A Modification of the Dry-Bed Training for the Treatment of Nocturnal Enuresis

Abdurrazek

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A MODIFICATION OF THE DRY-BED TRAINING FOR 
THE TREATMENT OF NOCTURNAL ENURESIS

by

Abubaker Muftah Abdurrazek

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
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Western Michigan University
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A MODIFICATION OF THE DRY-BED TRAINING FOR
THE TREATMENT OF NOCTURNAL ENURESIS

Abubaker Muftah Abdurrazek, M.A.
Western Michigan University, 1984

The present study explored the effectiveness of the Dry-Bed
Training (DBT) method without positive practice (20 trips to the
toilet) and urine alarm. It also compares the efficacy of the DBT
with and without the urine alarm. Eight nocturnally enuretics,
aged 6 to 12 years, were assigned to two groups, experimental and
control; each consisted of three boys and one girl. During the
first phase of treatment, the experimental group underwent the DBT
without positive practice and urine alarm, whereas the control
group underwent the DBT with positive practice but no alarm. Sub­
sequently, the urine alarm was introduced to both groups. Statisti­
cal comparisons revealed significant reduction in bedwetting for
the control group during the first phase of treatment. Elimination
of bedwetting for both groups occurred after the incorporation of
the urine alarm. While the positive practice significantly reduced
bedwetting, elimination of bedwetting appeared to depend on in­
corporating the alarm.
ACKNOWLEDGMENTS

This work could not have been completed without the encouragement, advice, and support of two people to whom I am in great debt: Dr. Chris Koronakos of the Department of Psychology and Dr. David Keenan, former director of the Child Development Center and former clinical associate at the Institute for Human Services. Particular gratefulness and appreciation to Dr. Ron Hutchinson, president of the Foundation for Behavioral Research, for his permission to conduct this study using the facilities of the Child Development Center, which is sponsored by the Foundation. I am also grateful to Dan McCallum, director of the Child Development Center, and the Center staff for their assistance and cooperation. Finally, I wish to extend very special thanks to Drs. Malcolm Robertson and Paul Mountjoy, both of the Psychology Department, for their constructive criticism, sympathetic understanding, and above all, their patience.

Content of this report is finally my own responsibility.

Abubaker Muftah Abdurrazek
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CHAPTER I

INTRODUCTION

Enuresis is an international phenomenon, found to some degree in almost every culture. Nevertheless, attitudes toward enuresis and its treatment differ from one society to another. Trepper (1978) concluded that "even though all cultures have incontinent children, how severly the act is viewed, and how severely it is treated, varies from culture to culture" (p. 72). Moreover, attitudes toward enuresis may vary within the same society; for instance, while the lower social class strata provide greater tolerance to the problem, other social groups are less flexible (Yates, 1970).

Historically, enuresis has been recognized as a childhood disturbance requiring medical intervention since the time of Papyrus Ebers, 1550 B.C. (Glicklich, 1951). However, it was only in the 19th century when the problem was first recognized as a branch of medicine.

With the emergence of the Renaissance, Paulus Bagellardus published the first printed book on children's disease in 1472, including a chapter on enuresis (Glicklich, 1951).

In 1544, Thomas Phaer, an English pediatrician, published his book on children's diseases, including his views for treatment of enuresis (Glicklich, 1951).
The types of humoral therapies suggested by Bagellardus and Phaer continued in the works of the 17th century authors (Glicklich, 1951).

In 1762, Thomas Dickson reported the successful application of blisters in treating a 13-year-old girl in only 24 hours (Glicklich, 1951). By the 18th century, the pediatric works had enormously expanded. Humoral and magical prescriptions had by now disappeared. However, less emphasis was placed on enuresis as a special disorder which assumed a position of less importance compared to other common diseases of children (Glicklich, 1951).

In the 19th century numerous factors were mentioned as possible contributors to the development of enuresis; among those factors were: deep sleep, imbalance of musculature in the bladder, bladder irritation, dreams, laziness, diabetes, penile erection, and irritation of the bladder muscle fibers (Glicklich, 1951). Likewise, a wide variety of treatment techniques were suggested; for example, limiting fluid intake, emptying the bladder at bedtime, sleeping on a hard mattress, awakening the child during the night, and following a special diet (Glicklich, 1951). In addition, four kinds of drugs were specially used; they are: strychnine, belladonna, sacral plasters, and chloral hydrate (Glicklich, 1951).

By the emergence of the 20th century and the advancement of psychiatry, the etiological emphasis shifted from medicine to psychology (McDonald & Trepper, 1977). Thus, three treatment approaches--medical, psychodynamic, and behavioral--have dominated the field of enuresis therapy.
Medical Approach

Since physical factors contribute to only about 5 to 10% of enuretics (Faschingbauer, 1975), some authors have been skeptical as to whether enuresis is really a medical disorder (McDonald & Trepper, 1977). Nevertheless, medical therapy has been the typical treatment for centuries, and over 500 different drugs have been developed and tried with enuretics (Faschingbauer, 1975).

The medical approach assumes that enuresis is a result of dysfunctions of the urinary tract or nervous system (W. W. Williams, 1974). Some of the urinary system disorders are: inflammation of the bladder, abnormal bladder capacity, vesical calculus, and disorders of the valves of the posterior urethra (Faschingbauer, 1975). Other causes for enuresis are dysfunctions in the nervous system, such as: spinal cord disorders, deficiency in the nervous system development, and atony of the external sphincter caused by parasympathetic imbalance (Faschingbauer, 1975).

The most widely used drugs are the tricyclic antidepressants, amitriptyline and imipramine (Kolvin, 1975). Imipramine was first suggested by a psychologist, Hagh Esson, who discovered the drug effectiveness by chance, when he noted urine retention in depressed patients treated with imipramine (Johnson, 1980). The mechanism by which tricyclics affect enuresis is still a controversial issue subject to contradictory explanations. However, the most compelling theory is that tricyclics increased the bladder capacity of the enuretic child because of their relaxing effect on the detrusor.
muscle (Johnson, 1980).

