off the mattress, and deposit the soiled linen in the appropriate place. While the child transported the soiled linen, the trainer replaced the cloth material between the metal pads of the urine-alarm apparatus and reset the device. When the bedwetter returned, he was required to obtain clean sheets and to remake his bed. After the bed sheets were changed, the child was informed that his accident indicated that he needed more practice in correct toileting in order to stay dry in the future. He was then given the Positive Practice training in arising and toileting correctly until he had performed 20 practice trips to the bathroom. No reinforcement was given for correct urination during Positive Practice. The child then returned to bed.

On the evening following a bedwetting accident, the child was given 20 Positive Practice trials before he retired to bed.

Post-training supervision

Following the single evening of intensive training, the alarm was placed on the bed each night prior to the child's bedtime. If the child had had an accident during the previous night, he was given Positive Practice before going to bed. Immediately before the parents' bedtime, usually about 11:00-12:00 p.m., the parents awakened their child and sent him to the bathroom. After each dry night, the parents awakened the child for toileting a half-hour earlier on the following evening. This night-time awakening was discontinued when the time of awakening was scheduled to follow the child's bedtime by no more than one hour. If a bedwetting accident occurred, the child was given the same procedure as during the initial training, namely he was awakened, reprimanded for wetting, and given Cleanliness Training and Positive Practice in toileting. Encouraging fluid intake and awakening the child hourly were discontinued during the Post-Training Supervision. The Post-Training Supervision continued until the child had been dry for 7 consecutive days.

After a dry night. If no bedwetting occurred during a given night, the next day the child was praised for having kept his bed dry. The parents were instructed to continue praising the child at appropriate and convenient times during the day, e.g., at meals and before bedtime. Close relatives or other persons whom the child admired and respected were invited to call and congratulate the child for not wetting his bed and to encourage him to remain dry at night.

Normal routine

After the Post-Training Supervision was discontinued, the urine-alarm was no longer used nor were the nighttime awakenings continued. The parents inspected the child's bed in the morning. If the bed was wet, they required the child to remake it immediately and, before bedtime that evening, the bedwetter was given Positive Practice in correct toileting. If bedwetting occurred on 2 nights within a week, the Post-Training Supervision procedure was reinstated until the child had no accidents on seven consecutive nights.

The rationale and general description of particular procedures such as Cleanliness Training, Positive Practice, fading prompts, encouraging fluid intake, and Graduated Guidance can be found in previous reports (Azrin and Foxx, 1971; Azrin *et al.*, 1973; Azrin, Kaplan and Foxx, 1973; Foxx and Azrin, 1972; Foxx and Azrin, 1973a; 1973b; 1973c). These procedures as used in both daytime and nighttime toilet training are described in especially great detail for use with retarded persons in Foxx and Azrin (1973a) and for normal children in Azrin and Foxx (1974).

RESULTS

Figure 1 shows the median number of accidents per week for the 26 enuretic children. Before training, bedwetting occurred every night. The standard urine-alarm procedure reduced the accidents slightly to six bedwettings during the first week of training and to five accidents per week during the second week. After the one night of intensive training by the Dry-Bed procedure, the median number of accidents was only one during the first week, one during the second week, and none after the third week for the six-month follow-up. A statistical comparison of the two procedures during the first two weeks by the *t* test for differences showed that the number of accidents was significantly less for the children trained the Dry-Bed procedure than by the standard urine-alarm procedure ($p < 0.005$).

Examination of the individual children trained by the standard urine-alarm procedure showed that only two of the 13 children remained dry for more than 6 nights during the

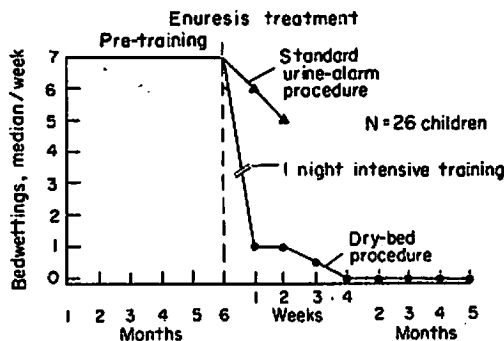


Fig. 1. The median number of nights per week that the 26 enuretic children wet their bed. The pre-training data was the report of the parent of the average number of bedwettings during the previous 6 months. The data points are presented for each week for the first 4 weeks after training and for each month thereafter. The 'break' in the curve represents the single evening during which the Dry-Bed training procedure was used. The 'Triangle' data points are for the 13 matched-control children who were given the standard urine-alarm conditioning procedure. The 'Circle' data points are for the new Dry-Bed procedure and includes the 13 enuretic children in the treatment group as well as the 11 children in the control group who failed to remain dry after 2 weeks of the standard conditioning procedure.

first 2 weeks of training. No attempt was made to retrain these two children by the Dry-Bed procedure. The other 11 children were retrained by the Dry-Bed procedure and are included in the data points of Fig. 1.

Examination of the individual children trained by the Dry-Bed procedure, including the 11 children who had been given the standard urine-alarm training, showed that all 24 children were trained. Figure 2 shows that the slowest learner had nine accidents before achieving 14 consecutive dry nights, whereas the average child (median) had only two accidents. The fastest learners had no accidents and included three of the 24 children (12 per cent).

The number of accidents was virtually the same during the Parent-Only-Alarm procedure of Experiment II and the Parent-and-Child Alarm procedure of Experiment I. The mean number of accidents during the first 2 weeks was 2.6 and 2.2 respectively for the two procedures and was not significantly different.

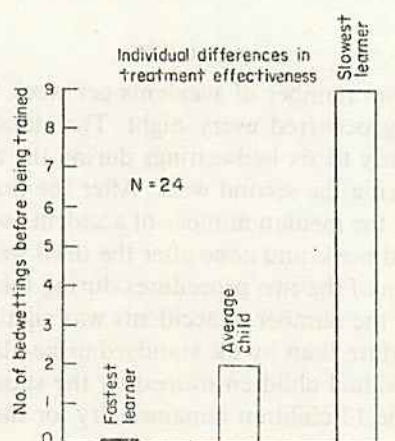


Fig. 2. The range of individual differences in trainability by the new Dry-Bed procedure of the 24 enuretic children. Each vertical bar designates the number of nights that the child wet his bed after the 1-night training session before he reached the criterion of 14 consecutive dry nights. All children were trained, the slowest child having had 9 bedwettings, the fastest children (3) having no bedwettings, and the average child (median) having two accidents before achieving the criterion of dryness.

None of the children relapsed to their pre-training level of bedwetting at any time during the six-month follow-up. The procedure had required the reinstatement of the urine-alarm apparatus should two accidents occur within a week. In only seven instances did two such accidents occur. In each instance, the child had no further accidents during the week after the urine-alarm was reinstated, and the apparatus was, therefore, again discontinued.

After the intensive night of training, the urine-alarm was no longer put on the bed once the child had 7 consecutive dry nights. This criterion resulted in a median of 19 days of alarm usage after training. The Dry-Bed procedure also called for a gradual discontinuation of the nighttime awakenings. A median of 6 days was required to eliminate these awakenings.

DISCUSSION

The new procedure proved both effective and rapid in eliminating bedwetting. Enuresis was eliminated for all 24 children without exception including those under 6 yr of age. No