Johnson has come to the conclusion that drugs are almost completely ineffective, especially with adults, while Kolvin's (1975) advice was that drugs should not be given to children under the age of 7 years. In addition to the uncertainty of their use, drug therapies have been associated with a number of problems; namely, high relapse rate, and side effects such as: dry mouth, dizziness, drowsiness, irritability, constipation, concentration difficulty, and appetite and sleep disturbances (Johnson, 1980; Kolvin, 1975).

The application of drugs is therefore more for the benefits of the family rather than for the patient, since drugs are found to have more negative side effects and less cure rate. Their advantages are only in their simplicity and convenience of administration.

Psychodynamic Approach

The psychodynamic formulation assumes that enuresis is a symptom of underlying emotional disturbance which must first be removed; otherwise, another emotional conflict (e.g., symptom substitution) may arise from the disappearance of enuresis. However, it seems there is no agreement on the nature of these underlying emotional disturbances. Consequently, psychodynamic theorists have interpreted enuresis variously as: (a) an indirect expression of anxiety, (b) a repressed feeling of sexuality, (c) an expression of hostility toward the parents, (d) an attempt to maintain an infantile relationship with the mother, and (e) a regression caused by
separation from a loved person (Johnson, 1980; W. W. Williams, 1974).

Accordingly, psychotherapeutic goals are inconsistent, ranging from uncovering the underlying emotional conflicts to changing the mother's attitude in favor of the child (Faschingbauer, 1975). Thus, different therapeutic techniques have been suggested, including hypnosis, dream analysis, and suggestive therapy. Faschingbauer explained the typical psychotherapeutic procedure, which begins with explanations of the causes and treatment of enuresis:

Attempts are then made to induce a "positive hypnotic emotional state" through muscular relaxation until the hypnotic depth that is best for the individual patient is reached. Every effort is made to increase the patient's self-esteem and to explain points that interest him. (p. 23)

Another psychotherapeutic technique is supportive therapy, in which the purpose is to relieve the child's guilt and to increase the child's self-confidence (Faschingbauer, 1975). Finally, there is the psychodrama and sociodrama group therapy.

The psychodynamic diagnosis and treatment for enuresis have been severely criticized. For instance, Johnson (1980) pointed out the fact that "There is no data to support the notion that psychological problems cause enuresis since the reverse interpretation (e.g., enuresis causes psychological problems) is equally likely" (p. 129). To conclude, the effectiveness of psychotherapy in treatment of enuresis is questionable since "only two controlled studies using psychotherapy have been carried out" (Johnson, 1980, p. 99).
Behavioral Approach

Behavioral theories consider urinary incontinence to be a result of inadequate training and failure in learning the necessary skills (Johnson, 1980); thus, urinary continence could be achieved through a consistent training program.

Behavioral approaches to treatment of enuresis have conventionally been classified into two basic treatment perspectives: operant and classical conditioning.

Classical Conditioning

In their classical article, Mowrer and Mowrer (1938) introduced the urine alarm procedure, which is based upon the Pavlovian classical conditioning. However, the procedure was not extensively used until the 1960s (Johnson, 1980).

Mowrer and Mowrer (1938) explained the theory behind their procedure by indicating that:

If the child is repeatedly awakened at a time when the bladder is partially filled, but not so distended as to produce reflex emptying, the attendant bladder stimulation will eventually become specifically associated with the response of awakening, before the point has been reached at which voiding tends to occur automatically. (p. 445)

Although the basic mechanism has remained the same, the Mowrer's procedure has been modified in both design and administration. For instance, different drugs were employed as an adjunct to the urine alarm, as well as different schedules were used for the device administration (Doleys, 1977).
In spite of the high rate of success, 75% as reported by the studies reviewed by Doleys up to 1977, the procedure has suffered a high rate of relapse (41%) (Doleys, 1977) and a high rate of dropout (Azrin & Thienes, 1978).

Operant Conditioning

Two basic treatment procedures, Retention Control Training and Dry-Bed Training, have been distinguished under this approach, with both techniques applying the operant principles of conditioning.

Retention Control Training

Although Kimmel and Kimmel (1970) were credited for introducing Retention Control Training procedure to the literature (Doleys, 1977), the idea itself is an old one. Glicklich (1951) pointed out that during the 19th century "children be taught to retain their urine longer during the day and therefore increase tolerance of the bladder to urine held within its confines" (p. 868). Muellner (1960) proposed that primary enuresis was due to "the improper development of bladder capacity of a child through the inadequate use of its voluntary mechanism" (p. 1260). He suggested a training program which required the child to force fluids during the day to practice holding urine as long as possible. Muellner further suggested that a holding-volume range of 8 to 14 oz. during the day could be sufficient to eliminate the problem. He argued that "when this has occurred, the bladder is large enough to retain the total output of night urine and the child will no longer wet the bed."
The actual mechanics of the procedure involve shaping the desired behavior by "gradually increasing the period of time during which bladder distension cues sufficiently strong to evoke urination are present but urination is voluntarily withheld" (Kimmel & Kimmel, 1970, p. 122). During training the child is rewarded for each successful trial.

In evaluating the procedure, Doleys (1977) concluded that the available data "do not provide strong support for retention control training as a treatment procedure for enuresis" (p. 46).

**Dry-Bed Training**

In spite of its complexity, the Dry-Bed Training program has been regarded as probably "the most promising of the more social-behavioral and operantly oriented treatment procedures" (Doleys, 1977, p. 50).

The Dry-Bed Training procedure, which will be detailed in the following section (Chapter II), incorporates aspects of other methods such as the urine alarm and the retention control training. The procedure, however, stresses the significant contribution of such factors as "reinforcement, shaping, awareness training, self-correction, and positive practice" (Azrin & Thienes, 1978, p. 343).

Compared to psychodynamic and medical techniques, the behavioral approach has been valued as superior in terms of both theory and treatment (Yates, 1970). As McDonald and Trepper (1977) indicated, "The behavior approach has the advantages of the low
The Dry-Bed Training (DBT) procedure was first developed for toilet training retarded adults (Azrin, Sneed, & Foxx, 1973) and later extended to nonretarded children (Azrin, Sneed, & Foxx, 1974).

To increase the utilizations and benefits of the procedure, different attempts were made to modify and shorten the method. A major change was made by eliminating the urine alarm (Azrin & Thienes, 1978). Another important change was the elimination of a special trainer to help parents and child at home during the first day of training. Instead, professional assistance to parents and children has become limited to the office instructions only (Azrin, Thienes-Hontos, & Besalal-Azrin, 1979; Bollard & Woodroffe, 1977). An attempt to shorten the time required for training was made in a study by F. E. Williams and Sloop (1978). Finally, a number of studies were conducted to examine the adequacy of having parents train their children while following manual instructions and with no professional help (Bosalal, Azrin, Thienes-Hontos, & McMorrow, 1980; Butler, 1976; Matson & Ollendick, 1977). Negative reactions from both parents and children have been reported by some of these studies. These negative reactions were especially related to the positive practice procedure which requires the child to conduct 20 trips to the bathroom whenever an accident occurs and to do the same the following night before retiring to bed. For instance,
Butler (1976) reported 10 failures, six of which were a result of "severe emotional reaction by children to positive practice" (p. 187). Matson and Ollendick (1977) reported negative reactions experienced by mothers and were most often attributed to "the positive practice procedure and the graduated guidance" (p. 551).

It seems that the positive practice procedure was inconvenient for both parents and children and, as indicated, had contributed to failure in some cases. Moreover, it was found that the positive practice procedure had no positive treatment effect in a comparison study of the Dry-Bed Training with Retention Control Training procedure. This study found that "The addition of positive practice to the end of the retention intervals during the final 3 weeks of RCT [Retention Control Training] did not appear to affect the frequency of nocturnal wetting" (Doleys, Ciminero, Tollison, Williams, & Wells, 1977, p. 547).

While the study of Doleys et al. did not specifically examine the effectiveness of the positive practice procedure; it, however, placed suspicions on its singular contribution to the whole package of the Dry-Bed Training method. It was, therefore, the primary purpose of this study to examine the efficacy of the Dry-Bed Training without the positive practice component. The practical consequences of such modification are obvious: Reduction of time and effort required for training as well as reduction of emotional negative reactions of parents and children. Moreover, any attempt to shorten the procedure will facilitate and extend the utilizations of the method. Because some studies were skeptical about the
efficacy of the Dry-Bed Training (DBT) without the urine alarm (Bollard & Nettelbeck, 1981; Nettelbeck & Langeluddecke, 1979), a second purpose of this study was to compare the effectiveness of the DBT method without urine alarm to the same method when incorporating the alarm. It is hypothesized:

1. The Dry-Bed Training without the positive practice component can be as effective as the DBT with the positive practice.

2. The Dry-Bed Training, with or without positive practice, will not be as effective as when it is used in conjunction with the urine alarm.

Definition of Terms

Modified Dry-Bed Training and Original Dry-Bed Training

The term Modified Dry-Bed Training (MDBT) will be used throughout this text to refer to the Dry-Bed Training package as suggested by Azrin et al. (1979) with the elimination of the positive practice component. The term Original Dry-Bed Training (ODBT) refers to the same package with the inclusion of the positive practice procedure.

Positive Practice Procedure

The positive practice procedure, which is a part of the Original Dry-Bed Training, requires the subject to make 20 trips between his or her bed and the toilet. Each time, the subject lies down on the bed, pretending to be fully asleep, while focusing
attention on his/her bladder sensation. While lying in this position, the child tries to create the urge for urination, or if unable, pretends to have the urge. After finishing counting to 50, the child jumps and goes to the bathroom. He or she then comes back to his/her room and repeats the same sequences all over again, until 20 trials have been completed. The first time the subject exercises the positive practice is on the extensive training night as a part of the training requirements. Subsequently, the positive practice procedure is made contingent upon bedwetting accidents. The subject is required to carry out the 20 trials whenever an accident occurs; then he/she is required to repeat the same trials on the next night before retiring to sleep. The positive practice procedure is said to habituate the child to arousing and toileting himself or herself.

Dependent Variable

The average of wets per week (e.g., number of wet nights divided by number of weeks) was used as a dependent variable to measure the effectiveness of the proposed treatment.

Cure Criterion

The conventional cure criterion of 14 consecutive dry nights was adopted in evaluating the treatment effect. Accordingly, the treatment was terminated after the cure criterion was achieved.
Relapse

Relapse refers to "more than three consecutive nights wet after the 14-day dryness criterion" (Azrin et al., 1979, p. 17).
CHAPTER II

METHOD

Subjects

To recruit subjects, letters were distributed among parents in the Child Development Center and to some of the schools nearby the Center. In addition, letters were mailed to pediatricians and family physicians in the Kalamazoo area explaining the program and requesting the included information be made available to their patients. A short article was published in the Kalamazoo Gazette, and letters were sent to local radio stations explaining the study and asking for volunteers. Initially, 17 families called the investigator and expressed interest in the program. They were provided with information about the nature of the study and the investigator's position as a graduate student in the Psychology Department at Western Michigan University. During this initial phone call the investigator obtained information about the child's age, sex, previous training, and the child's general health. Because some of the parents were still undecided, they requested extra time to consult with each other before making their final decision. Eventually, five families decided not to participate; in addition, four children were excluded by the investigator for not meeting the inclusion criteria, e.g., wet the bed less than 3 nights a week, had medical problems, or were less than 6 years of age.
The final sample consisted of eight children, six boys and two girls; their ages ranged from 6 years to 12 years, with a mean age of 8 years. All but one were primary enuretics who had been wetting the bed since infancy. All were diurnally continent with at least 3 wet nights per week throughout the 2-week baseline period. Only children with no organic pathology, as determined by their physician's report, were included in the study. Although three children had previous drug therapy, none was undergoing any type of enuresis-related medication during the study. A brief questionnaire (see Appendix A) completed by the parents revealed that all children had no history of medical problems related to enuresis such as diabetes, kidney disease, and bladder infection. Nevertheless, it showed that some of the children had emotional problems which are described in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Type of emotional problem</th>
<th>Frequency among children</th>
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<tr>
<td>Noncompliance</td>
<td>4</td>
</tr>
<tr>
<td>Fears</td>
<td>2</td>
</tr>
<tr>
<td>Excessive tantrums</td>
<td>2</td>
</tr>
<tr>
<td>Thumbsucking</td>
<td>1</td>
</tr>
<tr>
<td>Nailbiting</td>
<td>1</td>
</tr>
<tr>
<td>Nightmare</td>
<td>1</td>
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Note. A particular child could have more than one emotional problem.
Apparatus

Since the investigator was unable to provide the required urine alarms, parents were asked to purchase their own units. Therefore, two of the children had used the Sears model (Catalog Number: 8K 1300); three children used J. C. Penney model (Catalog Number: AW 662-0041 A). Two others had to use the pants alarm, which is another variation of the urine alarm, available at Palco Labs, 5026 Scotts Valley, Santa Cruz, California, 95066. As the name suggests, the pants alarm consists of moisture-sensitive underpants wired to a small circuit box worn over the child's shoulder. This type was used because these two children used to roll over the bed when asleep, which made the pad type impractical. In spite of the different devices used, the mechanism by which they operate was the same: As the child urinated, an electrical circuit would be closed activating the buzzer to make sound and, consequently, wake up the child. One child, however, had to withdraw because his family was neither able to buy the alarm nor manage to borrow one.

Experimental Design

The eight children who finally agreed to continue the program were matched for age and sex making for two groups; each had three boys and one girl, with a mean age of 8 years. One group was randomly assigned (by flipping a coin) to the Modified Dry-Bed Training (experimental group); the other group was assigned to the Original
Dry-Bed Training (control group). Figure 1 represents the design arrangement.

Baseline

Before training was started, parents were instructed to keep daily records of the child bedwetting for at least 2 weeks.

Treatment Phase #1

During the first phase of treatment, the experimental group underwent a modified version of the Dry-Bed Training (MDBT), where both the urine alarm and the positive practice procedure (20 trips to the toilet) were eliminated. Therefore, nothing was mentioned about the urine alarm or the 20 trials during the in-office training sessions. Moreover, references to the alarm and the 20 trials were omitted from the instruction sheet given to parents for home reference.

The control group underwent the same procedure as the experimental group, with the addition of the positive practice component (20 trips to the toilet). Subjects in this group were informed about the positive practice procedure during the in-office training session and were given written instructions on how to carry out the procedure at home.

Treatment Phase #2

In the second phase of treatment, the urine alarm was incorporated into the previous treatment procedures of the first phase.
2-weeks baseline

Experimental group MDBT

Control group ODBT

First phase of treatment

DBT method with neither alarm nor positive practice

DBT method with positive practice but no alarm

Second phase of treatment

DBT method with alarm but no positive practice

DBT method with both alarm and positive practice

Follow-up
Monthly phone calls to parents

Figure 1. Design Flowchart
Subjects in both groups (experimental and control) were instructed to start using the urine alarm plus continuing implementing the treatment procedure previously assigned to each group. Instructions on how to use the alarm were mailed to the subjects of both groups (see Appendix B). The investigator subsequently called the parents to ensure that they had no trouble using the alarm unit and following the instructions.

Data Collection and Follow-Up

The investigator had to call parents once a week to obtain data about the child's wetting, response to treatment, and his or her general progress and attitude toward the training program.

Once the cure criterion of 14 consecutive dry nights had been achieved, the child was followed up by monthly phone calls to ensure maintenance of his/her improvement. The follow-up period ranged from 1½ months to 4 months, with an average of 3 months.

Procedure

The Pretraining Orientation Session

Parents who decided to pursue the program were invited to attend an orientation session at the Child Development Center. With the exception of three families, all parents attended the session, which was designed to reduce the probability of later dropout. Forms of medical report and informed consent were mailed to the parents to be completed and returned on the day of the orientation
session (see Appendix C for informed consent form).

The orientation session lasted 1 hour and covered topics which are outlined in Appendix D. During the meeting the investigator clarified the requirements of the program and other treatment alternatives available, so that the parents could decide whether to pursue the training program or discontinue their participation and seek the other alternatives. Before leaving, parents were asked to arrange for the individual training session, which was to be conducted in an office at the Child Development Center. Those who were absent were later contacted by phone to set an appointment for their training sessions.

The Office Training Sessions

Individual training sessions for parents and child were conducted at the Child Development Center. The average time of training per session was 1 hour and 15 minutes for the experimental group and 1 hour and 30 minutes for the control group. At the beginning of the session, parents were given a calendar to record the child's night wetting and a behavioral contract form, specifying the kind of reinforcers the child would have for maintaining a dry bed. As parents returned home, they had to fill out the contract, sign it with the child, and mail a copy to the investigator.

The Dry-Bed Training, Original or Modified, consisted of one intensive training day and the posttraining days thereafter. The intensive training day is the first day of training at home and lasted from 4:00 p.m. to 1:00 a.m. Parents were, therefore, advised
to start home training on the weekend, so that they and the child would have the next day for rest. To avoid interruption, parents had to arrange their activities so that they would be available for supervising the child on the intensive training day.

The investigator started the office training by explaining each treatment sequence and, if necessary, demonstrated it. The child rehearsed the sequences and, in some cases, role-played them with the parent. After comprehending the treatment procedure, the child and parents were ready to independently implement training at home. Before leaving the office, they were given written outlines of the procedure to use for home reference.

**Intensive Training Day at Home**

Following is detailed explanation for both the ODBT and MDBT methods as they were explained in the office training session and subsequently carried out by the child and parents at home. Note that both treatment procedures were identical; the only difference between the two was the positive practice component (20 trips to the toilet) which was included in the ODBT but not in the MDBT.

**From Afternoon to Bedtime**

Parents were instructed to start home training at about 4:00 p.m. Favorable drinks were to be available, together with varieties of salty foods (e.g., potato chips, popcorn, and peanuts) to increase the child's appetite for drinks. The child started by drinking fluids and each half hour, he or she attempted to strain on the...
toilet to create the urge for urination. Once the urge to urinate was felt, the child was to hold in and hurry back to bed. The child would lie on the bed, pretending sleep by closing his/her eyes and breathing deeply. Initially, the child was to hold back for 2 minutes; this was gradually increased by 1 minute after each successful trial. While lying on the bed and holding back, the child had to concentrate on the full feeling and sensation of his/her bladder. To accomplish this goal, the investigator asked the child and the parent during the office training session to rehearse and role play the following scene, which they subsequently carried out during home training. The child would lie down on the bed and pretended to be fully asleep. While gently putting his/her hand on the child's stomach, the parent was to say, "Jimmy, think how your tummy feels. Think hard! When you're in bed asleep and you have this full feeling, what will you do?" To this the child answered, "I'll hold it back for as long as I can until it goes away." The parent then asked, "Good! But what if it does not go away! What will you do then, Jimmy?" The child responded by saying, "I'll jump fast and go to the bathroom, so that I won't wet my bed." The parent praised the child's response by saying, "Good! Now, pretend you're asleep but think hard of how your tummy feels. You're doing great!" If, by the end of the holding back interval, the urge to urinate disappeared, the child could go back to his/her normal activities; otherwise, he/she would go to the bathroom. In both cases, the child was to be praised and given more fluids to drink.
The purpose of the "strain-and-hold" procedure was to increase the child's awareness of the bladder sensation and to teach him/her the skill of voluntarily controlling urination. Drinking large amounts of liquids was to extend the bladder walls to full capacity. In order to communicate this idea to the child, the investigator used a small rubber balloon which he gradually filled with water and then gently squeezed it to stretch it out.

One hour before bedtime, the parent was to review with the child the self-correction procedure, which included cleaning oneself, changing bed sheets, and remaking the bed. Subsequently, the child acted out these sequences which were to be carried out whenever an accident occurred. The purpose of self-correction or cleanliness procedure was to make the child aware of the inconvenience of wetting and to take full responsibility of his/her own behavior.

The positive practice was another procedure to be acted out by the child before bedtime provided that he/she was in the control group. Therefore, only children in this group were taught during the office training session how to carry out the procedure, which required the child to make 20 trips between his/her bed and the bathroom. In each trial, the child lies down on the bed and pretends to be fully asleep by closing his/her eyes and breathing deeply. While lying on the bed, the child had to strain to create the urge for urination or, if unable, pretended to have the urge. After silently counting to 50, the child rushed to the bathroom and attempted to urinate. The child then returned to the bed and repeated the same sequence all over until 20 such trials were
completed. While encouraging the child by counting the trials loudly, the parent watched him/her to ensure correct performance. The child was required to carry out the 20 trials after each accident and to repeat them again the following night before retiring to bed. The positive practice was to habituate the child to arouse and toilet himself or herself.

At bedtime, which was scheduled 1 hour earlier than the child's regular bedtime, the parent reviewed with the child the procedure to be followed during the night; namely, the hourly awakening and the correction procedure for bedwetting. While lying in bed, the child described what he/she would do if there was an urge to urinate—that is, to hold urine in until the urge goes away or jump and go to the bathroom. With eyes closed, the child felt the sheets and commented on their dryness. Before leaving the child to sleep, the parent reminded the child of the benefits he/she would have for keeping the bed dry and expressed confidence in the child's ability to maintain a dry bed.

**Hourly Awakening**

Parents had to wake up the child every hour until 1:00 a.m. Using minimal prompt, the parent was to call the child's name first then gently shake his/her shoulder and assist him/her to sit up. As the child awakened, the parent asked him/her what he/she should do. If the child did not respond by moving out of bed, the parent manually guided him/her to the toilet prompting all the while by saying, "Hurry up if you don't want to wet your bed." At the door of the
bathroom, the parent was to ask the child if he/she could hold urine for 1 more hour. If the child answered he could, he/she then had more to drink and returned to bed. Conversely, the child was allowed to urinate if he/she could hold it no longer. In either case, the child was praised for his/her effort and given more drinks which, nevertheless, were to be terminated after 11:00 p.m. When the child returned to the bed, he/she would feel the sheets, comment on their dryness, and stated what he/she would do if there was an urge to urinate. Again, the parent praised the child for keeping the bed dry and reminded him/her to keep thinking of the full feeling in his/her stomach.

**Accident During the Night**

Whenever an accident occurred, the child was to be awakened and told that the bed was wet. If the child did not take the initiative of correcting the accident, the parent would then give him/her general reminders of what should be done. The child was to feel the sheets, comment on their wetness, and replace them with dry ones. Having finished urination in the bathroom, the child cleaned himself/herself and put on dry nightclothes. In case the child was in the control group, he/she had to carry out the 20 trials (positive practice). Upon completing the 20 trials and returning to the bed for sleep, the child would run his/her hand over the sheets and comment on their dryness, so that he/she appreciated the difference between wetness and dryness. Before leaving the child to sleep, the parent praised the child for cleaning up the bed and reminded
him/her to focus attention on the sensation and full feeling in his/her bladder. In such cases of accident, no more drinks were given.

Home Training in the Following Days

Next morning, the parent was to inspect the child's bed 1/2 hour before the child's normal time to wake up. The child was allowed to sleep if the bed were dry; otherwise, he/she was immediately awakened to carry out the cleanliness procedure and, if the child was in the control group, to conduct the 20 trials.

On the first night following the intensive training day, the child was to be awakened at midnight. Subsequently, he/she was to be awakened 1/2 hour earlier provided that the child was dry the night before; otherwise, he/she was to be awakened at the same hour as the preceding night. The awakening procedure, however, was to be discontinued entirely after it was only 1 hour after the child's bedtime.

At bedtime the child followed the same routine as before; namely, he/she commented on the sheet dryness and stated how he/she would respond to the urge for urination during the night. While communicating confidence and support to the child, the parent referred to the child's previous progress and reminded him/her of the rewards he/she would get for keeping the bed dry.

During posttreatment some of the treatment requirements were discontinued; these included liquid intake, hourly awakening, and "strain-and-hold" practice. Because of their small bladder capacities, some of the children had to continue voluntary drinks and
gradual delay of urination. These children had to use a measuring cup to urinate in instead of the toilet. The idea behind using the cup was to have the child monitor his/her daily progress in expanding the bladder capacity and to further encourage the child to increase the holding-back interval.

All treatments requirements were discontinued after 14 consecutive dry nights. Only the positive practice for the control group and self-correction were to be made contingent on any accident thereafter. The urine alarm was used by both groups (experimental and control) during the second phase of treatment. Subjects had to use the alarm until they achieved 14 consecutive dry nights. Once the cure criterion was achieved, the child discontinued using the alarm unless he/she relapsed, in which case the child started using the alarm again until bedwetting was completely ceased.
CHAPTER III

RESULTS

Figure 2 compares the means of wet nights for both experimental and control groups during the 2-week baseline and subsequent treatment phases. During the first phase of treatment, the experimental group underwent the Modified Dry-Bed Training (MDBT), without both the positive practice and the urine alarm. The control group underwent the Original Dry-Bed Training (ODBТ), which included the positive practice but not the urine alarm. The urine alarm was incorporated into both treatment procedures during the second phase of treatment.

As Figure 2 shows, there is a massive reduction of bedwetting for the control group during the first phase of treatment, whereas frequency of bedwetting for the experimental group remains unchanged. As subjects of both groups proceeded to the second phase of treatment, their bedwetting frequencies were equally reduced to the same considerable level. Although Figure 2 shows the mean number of wet nights for the control group during baseline to be less than that of the experimental group, this difference, however, is not statistically significant, t(6) = 1.43, p > .05.

Both groups continued the first phase of treatment for 5 weeks. On the 6th week one subject dropped out and another requested to start using the alarm because of lack of improvement under the ongoing procedure; both subjects were in the experimental group.
Figure 2. Means of wet nights per week for both control and experimental groups throughout 2-week baseline and two phases of treatment. During the first phase the experimental group underwent the MDBT without positive practice and urine alarm, while the control group underwent the ODBT with positive practice but no alarm. In the second phase the urine alarm was incorporated into both procedures. Beginning the 7th week of Phase #2 data for the experimental group represent only two subjects.
While this particular child, by applying the alarm, was able to progress to the second phase of treatment as early as the 6th week, other children had to wait for a relatively longer time before they were able to do the same. The cost of the urine alarm was beyond the immediate financial ability for some of those families who had to wait until they had the money to pay for the alarm unit. Due to this variation in the duration of treatment exposure, the statistical analysis for this phase concerned only the first 5 weeks. A statistical comparison of the two procedures during the first 5 weeks revealed less bedwetting accidents among children in the control group than among those in the experimental group, \( t(6) = 8.32, p < .05 \). Within-group comparison of means of baseline and first phase of treatment supported the same conclusion: While there was substantial reduction in bedwetting for the control group (\( t(3) = 5.69, p < .05 \)), no such reduction was detected in the experimental group, \( t(3) = .95, p > .05 \). Moreover, one control child had achieved the cure criterion during this first phase while none of the experimental group did.

As subjects passed into the second phase of treatment and started using the urine alarm, a substantial reduction in bedwetting took place among both groups. Between-group comparison shows no statistically significant difference between the two means of bedwetting, \( t(4) = 1.30, p > .05 \). By the end of the 8th week of the second phase, all the six children who continued the program had achieved the cure criterion of 14 consecutive days of dryness. The time required during this phase to reach the cure criterion ranged
from 4 to 8 weeks, with an overall mean of 5 weeks and 4 days.

All children had been followed up for an average of 3 months, during which one control group child relapsed after achieving the 14 consecutive dry nights in the first phase of treatment. Relapse was defined as more than 3 consecutive wet nights after the 14 consecutive nights of dryness. This child, however, had ceased wetting after his first night of using the alarm and remained dry thereafter. Since this child did not present any alarm data to be analyzed, he was not included in the statistical analysis of the second phase of treatment. Two boys of the experimental group had dropped out. One child, aged 10 years, dropped out on the 6th week of the first phase of treatment because his family was unable to provide the urine alarm. The second child, aged 6 years, dropped out on the 7th week of the second phase of treatment because of his lack of response to the alarm sound.
CHAPTER IV

DISCUSSION

The primary hypothesis of this study proposed that elimination of the positive practice (20 trips to the toilet) would not reduce the effectiveness of the Dry-Bed Training package. The second hypothesis was that the Dry-Bed Training without the urine alarm would not be as effective as when it incorporated the alarm. To examine these two hypotheses, two groups, experimental and control, were formed. During the first phase of treatment, which was designed to deal with the first hypothesis, the experimental group underwent the Modified Dry-Bed Training (MDBT) without positive practice and urine alarm; while the control group underwent the Original Dry-Bed Training (ODBT) which included positive practice but not the urine alarm. The urine alarm was incorporated into both treatment procedures, MDBT and ODBT, in the second phase of treatment, which was concerned with the second hypothesis.

In contrast to the investigator's primary hypothesis, the Modified Dry-Bed Training (MDBT) without the positive practice and the urine alarm showed no effect on reducing bedwetting frequency of the experimental group which remained at baseline level. On the other hand, the Original Dry-Bed Training (ODBT), which included the positive practice but not the urine alarm, demonstrated significant effect on reducing bedwetting of the control group, whether in comparison to the MDBT or to the baseline wetting. However, only one
child in the control group had achieved the cure criterion of 14 consecutive dry nights and subsequently relapsed. Therefore, although the ODBT without the urine alarm proved to be effective in reducing bedwetting, it did not eliminate the problem entirely. This later finding supports recent studies by Bollard and his colleagues (Bollard & Nettelbeck, 1981; Bollard, Nettelbeck, & Roxbee, 1982; Bollard & Woodroffe, 1977) and contrasts with Azrin's claim about the efficacy of the Dry-Bed Training procedure without the urine-alarm device (Azrin & Thienes, 1978; Azrin et al., 1979).

The significant difference between the two treatment procedures, MDBT and ODBT, detected in the first phase had disappeared after introducing the alarm system in the second phase; bedwetting frequency for both groups was reduced to an almost equal level. Moreover, it was only after incorporating the urine alarm in the second phase of treatment that all remaining children ceased bedwetting. This finding about the alarm contribution to the whole package of the Dry-Bed Training (DBT) was in accordance with the investigator's second hypothesis which proposed that neither the ODBT nor the MDBT would be as effective as when it is used in conjunction with the urine-alarm device. The urine alarm has been shown to be a uniquely distinguished component in the DBT package; indeed, not only does the alarm speed up the child's progress as Azrin and Besalel (1979) have suggested, but also it eliminates bedwetting entirely. The implication of this finding is that no substitute has been found for the urine alarm when the therapeutic goal is to eliminate bedwetting completely.
When Mowrer and Mowrer (1938) first introduced the urine alarm, they explained its operating mechanism in terms of the Pavlovian classical conditioning; that is, after sufficient association between the alarm sound (Unconditioned Stimulus) and the bladder sensation (Conditioned Stimulus), the child would eventually be able to wake up to the mere bladder stimulation. The investigator, however, shares Azrin et al.'s (1974) speculation that the classical conditioning might not be the underlying process responsible for the alarm effectiveness. Rather, it is the contingency associated with the alarm signal that is most important. The investigator based his speculation on two observations: The first one concerned the relapsed child, who ceased wetting on the first night he used the alarm even though the alarm never sounded. Since the condition of association between onset of bedwetting and alarm signal required for classical conditioning was not present in this case, the investigator attributed alarm effectiveness to the child's concern over the aversive consequences of the alarm signal which could only be avoided by holding urine back. These consequences would probably involve awakening everyone in the house, interrupting the child's sleep, going to the bathroom, cleaning up the bed, and conducting the 20 trips to the bathroom. The second observation concerned the child who dropped out during the second phase of treatment after unsuccessful use of the alarm for 6 weeks in spite of the continuing presence of association between the unconditioned stimulus (alarm signal) and the conditioned stimulus (bladder distention). The parents of the child complained that he was not making any effort to
wake up to the alarm signal. Discouraged by this indifferent attitude toward the alarm, the parents discontinued the program. It seems that this child, whose bedroom was on a different floor, had learned to avoid the aversive stimulus of the alarm by ignoring the buzzer signal and not by waking up or holding urine back. It is apparent that the appropriate contingency was not present in this case since the parents, whose bedroom was downstairs, had no way to hear the alarm in the upper floor except to place the alarm device in their bedroom which they refused to do.

The present program appeared to be particularly successful with those children who pursued the program to the end; all those children had ceased bedwetting and maintained dryness over an average of 3-months follow-up. In fact, one mother, inspired by her son's success, started successfully training her younger daughter by following the same training procedure. Considering the two cases of dropouts as failure, the program was 75% successful.

It is interesting that while none of the families who attended the orientation session had later withdrawn, two of the three who did not attend the session did drop out. In the orientation session the investigator had emphasized the idea that factors such as: parents' cooperation, consistency in following instructions, persistence in carrying out the procedure, and patience with the child's progress were prerequisite conditions for a successful training experience. It is therefore the investigator's belief that the orientation session had influenced the dropout rate which could otherwise be higher. Further investigation for a possible role of
such prior awareness and education in reducing premature drop out is justifiable.

Another area of future research is the number of trials in the positive practice component which currently requires $\frac{1}{2}$ hour to be carried out. Azrin's suggestion of 20 trials appears to be arbitrary and has neither theoretical rationale nor empirical support. Therefore, there is a need for empirical examination of the possibility of decreasing the number of trials thereby reducing some of the training demands while preserving the contribution of the positive practice.

Finally, the intensive training day is another area of promising research. Azrin has rationalized that the intensive training day provides a strong start, thereby increasing the child's chance for a successful beginning which subsequently leads to further success. Even though such an assertion appears theoretically reasonable, it yet has no empirical foundation. One might argue that such tremendous effort on the part of the child and parents during the very early beginning could lead to unrealistically high expectations which subsequently might result in high frustrations provided that the child fails to secure adequate success during the initial days of treatment.

While conducting this study, the investigator had encountered the problem of parental inability to have in their possession the urine-alarm device when the child was to move to the second phase of treatment. The cost of the alarm unit (approximately $40.00) was beyond the financial ability of some of the parents. This factor
influenced the study methodology in two ways: First, one child prematurely dropped out because his family was unable to provide the alarm. Second, the duration of treatment during the first phase was not equal for all subjects; while some of the subjects were able to immediately purchase the alarm and start using it, others had to wait for a relatively longer time before they were able to do the same. It is, therefore, the investigator's advice for those researchers who would use the urine alarm to make certain that the device would be available on hand whenever needed.
Appendix A

Screening Sheet

Child's Name ______________________________ Age ______ Sex ______
Address ____________________________________ D.O.B. _____________
Home Phone _______________________________ Phone ____________________
Family Physician (Name) ______________________ Phone _________________

Child's Medical Condition: Circle the ones that apply to the child.

- bladder infection
- pain in urination
- insufficient sphincter control
- kidney disease
- epilepsy
- diabetes
- asthma
- high blood pressure
- heart disease
- sickle-cell anemia

Child's Emotional Condition: Circle the ones that apply to the child.

- nightmares
- thumbsucking
- sleepwalking
- nailbiting
- excessive tantrums
- fears or anxiety
- noncompliance (stubborn)
- stuttering

With whom is the child living?
both parents ______ mother ______ father ______ other ______

With whom does the child sleep?
w/parents ______ w/siblings ______ alone ______

Is the child dry during daytime? Yes ______ No ______
If yes, for how many years? ________________________

What kind of training methods or drugs have you ever tried with the child? (Please give brief description)
________________________________________________________________________________________
________________________________________________________________________________________

How did the child respond to the previous treatment?
________________________________________________________________________________________
________________________________________________________________________________________

Why did you discontinue the previous treatment?
________________________________________________________________________________________
________________________________________________________________________________________

Final Notes:
"Please indicate any special notes about the child, e.g., heavy sleeper, etc., or any other remarks you would like us to know."
________________________________________________________________________________________
Appendix B

General Instructions for Proper Use
of the Urine Alarm

This alarm is designed to help your child acquire the necessary
skills of getting up during the night and going to the bathroom once
he/she feels the urge to urinate. It is just like a teacher; and as
a teacher, it cannot work well unless the child listens to it care­
fully and responds to it immediately and quickly. Because of differ­
ent models available in the market, please carefully read and follow
the manufacturer’s instructions. In addition, the following direc­
tions will help you to obtain better results from using the alarm:

1. Before using the alarm, demonstrate to the child how it
works by pouring some water on the pad and turning the switch on.

2. Right before going to bed each night, the child should
drink some fluids which should be gradually increased for each
night.

3. Let the child demonstrate to you before retiring to sleep
every night what he/she would do when he/she hears the alarm sound
(e.g., he/she should hold in and quickly jump to go to the bathroom).

4. It is advisable that the child sleep without heavy night­
clothes below the waist, so that the urine will not be absorbed by
the clothes.

5. Be sure before going to bed that the alarm is properly con­
nected and the switch is far enough from the bed so that the child
will not be able to turn off the buzzer while still half asleep.
6. Be ready to wake up as soon as you hear the buzzer to supervise the child while doing what he/she is supposed to do after each accident.

7. If the child does not wake up immediately, help him/her to wake up to turn off the buzzer; do not do the job for him/her.

8. After the child wakes up, he/she should rush to the bathroom to finish urination and then wash his/her face to assure full awakening.

9. The alarm should be used continuously until the child has achieved 14 consecutive dry nights.

10. Besides using the alarm the child should continue doing the activities outlined in the paper given to you.

11. Remember that the machine is so sensitive that it can give false alarm because of the child sweating. So, watch for heater and heavy blankets.
Appendix C

Informed Consent

We, ___________________________________, parents of __________ agree to participate and give permission for our son/daughter to participate in the clinical research project for controlling bedwetting, conducted by Mr. Abdurrazek at the Institute for Human Services. We understand that this project is a thesis requirement for Mr. Abdurrazek's Master's degree from WMU Department of Psychology and may take from 1 to 3 months to be completed.

We are aware that the proposed training procedure requires encouraging the child to drink liquids during the day and to gradually practice holding in urine. It also requires awakening the child during the night, training the child to take responsibility of his/her bedwetting behavior, and providing rewards for dry nights. We understand that our child may be required at night to conduct 20 trials between the toilet and the bed every time the bed is wet. We are also aware that the training procedure may include the urine alarm in the final stage of treatment.

By signing this consent, we give permission to Mr. Abdurrazek to utilize the obtained information in his thesis project; however, he assumes responsibility to protect the confidentiality of the collected data and, when publishing the data, to adequately disguise our name and the name of our child.

It is further understood that we may withdraw our consent and participation at anytime from this study. We certify that our questions regarding the treatment procedure have sufficiently been answered, and we are satisfied with the information given to us.

Father

Mother

Witness ________________________  Abubaker M. Abdurrazek
Appendix D

Outline of the Topics Discussed in the Orientation Session

I. Incidence of bedwetting
   A. Incidence among male and female
   B. Incidence at each age group

II. Treatment alternatives
   A. Ignoring the problem and hope for spontaneous recovery
      1. The trouble with this approach is that there is no way to know for sure which child will outgrow it and when
      2. Recent data indicate that the earlier the child starts training, the faster he/she will achieve dryness
   B. Common sense intervention
      1. Awakening the child during the night
      2. Limiting fluid intake
      3. Giving salt tablets
      4. Raising the foot or the head of the bed
   C. Medical approach
      1. Only a small percentage of enuretic children has pathological dysfunction
      2. Medical treatment is appropriate when organic causes are clearly identified
      3. Medical interventions include surgery and drugs
         a. Problems associated with drugs:
            i. Low cure rate
            ii. High relapse rate
            iii. Negative side effects such as dizziness, constipation, etc.
   D. Psychoanalytic approach
      1. Perceives enuresis as a symptom of underlying emotional disturbance
      2. Treatment includes hypnosis, dream analysis, etc.
      3. Psychoanalytic treatment is ineffective
   E. Behavioral approach
      1. Perceives enuresis as a result of inappropriate training for bladder control
      2. Treatment is based on learning principles
      3. This approach is the most effective
         a. Problems with this approach
            i. Highly demanding on both parents and child which usually results in a premature dropout
            ii. Requires parents' cooperation, consistency, persistence in following instructions, and patience with the child's progress


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